

Lake Ontario Fish Communities and Fisheries:

2024 Annual Report of the Lake Ontario Management Unit









Ontario

Cover Photos:

(Top Left) Brown Bullhead captured during the St. Lawrence River Fish Community Index Netting – Thousand Islands. For more information, see Section 1.9

(Top Right) LOMU field crew surgically implanting an acoustic telemetry tag in a fish.

(Bottom Left) LOMU and ARMS staff photo on board the research vessel Jack Christie at the Glenora Fisheries Station.

(Bottom Right) Spring yearling Lake Trout, raised by MNR's Fish Culture Section, being released into Lake Ontario. For more information , see Section 5.1.

LAKE ONTARIO FISH COMMUNITIES AND FISHERIES:

2024 ANNUAL REPORT OF THE LAKE ONTARIO MANAGEMENT UNIT

Prepared for the

Great Lakes Fishery Commission

Lake Committees Meetings

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Lake Ontario Fish Communities and Fisheries

2024 Annual Report of the Lake Ontario Management Unit

Foreword

The Lake Ontario Management Unit (LOMU) and the Lake Ontario research staff from the Aquatic Research and Monitoring Section (ARMS) operating at the Glenora Fisheries Station, are pleased to provide the 2024 Annual Report of monitoring, assessment, research and management activities.

Lake Ontario fisheries are managed by the Lake Ontario Committee, consisting of the Ontario Ministry of Natural Resources (MNR) in partnership with New York State, under the auspices of the Great Lakes Fishery Commission. The Lake Ontario Fish Community Objectives (2013) provide bi-national fisheries management direction to protect and restore native species and to maintain sustainable fisheries. Our partners include: New York State Department of Environmental Conservation (NYSDEC), Fisheries and Oceans Canada (DFO), the U.S. Fish and Wildlife Service (USFWS), U.S. Geological Survey (USGS) and many other Ontario provincial ministries and conservation authorities and U.S. state and federal agencies, universities and non-government partners.

Glenora Fisheries Station staff delivered over forty field and laboratory projects in 2024 including the comprehensive long-term base monitoring program that spans over five decades. In 2024, assessment of the Canadian waters from the Niagara River to Lake Saint Francis included 99 trap and hoop net sets, 190 gill net sets and 174 trawls. Across all programs, 307,064 fish were captured (comprising more than 50 species) and 3,992 calcified structures were processed for age and growth assessment. Over 42,951 salmon and trout were observed migrating upstream using the Ganaraska River and Credit River video fish counter systems. MNR Fish Culture Section and partners stocked 1.78 million fish (approx. 51,000 kg).

We would like to express our sincere appreciation to the many partners and volunteers who contributed to the successful delivery of LOMU initiatives. Special thanks to the Ontario Federation of Anglers and Hunters and the many other partners committed to the Lake Ontario Atlantic Salmon restoration program. LOMU gratefully acknowledges the important contribution of the Lake Ontario Commercial Fishery Liaison Committee, the Fisheries Management Zone 20 Council (FMZ20) members, the Ringwood hatchery partnership with the Metro East Anglers, Chinook Net Pen

Committee, Muskies Canada, the Ganaraska River Fishway Volunteers, Napanee and District Rod & Gun Club, Queen's University and the University of Windsor and the participants in the angler diary and assessment programs.

The LOMU team would also like to express our appreciation and gratitude to the recently-retired Lake Ontario Manager Andy Todd for his leadership and dedication to the management of Lake Ontario's world class fisheries over the past 15 years. This will be the final annual report under Andy's leadership, after an exceptional 34-year career with the Ministry of Natural Resources. On behalf of the people of Ontario, we would like to thank Andy for his leadership and dedication towards collaborative Great Lakes Fisheries Management for the benefit of Ontarians.

Our team of skilled and committed staff and partners delivered an exemplary program that provides long-term benefits to the citizens of Ontario. We are pleased to share the important information about these activities and findings of the Lake Ontario Management Unit from 2024.



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1 Index Fishing Projects

1.1 Lake Ontario and Bay of Quinte Fish Community Index Gill Netting

S. Beech, Lake Ontario Management Unit

The Lake Ontario and Bay of Quinte annual fish community index gill netting program is used to monitor the abundance and biological characteristics of a diversity of warm, cool and cold-water fish species. Data from the program are used to help manage local commercial and recreational fisheries as well as for tracking long-term changes in the aquatic ecosystem.

Gill net sampling areas are shown in Figure 1.1.1 and the basic sampling design is summarized in Table 1.1.1. Included in the design are fixed single-depth sites, depth-stratified sampling areas, and depth stratified random sites. In 2024, each site or area was visited once with one to three gill net gangs set during each visit.

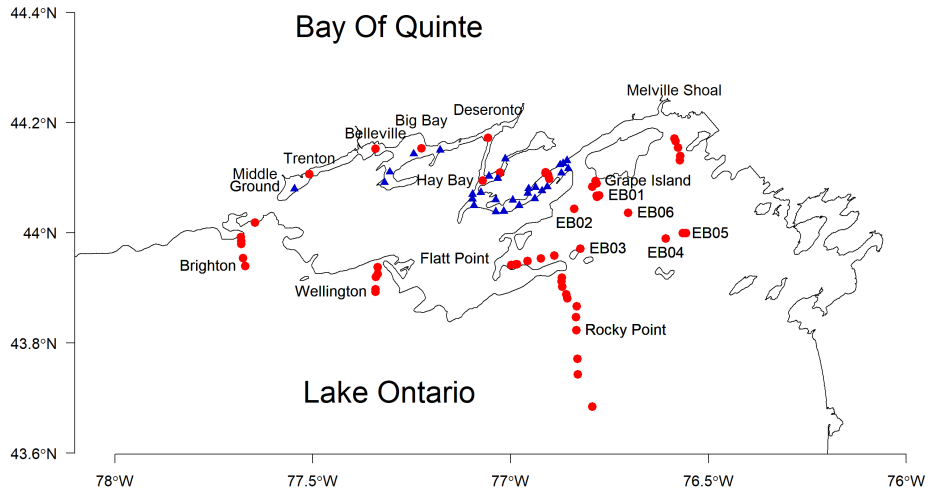


Figure 1.1.1: Map of Lake Ontario showing fish community index gill netting fixed (red) and random (blue) sites in 2024. Fixed sites are labelled.

Table 1.1.1: Sampling design of the Lake Ontario fish community index gill netting program (Lake Ontario) including geographic and depth stratification, number of visits, number of replicate gill net gangs set during each visit (by gill net length), and the time-frame for completion of visits. Also shown is the year in which gill netting at a particular area/site was initiated and the number of prior years that netting has occurred.

						Replicates by net size		Site location					
Region name	Area Name (Area code)	Design	Site name	Depth (m)	Visits	465 feet	500 feet	LAT (dec min)	LON (dec min)	Samples	Time-frame	Start	Years
Northeastern Lake Ontario	Brighton (BR)	Depth stratified area	BR08	7.5	1	2		435955	774058	2	mid July-Aug	1988	37
Northeastern Lake Ontario	Brighton	Depth stratified area	BR13	12.5	1	2		435911	774071	2	mid July-Aug	1988	37
Northeastern Lake Ontario	Brighton	Depth stratified area	BR18	17.5	1	2		435878	774053	2	mid July-Aug	1988	37
Northeastern Lake Ontario	Brighton	Depth stratified area	BR23	22.5	1	2		435777	774034	2	mid July-Aug	1988	37
Northeastern Lake Ontario	Brighton	Depth stratified area	BR28	27.5	1	2		435624	774004	2	mid July-Aug	1988	37
Northeastern Lake Ontario	Middle Ground (MG)	Fixed site	MG05	5	1	2		440054	773906	2	mid July-Aug	1979	46
Northeastern Lake Ontario	Wellington (WE)	Depth stratified area	WE08	7.5	1	2		435622	772011	2	mid July-Aug	1988	37
Northeastern Lake Ontario	Wellington	Depth stratified area	WE13	12.5	1	2		435544	772027	2	mid July-Aug	1988	37
Northeastern Lake Ontario	Wellington	Depth stratified area	WE18	17.5	1	2		435515	772025	2	mid July-Aug	1988	37
Northeastern Lake Ontario	Wellington	Depth stratified area	WE23	22.5	1	2		435378	772050	2	mid July-Aug	1988	37
Northeastern Lake Ontario	Wellington	Depth stratified area	WE28	27.5	1	2		435348	772066	2	mid July-Aug	1988	37
Northeastern Lake Ontario	Rocky Point (RP)	Depth stratified area	RP08	7.5	1	2		435510	765220	2	mid July-Aug	1988	37
Northeastern Lake Ontario	Rocky Point	Depth stratified area	RP13	12.5	1	2		435460	765230	2	mid July-Aug	1988	37
Northeastern Lake Ontario	Rocky Point	Depth stratified area	RP18	17.5	1	2		435415	765222	2	mid July-Aug	1988	37
Northeastern Lake Ontario	Rocky Point	Depth stratified area	RP23	22.5	1	2		435328	765150	2	mid July-Aug	1988	37
Northeastern Lake Ontario	Rocky Point	Depth stratified area	RP28	27.5	1	2		435285	765135	2	mid July-Aug	1988	37
Northeastern Lake Ontario	Rocky Point	Depth stratified area	RP40	40	1		3	435190	765040	3	mid July-Aug	2016	9
Northeastern Lake Ontario	Rocky Point	Depth stratified area	RP50	50	1		3	435090	765030	3	mid July-Aug	2016	9
Northeastern Lake Ontario	Rocky Point	Depth stratified area	RP60	60	1		3	434950	765029	3	mid July-Aug	1997	28
Northeastern Lake Ontario	Rocky Point	Depth stratified area	RP80	80	1		3	434633	765006	3	mid July-Aug	1997	28
Northeastern Lake Ontario	Rocky Point	Depth stratified area	RP100	100	1		3	434477	764998	3	mid July-Aug	1997	28
Northeastern Lake Ontario	Rocky Point	Depth stratified area	RP140	140	1		3	434122	764808	3	mid July-Aug	1997	28
Kingston Basin (nearshore)	Flatt Point (FP)	Depth stratified area	FP08	7.5	1	2		435665	765993	2	Jun 27-Jul 29	1986	39
Kingston Basin (nearshore)	Flatt Point	Depth stratified area	FP13	12.5	1	2		435659	765927	2	Jun 27-Jul 29	1986	39
Kingston Basin (nearshore)	Flatt Point	Depth stratified area	FP18	17.5	1	2		435688	765751	2	Jun 27-Jul 29	1986	39
Kingston Basin (nearshore)	Flatt Point	Depth stratified area	FP23	22.5	1	2		435726	765541	2	Jun 27-Jul 29	1986	39
Kingston Basin (nearshore)	Flatt Point	Depth stratified area	FP28	27.5	1	2		435754	765314	2	Jun 27-Jul 29	1986	39
Kingston Basin (nearshore)	Grape Island (GI)	Depth stratified area	GI08	7.5	1	2		440537	764712	2	Jun 27-Jul 29	1986	39
Kingston Basin (nearshore)	Grape Island	Depth stratified area	GI13	12.5	1	2		440523	764747	2	Jun 27-Jul 29	1986	39
Kingston Basin (nearshore)	Grape Island	Depth stratified area	GI18	17.5	1	2		440476	764710	2	Jun 27-Jul 29	1986	39
Kingston Basin (nearshore)	Grape Island	Depth stratified area	GI23	22.5	1	2		440405	764718	2	Jun 27-Jul 29	1986	39
Kingston Basin (nearshore)	Grape Island	Depth stratified area	GI28	27.5	1	2		440470	764796	2	Jun 27-Jul 29	1986	39
Kingston Basin (nearshore)	Melville Shoal (MS)	Depth stratified area	MS08	7.5	1	1		441030	763500	1	Jun 27-Jul 29	1986	39
Kingston Basin (nearshore)	Melville Shoal	Depth stratified area	MS13	12.5	1	1		441004	763470	1	Jun 27-Jul 29	1986	39
Kingston Basin (nearshore)	Melville Shoal	Depth stratified area	MS18	17.5	1	2		440940	763460	2	Jun 27-Jul 29	1986	39
Kingston Basin (nearshore)	Melville Shoal	Depth stratified area	MS23	22.5	1	2		440835	763424	2	Jun 27-Jul 29	1986	39
Kingston Basin (nearshore)	Melville Shoal	Depth stratified area	MS28	27.5	1	2		440792	763424	2	Jun 27-Jul 29	1986	39
Kinston Basin (offshore)	Eastern Basin (EB)	Fixed site	EB01	31	1	3		440400	764650	3	Jul-Aug	2016	8
Kinston Basin (offshore)	Eastern Basin (EB)	Fixed site	EB02	30	1	3		440330	765050	3	Jul-Aug	1968	56
Kinston Basin (offshore)	Eastern Basin (EB)	Fixed site	EB03	25	1	3		435820	764950	3	Jul-Aug	2016	8
Kinston Basin (offshore)	Eastern Basin (EB)	Fixed site	EB04	27	1	3		435940	763610	3	Jul-Aug	2016	8
Kinston Basin (offshore)	Eastern Basin (EB)	Fixed site	EB05	29	1	3		440000	763400	3	Jul-Aug	2016	8
Kinston Basin (offshore)	Eastern Basin (EB)	Fixed site	EB06	30	1	3		440220	764210	3	Jul-Aug	1968	56
Bay of Quinte	Conway	Depth stratified area	CO08	7.5	1	1		440664	765463	1	Jul-Aug	1972	52
Bay of Quinte	Conway	Depth stratified area	CO13	12.5	1	1		440649	765452	1	Jul-Aug	1972	52
Bay of Quinte	Conway	Depth stratified area	CO20	20	1	1		440643	765453	1	Jul-Aug	1972	52
Bay of Quinte	Conway	Depth stratified area	CO30	30	1	1		440620	765440	1	Jul-Aug	1972	52
Bay of Quinte	Conway	Depth stratified area	CO45	45	1	1		440601	765402	1	Jul-Aug	1972	52
Bay of Quinte	Hay Bay (HB)2	Depth stratified area	HB08	7.5	1	1		440656	770156	1	Jul-Aug	1959	65
Bay of Quinte	Hay Bay	Depth stratified area	HB13	12.5	1	1		440575	770400	1	Jul-Aug	1959	65
Bay of Quinte	Deseronto (DE)	Fixed site	DE05	5	1	1		441035	770339	1	Jul-Aug	2016	8
Bay of Quinte	Big Bay (BB)	Fixed site	BB05	5	1	1		440920	771360	1	Jul-Aug	1972	52
Bay of Quinte	Belleville (BE)	Fixed site	BE05	5	1	1		440914	772048	1	Jul-Aug	2016	8
Bay of Quinte	Trenton (TR)	Fixed site	TR05	5	1	1		440636	773063	1	Jul-Aug	2016	8
Bay of Quinte	Upper Bay of Quinte (UB)	Random site		1-3	2	1		NA	NA	2	Jul-Aug	2019	5
Bay of Quinte	Upper Bay of Quinte (UB)	Random site		3-6	1	1		NA	NA	1	Jul-Aug	2019	5
Bay of Quinte	Upper Bay of Quinte (UB)	Random site		6-12	2	1		NA	NA	2	Jul-Aug	2019	5
Bay of Quinte	Middle Bay of Quinte (MB)	Random site		1-3	2	1		NA	NA	2	Jul-Aug	2019	5
Bay of Quinte	Middle Bay of Quinte (MB)	Random site		3-6	2	1		NA	NA	2	Jul-Aug	2019	5
Bay of Quinte	Middle Bay of Quinte (MB)	Random site		6-12	2	1		NA	NA	2	Jul-Aug	2019	5
Bay of Quinte	Middle Bay of Quinte (MB)	Random site		12-20	2	1		NA	NA	2	Jul-Aug	2019	5
Bay of Quinte	Lower Bay of Quinte (LB)	Random site		1-3	1	1		NA	NA	1	Jul-Aug	2019	5
Bay of Quinte	Lower Bay of Quinte (LB)	Random site		3-6	2	1		NA	NA	2	Jul-Aug	2019	5
Bay of Quinte	Lower Bay of Quinte (LB)	Random site		6-12	2	1		NA	NA	2	Jul-Aug	2019	5
Bay of Quinte	Lower Bay of Quinte (LB)	Random site		12-20	2	1		NA	NA	2	Jul-Aug	2019	5
Bay of Quinte	Lower Bay of Quinte (LB)	Random site		20-35	4	1		NA	NA	4	Jul-Aug	2019	5
Bay of Quinte	Lower Bay of Quinte (LB)	Random site		35+	4	1		NA	NA	4	Jul-Aug	2019	5

The annual index gill netting field work occurs during the summer months based on an understanding of water temperature stability, fish movement/migration patterns, fish growth patterns, and logistical considerations. The time frames for completion of field work varies among sampling sites/areas (Table 1.1.1). This increases the probability of encountering a wide-range of water temperatures across the depth ranges sampled and in various geographic areas.

Monofilament gill nets with standardized specifications are used (monofilament mesh replaced multifilament in 1992; only catches from 1992-present are tabulated here). Each gill net gang consists of a graded-series of ten monofilament gill net panels of mesh sizes from 38 mm (1½ in) to 152 mm (6 in) stretched mesh at 13 mm (½ in) intervals, arranged in sequence. However, a standard gill net gang may consist of one of two possible configurations. Either, all ten mesh sizes (panels) are 15.2 m (50 ft) in length (total gang length is 152.4 m (500 ft)), or, the 38 mm (1½ in) mesh size (panel) is 4.6 m (15 ft) in length and the remaining mesh sizes are 15.2 m (50 ft) each in length (total gang length is 141.7 m (465 ft) (see Table 1.1.1). Note that use of the shorter 38 mm gill net panel is related to the processing time required to deal with large numbers of small fish (e.g., Alewife and Yellow Perch) caught in this small mesh size. Gill net gangs are connected in series (i.e., cork lines and lead lines attached), but are separated by a 15.2 m (50 ft) spacer to minimize "leading" of fish. The 152 mm (6 in) end of one gang is connected to the 38 mm (1 ½ in) gang of the adjoining gang. The entire gill net strap (all joined gangs) is set within 2.5 m of the site depth listed in Table 1.1.1. Starting in 2019, only one gang was used at each site in the Bay of Quinte. The reduction of fixed sites from one to two gangs allowed for the reallocation of effort to depth stratified random sites.

The gill net set duration target ranges from 18-24 hours. Gill net catches were summed across the ten mesh sizes from 1½-6 inch. In the case where the 38 mm mesh size used was 4.6 m in length, the catch in this mesh was adjusted (i.e., multiplied by 15.2/4.6) prior to summing the ten mesh sizes. Therefore, all reported catches represent the total catch in a 152.4 m (500 ft) gang of gill net.

In 2024, 140 gill net samples were conducted from June 17 to August 27. A total of 31 different species and 9788 individual fish were caught. Lake Trout made up 32 percent of the standardized catch (by weight), followed by Walleye (27%), and Alewife (11%) (Table 1.1.2). Species-specific catches across depth ranges are shown for Lake Ontario in Table 1.1.3 and for the Bay of Quinte in Table 1.1.4. Species-specific gill net catches by geographic area are shown in Figure 1.1.2. Abundance trends for the selected species caught in Lake Ontario and the Bay of Quinte are shown in Tables 1.1.5 and 1.1.7, and Figures 1.1.3 and 1.1.5. Length distributions are shown for selected species in Figure 1.1.6. Other biological information is presented below for Lake Whitefish, Cisco, Lake Trout, Yellow Perch, and Walleye (Figure 1.1.7 and Figure 1.1.8) and described for Northern Pike, Largemouth Bass, and Smallmouth Bass.

Northeast and Kingston Basin, Lake Ontario

Northeast (Brighton, Wellington, Middle Ground and Rocky Point) and Kingston Basin (Melville Shoal, Grape Island and Flatt Point) Nearshore Areas (Table 1.1.5, Figure 1.1.3)

Six depth-stratified sampling areas (Melville Shoal, Grape Island, Flat Point, Rocky Point, Wellington and Brighton) that employ a common and balanced sampling design were used here to provide a broad picture of the warm, cool and cold-water fish community inhabiting the open-coastal waters

out to about 30 m water depth in the eastern half of Lake Ontario. Results were summarized and presented graphically (Table 1.1.5 and Figure 1.1.3) to illustrate abundance trends of the most abundant fish species. Middle Ground is a fixed site and represents one of our longest running gill netting locations.

Northeast (Rocky Point) and Kingston Basin (EB02-EB06) Offshore Areas (Table 1.1.5 and Table 1.1.6, Figure 1.1.4)

Offshore Rocky Point was initiated in 1997 as part of a lake wide depth stratified effort by sampling area, which spans a wide depth range (7.5-140m). Six single-depth sites (EB01-EB06) are used to monitor long-term trends in the deepwater fish community of the Kingston Basin. Four Kingston Basin deep gill net sampling sites, EB01, EB03, EB04 and EB05, have been netted since 2016. Together, along with EB02 and EB06, this netting provided a more complete description of the Kingston Basin deep-water fish community. Results for these sites were summarized in Table 1.1.5 and Table 1.1.6 and sites EB02 and EB06 are presented graphically (Figure 1.1.4) to illustrate abundance trends of the most abundant species (Alewife, Lake Trout, Lake Whitefish, Yellow Perch, Rainbow Smelt, Cisco, Chinook Salmon and Round Goby).

Bay of Quinte, Lake Ontario

Bay of Quinte, Fixed Sites (Trenton, Belleville, Deseronto, Conway, Hay Bay and Big Bay; Table 1.1.7)

Three sites are used to monitor long-term trends in the Bay of Quinte fish community. Big Bay is a single-depth site; Hay Bay has two depths and Conway five depths. Average summer catches at the three sites are summarized graphically in Figure 1.1.6 to illustrate abundance trends of the most abundant species from 1992 - 2022. Average catch per gillnet is provided for all six sites in the Bay of Quinte for 2024 and for the 2020-2023 period (Table 1.1.7).

Bay of Quinte, Depth Stratified (Upper, Middle and Lower Bay of Quinte; Table 1.1.3)

In 2019, effort was made to expand the depth and area sampled in the upper, middle and lower Bay of Quinte. To accomplish this, the Lake Ontario and Bay of Quinte Fish Community Index Gill Netting program was redesigned to reallocate a portion of Bay of Quinte fixed site sampling effort to randomly select sites within six depth strata based on their proportional representation in Bay of Quinte.

Species specific catch per gill net set by depth strata during the summer months (July/ August) are shown in Table 1.1.3. In 2024, each site in the Bay of Quinte was visited once. Together, along with the six fixed sites, this netting provided a more complete description of the upper, middle, and lower Bay of Quinte fish community.

Table 1.1.2: Species-specific catch in 2024 gill net sets from June 19 to August 27. “Standard catch” and “Standard weight” is the observed catch and weight, respectively, expanded to represent the catch in a 50 ft panel length of 1 1/2 inch mesh size in cases where only 15 ft was used.

Species	Observed Catch	Standard Catch	Standard Weight	Observed Weight
Alewife	7019	16522	228	228
Black crappie	3	3	1	1
Bluegill	29	59	1	1
Bowfin	4	4	10	10
Brown bullhead	19	21	5	5
Brown trout	13	13	28	28
Burbot	4	4	10	10
Chinook salmon	7	9	12	12
Common carp	4	4	24	24
Deepwater sculpin	1	1	<1	<1
Freshwater drum	83	88	93	93
Gizzard shad	6	6	7	7
Golden shiner	1	3	<1	<1
Lake herring	27	27	14	14
Lake sturgeon	2	2	2	2
Lake trout	205	212	687	687
Lake whitefish	25	27	20	20
Largemouth bass	12	12	8	8
Lepomis sp.	1	1	<1	<1
Longnose gar	56	79	113	113
Northern pike	22	24	45	45
Pumpkinseed	42	49	3	3
Rock bass	28	42	3	3
Round goby	55	175	2	2
Silver redhorse	3	3	6	6
Smallmouth bass	22	24	27	27
Walleye	382	398	578	578
White bass	1	1	1	1
White perch	831	1036	89	89
White sucker	64	66	47	47
Yellow perch	817	2165	56	56

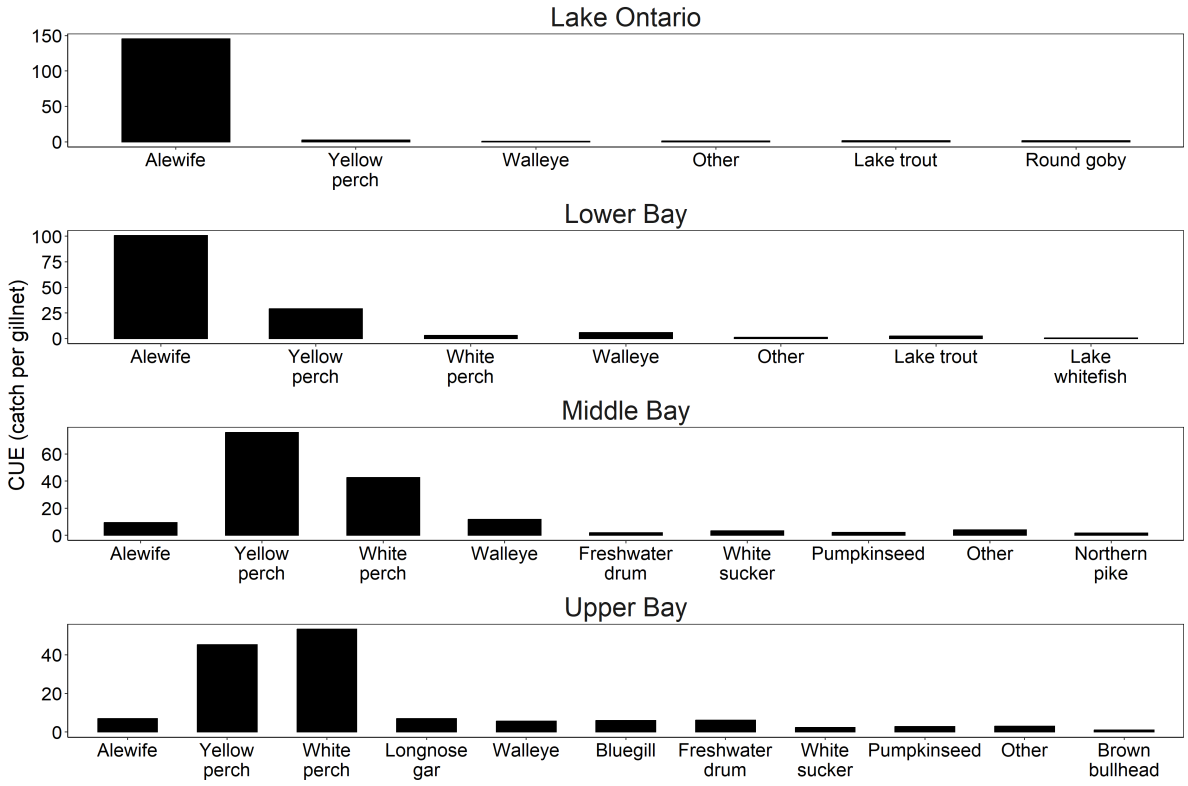


Figure 1.1.2: Species-specific catch per region in Lake Ontario (Eastern Basin) and the Bay of Quinte (upper, middle and lower sections) displaying the most abundant species (less abundant species were grouped into "other").

Table 1.1.3: Species-specific catch per depth strata (in meters) across areas in the Bay of Quinte. All fixed and random sites were included. The total number of fish caught and number of gill nets set are indicated.

Species	1-3	3-6	6-12	12-20	20-35	>35
Alewife	98.1	85	57.6	71.1	15	0.6
Black crappie	0.6	–	–	–	–	–
Bluegill	1.3	4.8	–	–	–	–
Bowfin	0.2	0.2	–	–	–	–
Brown bullhead	2.1	0.9	–	–	–	–
Freshwater drum	6.1	4.8	0.7	–	–	–
Gizzard shad	1	0.1	–	–	–	–
Golden shiner	0.7	–	–	–	–	–
Lake herring	–	–	0.3	0.5	–	–
Lake sturgeon	–	–	–	0.1	–	–
Lake trout	–	–	–	0.4	5.8	4.5
Lake whitefish	–	–	–	0.1	1.5	0.7
Largemouth bass	2.4	–	–	–	–	–
Lepomis sp.	0.2	–	–	–	–	–
Longnose gar	3.8	5.5	–	–	–	–
Northern pike	2.4	0.2	0.8	0.3	–	–
Pumpkinseed	4.1	1.9	1.3	–	–	–
Rock bass	2.1	0.3	–	–	–	–
Silver redhorse	0.6	–	–	–	–	–
Smallmouth bass	–	0.1	–	–	–	–
Walleye	12.8	13.6	11.7	2.7	0.3	–
White bass	–	0.1	–	–	–	–
White perch	6.4	70.4	33.7	2.4	–	–
White sucker	1	2.5	3.2	1.3	–	–
Yellow perch	32.5	64.9	89.3	46.6	5.7	–
Total Catch	891	2805	1192	1256	170	35
Effort	5	11	6	10	6	6

Table 1.1.4: Species-specific catch per depth strata across areas in Lake Ontario (Middle Ground, Rocky Point, Wellington, Brighton, Flatt Point, Grape Island, Melville Shoal, and Eastern Basin fixed sites), 2024. The total number of fish caught and number of gill nets set are shown.

Species	05	08	13	18	23	28	40	50	60	80	100	140
Alewife	5	215.3	162.9	203	198.9	72.2	346.7	365.7	4.3	27.3	100.7	42.7
Bowfin	–	0.1	–	–	–	–	–	–	–	–	–	–
Brown bullhead	–	0.1	–	–	–	–	–	–	–	–	–	–
Brown trout	–	–	0.5	0.3	0.1	<0.1	0.7	–	–	–	–	–
Burbot	–	–	–	–	0.1	0.1	–	–	–	–	–	–
Chinook salmon	–	–	–	–	0.2	0.2	0.3	–	–	–	–	–
Common carp	1.5	0.1	–	–	–	–	–	–	–	–	–	–
Deepwater sculpin	–	–	–	–	–	–	–	–	–	–	0.3	–
Freshwater drum	–	0.1	–	–	–	–	–	–	–	–	–	–
Lake herring	–	–	–	0.2	–	0.6	–	–	–	–	–	–
Lake sturgeon	–	–	–	0.1	–	–	–	–	–	–	–	–
Lake trout	–	–	–	–	0.1	1.8	1.3	17.7	9.7	1.3	1	–
Lake whitefish	–	–	–	–	0.1	0.4	0.3	–	–	–	–	–
Northern pike	1	–	–	–	–	–	–	–	–	–	–	–
Rock bass	0.5	1.3	0.8	0.4	–	–	–	–	–	–	–	–
Round goby	–	0.6	0.9	1.7	6.4	1.8	1	–	–	–	–	–
Smallmouth bass	–	1.7	0.3	–	0.2	–	–	–	–	–	–	–
Walleye	0.5	4.7	1.7	1	0.2	<0.1	–	–	–	–	–	–
White perch	–	0.3	–	–	–	–	–	–	–	–	–	–
White sucker	–	–	0.1	0.1	–	–	–	–	–	–	–	–
Yellow perch	53.4	1.1	3.4	6	1.8	–	–	–	–	–	–	–
Total Catch	124	2478	1876	2552	2702	2238	1051	1150	42	86	306	128
Effort	2	11	11	12	13	29	3	3	3	3	3	3

Species Highlights

Lake Whitefish

A total of 25 Lake Whitefish were caught and interpreted for age in the 2024 index gill nets (Figure 1.1.8 and Figure 1.1.7). Fish ranged in age from 1-22 years. Thirteen year-classes were represented. Ten (42%) fish were from either the 2019, or 2020 year-classes (ages 4 and 5).

Cisco

A total of 27 Cisco were caught and interpreted for age in 2024 index gill nets (Figure 1.1.8 and Figure 1.1.7). Fish ranged in age from 3- 13 years. Eight year-classes were represented with 27% of fish from the 2020 year class (age 5).

Lake Trout

A total of 205 Lake Trout were caught and interpreted for age (CWT and age structures combined) in the 2024 index gill nets (Figure 1.1.8 and Figure 1.1.7). Fish ranged in age from 1-25 years. Twenty-one year-classes were represented. Ninety-one (45%) of Lake Trout were from either the 2021, 2020, or 2019 year-classes.

Walleye

A total of 382 Walleye were caught and interpreted for age in the 2024 summer index gill nets (Figure 1.1.8 and Figure 1.1.7). Fish ranged from age 1-23 and 48% were age-2 or age-4 (2022 or 2020 year-class). Gonadal somatic index indicated females were mature at age 4 (Figure 1.1.8). At age 5, 92% of fish were mature based on gonad condition.

Yellow Perch

A total of 817 Yellow Perch were caught and 192 were interpreted for age in the 2024 index gill nets (Figure 1.1.8 and Figure 1.1.7). Fish ranged in age from 1-9 years. Of these fish, 83% were female; 86% of males and females were mature by age 5.

Northern Pike

A total of 22 Northern Pike were caught and interpreted for age in the 2024 index gillnets. Fish ranged in age from 1-7 years (mean of 4.5 years). Of these fish, 64% were female and 77% of males and females were mature.

Largemouth Bass

A total of 12 Largemouth Bass were caught and interpreted for age in the 2024 index gillnets. Ages ranged from 2-7 years with a mean of 4.1 years. Of these fish, 42% were mature and 42% were female.

Smallmouth Bass

A total of 22 Smallmouth Bass were caught and interpreted for age in the 2024 index gillnets. Ages ranged from 1-9 years, 73% of fish were mature and 77% were female.

Table 1.1.5: Species-specific catch per gillnet set in Lake Ontario and Eastern Basin nearshore sites. Values include the 2024 catch per gillnet and the 2020- 2024 mean. Annual catches are averages for 1-3 gillnet gangs set at each of five depths (7.5, 12.5, 17.5, 22.5 and 27.5 m) plus additional depths at Rocky Point deep (40, 50, 60, 80, 100, 140) during each of 1-3 visits during summer.

	Melevile Shoal		Flatt Point		Grape Island		Brighton		Middle Ground		Wellington		Rocky Pt		Rocky Pt Deep	
Species	2020 - 23	2024	2020 - 23	2024	2020 - 23	2024	2020 - 23	2024	2020 - 23	2024	2020 - 23	2024	2020 - 23	2024	2020 - 23	2024
Lake sturgeon		0.1	<0.1		<0.1											
Bowfin							<0.1	0.1								
Alewife	290.2	139.4	338	393.7	436.5	192.9	46.3	147.8	46.8	5	100.5	55	3.3	208.8	12.7	147.9
Chinook salmon	<0.1	0.1	<0.1	0.1			0.4				0.1	0.3	0.7		<0.1	0.1
Atlantic salmon			<0.1													
Brown trout	0.1		0.1	0.1	0.1		0.1	0.6				0.2	0.2	0.2		0.1
Lake trout	0.2		0.4	0.3	0.8	0.1	0.5				0.3				5.2	5.2
Lake whitefish	<0.1		0.1	0.1	0.4	0.3									<0.1	0.1
Lake herring	0.3		0.7	0.2	0.6	0.1	0.4	0.1			0.1		0.2	0.2		
Rainbow smelt			0.1				0.1				<0.1		0.1			
Northern pike			0.1		<0.1		0.1		0.2	1	<0.1					
White sucker			0.1		0.1	0.1	0.1		0.3					0.1		
Common carp			<0.1					0.1		1.5						
Brown bullhead								0.1								
Burbot							0.1	0.2			0.1	0.1				
White perch					<0.1	0.3	0.1									
Rock bass	0.7	0.9	0.7	0.8	0.4		0.9	0.5	2.2	0.5		0.5	0.8	0.4		
Smallmouth bass	0.6	0.9	0.1		0.8	1.4	38.7						1.1	0.5		
Yellow perch	4.9	6.7	0.9		1.6	2.7	1.4	0.3	27.6	53.4	4.2	4.5	0.3			
Walleye	11	10.5	0.1		0.9	2	0.2	0.2	1.3	0.5	0.2	0.1	1.4	0.5		
Round goby	0.2	0.3	0.9	1	0.9	0.7	1.4	2.6			1.5	5.3	1.4	7.3		0.2
Freshwater drum						0.1	0.1		0.7		<0.1					
Deepwater sculpin															0.8	0.1

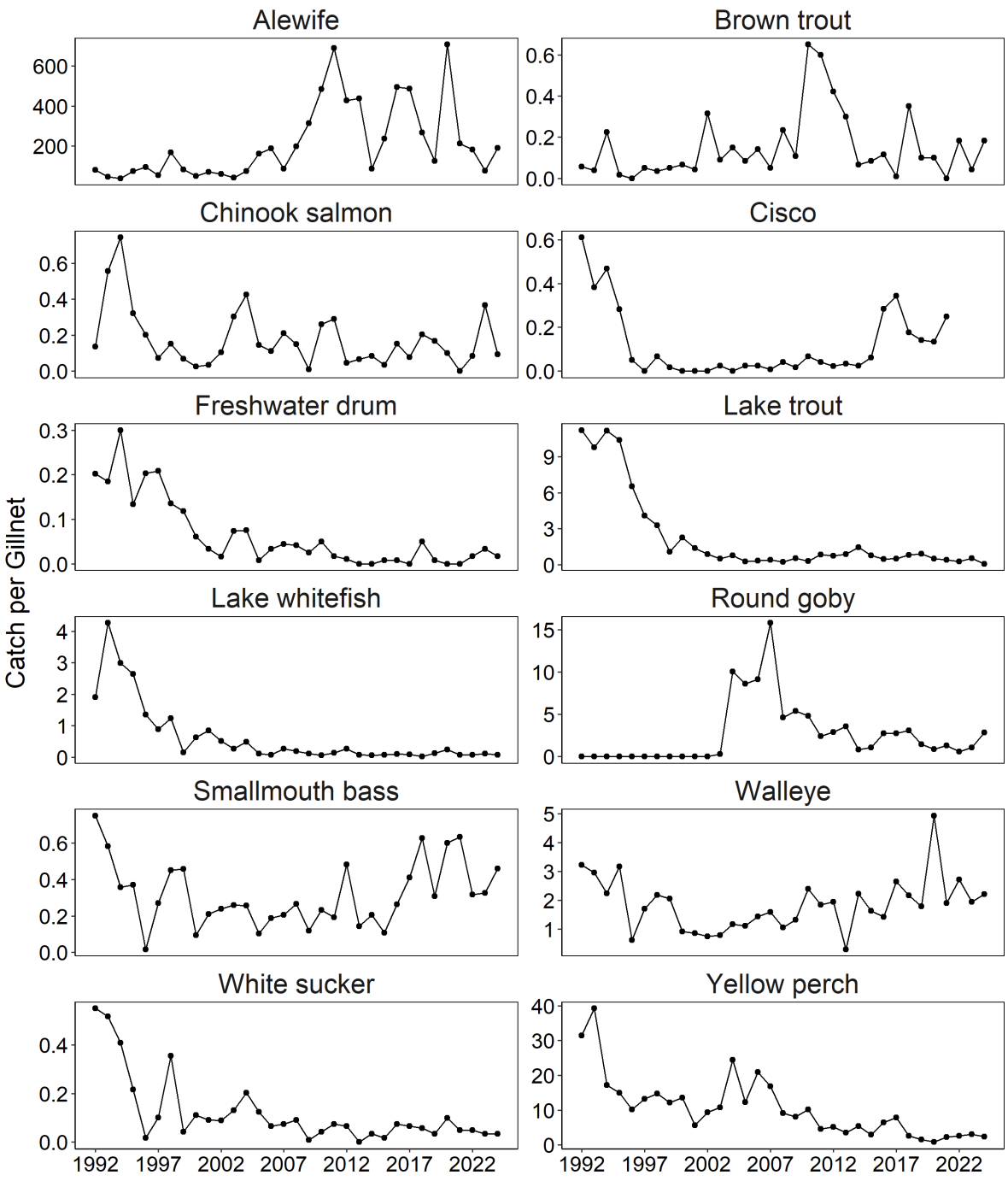


Figure 1.1.3: Abundance trends for the most common species caught in gill nets at six depth-stratified transects (nearshore out to 30 m) in northeastern Lake Ontario (Melville Shoal, Grape Island, Flatt Point, Rocky Point, Wellington and Brighton; see Fig. 1.1.1). Annual catch per gill net values are unweighted means.

Table 1.1.6: Species-specific catch per gillnet set at Eastern Basin sites. Values include the 2024 catch per gillnet and the 2020-2024 mean. Annual catches are averages for 1-3 gillnet gangs set during each of 1-3 visits during summer.

	EB01		EB02		EB03		EB04		EB05		EB06	
Species	2020 - 23	2024	2020 - 23	2024	2020 - 23	2024	2020 - 23	2024	2020 - 23	2024	2020 - 23	2024
Alewife	2	9.1	148.5		3.6	0.3	5.8	1.1	2.8		12.3	
Chinook salmon	0.3	0.7									0.2	
Brown trout					0.3						0.2	
Lake trout	1.2	8	0.7	3.2	0.2	2.3	1.8	2.1		0.3	1.8	0.3
Lake whitefish	1.5	2.3	0.2				1.7		0.2		5.3	0.3
Lake herring		4.7			1.3		1.5				4.7	
Burbot										0.3		
Yellow perch									5			
Walleye					0.2	0.3						
Round goby					0.6							

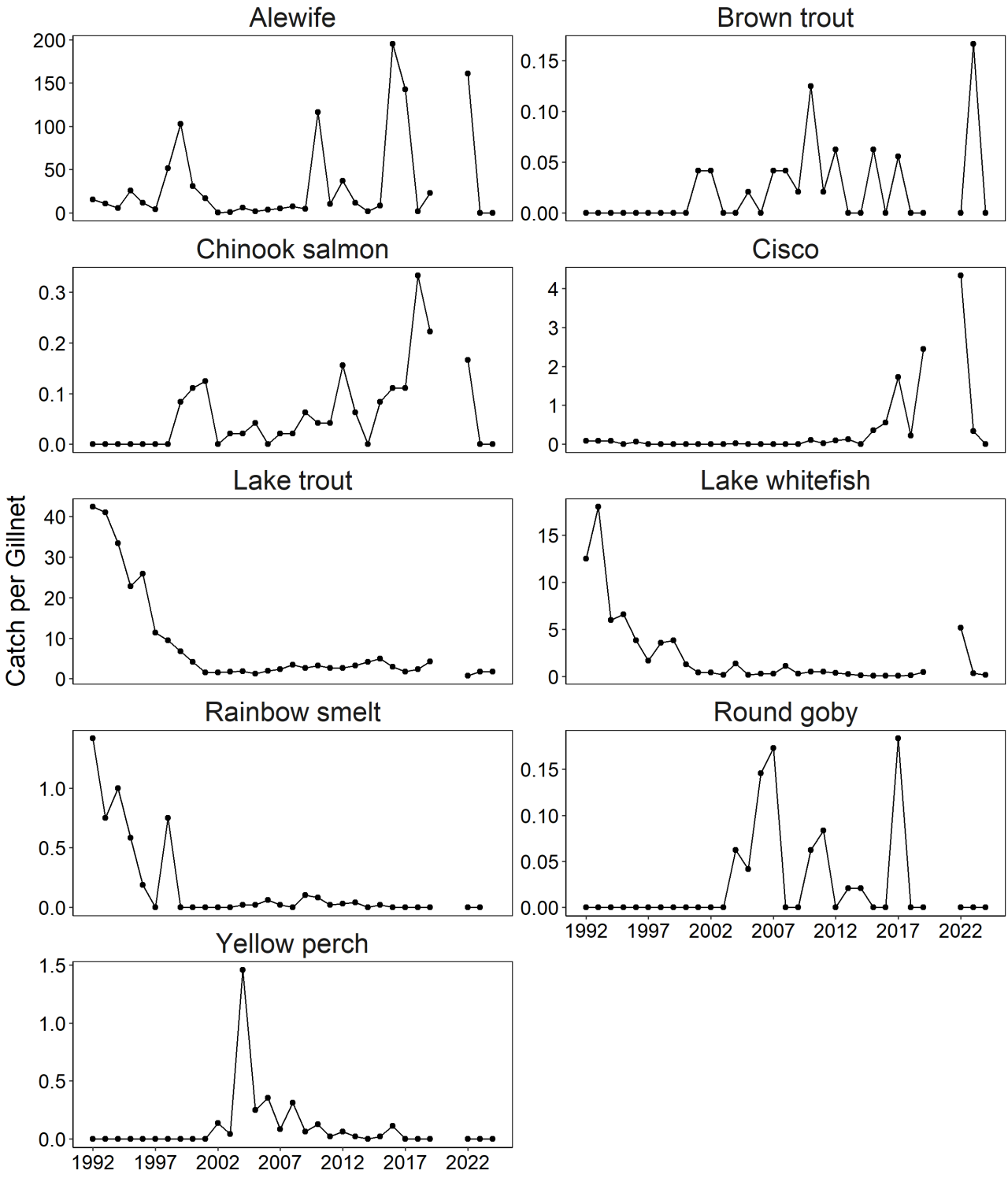


Figure 1.1.4: Abundance trends (annual means) for the most common species caught in gill nets at the Kingston Basin deep sites, in eastern Lake Ontario (EB02 and EB06; see Fig. 1.1.1).

Table 1.1.7: Species-specific catch per gillnet set at fixed sites in the Bay of Quinte. Values include 2024 catch per gillnet and the 2020 - 2024 mean. Annual catches are averages for 1-3 gillnet gangs set during each of 1-3 visits during summer.

	Trenton		Big Bay		Belleville		Deseronto		Hay Bay		Conway	
Species	2020 - 23	2024	2020 - 23	2024	2020 - 23	2024	2020 - 23	2024	2020 - 23	2024	2020 - 23	2024
Lake sturgeon												0.1
Longnose gar	6.9	16.9	8.3	6.3	10.7	10.6	0.2	3.3				
Alewife	1.1	41.7					1.7	3.3	6.8		50.1	95.7
Gizzard shad	29.5		4.9		12.4		8.2		0.6		0.6	
Chinook salmon											0.1	
Rainbow trout											0.1	
Brown trout											<0.1	
Lake trout										1	2.6	2.7
Lake whitefish											0.2	0.4
Lake herring									0.6	1	0.1	
Northern pike							0.8	1	1.1	2.7	<0.1	
White sucker	0.9	3	7.2	6	0.9		1	2	6.4	7.2	0.4	0.1
Common carp					0.1		0.5					
Brown bullhead	0.7	1	0.8		1.8	2	1.5	1				
Channel catfish	0.3											
White perch	77.4	25.3	119.8	152.1	72.5	71.5	139.1	136.1	31.8	63	6.7	4.7
White bass			0.5		0.1		1.2				<0.1	
Rock bass	0.2						0.8				<0.1	
Pumpkinseed	6.5	2	0.8		6.5	3	23.9	6	1.4	4		
Bluegill	4.8	24.1	14.6	8.3	14.4	5	1.8					
Smallmouth bass	1.6	1			0.2							
Largemouth bass	0.2											
Black crappie			0.2									
Lepomis sp.	0.6											
Yellow perch	28	27.4	56	46.3	20.2	3.3	127	134.3	98.9	106	27.4	22
Walleye	5.7	7	4.5	1	5.1	5	12.1	24	2.8	4.5	2.3	4.8
Round goby											0.3	
Freshwater drum	2.6	1	8.5	4	8.5	5	8.8	5	2.5		1.3	0.1

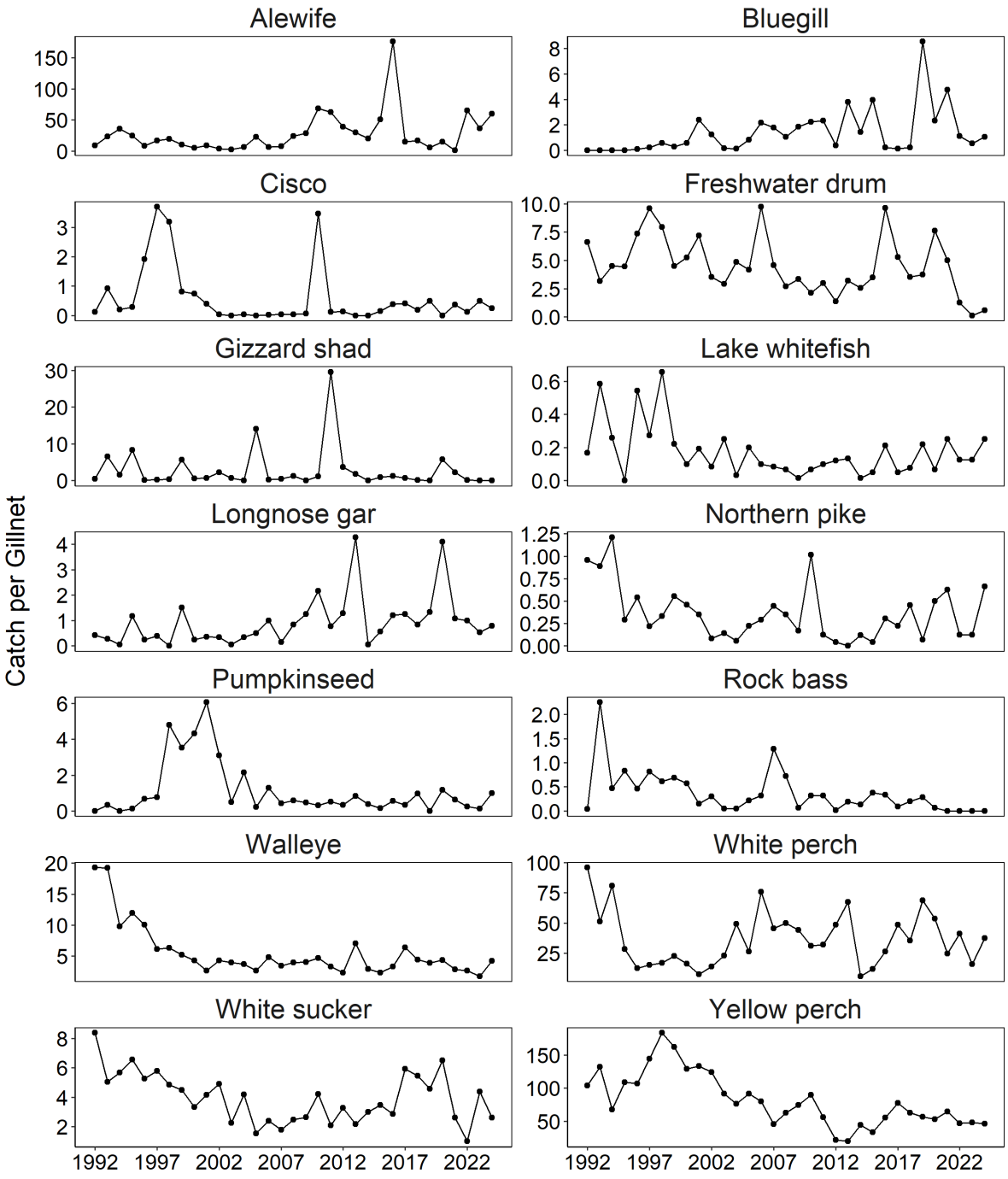


Figure 1.1.5: Abundance trends (annual means) for the most common species caught in gill nets at three areas in the Bay of Quinte (Conway, Hay Bay and Big Bay; see Fig. 1.1.1).

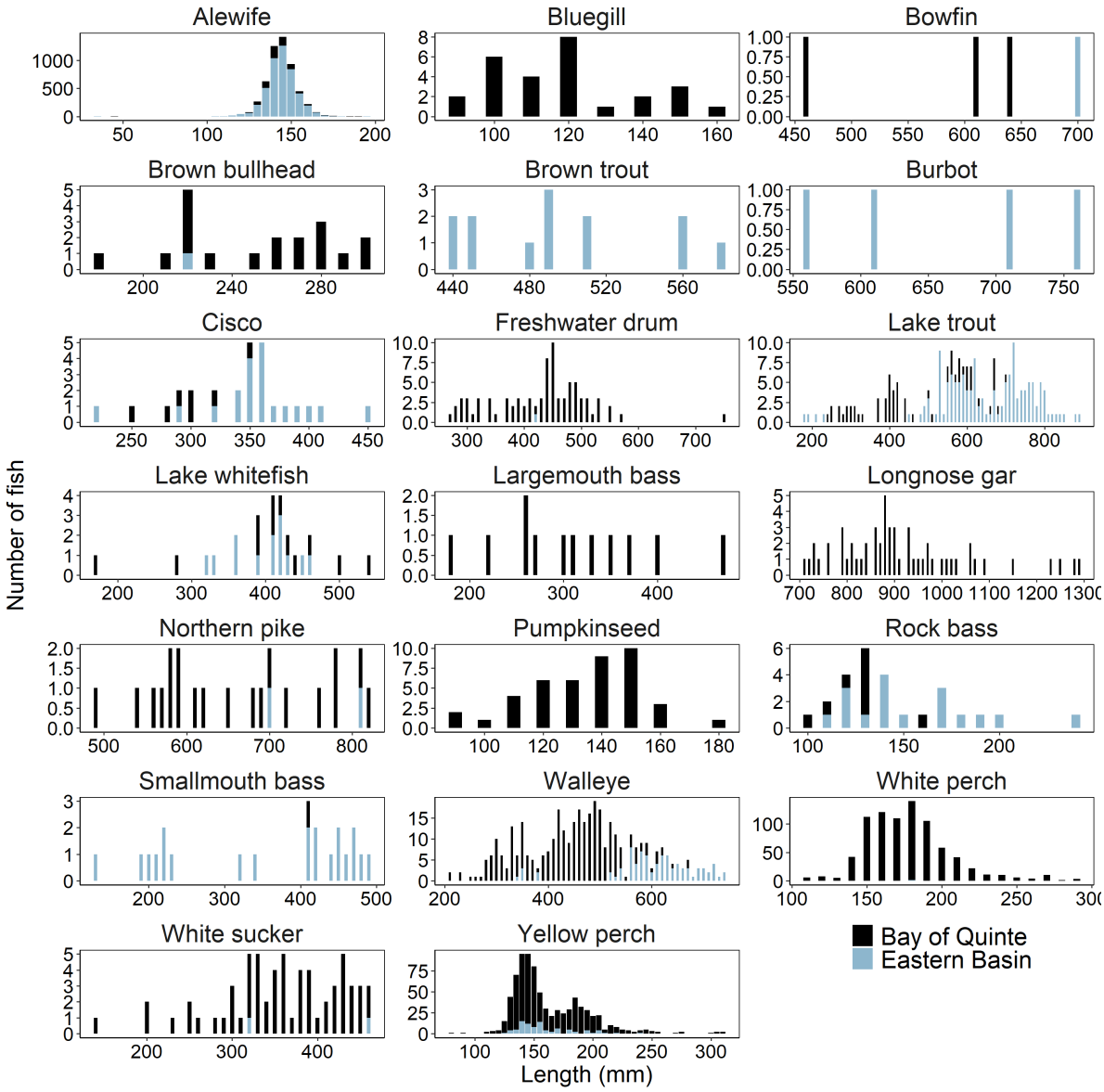


Figure 1.1.6: Length distributions for commonly caught species in the 2024 gillnet sets in the Bay of Quinte (black) and Eastern Basin (blue). Length values are grouped into 10mm bins for all species except Yellow Perch and Alewife that are grouped into 5mm bins.

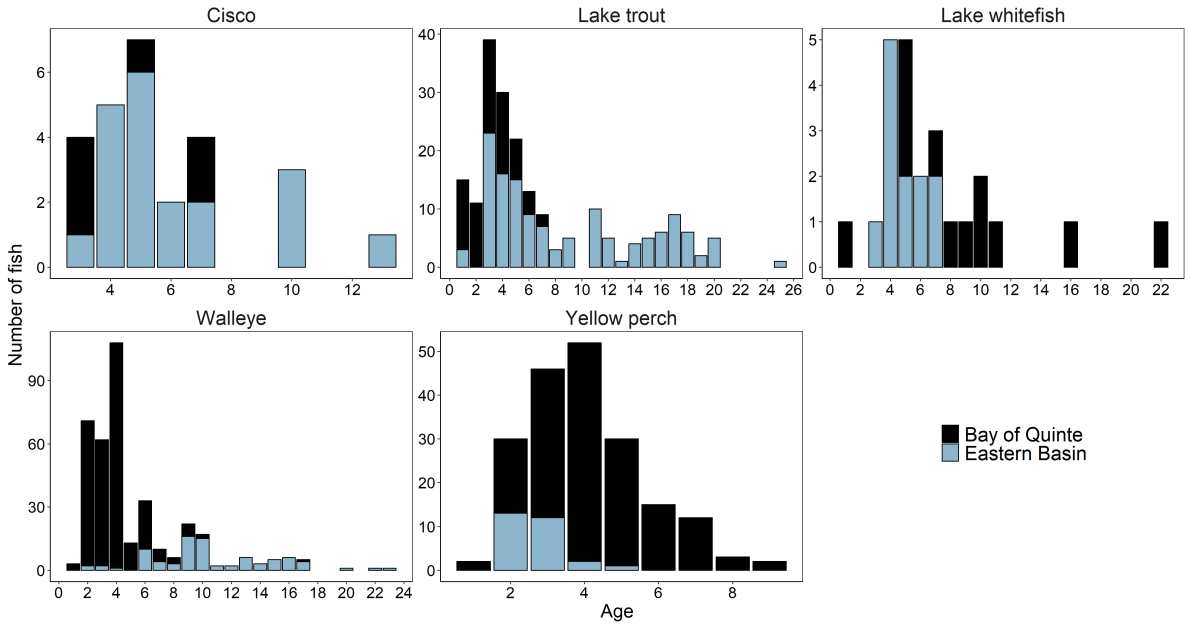


Figure 1.1.7: Age distribution of five species (Walleye, Yellow Perch, Cisco, Lake trout and Lake Whitefish) sampled from index gill nets by region (Bay of Quinte and Eastern Basin), 2024.

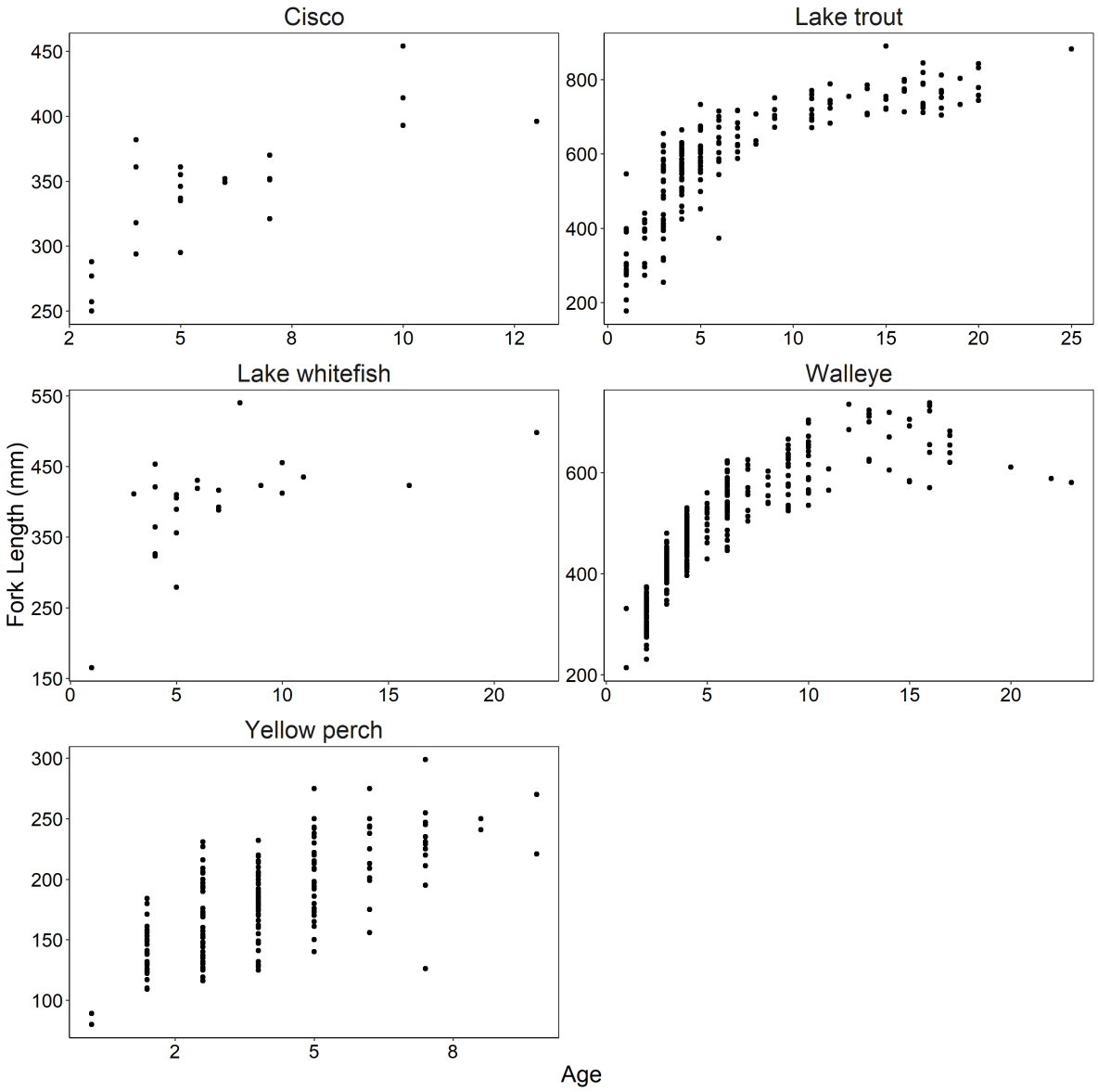


Figure 1.1.8: Fork length across ages for five species (Walleye, Yellow Perch Cisco, Lake Trout and Lake Whitefish) sampled from index gill nets in 2024.

1.2 Lake Ontario and Bay of Quinte Fish Community Index Trawling

S. Beech, Lake Ontario Management Unit

Bottom trawling has been used to monitor the relative abundance of small fish species and the young of large-bodied species in the fish community since the 1960s. Two trawl configurations (one for the Bay of Quinte and one for Lake Ontario) were routinely employed.

In the Kingston Basin of eastern Lake Ontario, six sites, ranging in depth from 20 to 35 m, were visited about four times annually up until 1992 when three sites were dropped. From 1992 to 2015, three visits were made to each of three sites annually, and four replicate ½ mile trawls are made during each visit. After 1995, a deep water site was added outside the Kingston Basin, south of Rocky Point (visited twice annually with a trawling distance of 1 mile; about 100 m water depth), to give a total of four Lake sites (Figure 1.2.1). In 2014, a second trawl site/depth was added at Rocky Point (60 m) and two trawl sites at each of Cobourg and Port Credit (60 and 100 m depths at both locations). In 2015, the Lake Ontario trawling was expanded significantly to include several more sampling depths at each of Rocky Point, Cobourg, and Port Credit. Starting in 2016, the three Kingston Basin sites that were dropped in 1992, were added back in to the sampling design, and trawling was not done at Cobourg and Port Credit (note that these sites were sampled in spring and fall prey fish assessments). Since 2019, trawling was not done at Cobourg, Port Credit and Rocky Point, further, the seasonal component was dropped (note that these sites are sampled in the spring and fall prey fish program). Since 2022, only one trawl is conducted per site except at EB03 where four replicates trawls are still conducted.

In the Bay of Quinte, six fixed-sites, ranging in depth from about 4 to 21 m, are visited annually on two or three occasions during mid to late-summer. Only one, ¼ mile trawl has been conducted at each site during each visit site since 2022. The 2024 trawl sampling design is shown in Table 1.2.1.

A total of 25 species and approximately 18,627 fish were caught in 21 trawls between July 29 and August 27. Round Goby (59%), Alewife (16%), Yellow Perch (10%) and White Perch (9%) collectively made up 94% of the catch by number. Species-specific catches during 2024 trawling are shown in Table 1.2.2.

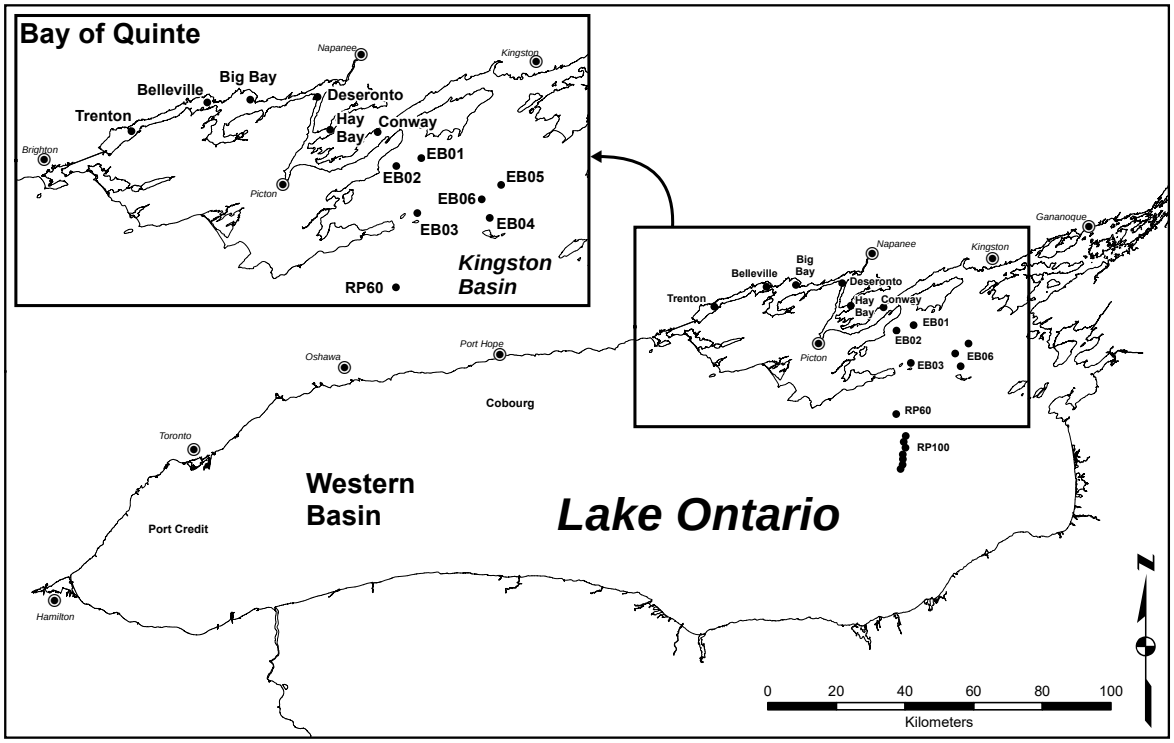


Figure 1.2.1: Map of northeastern Lake Ontario. Shown are eastern Lake Ontario and Bay of Quinte fish community index bottom trawling site locations.

Table 1.2.1: Sampling design of the Lake Ontario fish community index bottom trawling program including geographic stratification, number of visits, number of replicate trawls made during each visit, and the timeframe for completion of visits. Also shown is the year in which bottom trawling at a particular area was initiated and the number of years that trawling has occurred.

Region Name	Area Name (code)	Site Name	Depth (m)	Visits*	Reps x duration	Lat (DMS)	Lon (DMS)	Visits x Reps	Timeframe	Start Year	Years
Kingston Basin	Eastern Basin (EB)	EB01	30	1	1 x 5 minute	N440400	W764720	1	Aug 1-Sep 9	2016	9
Kingston Basin	Eastern Basin (EB)	EB02	30	1	1 x 5 minute	N440280	W765120	1	Aug 1-Sep 9	1972	53
Kingston Basin	Eastern Basin (EB)	EB03**	21	1	4 x 5 minute**	N435780	W764810	4	Aug 1-Sep 9	1972	53
Kingston Basin	Eastern Basin (EB)	EB04	35	1	1 x 5 minute	N435680	W763700	1	Aug 1-Sep 9	2016	9
Kingston Basin	Eastern Basin (EB)	EB05	33	1	1 x 5 minute	N440110	W763540	1	Aug 1-Sep 9	2016	9
Kingston Basin	Eastern Basin (EB)	EB06	35	1	1 x 5 minute	N435940	W763910	1	Aug 1-Sep 9	1972	53
Bay of Quinte	Conway (LB)	BQ17	21	2	1 x 6 minutes	N440650	W765420	2	Aug 1-Sep 9	1972	53
Bay of Quinte	Hay Bay (MB)	BQ15	5	2	1 x 6 minutes	N440650	W770175	2	Aug 1-Sep 9	1972	53
Bay of Quinte	Deseronto (UB)	BQ14	5	2	1 x 6 minutes	N441000	W770360	2	Aug 1-Sep 9	1972	53
Bay of Quinte	Big Bay (UB)	BQ13	5	2	1 x 6 minutes	N440975	W771360	2	Aug 1-Sep 9	1972	53
Bay of Quinte	Belleville (UB)	BQ12	5	2	1 x 6 minutes	N440920	W772010	2	Aug 1-Sep 9	1972	53
Bay of Quinte	Trenton (UB)	BQ11	4	2	1 x 6 minutes	N440600	W773120	2	Aug 1-Sep 9	1972	53

Lake Ontario

Kingston Basin

Bottom trawls were conducted at six sites in the Kingston Basin in August 2024. Four species were caught with the most abundant species being Round Goby. Average species-specific catch per trawl and trends through time for the most commonly caught species are shown in Table 1.2.3 and Figure 1.2.2, respectively.

Bay of Quinte

Conway, Hay Bay, Deseronto, Big Bay, Belleville, and Trenton

Bottom trawls were conducted six sites in the Bay of Quinte in August 2024. Species-specific catch per trawl at each site is shown in Table 1.2.4. Bottom trawl results were summarized across the six Bay of Quinte sites and presented graphically to illustrate abundance trends for major species in Figure 1.2.3 and Figure 1.2.4. All species show significant abundance changes over the long-term.

Species Highlights

Length distributions for the most abundant species caught in bottom trawls in 2024 are shown in Figure 1.2.5. Catches of age-0 fish for selected species and locations are shown in Figure 1.2.6 to Figure 1.2.9. Additional age information is provided for all Walleye captured in 2024 in Table 1.2.5.

Cisco and Lake Whitefish

One hundred Cisco and three Lake Whitefish were caught during bottom trawling. All Cisco and Lake Whitefish were age-0 and were captured at the EB03 or BQ17 (Conway) sites in the summer (Figure 1.2.6 and Figure 1.2.7). Trawls at the two historical sites (EB03 or Conway) conducted during the fall trawling program did not capture any age-0 Cisco or Lake Whitefish.

Yellow Perch

An estimated 356 age-0 Yellow Perch were caught at five of six trawl sites in the Bay of Quinte. Catch per trawl was similar compared to the previous three years (Figure 1.2.8).

Walleye

Seventy-three age-0 Walleye were caught in four of six trawl sites in the Bay of Quinte. Overall, age-0 catch per trawl was considered “good” and increased compared to the 2023 average (Figure 1.2.9). Additional age information is provided in Table 1.2.5.

Table 1.2.2: Species-specific total bottom trawl catch and biomass in summer 2024. Standard biomass is calculated by standardizing trawls to six minutes (¼ mile) in the Bay of Quinte and 12 minutes (½ mile) in the Lake Ontario. Frequency of Occurrence (FO) is the number of trawls, out of a possible 21, in which each species was caught. Mean weight of each species is also provided.

Species	FO	Catch	Biomass	Standard Catch	Standard Biomass
Alewife	11	4517	17.63	4590	17.85
Black crappie	1	2	0.89	2	0.89
Bluegill	6	51	1.45	51	1.45
Brook silverside	1	1	<0.01	1	<0.01
Brown bullhead	10	63	17.36	64	17.47
Freshwater drum	6	25	7.68	25	7.68
Gizzard shad	9	275	3.36	276	3.36
Lake herring	2	100	1.06	124	1.31
Lake trout	3	10	0.21	18	0.35
Lake whitefish	2	3	0.02	3	0.02
Largemouth bass	6	36	0.19	36	0.19
Lepomis sp.	4	41	0.03	41	0.03
Logperch	3	40	0.1	40	0.1
Northern pike	1	1	3.8	1	3.8
Pumpkinseed	9	224	8.19	225	8.22
Rainbow smelt	10	118	0.29	182	0.65
Rock bass	2	3	0.02	3	0.02
Round goby	16	7177	17.11	17091	38.56
Spottail shiner	9	230	1.12	230	1.12
Trout-perch	7	295	0.78	295	0.78
Walleye	11	84	10.89	86	17.44
White bass	8	20	0.23	20	0.23
White perch	10	2460	73.1	2470	73.28
White sucker	6	13	9.9	13	9.9
Yellow perch	12	2838	22.78	2864	23.25

Table 1.2.3: Species-specific catch per trawl (12 min duration; 1/2 mile) by year in the fish community index bottom trawling program during summer at six sites in the Eastern Basin, Lake Ontario. Catches are the mean number of fish observed for the number of trawls (one for all sites except EB03 which was sampled four times).

	EB01		EB02		EB03		EB04		EB05		EB06	
Species	2020-2023	2024	2020-2023	2024	2020-2023	2024	2020-2023	2024	2020-2023	2024	2020-2023	2024
Alewife	156		832		189.38		39					
Freshwater drum					0.5							
Lake herring					0.5							
Lake trout		8	1					1		1	1	
Lake whitefish					0.38							
Rainbow smelt	3	2	46	1	650.25	1	6	1	3.5	15	2	14
Round goby	179.5	572	313.5	1623	737.62	231.5	1148	1338	495	1445	6	1002
Walleye						0.25						

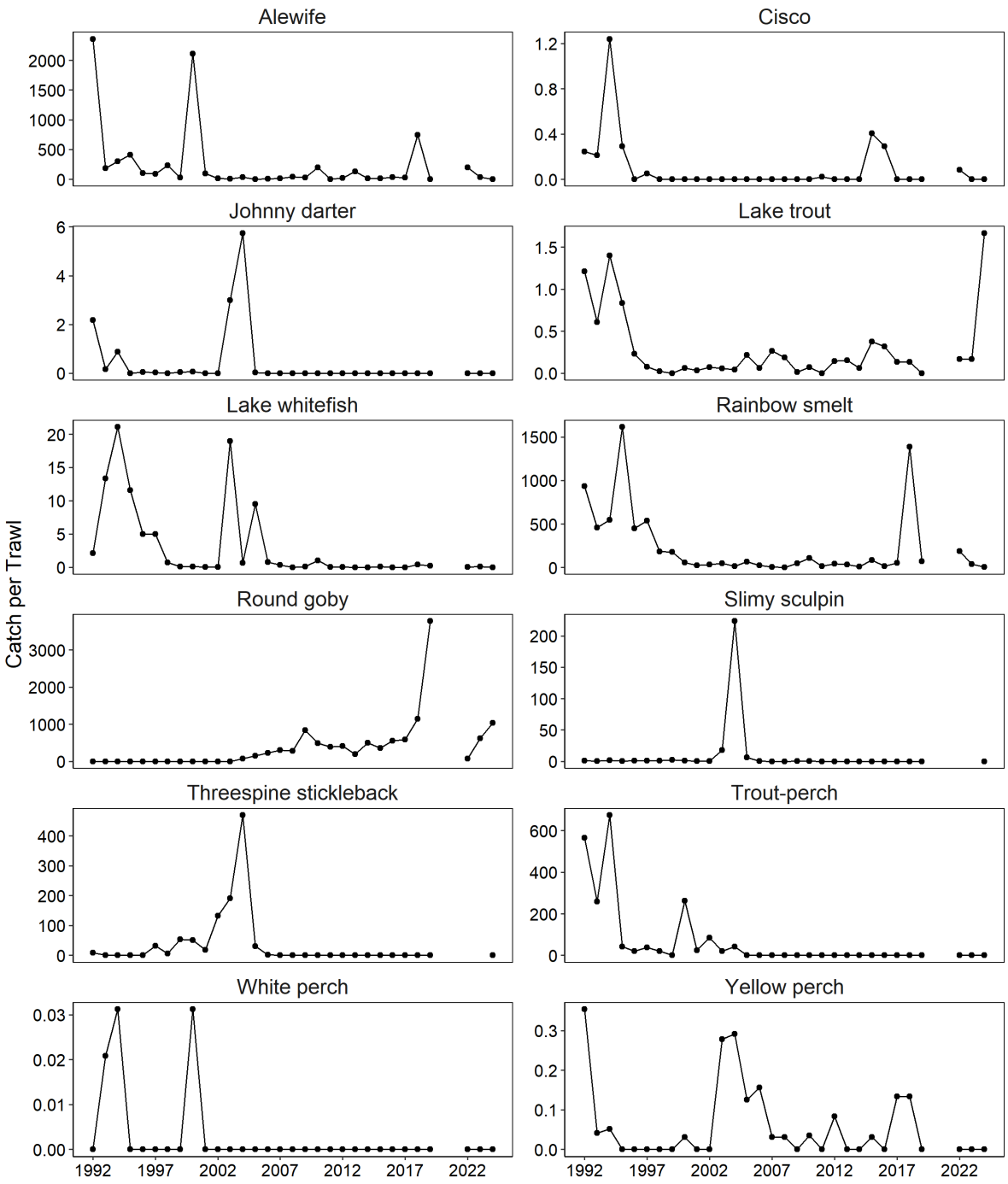


Figure 1.2.2: Abundance trends (annual means) for the most common species caught in bottom trawls at three to six sites in the Kingston Basin, eastern Lake Ontario (EB01, EB02, EB03, EB04, EB05, EB06; Figure 1.2.1).

Table 1.2.4: Species-specific catch per trawl (6-min duration; 1/4 mile) by year in the fish community index bottom trawling program at six sites in the Bay of Quinte. Catches are the mean number of fish observed for the two trawls visits.

	Belleville		Big Bay		Conway		Deseronto		Hay Bay		Trenton	
Species	2020-2023	2024	2020-2023	2024	2020-2023	2024	2020-2023	2024	2020-2023	2024	2020-2023	2024
Alewife	114.06	731.5	210.15	347	30.15	5.5	345.26	498.5	1376.17	618	125.98	58
Gizzard shad	511.96	45.5	58.87	38			84.1	22.5	51.94	20	265.2	11.5
Lake trout					0.38							
Lake whitefish					1.5	1.5						
Lake herring					1.69	50						
Rainbow smelt					45.73	40.5			0.12			
White sucker	0.56	1	1.28	1.5	2.54	2.5	0.93	0.5	0.31	0.5	0.91	0.5
Common carp	0.06		0.59				0.03					
Golden shiner									0.25			
Emerald shiner			0.5		1.78							
Spottail shiner	8.41	15	10.16	12			32	10.5	40.74	32	28.28	45.5
Brown bullhead	9.01	10	3.38	5.5			12.64	5.5	2.94	7	5.18	3.5
Channel catfish			0.31				0.12					
American eel							0.5		0.75			
Trout-perch	22.5	93	12.4	36	3.17	8.5	20.71	7.5	0.72	2	1.28	0.5
White perch	311.03	173	329.88	372.5	2.53		408.77	308.5	236.09	251.5	193.94	124.5
White bass	2.09	6	1.47	1			5.45	2	2.44		0.92	1
Morone sp.	2.62		0.12									
Sunfishes											0.06	
Rock bass							0.09		0.19		2.5	1.5
Pumpkinseed	25.31	44	9.28	11.5			68.29	7	10.83	15.5	50.72	34
Bluegill	5.38	9.5	18.11	2			3.67	1	2.75		22.81	13
Smallmouth bass	0.12										1.2	
Largemouth bass	3.94	8.5	3.41				3.76	2.5	1.12	0.5	13.34	6.5
Black crappie							1.06	1	1.25			
Lepomis sp.	28.78	0.5	46.63	1			0.72		0.56		15.67	19
Yellow perch	140.69	408	75.28	48	25.81	28.5	545.2	370.5	295.13	109	543.75	455
Walleye	9.03	16.5	9.41	16	0.41	1	10.75	6	4	1	4.82	1
Johnny darter	0.09						0.03		0.03		0.22	
Logperch	3.25	0.5	0.25				0.55	2.5	0.25		15.75	17
Brook silverside	0.78		0.88				0.25	0.5				
Round goby	15.09	2.5	1.38		153.06	117	3.88	1.5	0.5	2	9.28	12.5
Freshwater drum	21.38	4.5	20.97	6	0.03		13.75	1.5	9.21	0.5	1.75	
Northern pike										0.5		

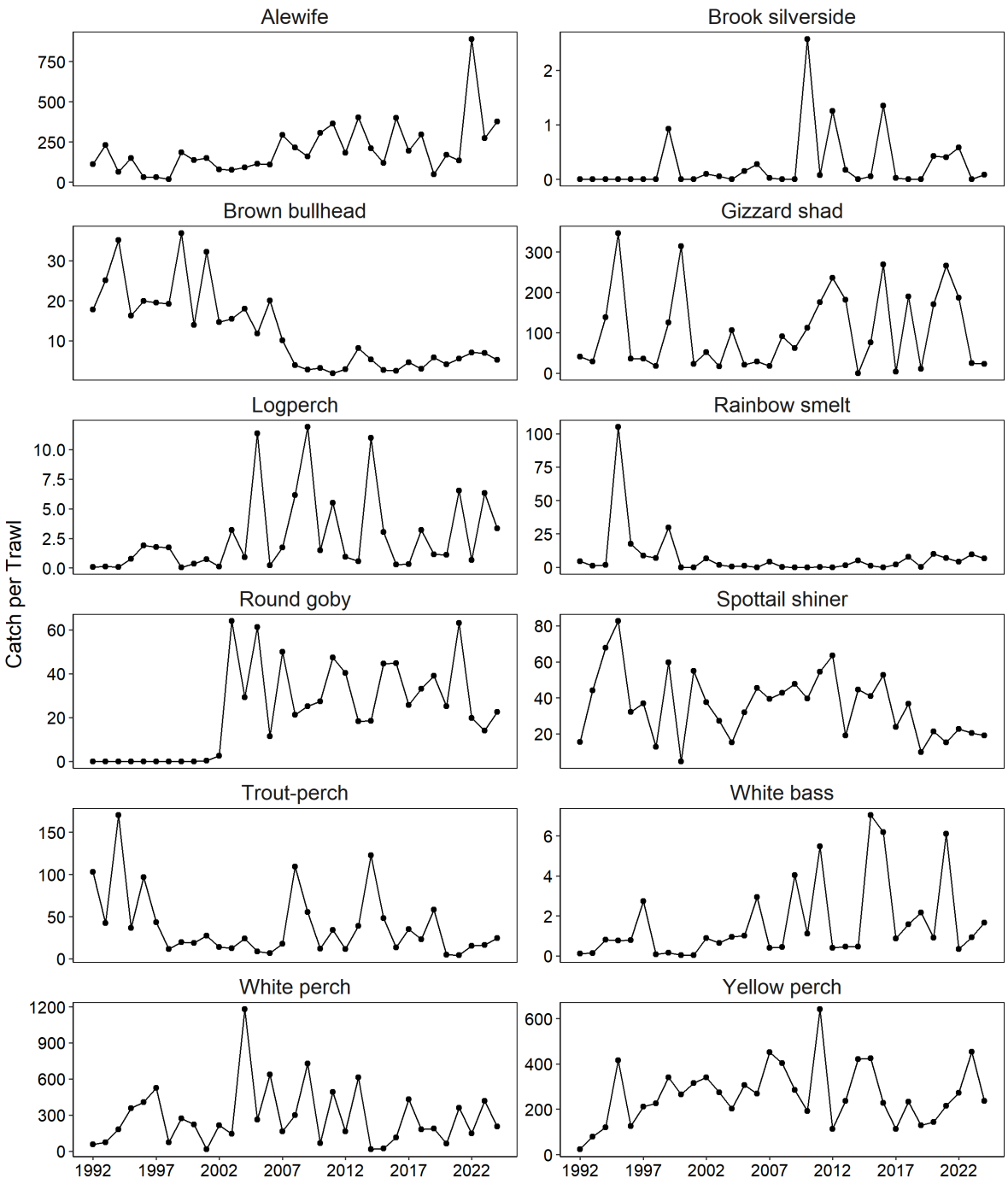


Figure 1.2.3: Abundance trends (annual means) for the most common species caught in bottom trawls at six sites in the Bay of Quinte (Conway, Hay Bay, Deseronto, Big Bay, Belleville and Trenton; see Figure 1.2.1).

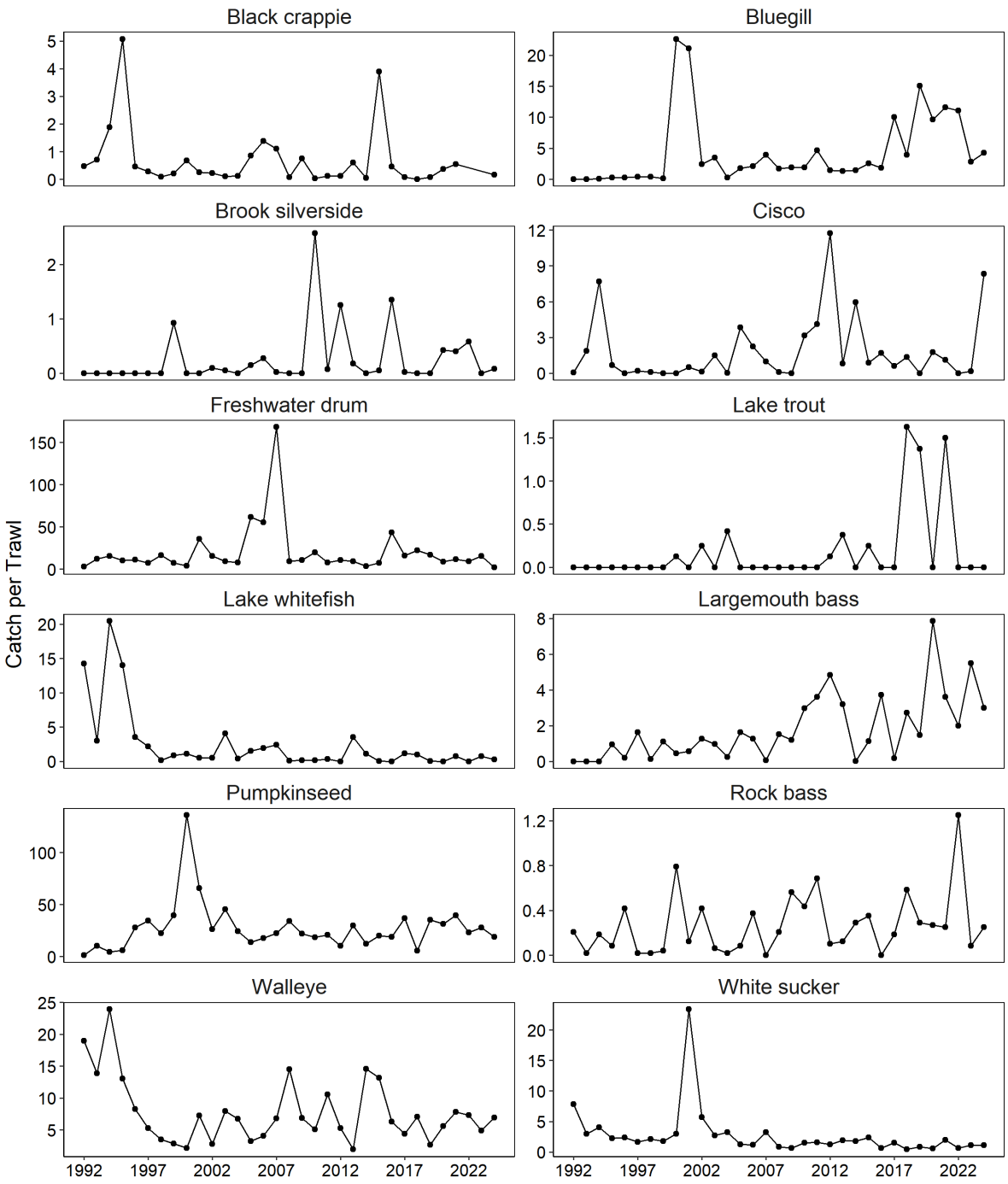


Figure 1.2.4: (continued) Abundance trends (annual means) for the most common species caught in bottom trawls at six sites in the Bay of Quinte (Conway, Hay Bay, Deseronto, Big Bay, Belleville and Trenton; see Figure 1.2.1).

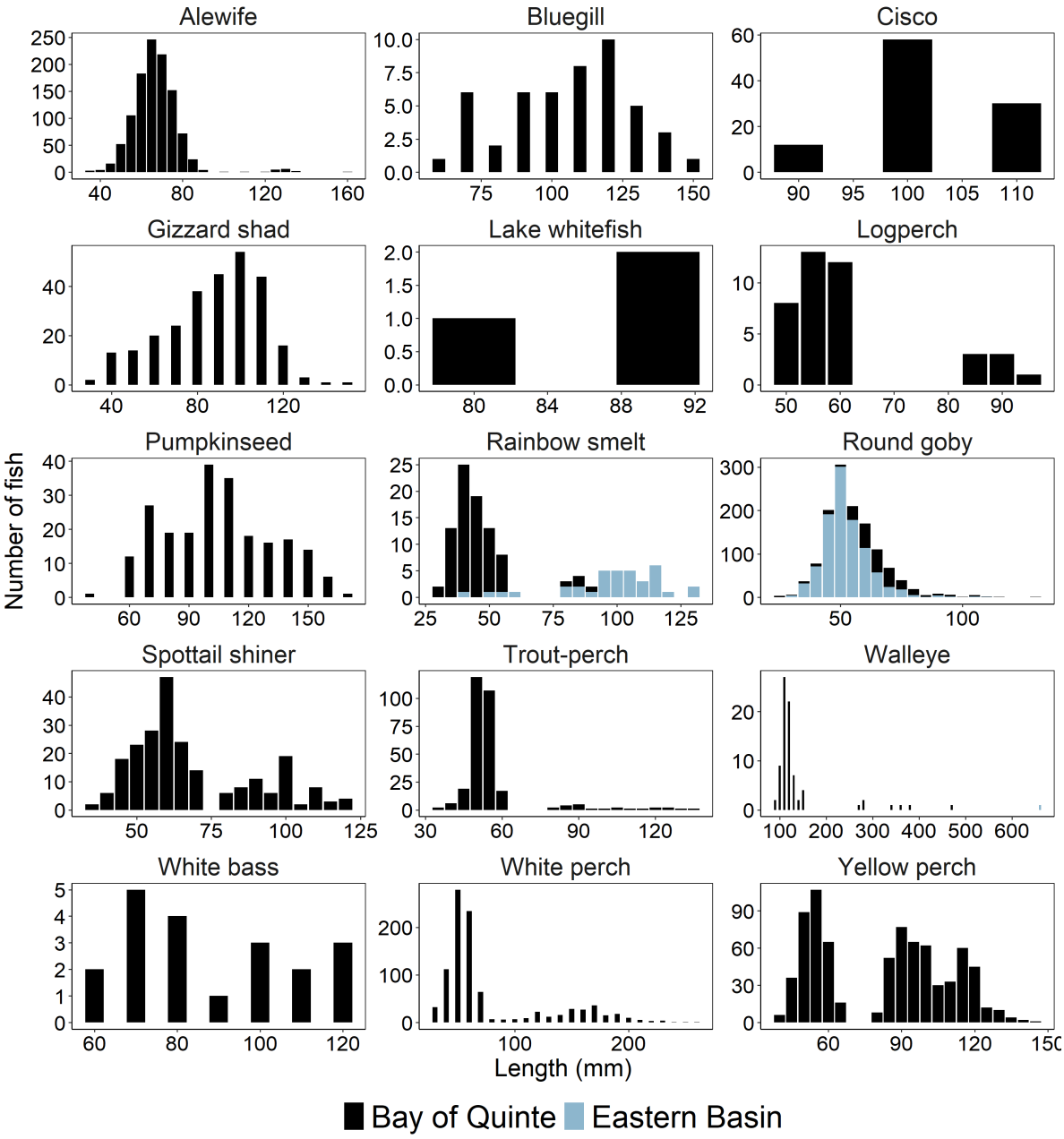


Figure 1.2.5: Length distributions for the most abundant species caught in trawls in the Eastern Basin (red) and Bay of Quinte (black) in 2024. Length values were grouped into 10mm bins for all species except Yellow perch, Spottail shiner, Rainbow smelt, Round Goby, Trout perch and Alewife that were grouped into 5mm bins.

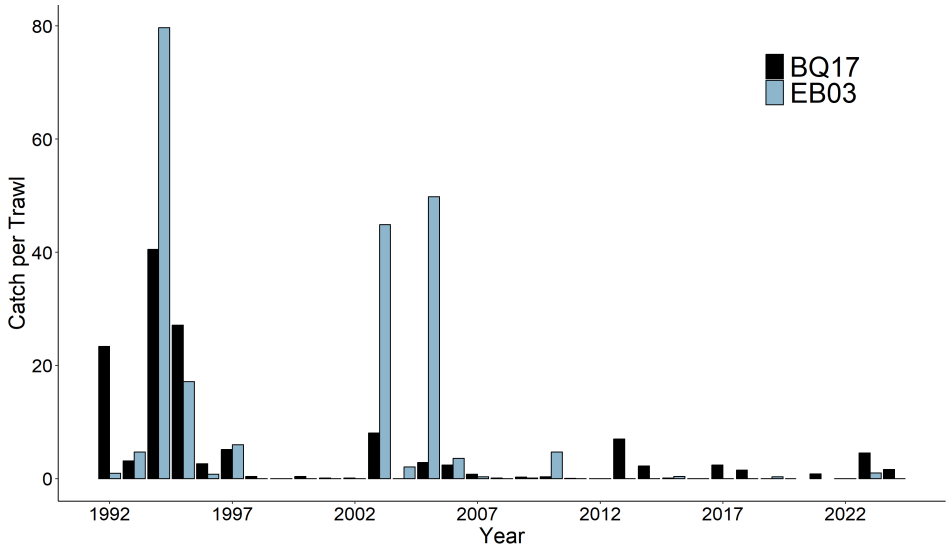


Figure 1.2.6: Mean catch-per-trawl of age-0 Lake Whitefish at sites Conway in the lower Bay of Quinte (black) and EB03 (blue) in eastern Lake Ontario, 1992-2024. One to four replicate trawls on each of two to four visits were made at each site. Distances of each trawl drag were 1/4 mile for Conway and 1/2 mile for EB03. No trawls were conducted at EB03 in 2020 or 2021.

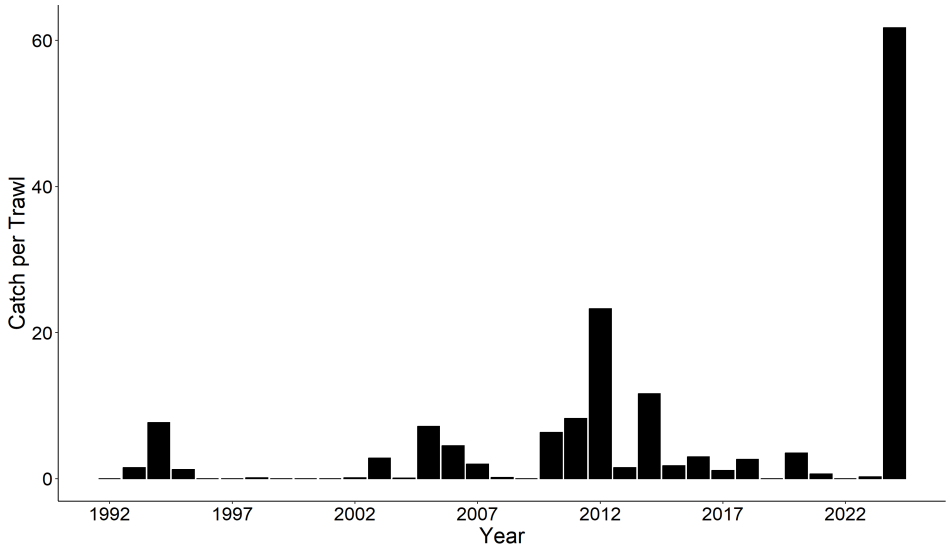


Figure 1.2.7: Mean catch-per-trawl of age-0 Cisco at Conway in the lower Bay of Quinte, 1992-2024. One to four replicate trawls on each of two to four visits between July-September were made. The distance of each trawl drag was 1/4 mile.

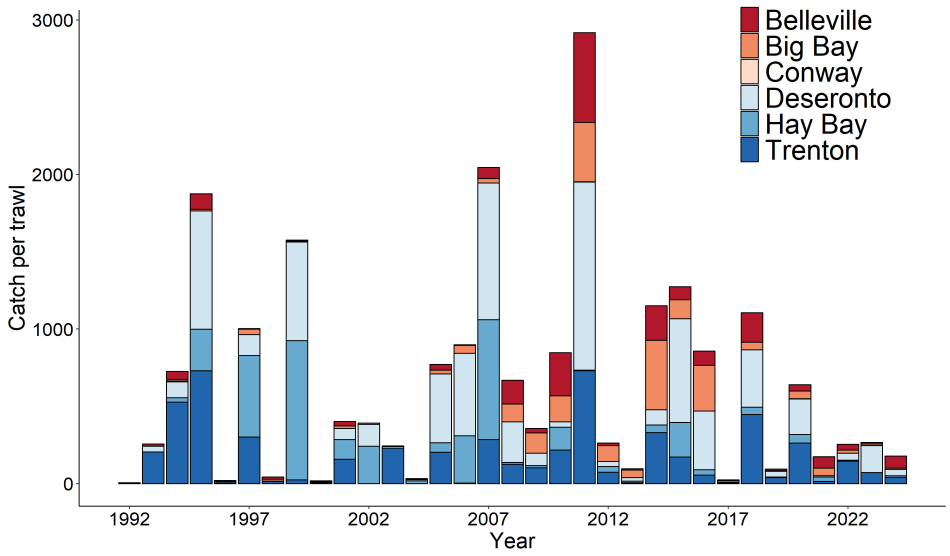


Figure 1.2.8: Mean catch-per-trawl of age-0 Yellow Perch at six Bay of Quinte sites, 1992-2024. One to four trawls on each of two to three visits from July-September were made at each site. The distance of each trawl drag was 1/4 mile.

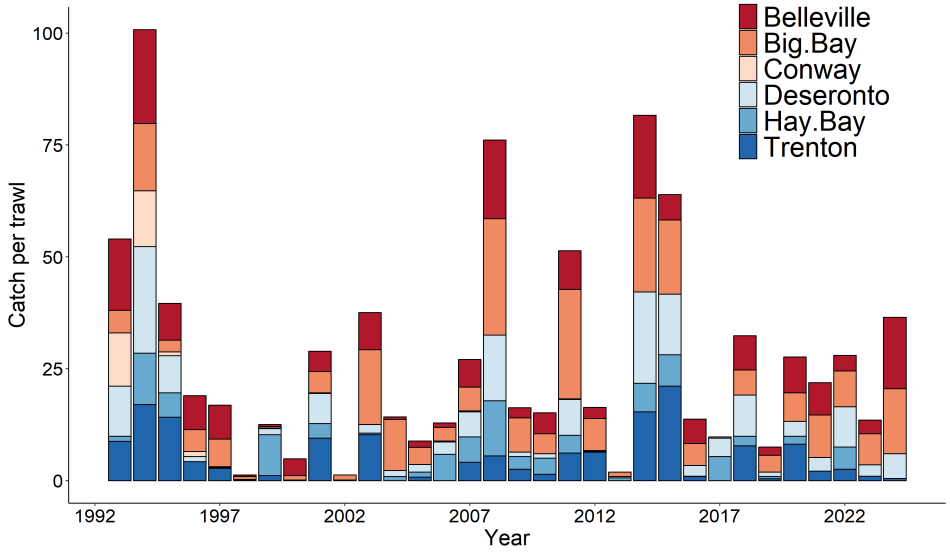


Figure 1.2.9: Mean catch-per-trawl of age-0 Walleye at six Bay of Quinte sites, 1992-2024. One to four replicate trawls on each of two to three visits were made at each site between July-September. The distance of each trawl drag was 1/4 mile.

Table 1.2.5: Age distribution of 87 Walleye sampled from summer bottom trawls, Bay of Quinte, 2024. Also shown are mean fork length, mean weight, mean GSI (females), proportion female (of fish in which sex could be determined) and proportion mature. Fish that were not aged and had a fork length of less than 154 mm fork length were assigned an age of 0.

Age	0	1	2	3	5	8
Year class	2024	2023	2022	2021	2019	2016
Number	73	2	6	1	1	1
Mean weight (g)	14	209	428	1079	1439	4369
Mean length (mm)	116	272	342	470	506	660
Proportion mature	0	0	0	1	1	1
Proportion females	0.2	1	0.5	1	1	1
Mean GSI (females)	0.02	0.1	0.15	0.26	0.35	0.49

1.3 Lake Ontario Nearshore Community Index Netting

M. Jarvie, Lake Ontario Management Unit

In 2024, Nearshore Community Index Netting (NSCIN) was completed at Toronto Harbour, Hamilton Harbour, Presqu'ile Bay, and the upper Bay of Quinte (Figure 1.3.1).

NSCIN was first initiated in 2001 on the upper Bay of Quinte (Trenton to Deseronto), West Lake, and Weller's Bay, and was expanded to include the middle and lower Bay of Quinte (Deseronto to Lake Ontario) in 2002. In 2006, the NSCIN program was conducted in Hamilton and Toronto Harbours thanks to partnerships developed with Fisheries and Oceans Canada and Toronto and Region Conservation Authority. NSCIN was further expanded to other Lake Ontario areas in subsequent years (Table 1.3.1).

The NSCIN protocol is a provincial standard methodology which uses 6-foot trap nets and is designed to evaluate the relative abundance of fish species that inhabit the littoral area. Suitable trap net sites are chosen from randomly selected UTM grids that contain shoreline in the nearshore area. Ecosystem (e.g., Index of Biotic Integrity or IBI) and fish community (e.g., proportion of piscivore biomass or PPB) measures that have been developed for Lake Ontario's nearshore areas can be used to assess the relative health of the surveyed regions. These assessments are particularly useful to monitor the on-going status of impaired fish communities in Lake Ontario's Areas of Concern such as Hamilton and Toronto Harbours.

Survey information and basic catch statistics for the four nearshore areas sampled in 2024 are given in Table 1.3.2 and Table 1.3.3. Age and length distribution is displayed in Figure 1.3.2 and Figure 1.3.3. Abundance trends for selected species are presented in Figure 1.3.4 and Figure 1.3.5.

Toronto Harbour

Partnership project with Toronto and Region Conservation Authority

Twenty-four trap nets were sampled in Toronto Harbour from Aug 26, 2024 to Sep 11, 2024 (Table 1.3.2). Just over 3900 fish comprising 24 species were captured (Table 1.3.3). The most abundant species by number were Brown Bullhead (2964), Yellow Perch (255), Pumpkinseed (230), Rock Bass (99) and Alewife (84). Five American Eel were caught and one Atlantic Salmon.

Walleye have been stocked in Toronto Harbour in 2017, 2019, and 2023 in an effort to re-establish this native predatory fish and supplement the urban fishery. Current stocking targets are 100,000 summer fingerlings every other year (alternating with Hamilton Harbour; see Section 5.1). While there has been evidence of survival of stocked Walleye in Toronto through NSCIN; five age-2 fish caught in 2019, four age-3 fish caught in 2022, and one age-5 and one age-7 fish caught in 2024, it has been minimal. Stocked Walleye survival will continue to be monitored in future surveys.

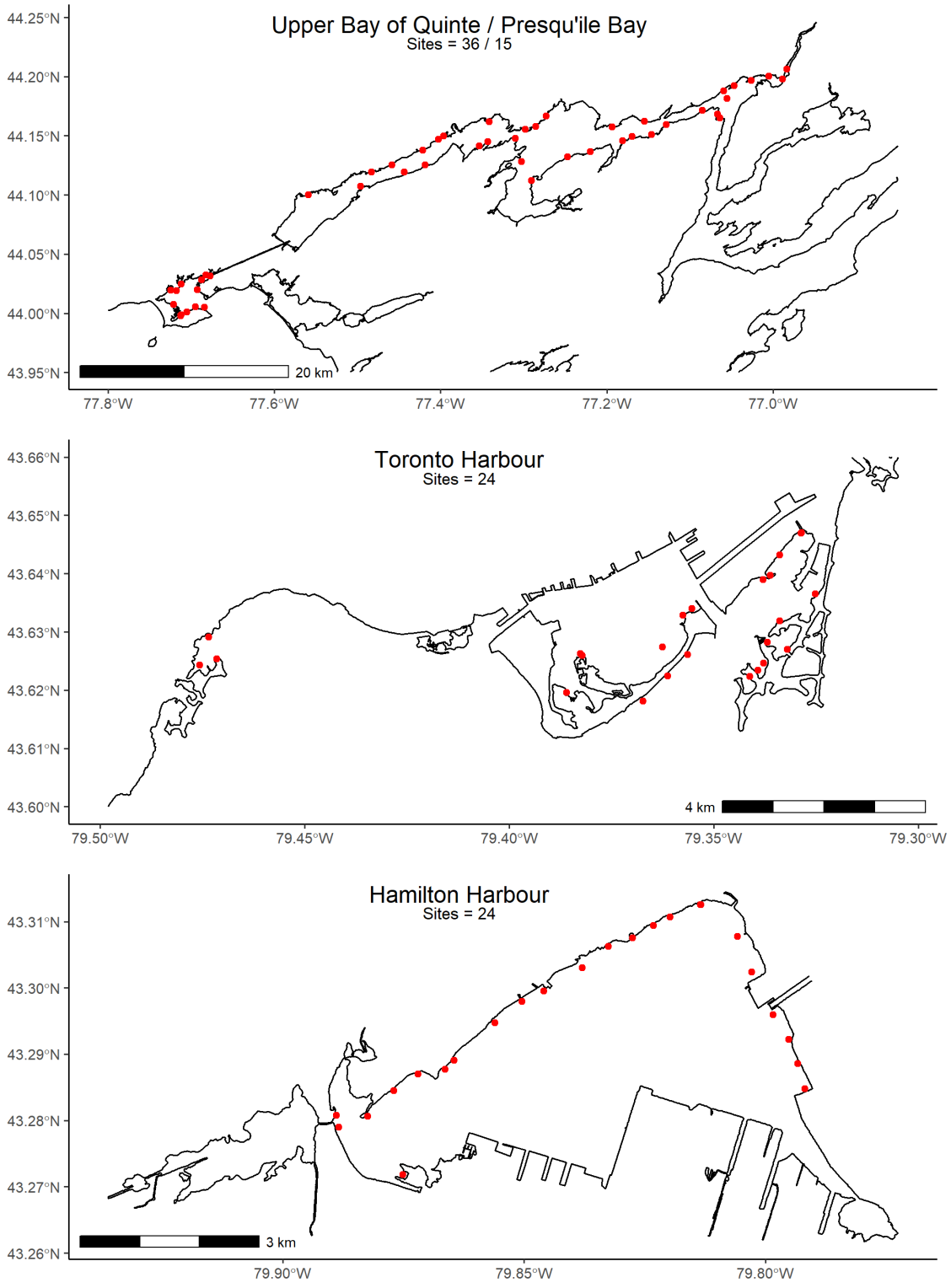


Figure 1.3.1: Map of NSCIN trap net locations in the Upper Bay of Quinte, Presqu'ile Bay, Toronto Harbour, and Hamilton Harbour, 2024.

Hamilton Harbour

Partnership project with Fisheries and Oceans Canada

Twenty-four trap nets were sampled in Hamilton Harbour from Aug 12, 2024 to Aug 22, 2024 (Table 1.3.2). Just under 7100 fish comprising 24 species were captured (Table 1.3.3). The most abundant species by number were White Perch (4229), Brown Bullhead (1347), Bluegill (454), Rudd (322) and Walleye (132). Four American Eel were caught and one Atlantic Salmon.

Walleye have also been stocked into Hamilton Harbour every two years since 2012 in an effort to re-establish the species and create an urban fishery. In the 2024 sampling, there was a strong showing of age-12, age-8, and age-6 Walleye from the 2012, 2016, and 2018 stocking events, respectively.

Table 1.3.1: Annual NSCIN trap net schedule for Lake Ontario nearshore areas, 2006-2024. The numbers of trap net samples at each area in each year are indicated.

Year	Hamilton Harbour	Toronto Harbour	Presqu'ile Bay	Weller's Bay	West Lake	East Lake	Prince Edward Bay	Upper Bay of Quinte	Middle Bay of Quinte	Lower Bay of Quinte	North Channel Kingston	Thousand Islands	Lake St. Francis
2024	24	24	15					36					
2023											36	36	35
2022		24		24				36					
2021	24												
2020													
2019	24	24						36	29	7			
2018	24	24						36					
2017					24	16	24	36					
2016	24	24						36					
2015	24		16	24				36					
2014	24	23						36					
2013					24	16	24	36					
2012	24	24						36					
2011								36	29	7			
2010	24	24						36					
2009							27	36	30	18	25	36	
2008	24		12	24				36					36
2007		24			18	18		36					36
2006	19	24											

Table 1.3.2: Survey information for the 2024 NSCIN program in Toronto Harbour, Hamilton Harbour, Presqu'ile Bay, and the Upper Bay of Quinte. Shown for each embayment are the survey dates, the range of observed surface water temperatures, the total number of trap net lifts, mean depth, and the number of trap net lifts broken down by observed substrate and cover types for nets included in the analysis.

		Upper Bay of Quinte	Hamilton Harbour	Presqu'ile Bay	Toronto Harbour
Survey dates		Sep 03-Sep 20	Aug 12-Aug 22	Sep 19-Sep 26	Aug 26-Sep 11
Water temp (°C)		17.4-22.6	12.3-24.9	14.19-24.03	15.99-23.6
Number of lifts		36	24	15	24
Average depth		2.5	2	1.8	2.3
Lifts by substrate type	Hard	19	3	4	1
	Soft	16	21	11	23
Lifts by degree cover	None	3	1	0	1
	Low (1-25%)	12	12	4	16
	Medium (26-75%)	11	11	7	4
	High (76-100%)	9	0	4	3

Presqu'ile Bay

Fifteen trap nets were sampled in Presqu'ile Bay from Sep 19, 2024 to Sep 26, 2024 (Table 1.3.2). Just under 800 fish comprising 23 species were captured (Table 1.3.3). The most abundant species by number were Bluegill (208), Brown Bullhead (173), Pumpkinseed (136), Rock Bass (82) and Gizzard Shad (52). Two American Eel were caught as well as one Spotted Gar.

Upper Bay of Quinte

Thirty-six trap nets were sampled in the upper Bay of Quinte from Sep 03, 2024 to Sep 20, 2024 (Table 1.3.2). Just over 3600 fish comprising 26 species were captured (Table 1.3.3). The most abundant species by number were Bluegill (2239), Pumpkinseed (533), Brown Bullhead (155), Black Crappie (125) and Rock Bass (111). Twenty-five American Eel were caught.

Table 1.3.3: Species-specific catch in the 2024 NSCIN program in Toronto Harbour, Hamilton Harbour, Presqu'ile Bay, and upper Bay of Quinte. Statistics shown include arithmetic mean (Arith. mean) catch-per-trap net (CUE), percent relative standard error of mean log10(catch+1) (%RSE = 100*SE/mean), and mean fork or total length (mm).

	Upper Bay of Quinte			Hamilton Harbour			Presqu'ile Bay			Toronto Harbour		
	Arith. mean	% RSE	Mean length	Arith. mean	% RSE	Mean length	Arith. mean	% RSE	Mean length	Arith. mean	% RSE	Mean length
Alewife	0.03	103	140				0.13	98	125	3.5	40	138
American eel	0.71	31		0.17	48		0.13	68		0.21	38	
Atlantic salmon				0.04	95	570				0.04	95	650
Black crappie	3.46	23	251	2.17	42	138	0.2	55	157	1.08	30	143
Bluegill	63.97	20	140	18.92	37	135	13.87	31	127	1.62	50	139
Bowfin	0.83	28	638	2.79	22	575	2.47	17	550	0.42	48	613
Brown bullhead	4.43	21	279	56.12	33	283	11.53	31	232	123.5	58	275
Brown trout										0.04	95	500
Channel catfish	0.63	37	570	2.25	26	585				0.29	45	610
Chinook salmon							0.07	104	730			
Common carp	0.29	38	620	1.25	22	528	0.4	52	585	1.33	24	668
Cyprinidae hybrids				1.12	25	353						
Freshwater drum	0.74	32	497	0.5	44	544	0.27	45	498	0.5	30	688
Gizzard shad	0.2	55	140	5.17	56	192	3.47	40	144	0.88	39	391
Golden shiner	0.06	70	130				0.2	55	140			
Goldfish				0.58	46	211				0.08	72	395
Greater redhorse	0.14	42	552									
Largemouth bass	1.34	24	251	0.42	31	254	2.13	36	193	1.33	32	190
Longnose gar	1.31	46	877	1.33	28	778	0.4	40	727	0.08	72	730
Moxostoma sp.	0.26	43	547									
Northern pike	0.29	35	690	0.46	37	670	0.4	32	610	1.75	30	635
Pumpkinseed	15.23	17	147	2.54	58	115	9.07	45	122	9.58	35	120
Rock bass	3.17	24	173	2.67	31	159	5.47	32	149	4.12	32	162
Rudd				13.42	17	248				0.96	84	230
Shorthead redhorse	0.31	35	453									
Silver redhorse	0.4	27	504	0.04	95	630	0.13	68	515			
Smallmouth bass	0.49	53	319							0.08	96	450
Spotted gar							0.07	104	590			
Walleye	1.4	28	476	5.5	29	614	0.13	68	520	0.29	51	581
White bass	0.03	103	260	0.12	56	350	0.07	104	130			
White perch	1.23	33	211	176.21	33	182	0.2	70	197	0.25	60	190
White sucker	0.11	44	423	0.04	95	470	0.13	98	250	1.25	37	446
Yellow perch	2.34	34	194	0.71	47	185	2.13	33	189	10.62	45	167

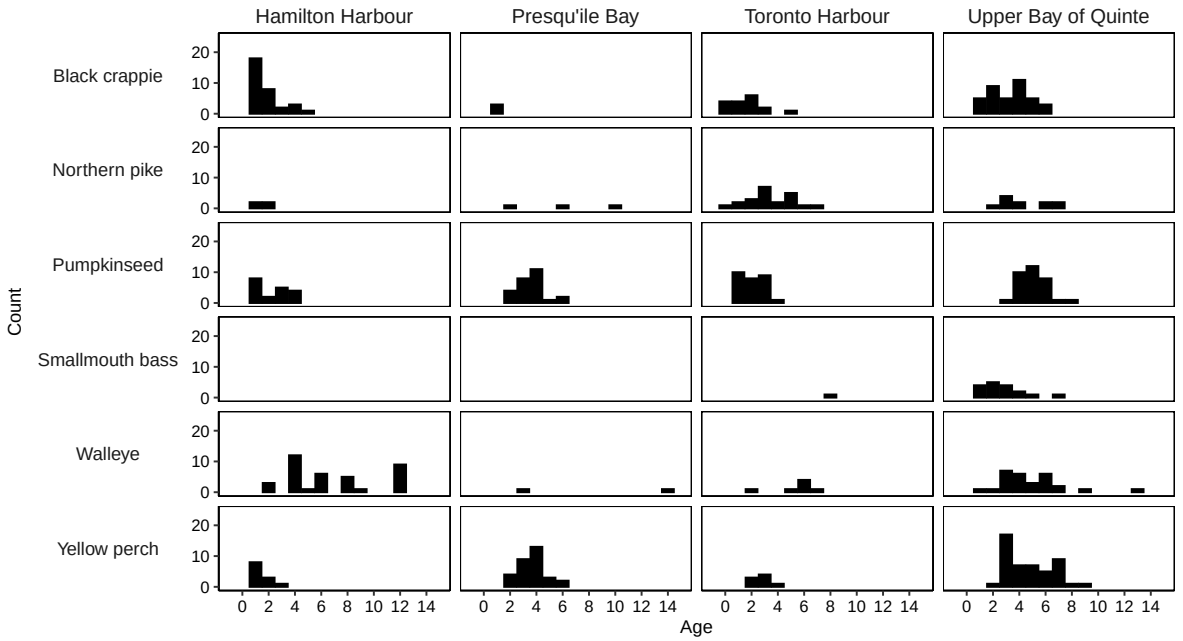


Figure 1.3.2: Age distribution (years) of selected species caught in Toronto Harbour, Hamilton Harbour, Presqu'ile Bay, and upper Bay of Quinte, 2024.

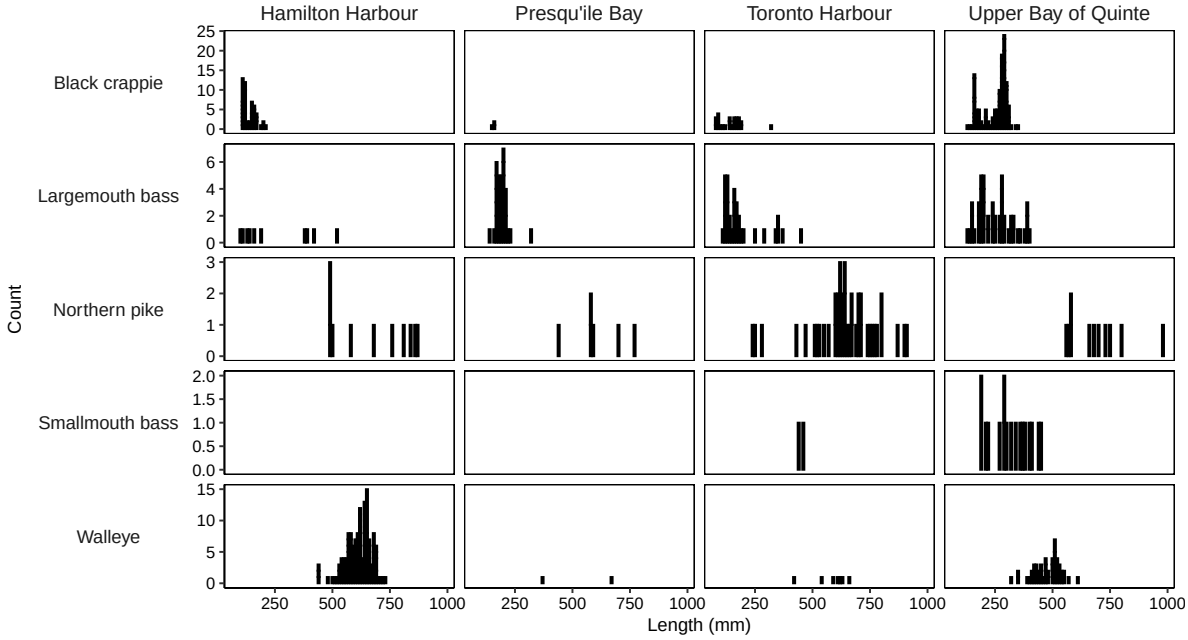


Figure 1.3.3: Length distribution (mm) of selected species caught in Toronto Harbour, Hamilton Harbour, Presqu'ile Bay, and the upper Bay of Quinte, 2024.

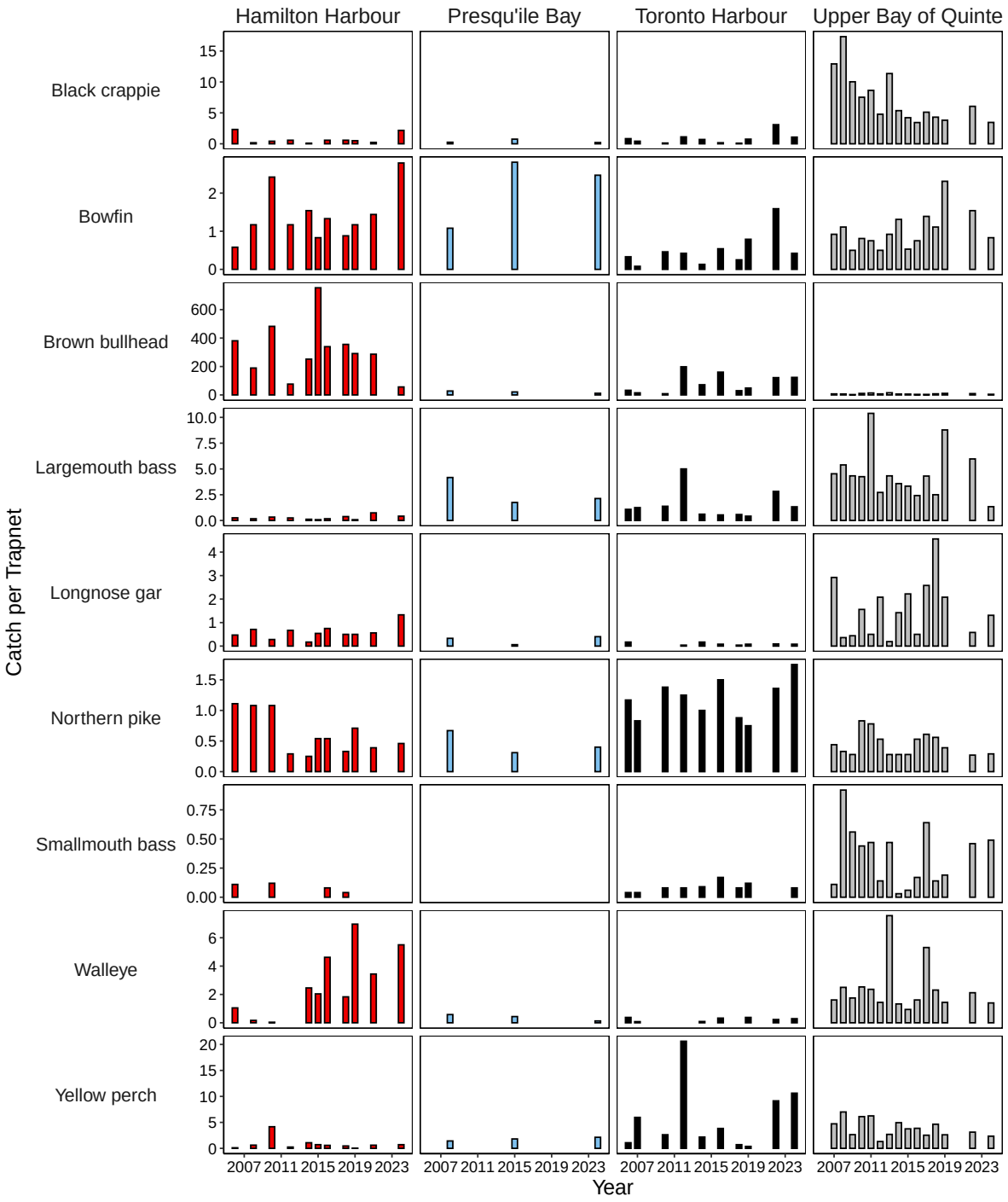


Figure 1.3.4: Abundance trends for selected species caught in nearshore trap nets in Toronto Harbour, Hamilton Harbour, Presqu'ile Bay, and the upper Bay of Quinte, 2024. Values shown are annual arithmetic means.

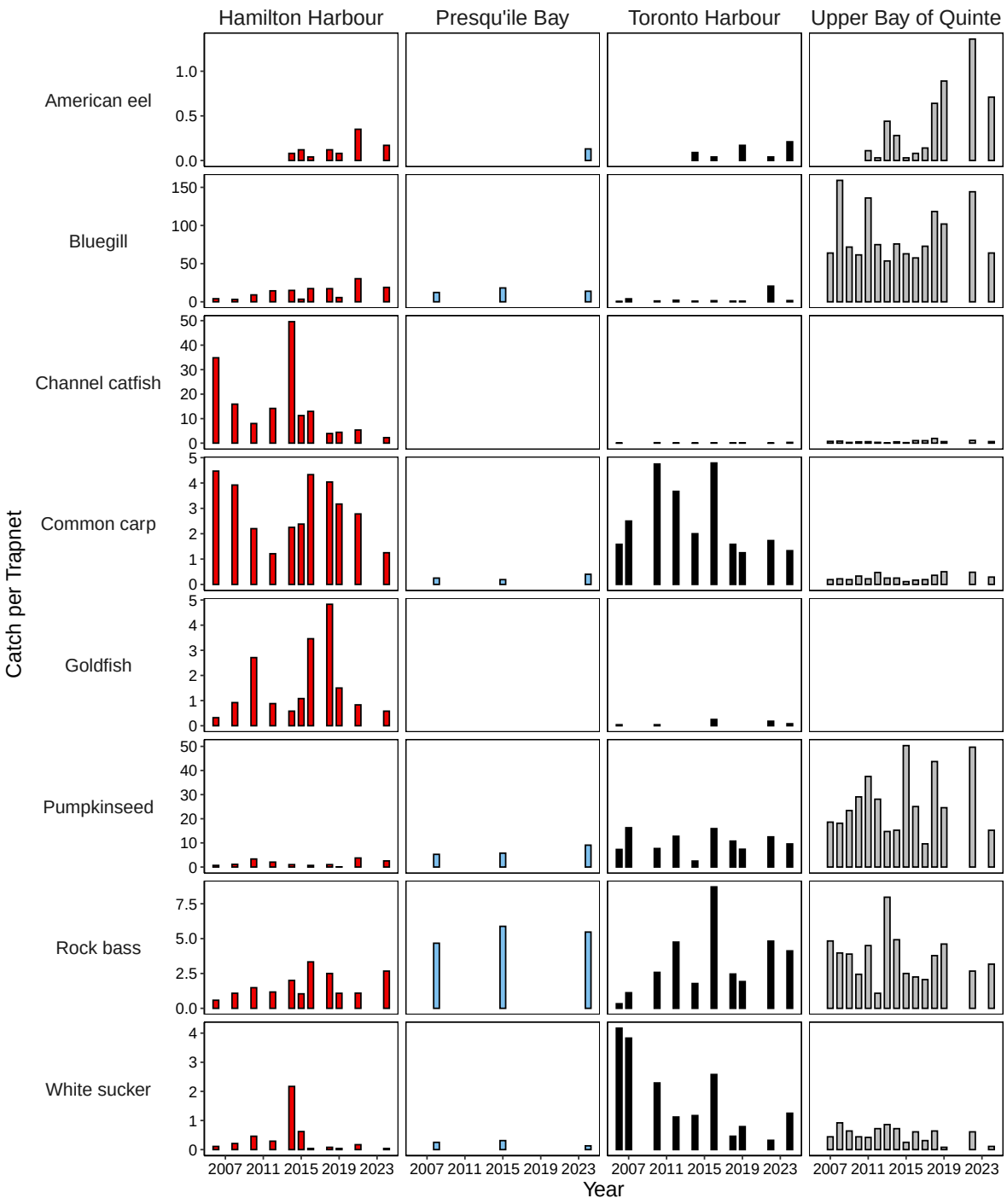


Figure 1.3.5: Abundance trends for selected species caught in nearshore trap nets in Toronto Harbour, Hamilton Harbour, Presqu'ile Bay, and the upper Bay of Quinte, 2024. Values shown are annual arithmetic means.

Ecosystem Health Indices

Indices have been developed based on NSCIN to evaluate ecosystem health in Lake Ontario nearshore areas (Hoyle and Yuille, 2016). The indices vary among nearshore areas with the degree of exposure to Lake Ontario, and therefore are presented separately for sheltered and exposed embayments.

Index of Biotic Integrity

The index of biotic integrity (IBI) is a measure of ecosystem health. IBI classes can be described as follows: 0-20 very poor, 20-40 poor, 40-60 fair, 60-80 good, and 80-100 excellent ecosystem health. The IBIs in 2024 were 53 (fair), 56 (fair), 66 (good), and 69 (good) for Toronto Harbour, Hamilton Harbour, Presqu'ile Bay, and the upper Bay of Quinte respectively. The average IBI between 2014-2024 for both Toronto and Hamilton Harbours remain below those of other Lake Ontario exposed and sheltered reference embayments respectively (Figure 1.3.6). Toronto Harbour decreased from its previous high of 61 (good) in 2022 while Hamilton Harbour increased from a 51 (fair) in 2021 and has been trending upwards since 2006 (Figure 1.3.7).

Piscivore Biomass

A proportion of the fish community biomass comprised of piscivores (PPB) greater than 0.20 reflects a healthy trophic structure. The PPBs in 2024 were 0.19, 0.31, 0.53, and 0.33 in Toronto Harbour, Hamilton Harbour, Presqu'ile Bay, and the upper Bay of Quinte respectively. While the average PPB for Toronto Harbour between 2014-2024 is above the 0.20 target, it is still lower than that of other exposed Lake Ontario embayments (Figure 1.3.8a). While Hamilton Harbour's PPB was its highest in 2024, its 2014-2024 average is below the 0.20 target (Figure 1.3.8a, Figure 1.3.9a).

Percent Specialist Biomass

A proportion of the fish community biomass comprised of specialists (PSPE) greater than 0.40 is also indicative of a healthy trophic structure. The PSPEs in 2024 were 0.24, 0.24, 0.23, and 0.49 in Toronto Harbour, Hamilton Harbour, Presqu'ile Bay, and the upper Bay of Quinte respectively. Both Toronto and Hamilton Harbours continue to have a PSPE below the 0.40 target and Hamilton remains below that of other sheltered Lake Ontario embayments (Figure 1.3.8b). Each of the embayments surveyed in 2024 have shown little change in their average PSPE since 2006 (Figure 1.3.9b).

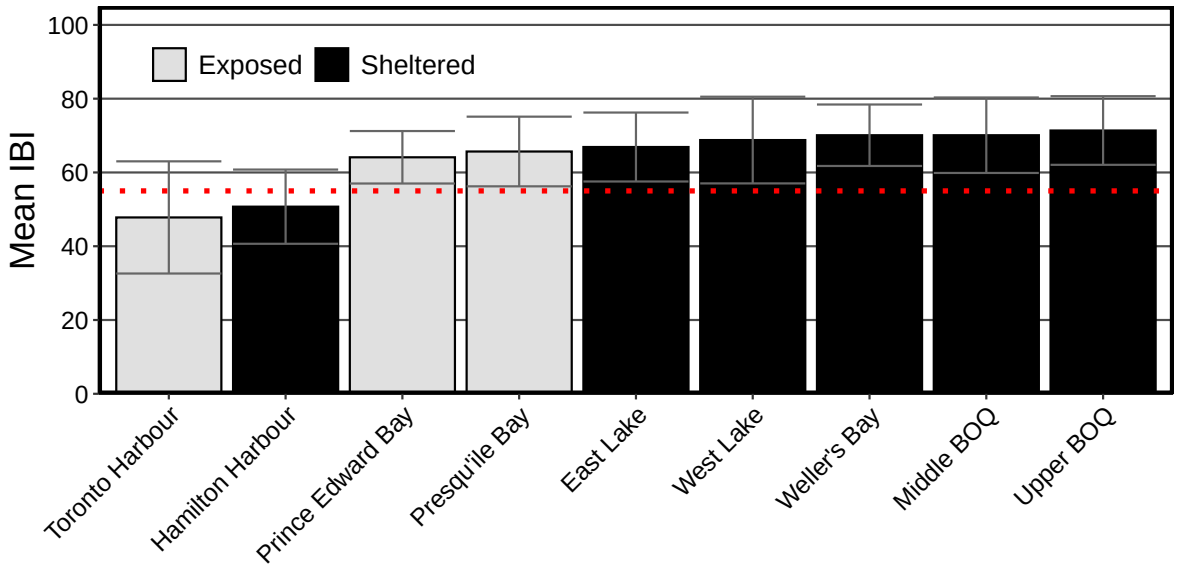


Figure 1.3.6: Index of biotic integrity (IBI), as a measure of ecosystem health, in the nearshore trap net surveys in exposed (grey) and sheltered (black) Lake Ontario embayments (2014-2024). The IBI target for Toronto Harbour is 55 (red dotted line). Error bars are +/- 2SD.

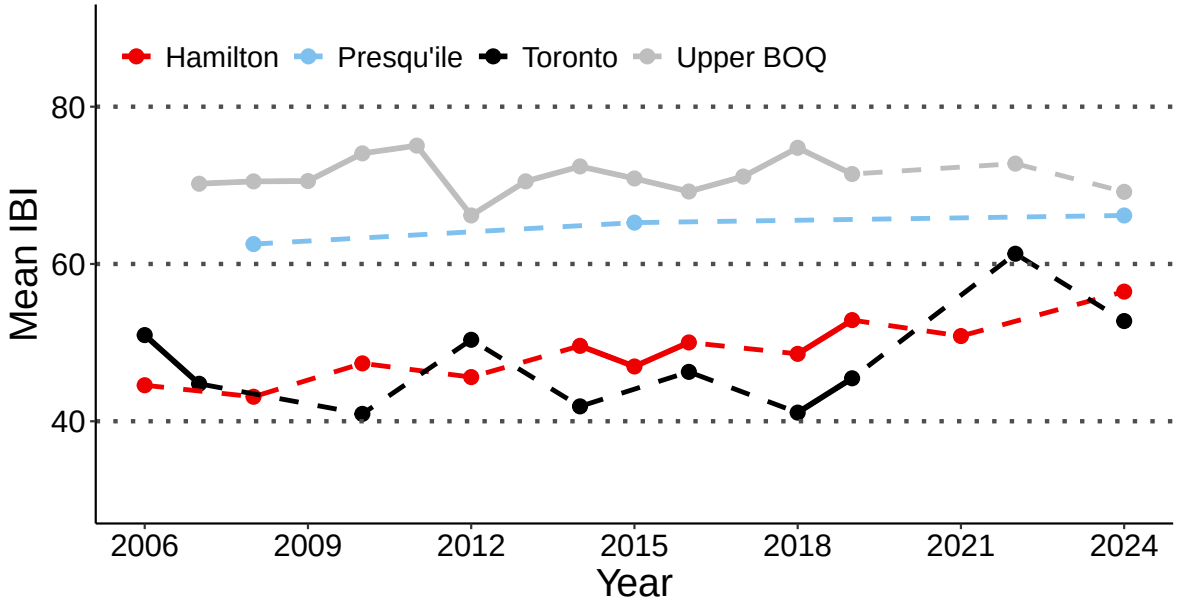
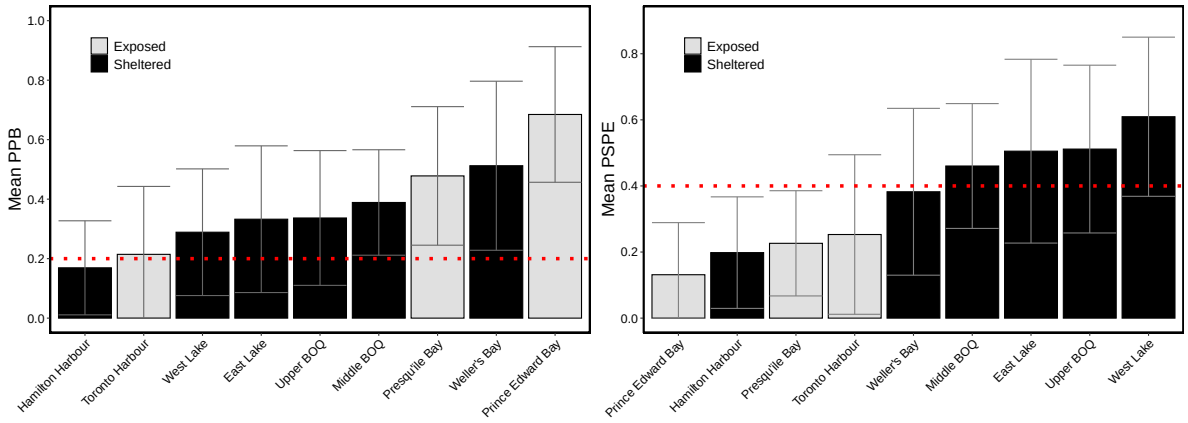


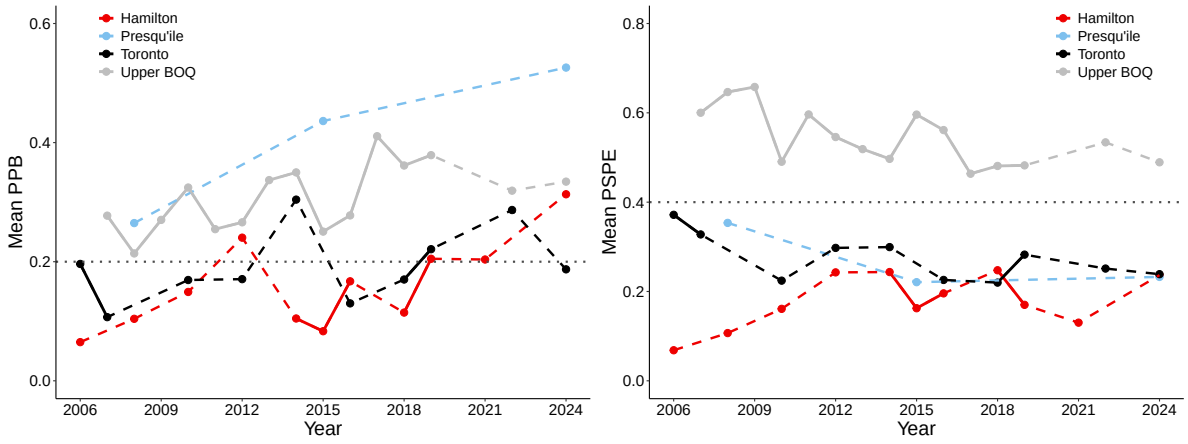
Figure 1.3.7: Index of biotic integrity (IBI) in the nearshore trap net surveys in Hamilton Harbour (red), Toronto Harbour (black), Presqu'ile Bay (blue) and the Upper Bay of Quinte (grey) through time (2006-2024). IBI classes can be described as follows: 0-20 very poor, 20-40 poor, 40-60 fair, 60-80 good, and 80-100 excellent ecosystem health.



(a) PPB

(b) PSPE

Figure 1.3.8: Proportion of (a) piscivore biomass (PPB) and (b) specialist biomass (PSPE) in the nearshore trap net surveys in exposed (grey) and sheltered (black) Lake Ontario embayments (2014-2024). A PPB of 0.20 and a PSPE of 0.40 are shown by the red dotted lines. Piscivore species included Longnose Gar, Spotted Gar, Bowfin, Northern Pike, Smallmouth Bass, Largemouth Bass, Walleye, Brown Trout, Atlantic Salmon, and American Eel. Specialist species included Alewife, Gizzard Shad, White Sucker, Redhorses, White Perch, White Bass, Rock Bass, Bluegill, Pumpkinseed, Black Crappie, Yellow Perch, and Freshwater Drum. Error bars are +/- SD.



(a) PPB

(b) PSPE

Figure 1.3.9: Proportion of (a) piscivore biomass (PPB) and (b) specialist biomass (PSPE) in the nearshore trap net surveys in Hamilton Harbour, Toronto Harbour, Presqu'ile Bay and the upper Bay of Quinte through time (2006-2024). A PPB of 0.20 and a PSPE of 0.40 is shown by the dotted lines.

Reference

Hoyle, J. A., & Yuille, M. J. (2016). Nearshore fish community assessment on Lake Ontario and the St. Lawrence River: A trap net-based index of biotic integrity. Journal of Great Lakes Research, 42(3), 687–694. https://doi.org/10.1016/j.jglr.2016.03.005

1.4 Ganaraska River Fishway Migratory Salmon and Trout Assessment

T. Gristey, Lake Ontario Management Unit

The tributaries of Lake Ontario provide spawning habitats for several migratory salmon and trout species, such as Rainbow Trout, Brown Trout, Chinook Salmon, and Coho Salmon. In spring 2016, the Lake Ontario Management Unit (LOMU) acquired new technology to count and assess fish in the Ganaraska River during their spawning migration. The Riverwatcher is an in-river fish counting system installed at the fishway at Corbett's Dam in Port Hope. Riverwatcher technology automatically counts daily observations of fish as they pass through the counting tunnel and records a silhouette image and a short, high-resolution video for each fish. The raw detection data is available online for previous years and throughout the camera's operation window. It can be accessed here: *http://www.riverwatcherdaily.is/?I=133*. After removal from the river, LOMU staff review the videos and silhouettes using the Riverwatcher software to identify species and parse out individual observations. Apart from Atlantic Salmon, the spawning runs of migratory salmon and trout are naturalized on the Ganaraska River. Monitoring and counting these fish during their spawning migration provides LOMU with an assessment index of naturalized salmon and trout populations in Lake Ontario. Understanding migration timing and patterns of these species is critical to evaluating the success of restoration efforts and annual abundance metrics. This section includes an annual summary of the reviewed Ganaraska Riverwatcher data, a species-specific breakdown of the migration run, Rainbow Trout assessment and the Chinook Salmon Spawning Index assessment program.

Ganaraska River Fish Counter (Riverwatcher)

The Ganaraska River Fish Counter was installed and operational on March 5th, 2024. The counter continued to operate through November 27th, 2024. A total of 46,353 upstream and downstream river events were recorded, with a total of 33,289 mature salmon and trout observed migrating upstream through the fishway (Figure 1.4.1). The number of events recorded is a conservative estimate. During periods of heavy rainfall, river flows increase, making the water cloudy. As the water becomes more turbid, the infrared counting sensors are not able to penetrate the water; thus, some fish could not be counted. During high flow and turbid water periods, the ability to accurately count fish as they moved through the fishway decreases. Additionally, similar to last year, high volumes of fish were migrating through the fishway in 2024, exceeding the system's ability to count them individually. This emphasizes the necessity of reviewing the recorded videos to increase the accuracy of the counts. The most active day during the 2024 monitoring season occurred on September 9th, with a total of 1,513 fish observed migrating through the fishway system throughout the day (Figure 1.4.1). Throughout the monitoring period, technicians reviewed the observations and were parsed out to identify and summarize Rainbow Trout, Chinook Salmon, Coho Salmon, Brown Trout and Atlantic Salmon observations.

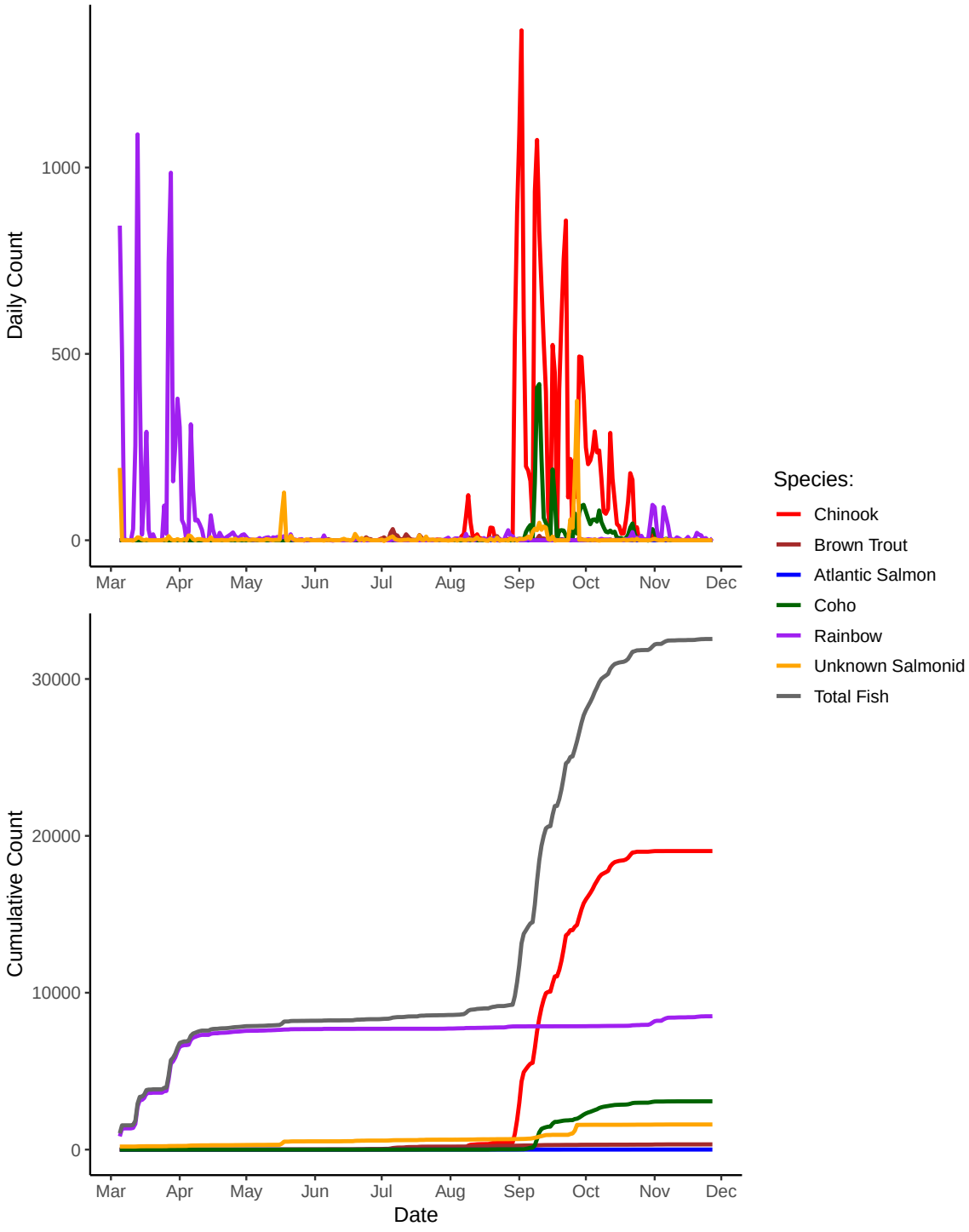


Figure 1.4.1: Total daily (top) and cumulative (bottom) observed counts of fish species at the Ganaraska River fishway at Port Hope, Ontario from March 5th to November 27th, 2024.

Rainbow Trout

The number of Rainbow Trout migrating up the Ganaraska River during spring to spawn has been estimated at the fishway on Corbett Dam, Port Hope, ON, since 1974. Before 1987, the Rainbow Trout counts at the fishway were based entirely on hand lifts and visual counts. Between 1987 and 2016, fish counts were made with a Pulsar Model 550 electronic fish counter. Based on visual counts, the Pulsar counter was 85.5% efficient, and the complete size of the run was estimated accordingly. The run was estimated using a virtual population analysis over the years without direct observations. The counter is usually operated from mid to late March until early May. Starting in 2018, the count of Rainbow Trout migrating upstream through the Corbett Dam was determined using the Riverwatcher fish counting system. The Riverwatcher actively counted and recorded fish from March 31st to May 31st, 2024, when the Rainbow Trout spawning run ended.

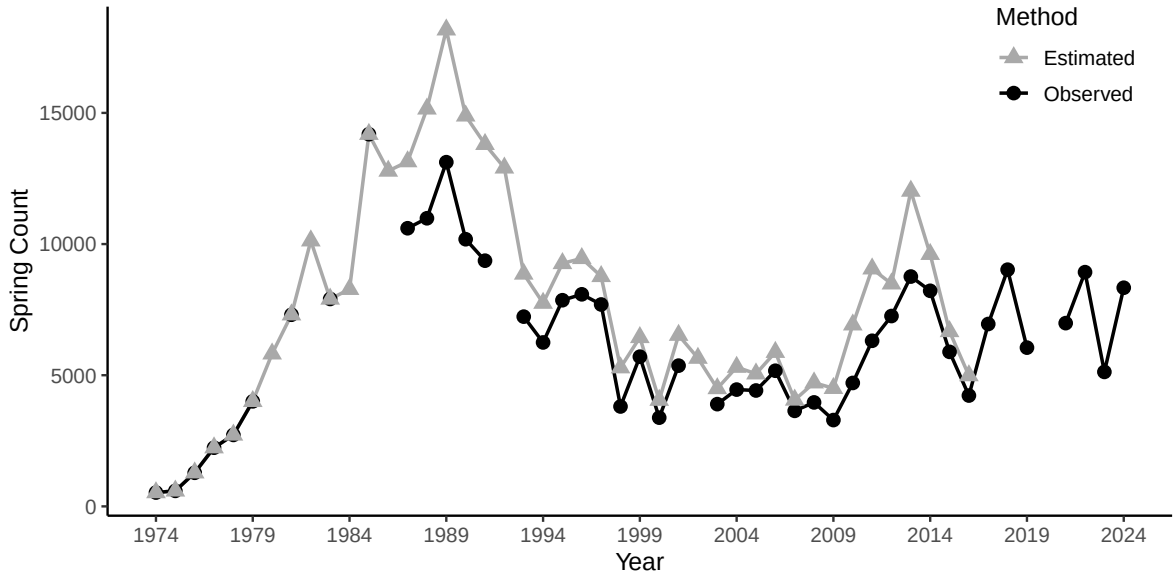


Figure 1.4.2: Estimated and observed run of Rainbow Trout at the Ganaraska River fishway at Port Hope, Ontario during spring 1974-2024.

In the spring of 2024 (March 5th to May 31st), 8,335 Rainbow Trout were observed passing through the Ganaraska Fishway (Figure 1.4.2 and Figure 1.4.3). Due to unforeseen technical difficulties with the Riverwatcher system, the spring Rainbow Trout run value should be considered a conservative estimate. The hardware issue with the infrared scanner was resolved by mid-March with a replacement using the Credit River fish counting system. The 2024 Rainbow Trout observations are above the previous 10-year average (7,016, 2020 was omitted). The observed peak number of Rainbow Trout occurred on March 13th, with 1,098 fish observed swimming upriver through the fishway. In the spring, the fishway was most active in mid-March to early April. Rainbow Trout were observed utilizing the fishway after the spring monitoring period throughout the year with another peak of observations occurring in the fall. Another 830 Rainbow Trout migrated through the fishway

after the primary spring run, making a total of 9,162 Rainbow Trout identified migrating upstream through the Ganaraska Fishway in 2024.

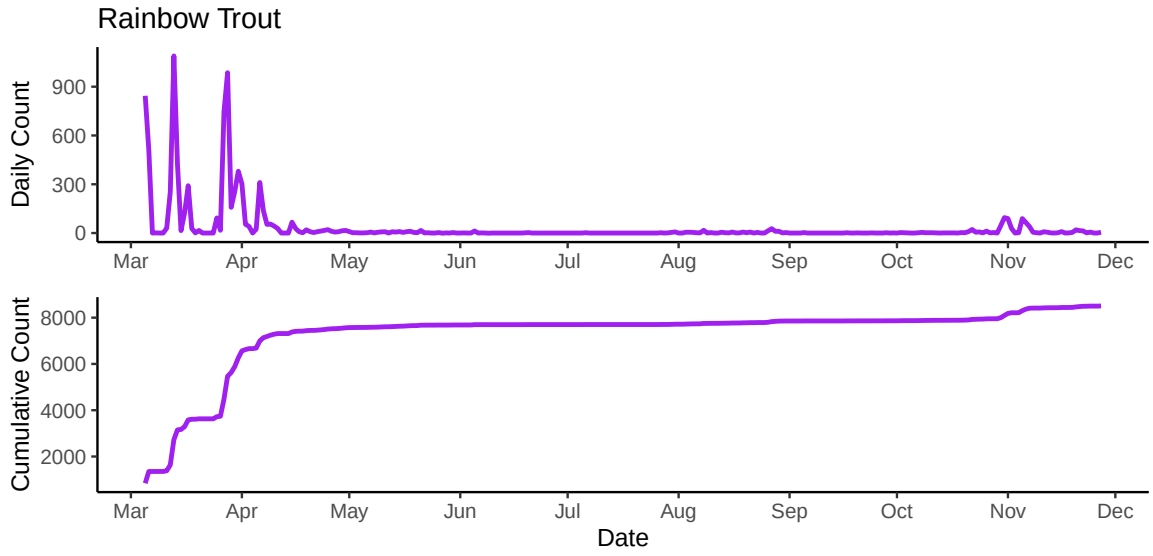


Figure 1.4.3: Daily (top) and cumulative (bottom) observed counts of Rainbow Trout at the Ganaraska River fishway at Port Hope, Ontario from March 5th to November 27th, 2024.

Rainbow Trout were measured and weighed during the spawning run most years since 1974. The estimated weight (based on a log-log regression) of a 635 mm or 25" (total length) Rainbow Trout is used as an index of condition factor. The condition factor is a fish's relative robustness or degree of well-being. Variations in a fish's condition primarily reflect the state of sexual maturity and degree of nourishment acquired throughout its lifetime. In 2024, the Rainbow Trout condition factor of males (2,386 g) slightly decreased from 2023 (2,397 g) and a larger decrease was observed for females (2,478 g) compared to 2023 condition (2,604 g). Both female and male condition is below the previous 10-year average (Figure 1.4.4).

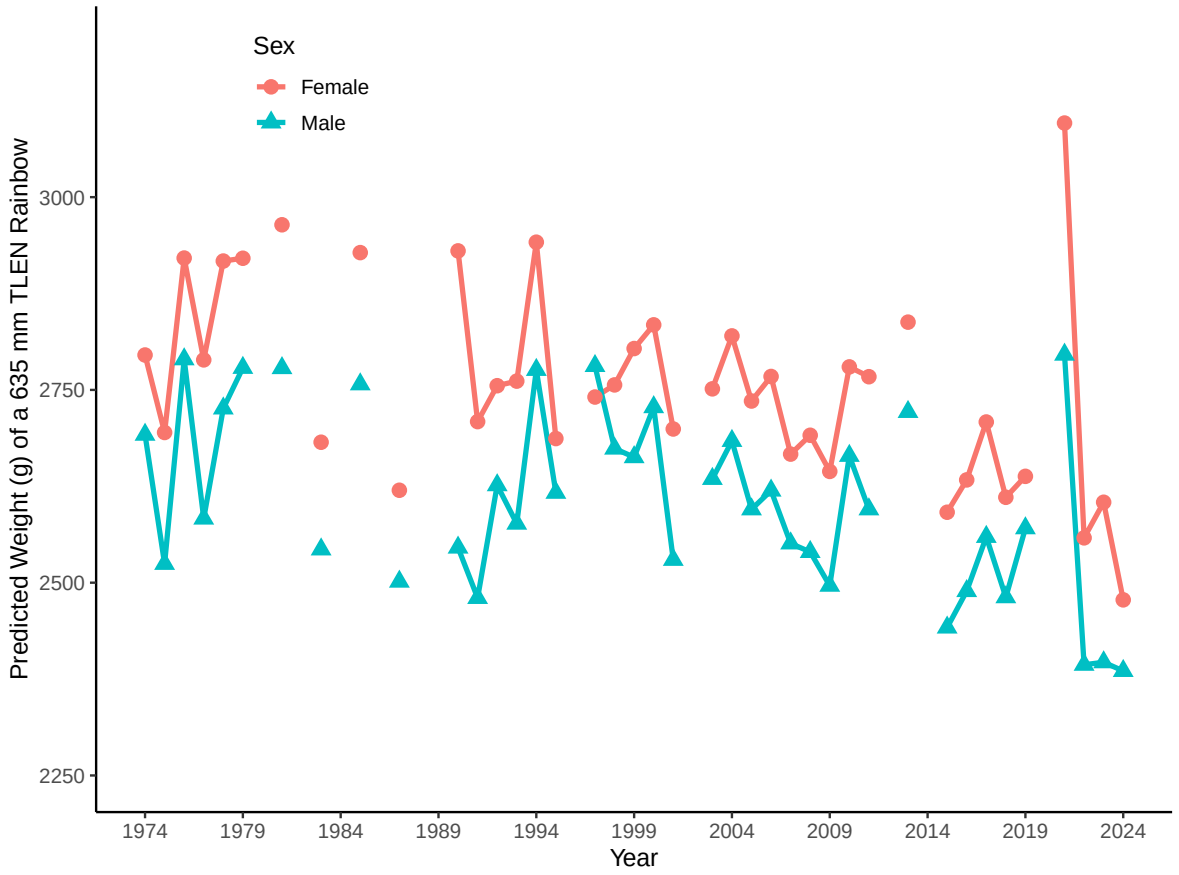


Figure 1.4.4: Body condition (estimated weight at 635 mm total length) of Rainbow Trout at the Ganaraska River fishway at Port Hope, Ontario during spring 1974-2024. Black and grey circles represent male and female Rainbow Trout (respectively).

The proportion of Rainbow Trout with Sea Lamprey marks in the Ganaraska River has been reported since 1974. In 2024, 24% of fish had Lamprey marks (wounds or scars), a decrease from 2023, which was 29%. Lamprey wounds on Ganaraska River Rainbow Trout in 2024 are above the previous 10-year average of 23%.

In addition to the Sea Lamprey assessment, technicians also visually assessed gill lice/maggots (*Salmincola spp*) infestations on Rainbow Trout. Gill lice, a small copepod, parasitizes the gills of salmon and trout. From 2018 to 2022, the survey evaluated the presence/absence of gill lice. In 2023, the severity of the infestation was graded into four levels: Absent, Light, Moderate and Heavy (Figure 1.4.6), depending on the amount of gill lice visually present on the gills. The percent of observed gill lice infestation in 2024 was 51% (n = 64/125), a decrease from 53% observed in the 2023 assessment (Figure 1.4.5). Of the 2024 gill lice infestation levels (n = 125), 35% were classified as light, 13% were considered moderate, and 3% were heavy (Figure 1.4.6).

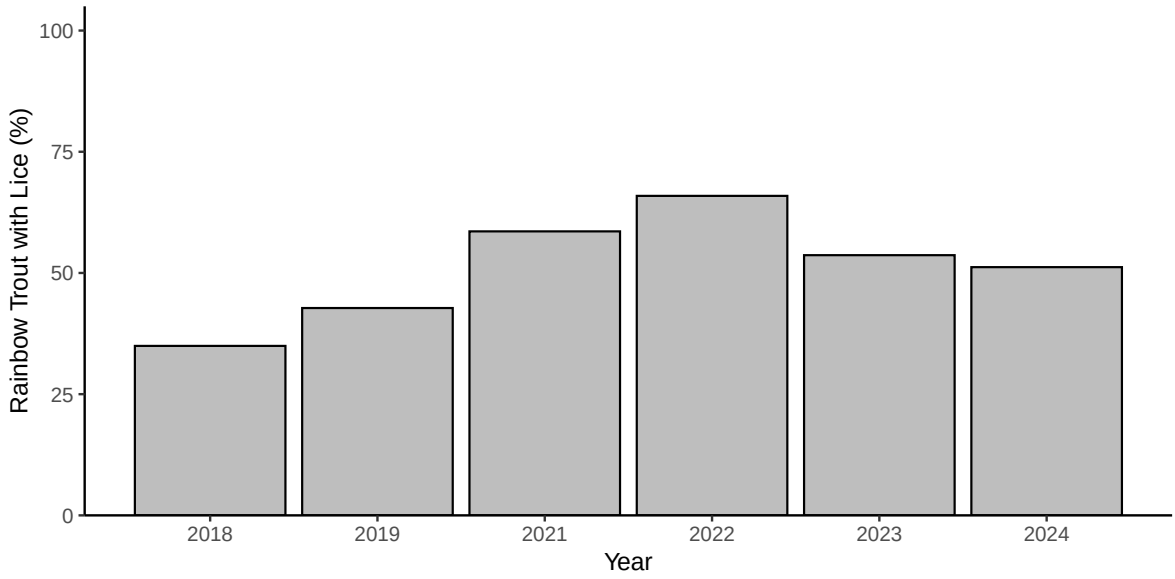


Figure 1.4.5: Percent of Rainbow Trout observed with gill lice at the Ganaraska River fishway at Port Hope, Ontario, during spring 2018-2024.

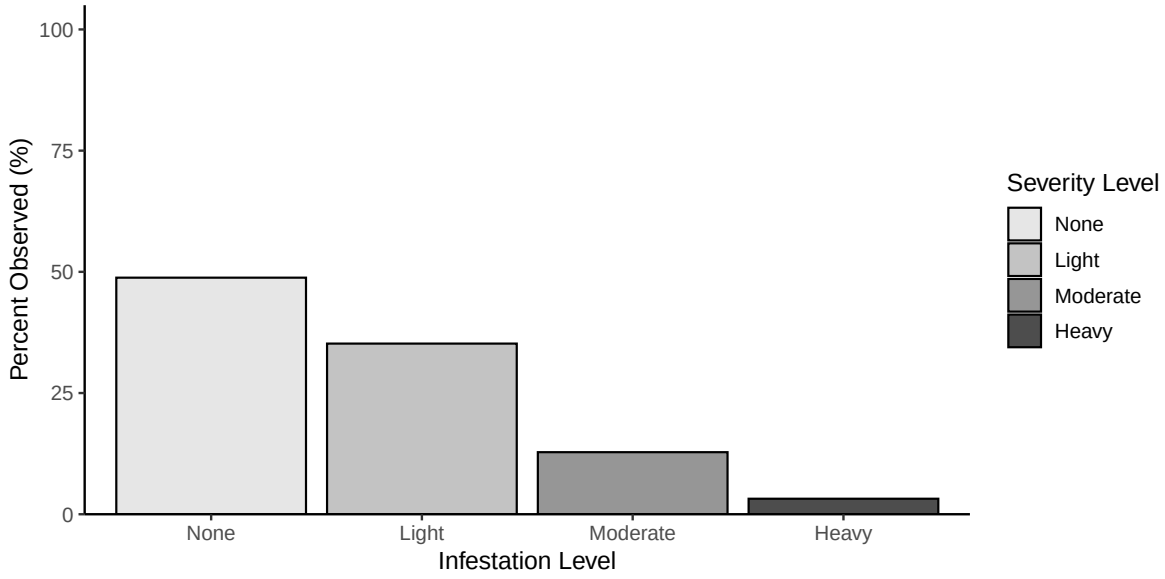


Figure 1.4.6: Gill lice severity observed in Rainbow Trout at the Ganaraska River fishway at Port Hope, Ontario, during spring 2024. The severity of the infestation was graded into four levels, Absent, Light, Moderate and Heavy.

Coho Salmon

The Coho Salmon run in 2024 began with the first fish being observed on August 19th, 2024 and continued until the last fish was observed on November 22nd, 2024. Over the course of the run, a total of 3,200 fish were counted. The peak daily migration occurred on September 10th, 2024, with 419 fish recorded passing upstream through the fishway (Figure 1.4.7).

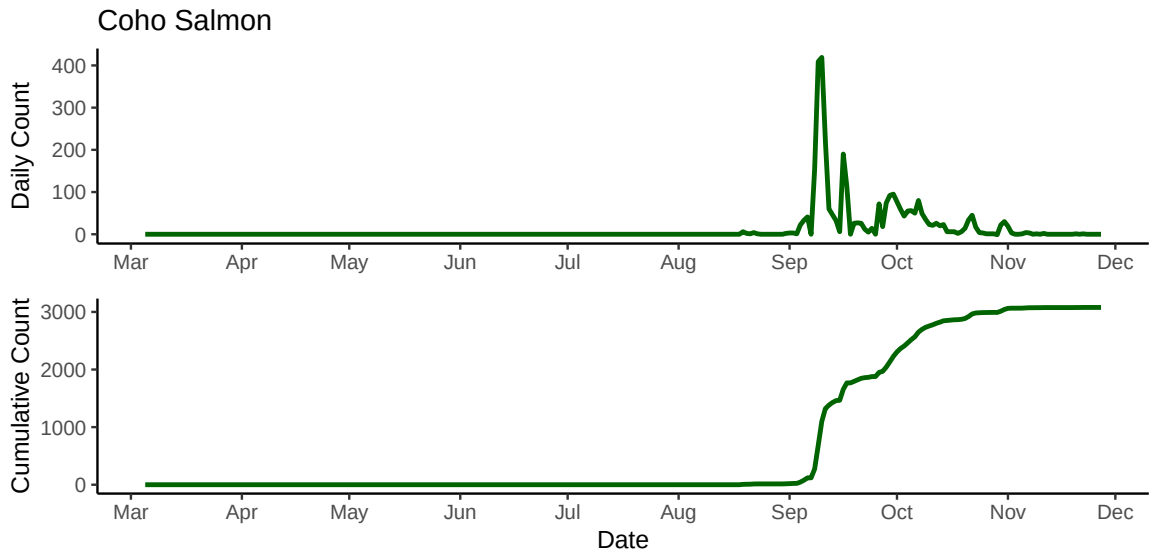


Figure 1.4.7: Daily (top) and cumulative (bottom) observed counts of Coho Salmon at the Ganaraska River fishway at Port Hope, Ontario from March 5th to November 27th, 2024.

Brown Trout

The Brown Trout run in 2024 began with the first fish being observed on April 16th, 2024 and continued until the last fish was observed on November 23rd, 2024. Over the course of the run, a total of 336 fish were counted. The peak daily migration occurred on July 6th, 2024, with 30 fish recorded passing upstream through the fishway (Figure 1.4.8).

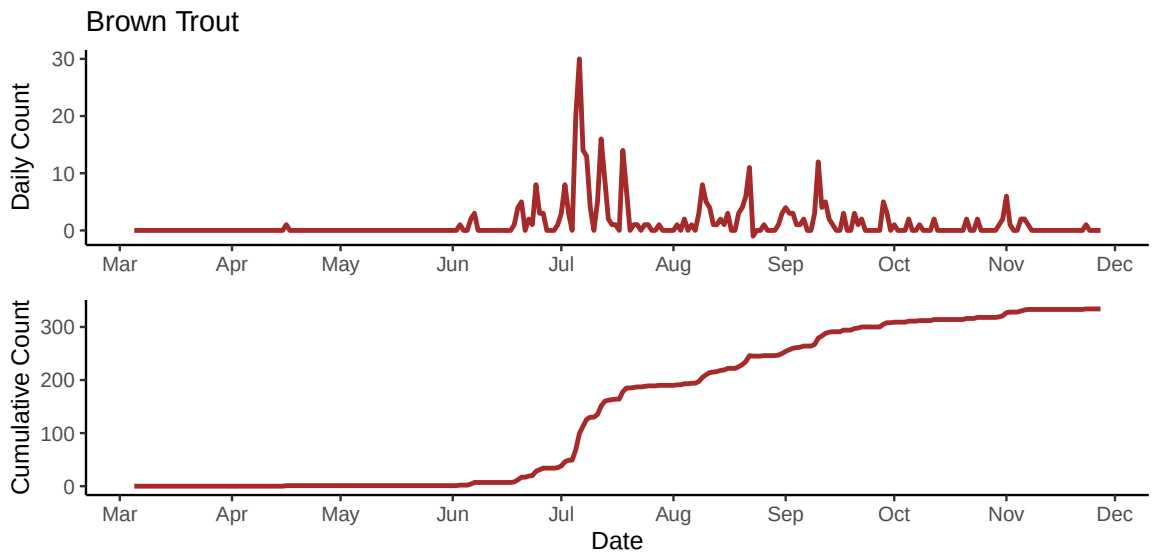


Figure 1.4.8: Daily (top) and cumulative (bottom) observed counts of Brown Trout at the Ganaraska River fishway at Port Hope, Ontario from March 5th to November 27th, 2024.

Atlantic Salmon

The Atlantic Salmon run in 2024 began with the first fish being observed on August 28th, 2024 and continued until the last fish was observed on October 22nd, 2024. Over the course of the run, a total of four fish were counted (Figure 1.4.9).

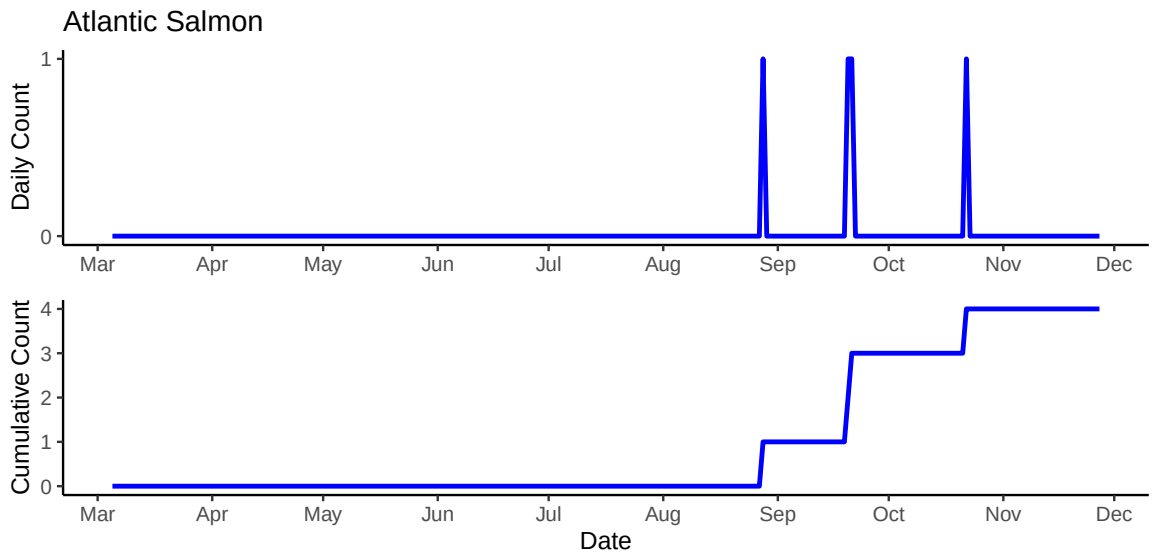


Figure 1.4.9: Daily (top) and cumulative (bottom) observed counts of Atlantic Salmon at the Ganaraska River fishway at Port Hope, Ontario from March 5th to November 27th, 2024.

Chinook Salmon

The Chinook Salmon run in 2024 began with the first fish being observed on April 9th, 2024 and two additional fish observed in May early in the season. The fall migration started in August with the majority of the run coming through in September. The last fish was observed on November 6th, 2024. Over the course of the run, a total of 19,513 fish were counted. The peak daily migration occurred on September 2nd, 2024, with 1,368 fish recorded passing upstream through the fishway (Figure 1.4.10). Detailed sampling of the Ganaraska River Chinook Salmon spawning population occurred in 2024 and the results are reported below.

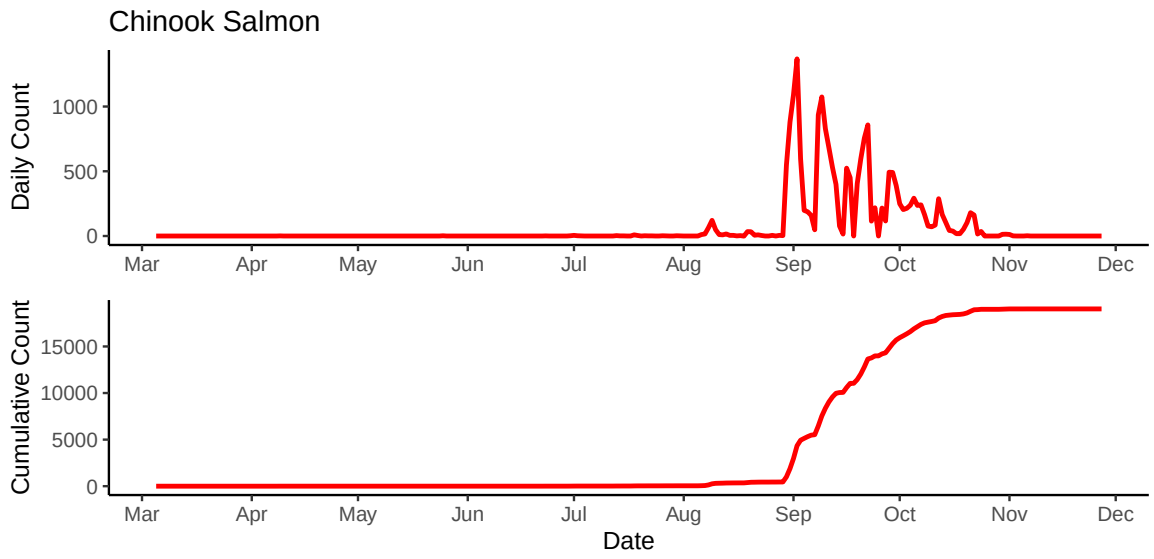


Figure 1.4.10: Daily (top) and cumulative (bottom) observed counts of Chinook Salmon at the Ganaraska River fishway at Port Hope, Ontario from March 5th to November 27th, 2024.

Historical Riverwatcher Observations

The Riverwatcher system has recorded 197,440 salmon and trout species migrating through the fishway from 2017 to 2024 (Table 1.4.1). The system has been operational for 1,846 days over the eight-year period. The total number of fish observed migrating through the fishway has increased over the years, with the highest observed count in 2023. The 2020 season was delayed due to high spring flows, resulting in a lower total count of fish observed migrating through the fishway.

Table 1.4.1: Total counts of mature salmon and trout migrating upstream through the fishway on the Ganaraska River, Port Hope, ON. Season identifies the date on which the camera system was installed each year and the row "Days" represents the total number of days monitored for that year.[1] The Riverwatcher installation was delayed in 2020 due to high spring flows.

Species	2017	2018	2019	2020	2021	2022	2023	2024	Total
All S & T	20,697	25,650	29,532	14,256	16,012	22,032	37,100	32,085	**197,364**
Rainbow	8,897	9,014	6,577	1,172	8,008	9,751	5,520	9,032	**57,971**
Chinook	8,646	9,067	19,247	8,173	5,039	8,060	28,294	19,514	**106,040**
Coho	1,325	1,550	1,834	1,702	1,462	1,991	2,491	3,201	**15,556**
Brown	149	183	297	270	161	76	160	334	**1,630**
Atlantic	0	23	8	29	4	8	15	4	**91**
Season	Mar. 28 to Nov. 8	Mar. 26 to Nov. 22	Apr. 2 to Nov. 18	May 12 to Nov 13	Mar. 24 to Nov. 9	Apr. 1 to Nov. 21	Mar. 31 to Nov. 19	Mar. 5 to Nov. 27	–
Days	225	241	230	185	230	234	233	268	**1,846**

Chinook Salmon Spawning Index

In addition to the Riverwatcher system, the fishway contains a deployable cage/basket downstream of the camera that can be removed and replaced by an overhead crane. This basket allows for the collection of fish moving through the fishway before entering the camera system. This basket was

used to intercept migrating Chinook Salmon during the 2024 fall migration. Captured fish were selected, measured, and checked for clips before detailed sampling. Detailed sampling included collecting data on size, weight, fin clips, coded-wire tags, lamprey marks, and otolith collection for age determination. This program is designed to provide a detailed analysis of the age, growth, lamprey wounds, and condition of the returning naturalized Chinook Salmon population on the Ganaraska River. It complements historical assessment programs conducted in the fall on the Ganaraska River. The fieldwork associated with the Chinook Salmon assessment started on September 18th and ran until October 10th. The program assessed 606 Chinook Salmon, 122 Coho Salmon, six Rainbow and one Brown Trout over 13 days of sampling. A total of 123 Chinook otoliths were sampled for age interpretations.

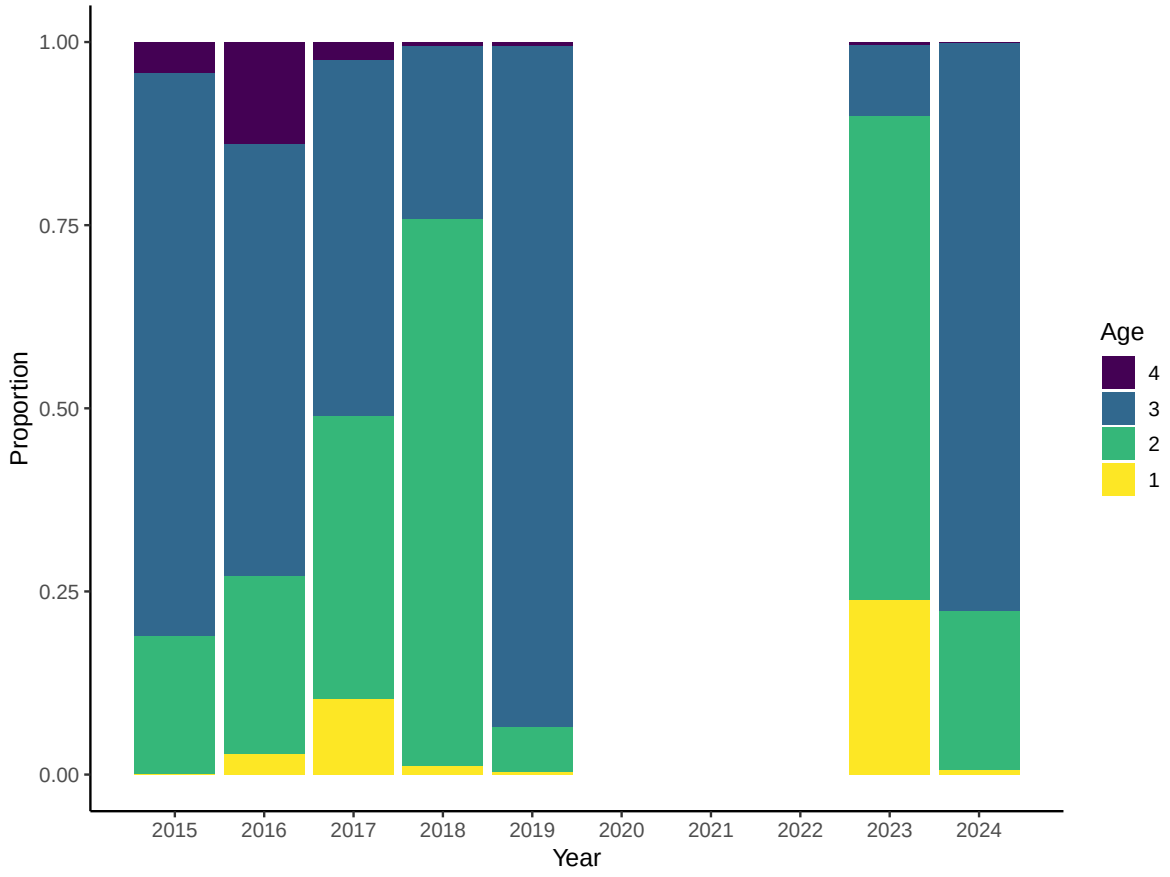


Figure 1.4.11: Age proportions of spawning Chinook Salmon (males and females pooled) sampled during the fall Ganaraska River fishway at Port Hope, Ontario. The four grey colours correspond to each age, with Age 1 = Yellow, Age 2 = Green, Age 3 = Blue, and Age 4 = Purple.

In Lake Ontario, Chinook Salmon typically return to spawn at age-2 and age-3. In 2024, 22% of the assessed Chinook were age-2, and 77% were age-3 (Figure 1.4.11). This change in age demographic

over 2023-2024 is very similar to the 2018-2019 year, with a large year class seen observed returning across multiple years.

The average fork length of Chinook Salmon for age-3 males in 2024 was 859 mm (Figure 1.4.12), which increased from observed values in 2023 (857 mm). Average fork length for age-2 males in 2024 was 753 mm, a decrease in length from 805 mm in 2023. The average fork length of an age-3 female Chinook in 2024 increased to 824mm from 814 mm in 2023. Age-2 females' average fork length in 2024 decreased to 819 mm from 837 mm in 2023.

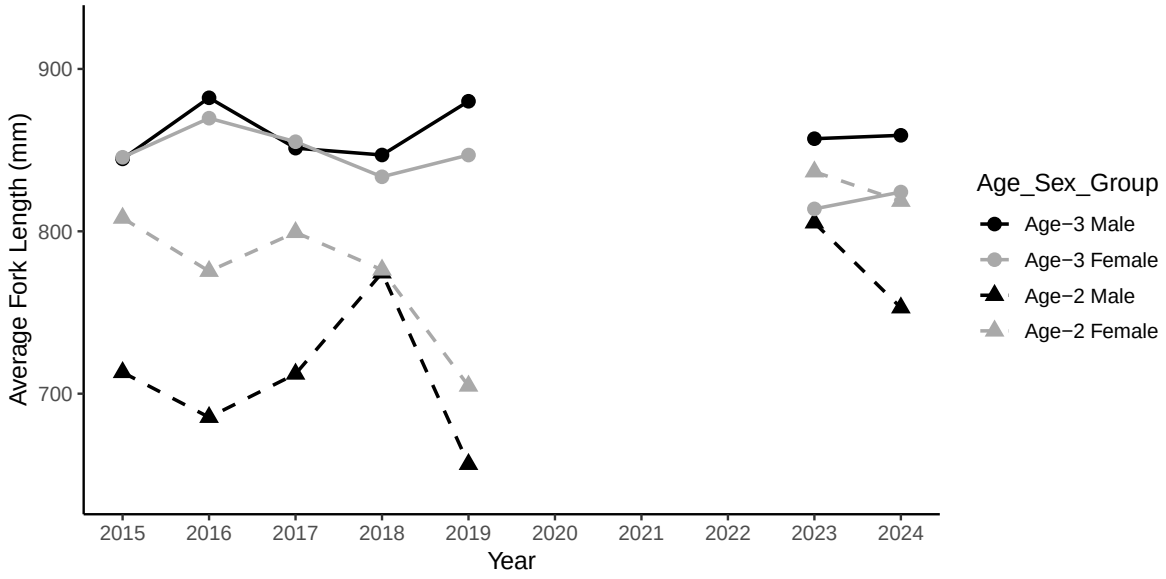


Figure 1.4.12: Mean fork length of age-2 and age-3 Chinook Salmon by sex, caught for spawn collection in the Ganaraska River fishway during the fall spawning run, 2015-2024.

The estimated weight (based on a log-log regression) of a 914mm or 36" (total length) Chinook Salmon is used as an index of condition factor (Figure 1.4.13). Female Chinook condition in 2024 (7,764 g) increased from 2023 (7,463 g), and male condition in 2024 (7,143 g) increased from 2023 (6,911 g).

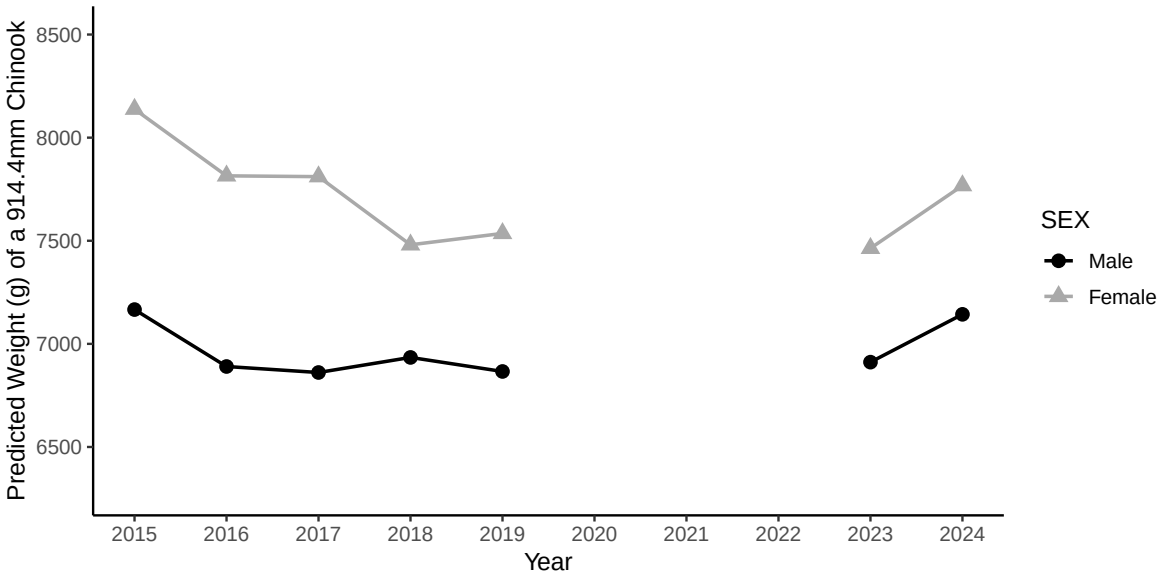


Figure 1.4.13: Condition index as the mean weight of a 914 mm / 36 inch (total length) Chinook Salmon in the Ganaraska River fishway during the spawning run, 2015-2024.

1.5 Credit River Fishway Migratory Salmon and Trout Assessment

T. Gristey, Lake Ontario Management Unit

The Credit River, below the Kraft Dam in Streetsville, has been the long-term sampling site for the Chinook Salmon gamete collection program. In August 2018, the Lake Ontario Management Unit completed infrastructure upgrades and construction on the Streetsville Fishway. During upgrades, a second Riverwatcher Fish Counting System was installed to assess migratory trout and salmon in the Credit River. For 2024, the Credit River Riverwatcher was operational on May 22nd 2024, and continued to collect data through November 26th. The following section includes a summary of the Credit River Riverwatcher data (available at www.riverwatcherdaily.is?I=143) along with the annual Credit River Chinook Salmon Spawning Index.

Pre-2018, the Streetsville Fishway was closed in the fall, effectively blocking all fish passage from mid-September to the end of the Chinook Salmon Egg Collection (see below). The Aurora District implemented experimental selective passage trials in 2018 using fishway jump height (see: LOMU 2018 Annual Report), whereby the fishway was left open. However, jump heights were manipulated to facilitate the passage of migratory salmonids with superior jumping abilities. Selective passage using jump height was abandoned by the district in 2019, and the district did not close the fishway, allowing LOMU to monitor and quantify the migratory salmon and trout spawning run for an entire ice-free season.

This section includes an annual summary of the reviewed Credit River Riverwatcher data, a species-specific breakdown of the spawning migration run, and the Credit River Chinook Salmon Spawning Index

Credit River Fish Counter (Riverwatcher)

The Credit River Riverwatcher was initially installed at the exit of the Streetsville Fishway in March, 2024. However, the system was not operational during the spring because the scanner unit was temporarily relocated to the Ganaraska River, where the existing scanner had gone offline and required replacement. The Credit system became fully operational again on May 22nd 2024, continuing through to its removal on November 26th, 2024. This in-river fish counter technology automatically counts fish as they pass through the counting tunnel and records a silhouette image and a short, high-resolution video for each fish. After reinstallation, data were uploaded to the Riverwatcher Daily website every hour. The camera made 11,815 observations, of which 9,662 were upriver movement detections. After reviewing the data, 6,854 mature salmon and trout were observed moving upstream through the Streetsville Fishway (Figure 1.5.1).

During heavy rainfall, river flows increase, making the water cloudy. As the water becomes less clear, the light from the infrared counting sensors cannot penetrate through the water, impacting the system's ability to detect movement. During these periods of high flow and turbid water, the system does not have the capacity to count fish as they move through the fishway. Additionally, during the monitoring period, the volume of fish moving through the fish counter can exceed the system's ability to count them individually.

September 26th, 2024, marked the most active day on the Streetsville Fishway with a total of 625 salmon and trout observed migrating upstream through the Riverwatcher (Figure 1.5.1). Throughout the monitoring period, data on Rainbow Trout, Chinook Salmon, Coho Salmon, Brown Trout and Atlantic Salmon were collected. The following paragraphs provide species-specific observations.

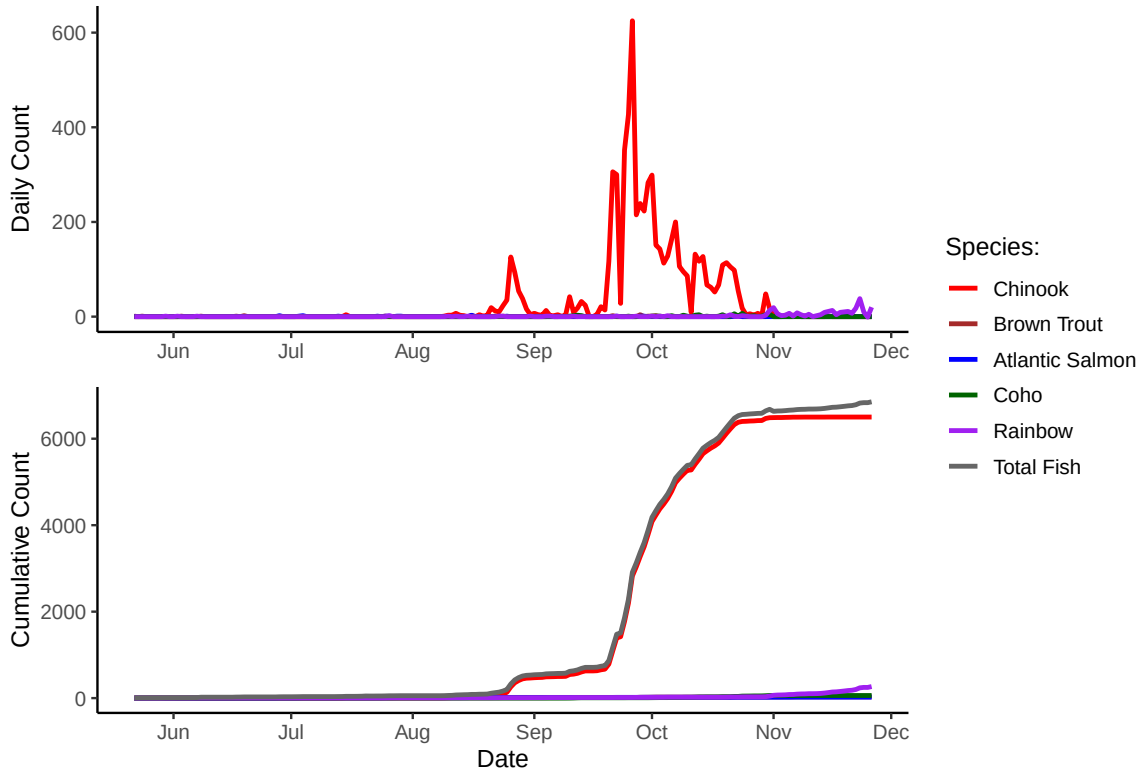


Figure 1.5.1: Total daily (top) and cumulative (bottom) observed counts of fish species at the Streetsville Fishway on the Credit River from May 22nd to November 26th, 2024.

Rainbow Trout

The spring Rainbow Trout migration tends to occur early in the year, from March to early May. Due to the system being offline, the system only captured the fall migration of Rainbow Trout for the 2024 season (Figure 1.5.2). A total of 267 Rainbow Trout were identified migrating upstream through the Streetsville Fishway from May 22nd 2024, to November 26th, 2024. The peak daily observations of Rainbow Trout occurred on November 23rd, with a total of 38 fish observed swimming up the fishway.

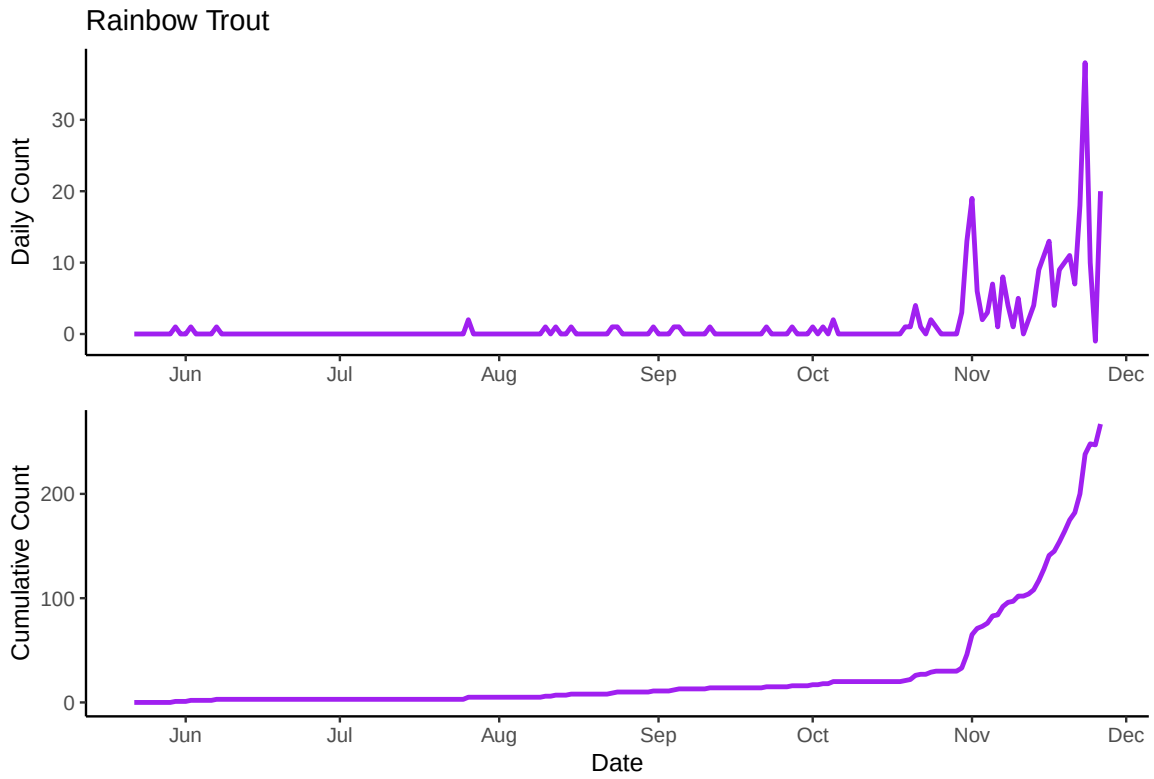


Figure 1.5.2: Total daily (top) and cumulative (bottom) observed counts of Rainbow Trout at the Streetsville Fishway on the Credit River from May 22nd to November 26th, 2024.

Coho Salmon

A total of 60 Coho Salmon were identified exiting the Streetsville Fishway upriver (Figure 1.5.3).The first Coho Salmon observed at the Streetsville Fishway in 2024 was on September 10th. The last Coho Salmon observed moving through the Streetsville Fishway was on October 31st. The most active day for Coho migration through the fishway occurred on October 24th, with a total of seven Coho observed.

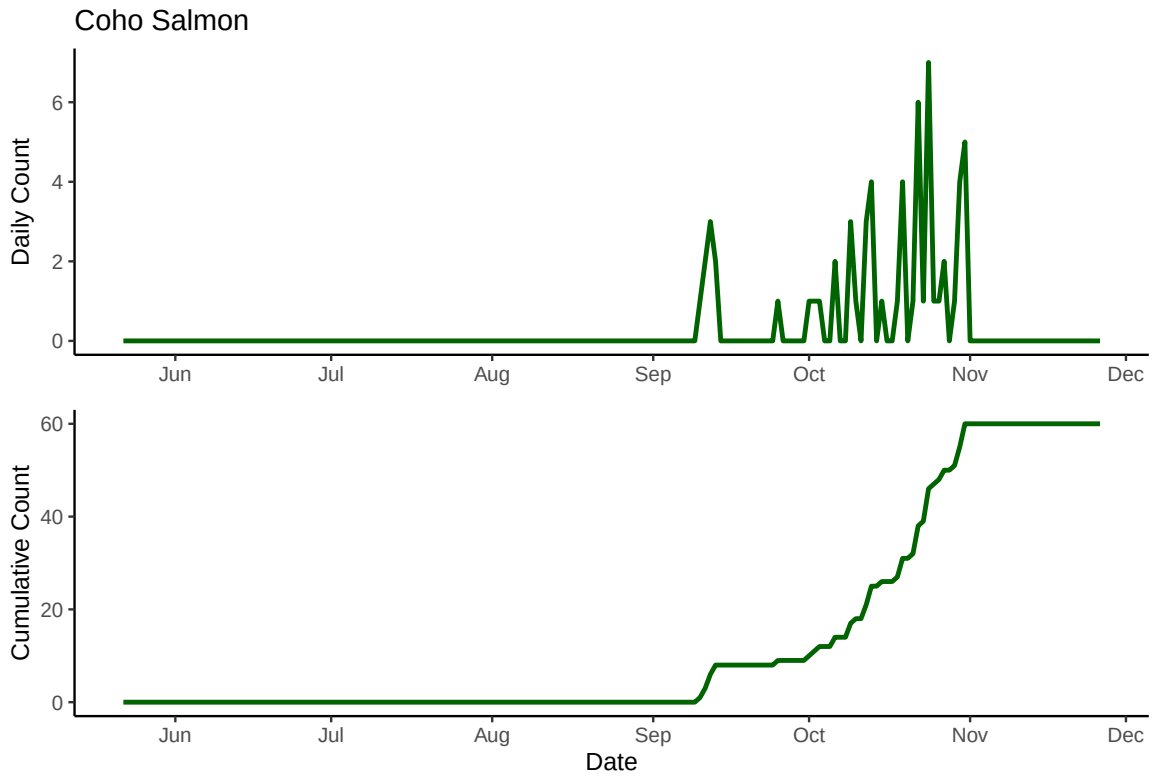


Figure 1.5.3: Daily (top) and cumulative (bottom) observed counts of Coho Salmon at the Streetsville Fishway on the Credit River from May 22nd to November 26th, 2024.

Brown Trout

The Brown Trout run in 2024 began with the first fish being observed on May 22nd, and continued until the last fish was observed on November 7th (Figure 1.5.4). Over the course of the run, a total of 28 fish were counted. The peak daily migration occurred on September 28th, 2024, with four fish recorded passing upstream through the fishway.

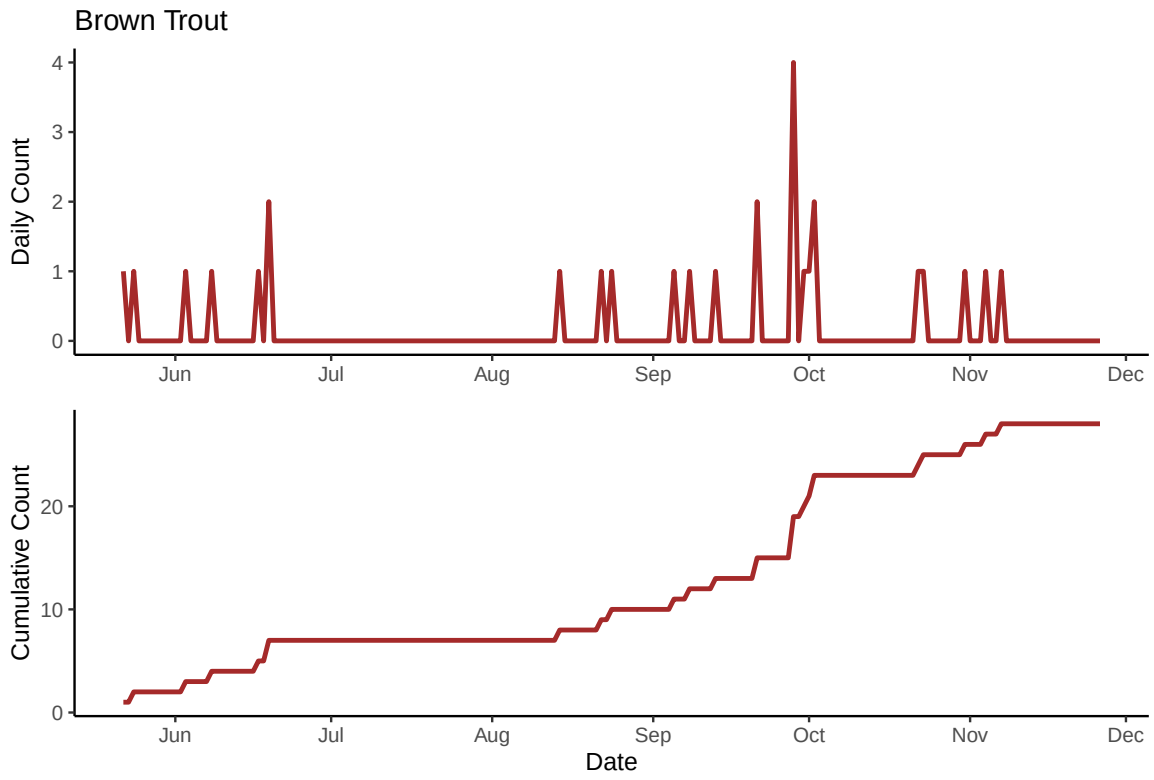


Figure 1.5.4: Daily (top) and cumulative (bottom) observed counts of Brown Trout at the Streetsville Fishway on the Credit River from May 22nd to November 26th, 2024.

Atlantic Salmon

The Atlantic Salmon run in 2024 began with the first fish being observed on June 28th, 2024 and continued until the last fish was observed on November 7th, 2024. Over the course of the run, a total of 23 fish were counted (Figure 1.5.5). The peak daily migration occurred on August 16th, 2024, with three fish recorded passing upstream through the fishway. In addition to the Riverwatcher observations, two Atlantic Salmon were also collected and sampled during the Chinook Salmon Spawning Index. The sampling included collecting fin clips for genetic analysis and complete biological sampling. These sampled Atlantic Salmon may contribute to the total observations made by the camera system.

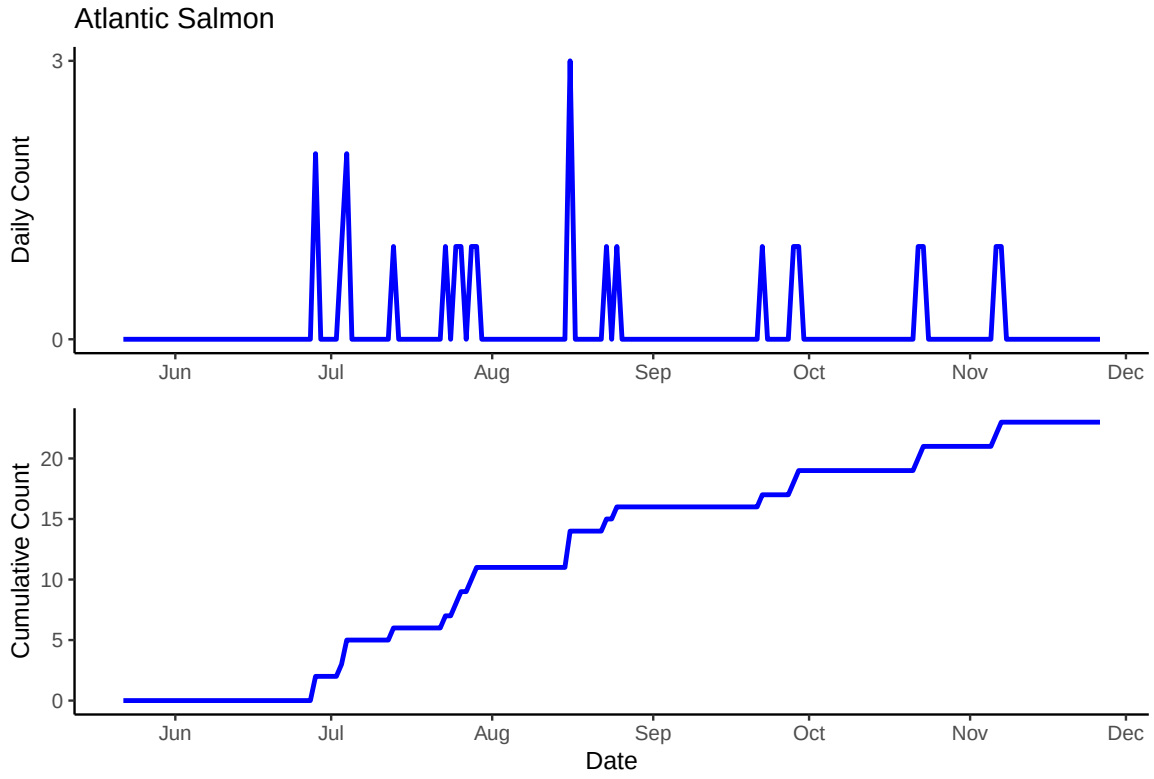


Figure 1.5.5: Daily (top) and cumulative (bottom) observed counts of Atlantic Salmon at the Streetsville Fishway on the Credit River from May 22nd to November 26th, 2024.

Chinook Salmon

A total of 6,501 Chinook Salmon were identified migrating upstream through the Riverwatcher in 2024. The first Chinook Salmon was observed on July 15th, 2024, and the last on November 15th, 2024 (Figure 1.5.6). The most active day for fish observed swimming through the counter occurred on September 26th, with 625 Chinook observed.

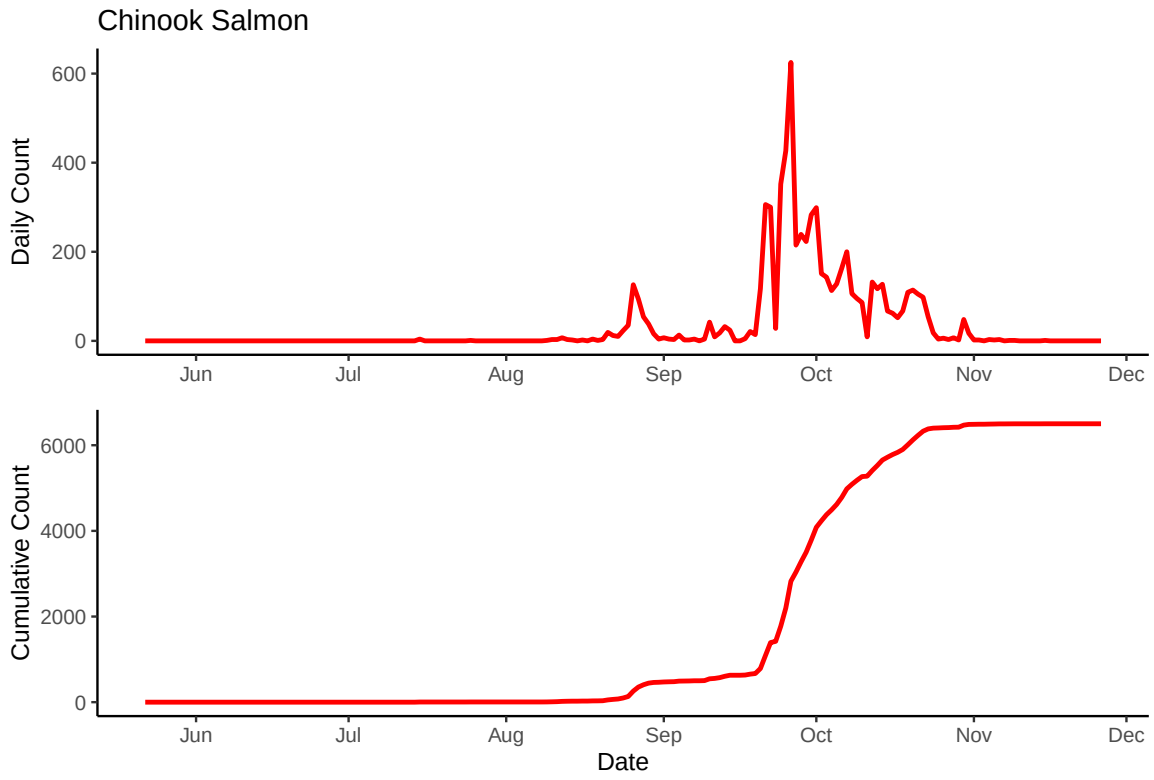


Figure 1.5.6: Daily (top) and cumulative (bottom) observed counts of Chinook Salmon at the Streetsville fishway on the Credit River from May 22nd to November 26th, 2024.

Credit River Chinook Salmon Spawning Index

Each year, at the beginning of October, Chinook Salmon are captured during the fall spawning run on the Credit River, below Streetsville Dam, using electrofishing gear for gamete collections. LOMU staff have utilized the fish collections to index the growth, condition, and lamprey marking of Chinook Salmon. The Credit River Chinook Salmon Spawning Index program ran between September 26 and October 13 with eight sampling days. Length measurements were taken on 300 Chinook Salmon (non-detailed sampling) and a further 563 fish detailed sampling occurred. Otoliths are collected from the fish used in the gamete collection, which has the potential to be biased toward larger fish. A representative length sample of the spawning population was further sampled to mitigate this bias.

The representative sample was completed by sampling 50 fish per day, which were randomly selected, measured, and checked for clips before fish were sorted for spawn collection and detailed sampling. Detailed sampling included collecting data on length, weight, fin clips, coded-wire tag (CWT), and lamprey marks, with a further subsample also having otoliths collected for age determination.

In Lake Ontario, Chinook Salmon typically return to spawn at age-2 and age-3, with some age-4 observed. In 2024, 87% of the Chinook were age-3, and 7% were age-2 (Figure 1.5.7). This increase of age-3 could correspond with the strong year class observed by last year's age-2 fish.

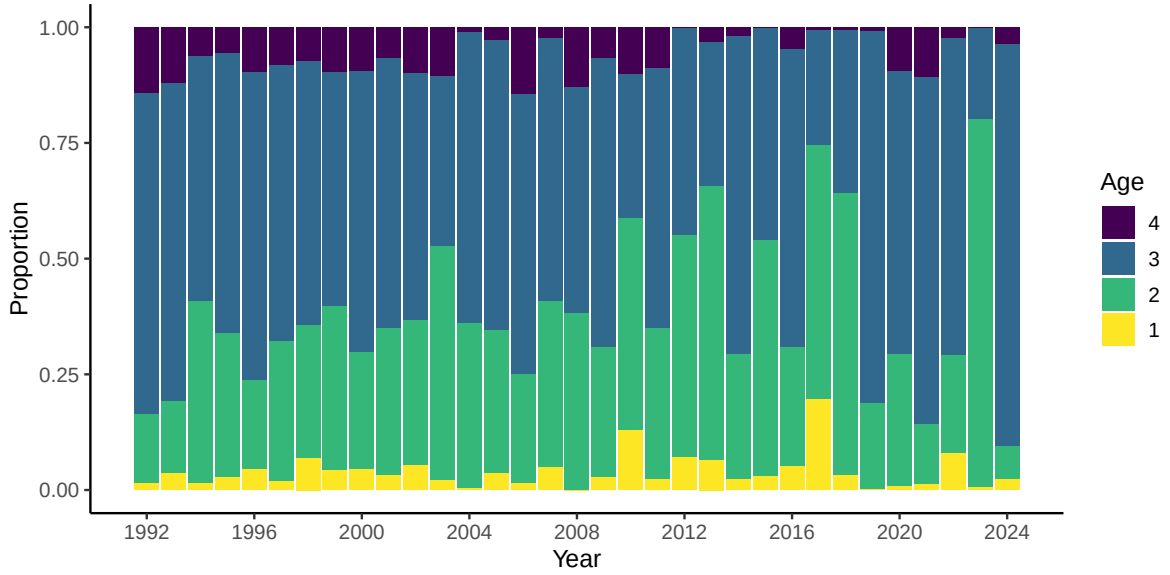


Figure 1.5.7: Age proportions of spawning Chinook Salmon (males and females pooled) sampled during the Chinook Salmon assessment on the Credit River. The four colours correspond to each age, with Age 1 = Yellow, Age 2 = Green, Age 3 = Blue, and Age 4 = Purple.

In 2024, the average fork length of Chinook Salmon for age-3 males was 849 mm, which decreased from observed values in 2023 (865 mm | Figure 1.5.8). The average fork length for age-2 males in 2024 was 769 mm, an increase from 757 mm in 2023. The average fork length of an age-3 female Chinook in 2024 decreased to 831 mm from 861 mm in 2023, while the fork length of age-2 females decreased to 823 mm from 771 mm in 2023.

The estimated weight (based on a log-log regression) of a 914mm or 36" (total length) Chinook Salmon is used as an index of condition. In 2024, both male and female condition measures increased from 2023 (Figure 1.5.9). Female condition in 2024 (7,782 g) showed an increase from 2023 (7,275 g). However, it is below the previous 10-year average (7,608 g). Male condition in 2024 (7,258 g) increased from 2022 (7,228 g) and is above the previous 10-year average (7,209 g).

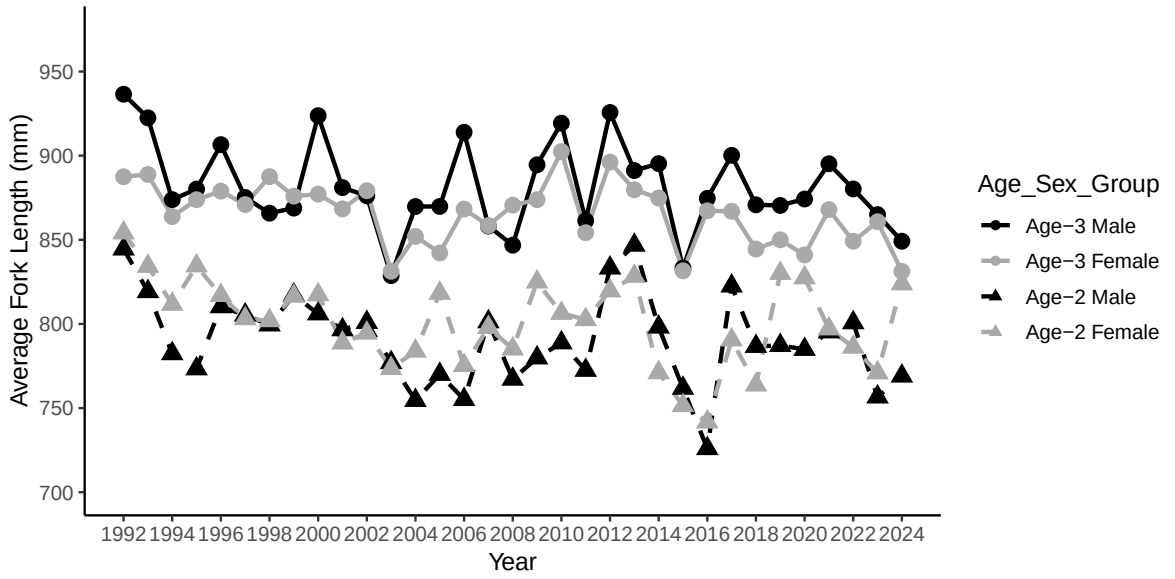


Figure 1.5.8: Mean fork length of age-2 and age-3 Chinook Salmon by sex, caught for spawn collection in the Credit River during the Chinook Salmon Assessment, 2015-2024.

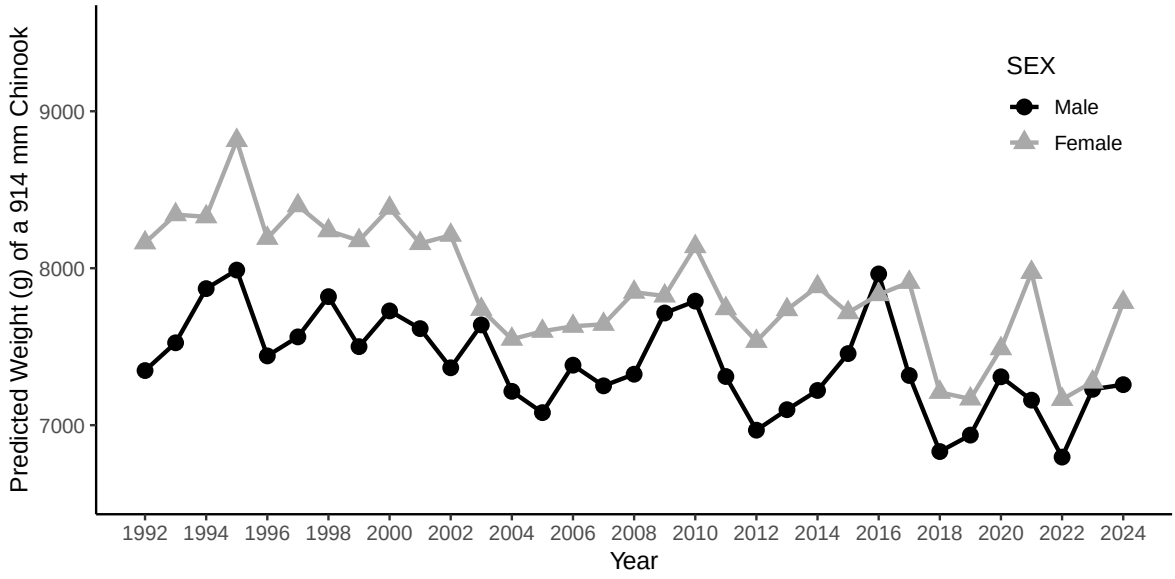


Figure 1.5.9: Condition index as the mean weight of a 914 mm / 36 inch (total length) Chinook Salmon in the Credit River during the spawning run, 2015-2024.

1.6 Lake Ontario Spring Prey Fish Assessment

J. Holden, Lake Ontario Management Unit

Since 1978 the New York State Department of Environmental Conservation (NYSDEC) and the U.S. Geological Survey (USGS) have annually conducted 100-120 bottom trawl tows, primarily in US waters in April, to provide an index of Alewife abundance as well as biological attributes such as age distribution and body condition. As the dominant prey species in Lake Ontario, understanding Alewife abundance and age structure is important for assessing predator-prey balance and establishing stocking levels of predator species (i.e. Chinook Salmon, Lake Trout).

Since 2016, the survey has been expanded to Canadian waters with the Ontario Ministry of Natural Resources (OMNR) trawling a portion of the Canadian sites (Figure 1.6.1). A total of 68 sites were sampled by the OMNR vessel in 2024 spanning bottom depths from 8.1 - 159.9 m between March 25 and April 26. A total of 19 species were captured in the survey.

The survey generally samples depths in proportion to the lake area however there are differences in how those samples are distributed between depths and jurisdictions. The south shore has well distributed coverage of depths between 8-200m that can be surveyed at multiple transects. Bottom trawling along the north shore is less uniform due to a lack of suitable soft sediment trawl sites at shallower depths. Attempts to trawl at depths shallower than 80m in the main basin have consistently resulted in snags and torn trawls. During the day, in early spring, most Lake Ontario Alewife are found near the lake bottom in the warmer, deeper water (75m – 150m) thus trawl sites at depths greater than 80m provide suitable index sites for Alewife. Additionally, shallow tows (<40m) in Ontario waters occur disproportionately in the Kingston Basin. Efforts continue to identify suitable trawl locations along the north shore habitats of the main lake. In 2024, two new main lake transects were added as well as additional sites throughout the lower Bay of Quinte.

All vessels followed a standard trawl protocol that utilized a polypropylene mesh bottom trawl referred to as “3N1” (see Table 1.6.1 for trawl dimensions) equipped with rubber discs that elevate the footrope off bottom to minimize catches of Dreissenid mussels. NYSDEC and USGS vessels used USA Jet slotted, metal, cambered trawl doors (1.22m x 0.75m) while OMNR used comparable Thyborne doors to spread the trawl. Trawl mensuration gear was used to record door spread, bottom time and headrope depth. Sampling protocol seeks a target tow time of five minutes but actual bottom time is known to vary with depth.

Sites were further expanded in 2019 to include more embayments throughout the lake. Within Ontario waters, the majority of these sites were within the Bay of Quinte. Throughout the survey, Alewife were the most abundant species caught (n = 148886) followed by Deepwater sculpin (n = 9171); and Yellow perch (n = 2603). Full catch data are presented in Table 1.6.2.

The Lake Ontario Spring Prey Fish Survey is a subset of a binational prey fish assessment program. The complete data set is available through the Ontario Open Data Catalogue (https://data.ontario.ca/en/dataset/lake-ontario-prey-fish-trawl-data). The binational report is available at (https://www.glfc.

org/pubs/lake_committees/common_docs/Weidel_etal_2024_LkOntarioAprilPreyfishAlewifeReport.pdf).

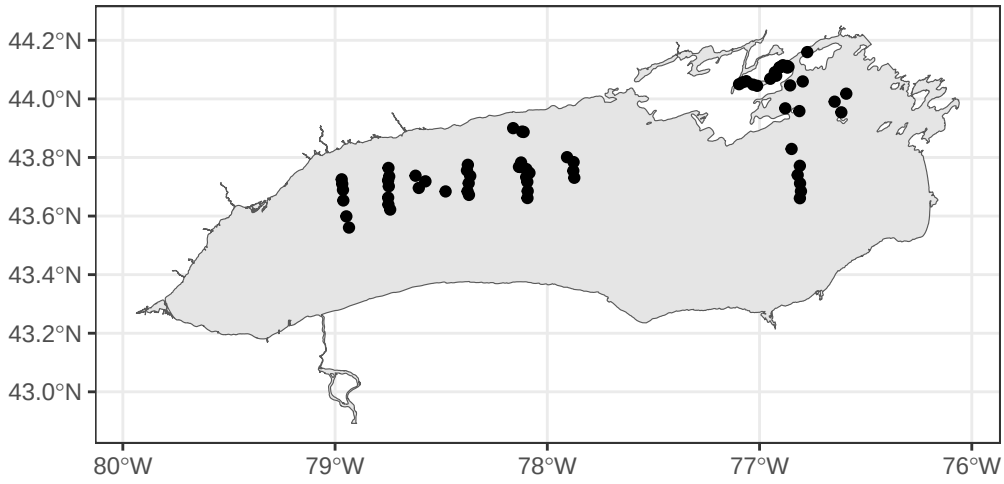


Figure 1.6.1: Tow sites conducted in the Ontario waters of Lake Ontario by the MNR vessel Ontario Explorer during the Spring Prey Fish Survey. Additional sites in the US and in Canada were conducted by USGS and NYSDEC.

Table 1.6.1: 3N1 bottom trawl gear description used in the spring survey by the MNR vessel Ontario Explorer

Component	Description
Headrope length	20 m
Footrope length	22 m
Cod end mesh	15.2 mm knotless mesh
Gear height	3.5 m
Cookie sweeps	100 mm rubber discs 0.3m below footrope
Trawl door weight	125 kg
Door area	0.93 sq. m
Door height	1.2 m

Table 1.6.2: Species composition across all trawl sites conducted in Ontario waters by the MNR vessel Ontario Explorer during the Spring Prey Fish Survey.

Species	Scientific Name	Total Catch	Total Weight (kg)	Frequency of occurrence
Alewife	*Alosa pseudoharengus*	148,886	3452	45
Deepwater Sculpin	*Myoxocephalus thompsoni*	9,171	218	37
Yellow Perch	*Perca flavescens*	2,603	21	15
Rainbow Smelt	*Osmerus mordax*	2,234	20	54
Round Goby	*Neogobius melanostomus*	275	1	15
Threespine Stickleback	*Gasterosteus aculeatus*	248	1	24
Trout-Perch	*Percopsis omiscomaycus*	137	1	4
White Perch	*Morone americanus*	109	2	10
Lake Whitefish	*Coregonus clupeaformis*	62	6	6
Slimy Sculpin	*Cottus cognatus*	15	0	9
Walleye	*Stizostedion vitreum vitreum*	12	5	2
Cisco (Lake Herring)	*Coregonus (Leucichthys) artedi*	10	1	5
Spottail Shiner	*Notropis hudsonius*	7	0	2
Freshwater Drum	*Aplodinotus grunniens*	5	4	3
Pumpkinseed	*Lepomis gibbosus*	4	0	2
Brown Bullhead	*Ictalurus nebulosus*	2	1	1
American Eel	*Anguilla rostrata*	2	3	2
Lake Trout	*Salvelinus namaycush*	2	3	2
White Sucker	*Catostomus commersoni*	1	0	1

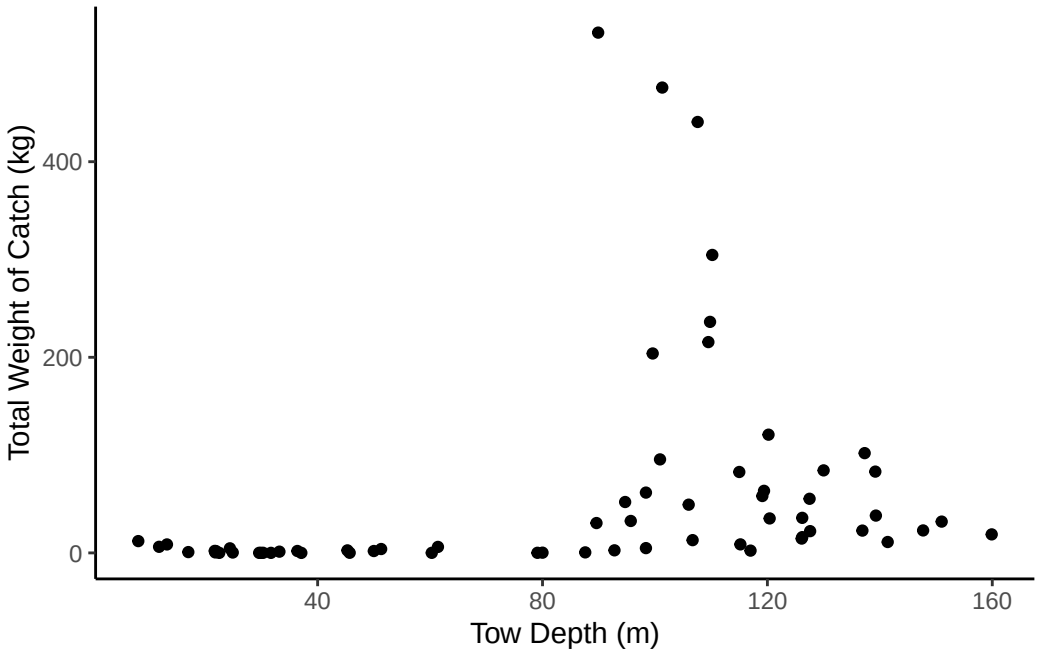


Figure 1.6.2: Total trawl catch (kg) by station depth illustrates that the majority of the Lake Ontario prey biomass is offshore during the spring survey.

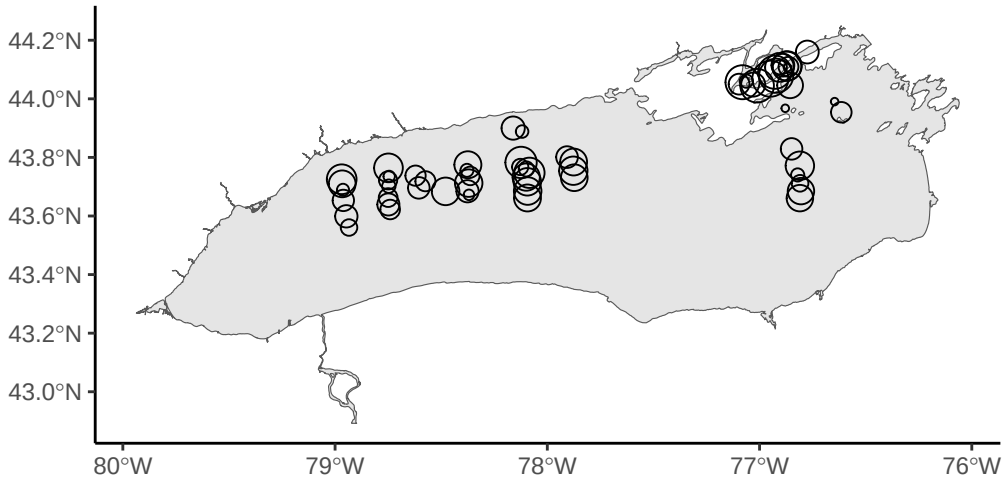


Figure 1.6.3: Shannon-Weaver Diversity Index by trawl depth for trawl site in the spring prey fish trawls conducted by the OMNR vessel. Diversity score is a function of the number of species captured at a site and the relative abundance of each species.

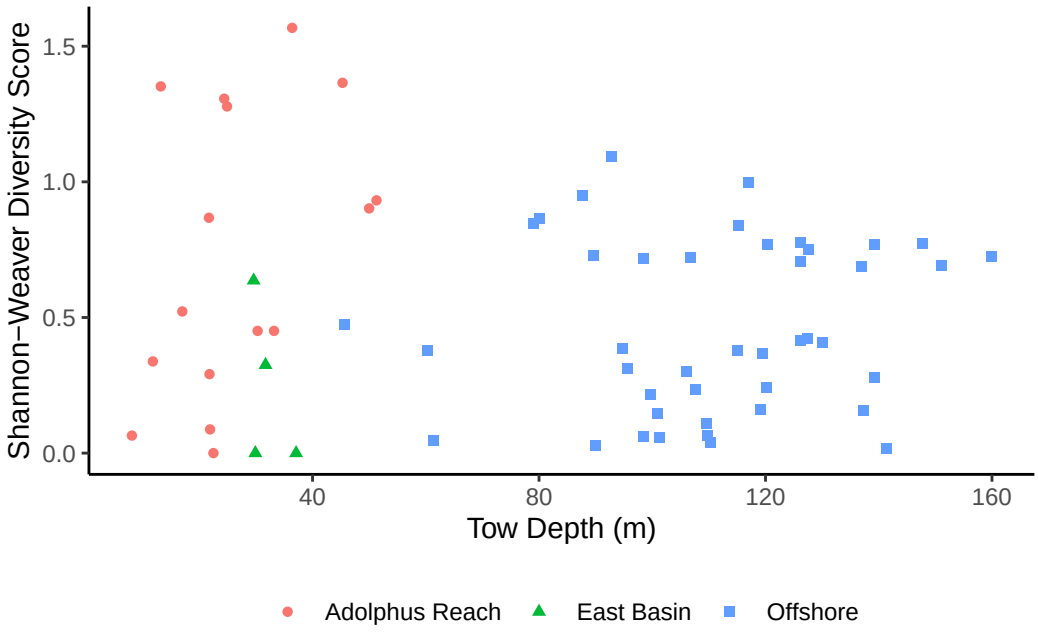


Figure 1.6.4: Shannon-Weaver Diversity Index by trawl depth for trawl site in the spring prey fish trawls conducted by the OMNR vessel. Diversity score is a function of the number of species captured at a site and the relative abundance of each species.

1.7 Lake Ontario Fall Benthic Prey Fish Assessment

E. Bloomfield, Lake Ontario Management Unit

The Lake Ontario offshore prey fish community was once a diverse mix of pelagic and benthic fish but by the 1970s the only native fish species that remained abundant was Slimy Sculpin. Recent invasions of dreissenid mussels and Round Goby have further changed the offshore fish community. The Lake Ontario Fall Benthic Prey Fish Survey provides an index of how prey fish abundance, distribution and species composition has changed through time in response to environmental change and species invasions.

A benthic prey fish assessment in the main basin of Lake Ontario has historically only been conducted by the US Geological Survey (USGS). The survey assessed prey fish along six southern-shore, US transects in depths from 8 - 150m. However, the restricted geographic and depth coverage prevented this survey from adequately informing important benthic prey fish dynamics at a whole-lake scale, including monitoring the reappearance of Deepwater Sculpin. In 2015, this program was expanded to include additional trawl sites conducted by the Ontario Ministry of Natural Resources (MNR) and New York State Department of Environmental Conservation (NYSDEC) with additional support provided from the US Fish and Wildlife Service (USFWS). The current survey provides abundance indices for Sculpin sp., Round Goby and Bloater with survey techniques comparable to Lake Michigan.

The Ontario portion of the 2024 survey consisted of 85 trawls conducted from September 16 through October 23 at transects across the north shore and in the Kingston Basin (Figure 1.7.1). Shallow tows (<40m) in Ontario waters are largely confined to the Kingston Basin due to limited suitable trawl sites across the north shore. Past efforts to trawl these areas have resulted in snags and damaged gear due to rocky substrate and large boulders.

The survey is conducted with a 3/4 Yankee Standard using Thyborne metal doors. Sites within the Bay of Quinte use a different trawl design (3N1) that has special foot gear to prevent the trawl from filling with mud. Depth loggers and wing sensors were used on all trawls to provide estimates of true bottom time and net opening to standardize catches with historical surveys and with US vessels.

Alewife were the most abundant species caught (n = 24063) followed by Deepwater Sculpin (n = 17831); and Round Goby (n = 8721). Full catch data are presented in Table 1.7.1. For Alewife, Deepwater Sculpin, Rainbow Smelt, Round Goby, Slimy Sculpin, and Yellow Perch, catch data are also presented by fish size distribution (Figure 1.7.2) and site depth (Figure 1.7.3). Alewife and Rainbow Smelt were captured throughout the site depth range (~10-160m). Deepwater Sculpin were caught between 60-160m and catches increased with depth, while Slimy Sculpin were captured between 45-125m, with the highest catches around 100m. Round Goby were caught at sites up to 140m, with the highest catches between 20-30m.

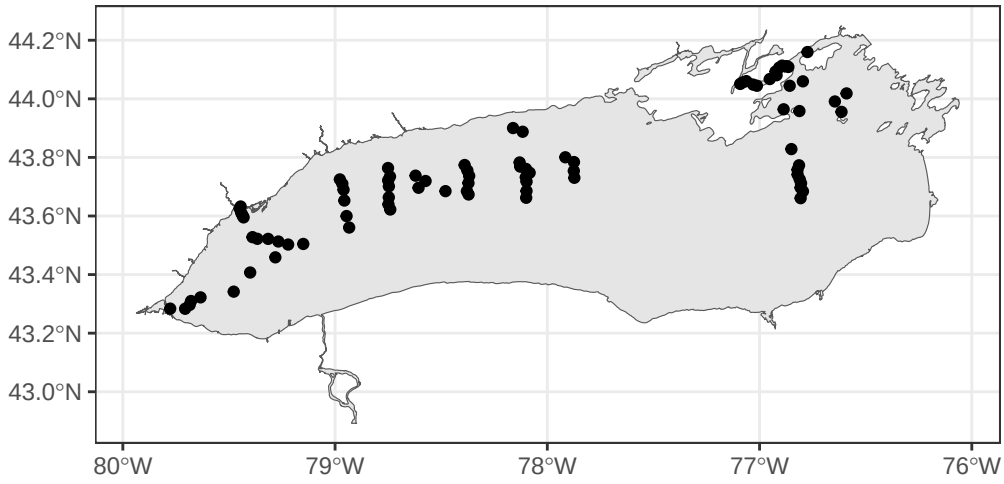


Figure 1.7.1: Trawl sites conducted in the Ontario waters of Lake Ontario by the MNR vessel Ontario Explorer during the Fall Benthic Prey Fish Survey. Additional sites in the US and in Canada were conducted by USGS and NYSDEC.

Table 1.7.1: Species composition across all trawls in Ontario waters conducted by the MNR vessel Ontario Explorer during the Fall Benthic Prey Fish Survey.

Species	Scientific Name	Total Catch	Total Weight (kg)	Occurrence (%)
Alewife	*Alosa pseudoharengus*	24,063	411	72
Deepwater Sculpin	*Myoxocephalus thompsoni*	17,831	384	54
Round Goby	*Neogobius melanostomus*	8,721	27	37
Rainbow Smelt	*Osmerus mordax*	1,317	6	44
White Perch	*Morone americanus*	1,195	21	9
Trout-Perch	*Percopsis omiscomaycus*	1,005	11	6
Slimy Sculpin	*Cottus cognatus*	292	2	25
Yellow Perch	*Perca flavescens*	188	4	8
Lake Whitefish	*Coregonus clupeaformis*	61	3	5
Walleye	*Stizostedion vitreum vitreum*	59	9	6
Freshwater Drum	*Aplodinotus grunniens*	49	26	8
Spottail Shiner	*Notropis hudsonius*	22	0	1
Threespine Stickleback	*Gasterosteus aculeatus*	20	0	3
Lake Trout	*Salvelinus namaycush*	16	1	11
Gizzard Shad	*Dorosoma cepedianum*	13	1	4
Brown Bullhead	*Ictalurus nebulosus*	11	4	4
White Sucker	*Catostomus commersoni*	5	3	2
White Bass	*Morone chrysops*	4	0	3
Carp	*Cyprinus carpio*	2	17	1
Cisco (Lake Herring)	*Coregonus (Leucichthys) artedi*	1	0	1
Bloater	*Coregonus (Leucichthys) hoyi*	1	0	1
Rockbass	*Ambloplites rupestris*	1	0	1

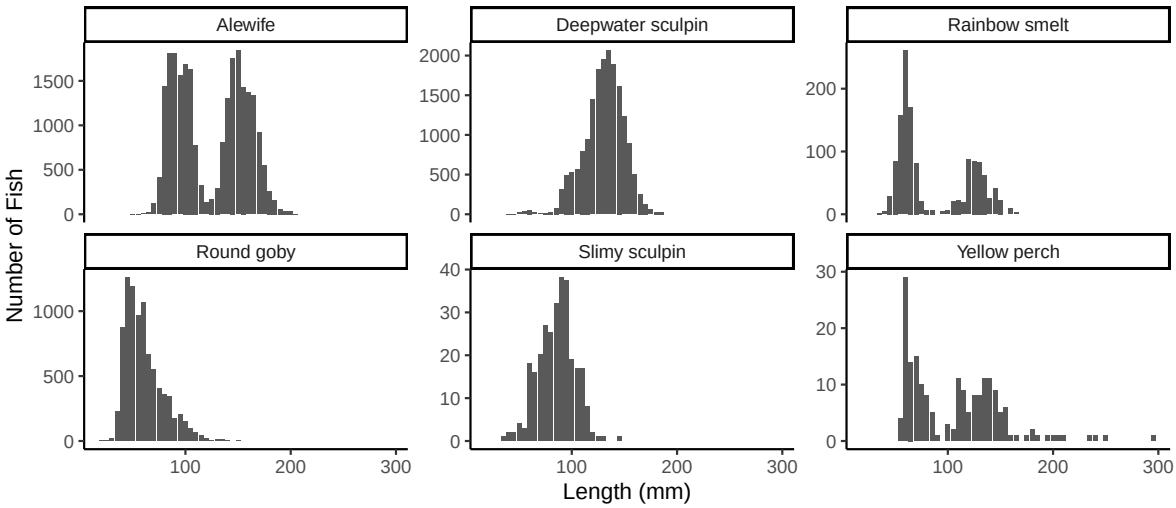


Figure 1.7.2: Size distribution of Alewife, Deepwater Sculpin, Rainbow Smelt, Round Goby, Slimy Sculpin and Yellow Perch captured across all trawls conducted in Ontario waters by the MNR vessel Ontario Explorer during the Fall Benthic Prey Fish Survey. Length is recorded as total length to the nearest millimeter.

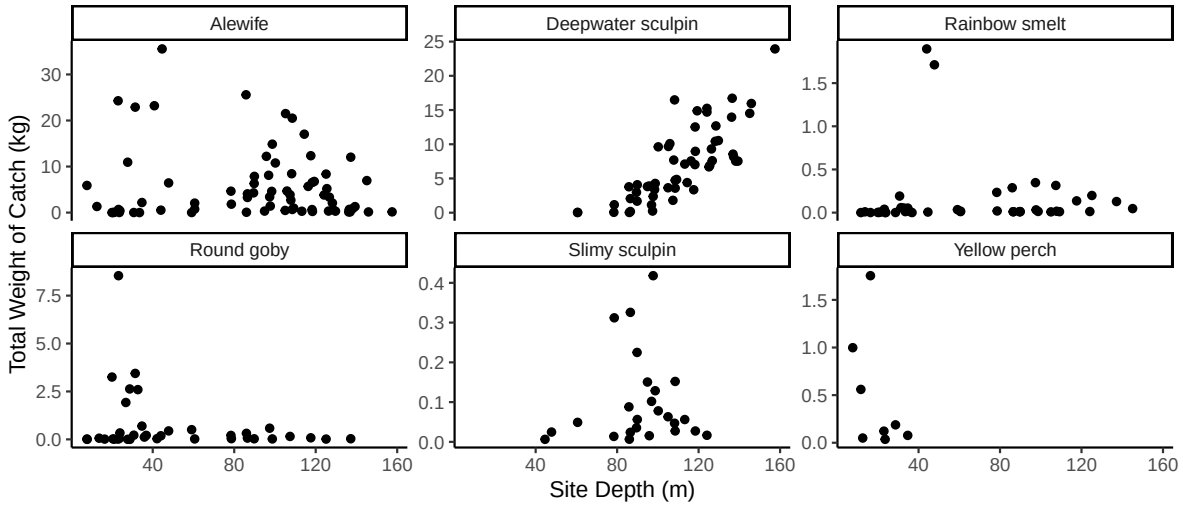


Figure 1.7.3: Total trawl catch (kg) by site depth for Alewife, Deepwater Sculpin, Rainbow Smelt, Round Goby, and Yellow Perch captured across all trawls in Ontario waters conducted by the MNR vessel Ontario Explorer during the Fall Benthic Prey Fish Survey.

The Shannon-Weiner Diversity Index for each trawl site is presented by location (Figure 1.7.4) and site depth (Figure 1.7.5). The index is a function of the number of species captured at a site and the relative abundance of each species, with higher values indicating higher diversity. Diversity was variable at site depths up to 80m and decreased from 80-160m, as the fish community became dominated by Deepwater Sculpin. The highest diversity was found in Adolphus Reach in the lower Bay of Quinte.

The Lake Ontario Fall Benthic Prey Fish Survey is a subset of a binational prey fish assessment program. The complete data set is available through the Ontario Open Data Catalogue (https://data.ontario.ca/en/dataset/lake-ontario-prey-fish-trawl-data).

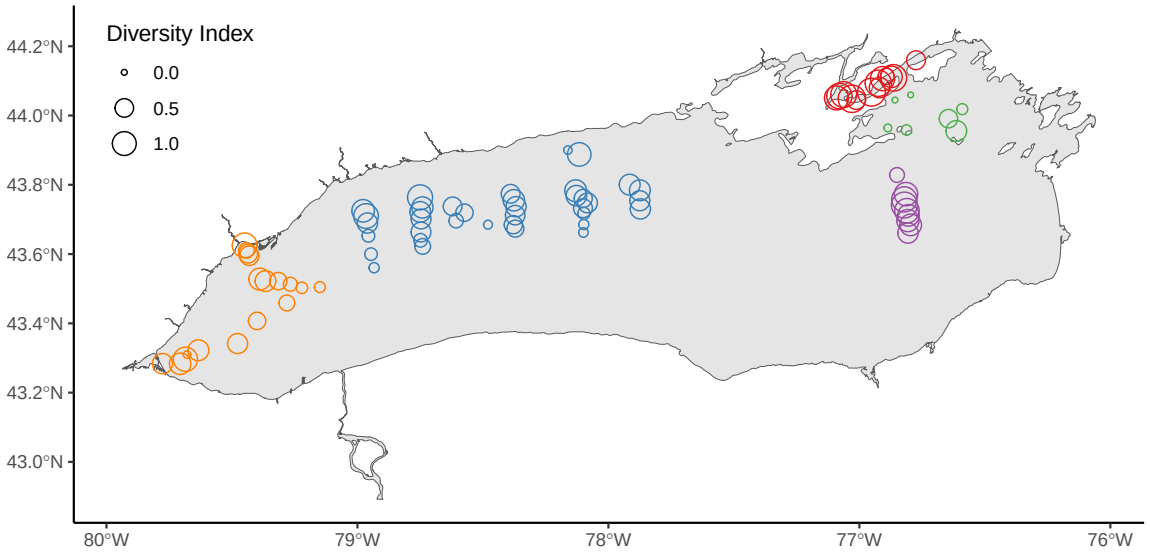


Figure 1.7.4: Shannon-Weiner Diversity Index for trawl catches across all sites in Ontario Waters conducted by the MNR vessel Ontario Explorer during the Fall Benthic Prey Fish Survey. Sites are divided into West - Toronto and Hamilton (orange), Central - Pickering to Brighton (blue), Rocky Point (purple), Kingston Basin (green), and Adolphus Reach in the lower Bay of Quinte (red). Higher values indicate a fish community with more diversity (higher number of species) and evenness (species have a similar abundance; not dominated by a single or few species).

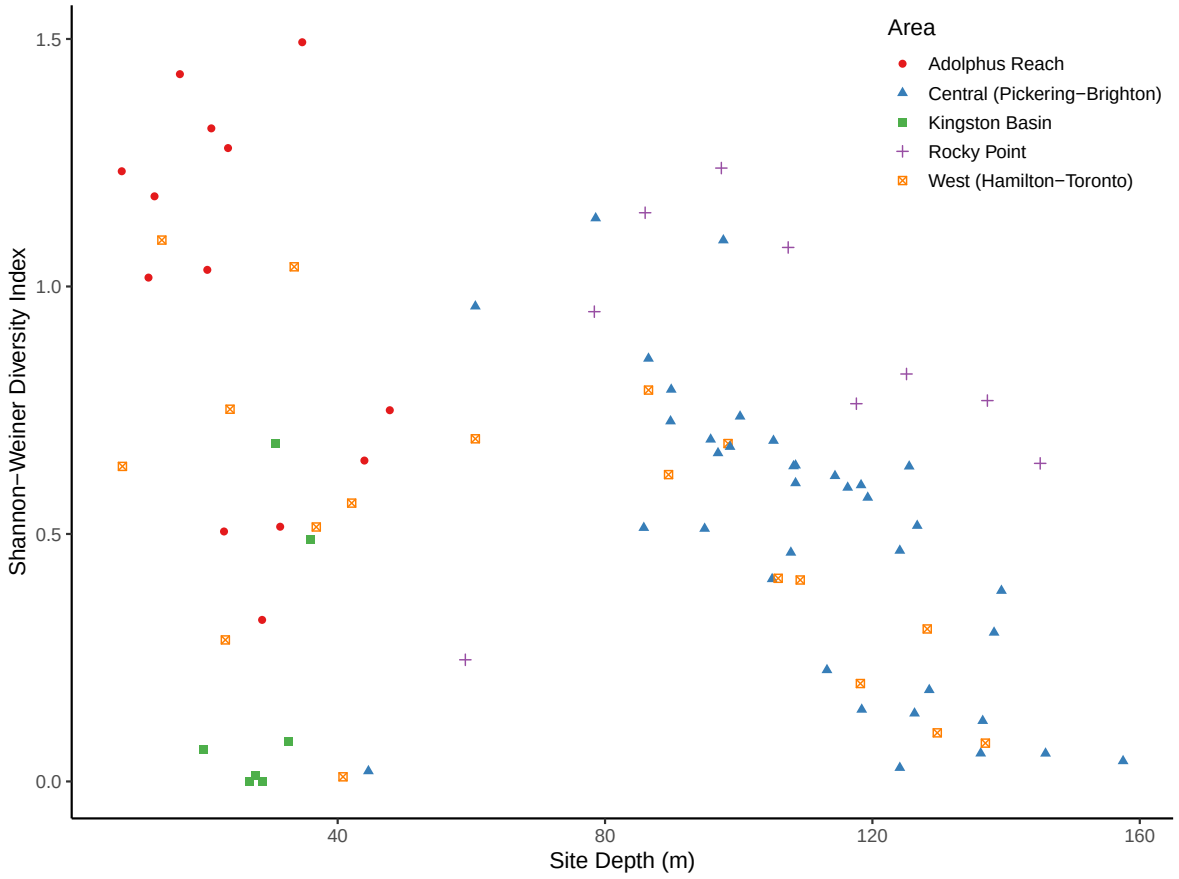


Figure 1.7.5: Shannon-Weiner Diversity Index by site depth for trawl catches across all sites in Ontario Waters conducted by the MNR vessel Ontario Explorer during the Fall Benthic Prey Fish Survey. Sites are divided by broad geographic area. Higher values indicate a fish community with more diversity (higher number of species) and evenness (species have a similar abundance; not dominated by a single or few species).

1.8 Lake St. Francis Community Index Netting

A. Row, Lake Ontario Management Unit

Traditionally, the Lake Ontario Management Unit (LOMU) conducts a Fish Community Index Gill Netting Survey in Lake St. Francis every other year in early fall. In 2019, the St. Lawrence River Fish Community Index Gill Netting Survey (Thousand Islands and Lake St. Francis) was redesigned to be conducted annually. Netting effort is allocated to randomly selected sites within four depth zones (1-3, 3-6, 6-12, 12+ meters) based on their proportional representation in the study area. The catches are used to estimate abundance, measure biological attributes, and collect materials for age determination, stomach contents and tissues for contaminant analysis and pathological examination. The survey is part of a larger collaborative effort with New York State Department of Environmental Conservation (NYSDEC), monitoring changes in the fish communities in four sections of the St. Lawrence River (Thousand Islands, Middle Corridor, Lake St. Lawrence, and Lake St. Francis) to provide comprehensive assessment of the river's fisheries resources. In 2024, ten additional locations were added to the survey in the waters surrounding Cornwall Island (Figure 1.8.1). The additional locations provide greater coverage across Lake St. Francis.

In 2024, the survey was conducted between September 16th and September 25th. Twenty-Five nets were deployed, using standard gill nets consisting of 25-foot panels of monofilament meshes ranging from 1.5 to 6 inches in half-inch increments. Due to potential net fouling and other issues that could impact the net's efficiency and results, two nets were removed from the final analysis (23 nets used for analysis). The nets fished for approximately 24 hours. The overall catch was 601 fish comprising 16 species (summary in Table 1.8.1). The average number of fish per gillnet set was 26.1, an increase from the previous 10-year average (15.1 fish per set; Figure 1.8.2). Yellow Perch remained the dominant species caught in 2024 followed by Rock Bass and Smallmouth Bass. Notably, the first Chinook Salmon in survey history was caught in 2024. All catches in the data series using multifilament in the St. Lawrence River before 2002 were increased by a factor of 1.58 to account for the gear change.

Species Highlights

Yellow Perch

In 2024, the Yellow Perch catch increased 72.7% from seven fish per net in 2023 to 12.1 fish per net in 2024. Yellow perch represented 46.3% of the total catch by number and 12% by biomass in 2024 (Figure 1.8.3). Catches of Yellow Perch in 2024 are greater than the previous 10-year average (average of 9.2 fish per net from 2014 to 2023). The proportion of large fish (> 220 mm) observed in catches (17.8% of the catch in 2024) is lower than the previous year's surveys (26% in 2023, Figure 1.8.6). Length at age for Yellow Perch is above the time series average for age-2 and age-4 (Figure 1.8.4). The age distribution of Yellow Perch in 2024 is summarized in Figure 1.8.5.

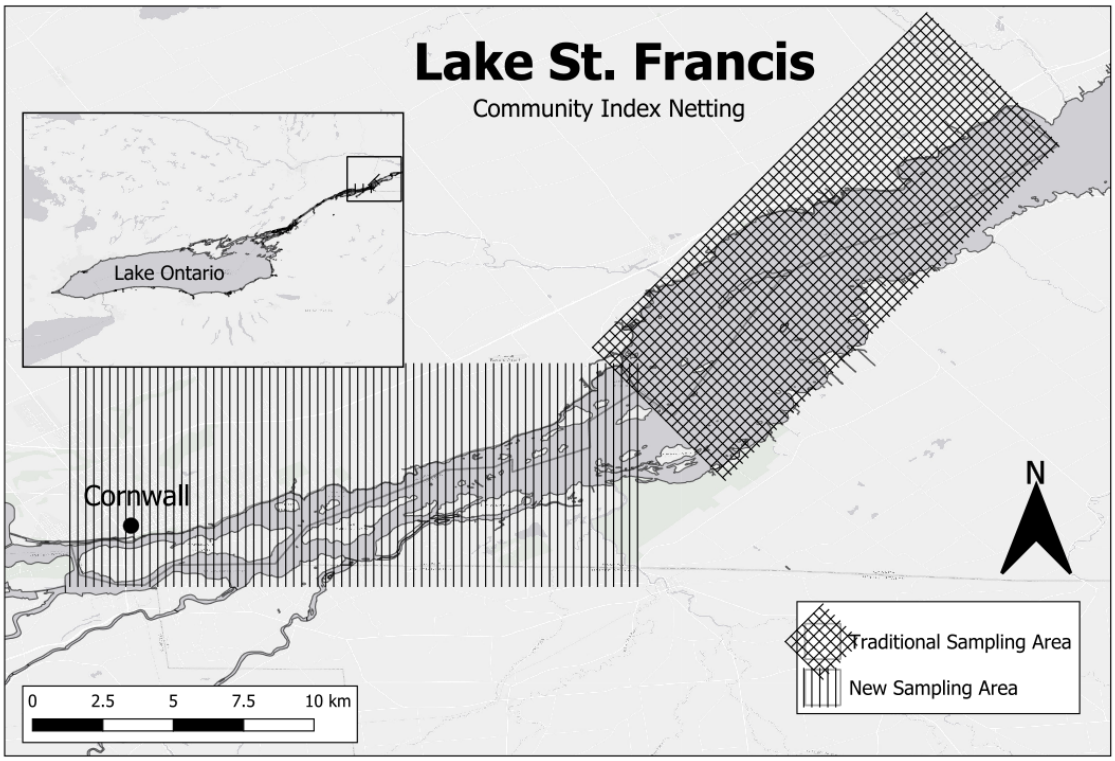


Figure 1.8.1: Gill net site locations during the 2024 St. Lawrence River Fish Community Index Gill Netting in Lake St. Francis. In 2024, 25 gillnet sets were deployed from September 16th to September 25th.

Centrarchids

The centrarchids are represented by six species in Lake St. Francis: Rock Bass, Pumpkinseed, Bluegill, Smallmouth Bass, Largemouth Bass and Black Crappie. Rock bass were the most abundant centrarchid species in the 2024 survey, representing 26.1% of the total catch by number, whereas Smallmouth Bass represented the largest amount of biomass (36% of total biomass, Figure 1.8.3). The catch of Smallmouth Bass increased in 2024 from 0.8 to 2.7 fish per net compared to 2023. The increase in 2024 marks the largest number of fish caught in survey history (Figure 1.8.7). Bluegill, Largemouth Bass and Black Crappie are historically at much lower levels than Rock Bass and Smallmouth Bass (Figure 1.8.8).

Northern Pike

Northern Pike catches in 2024 (0.2 fish per net) remain low across the previous ten years (average of 0.2 fish per net, Figure 1.8.9). Northern Pike abundance has declined since the early 1990's and is below the historical average of 2.85 fish per net (Figure 1.8.9, Table 1.8.1). Five Northern Pike were

caught in 2024, four were considered large (> 500 mm) and one was considered small (< 500mm, Figure 1.8.9). No Muskellunge were caught in 2024.

Walleye

Walleye represented 4.5% of the total catch and 13% of total biomass caught in 2024 with 27 individuals caught (Figure 1.8.3). The average catch per net was 1.2, which is above the previous 10-year average (1 fish per net, Figure 1.8.10). Small fish (≤ 500 mm) represented 74.1% of the catch, while 25.9% of the catch were large fish (>500 mm, Figure 1.8.10). Walleye ages ranged from 0 to 17 years old.

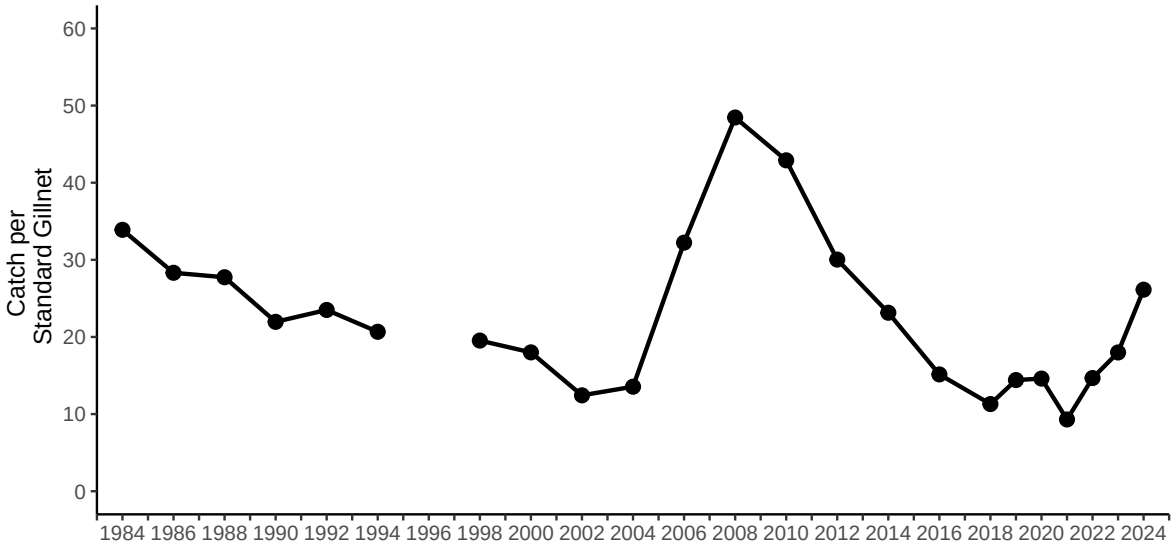


Figure 1.8.2: Total number of fish (all species) per standard gill net set in Lake St. Francis, 1984-2024.

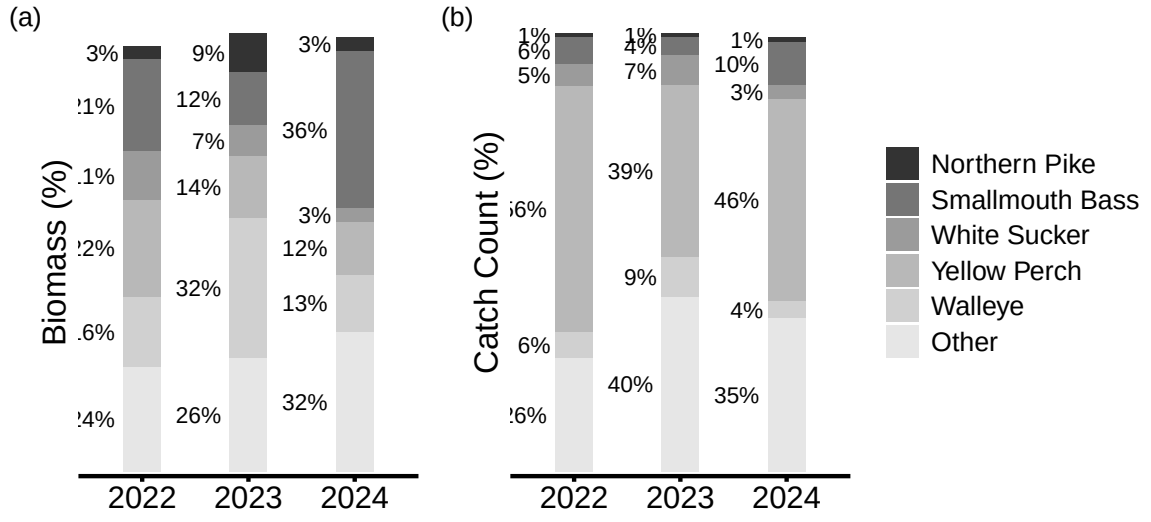


Figure 1.8.3: Species composition by (a) biomass and (b) catch in the 2024 Lake St. Francis Community Index Netting.

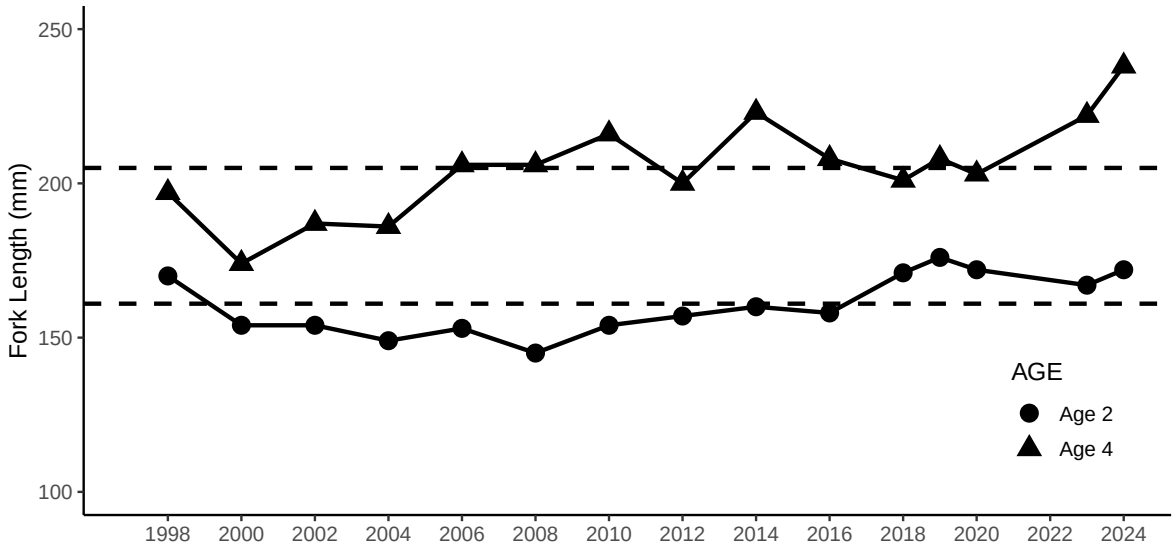


Figure 1.8.4: Mean fork length (mm) of age-2 (circle) and age-4 (triangle) Yellow Perch from 1997 to 2024. Dashed lines represent the average fork length from 1998 to 2024 for the aforementioned ages.

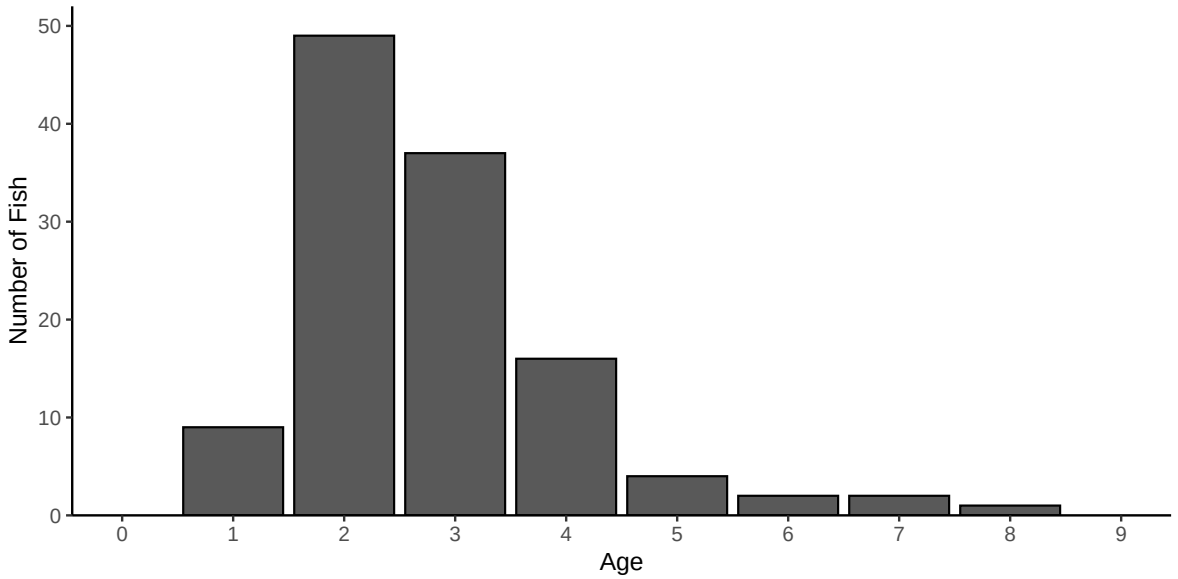


Figure 1.8.5: Age distribution of Yellow Perch caught in Lake St. Francis, 2024.

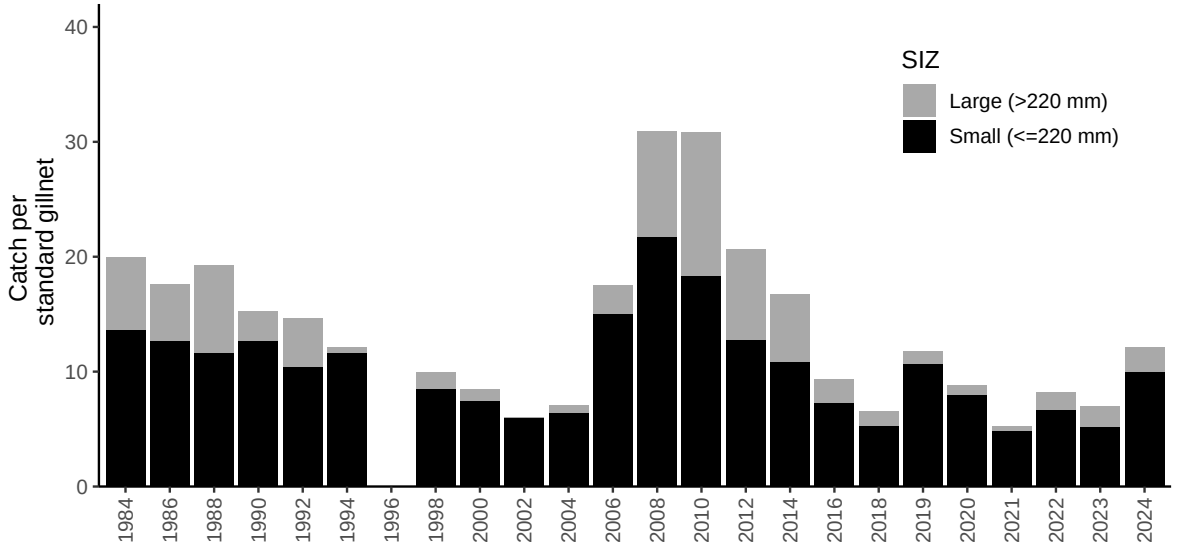


Figure 1.8.6: Catches of small (≤220 mm fork length) and large (>220 mm fork length) Yellow Perch per standard gill net set in Lake St. Francis, 1984-2024.

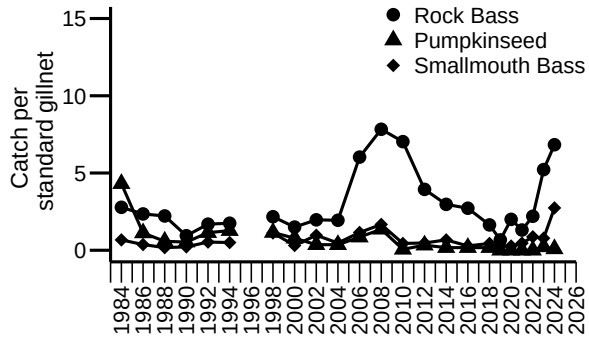


Figure 1.8.7: Rock Bass (circle), Pumpkinseed (triangle) and Smallmouth Bass (diamond) catches per standard gill net set in Lake St. Francis, 1984-2024.

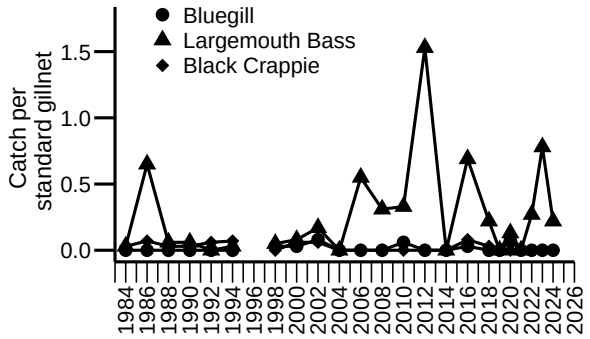


Figure 1.8.8: Black Crappie (circle), Bluegill (triangle) and Largemouth Bass (diamond) catches per standard gill net set in Lake St. Francis, 1984-2024.

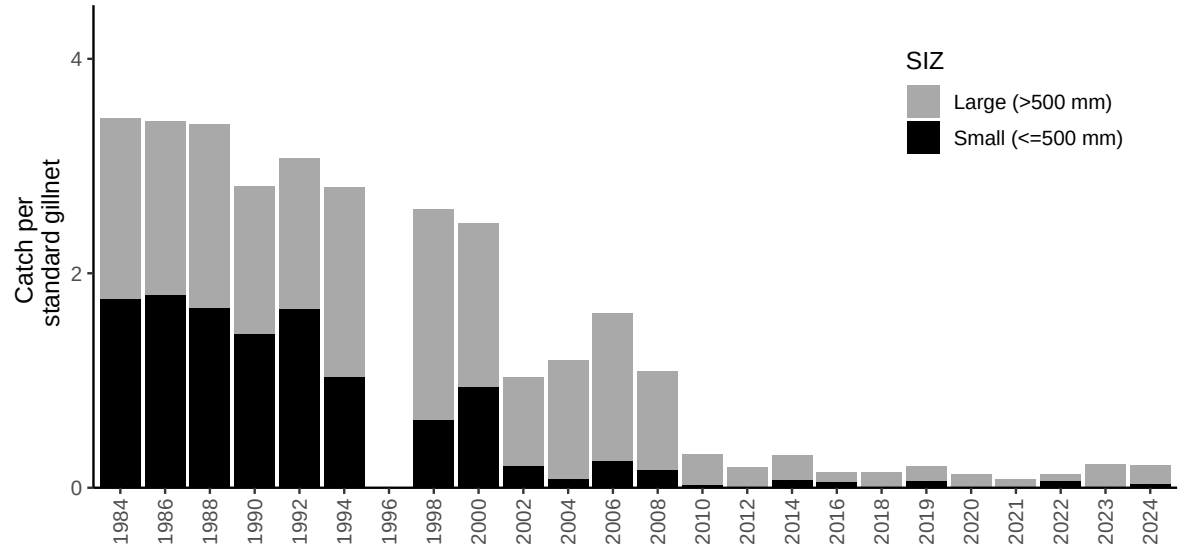


Figure 1.8.9: Catches of small (≤500 mm fork length) and large (>500 mm fork length) Northern Pike per standard gill net set in Lake St. Francis, 1984-2024.

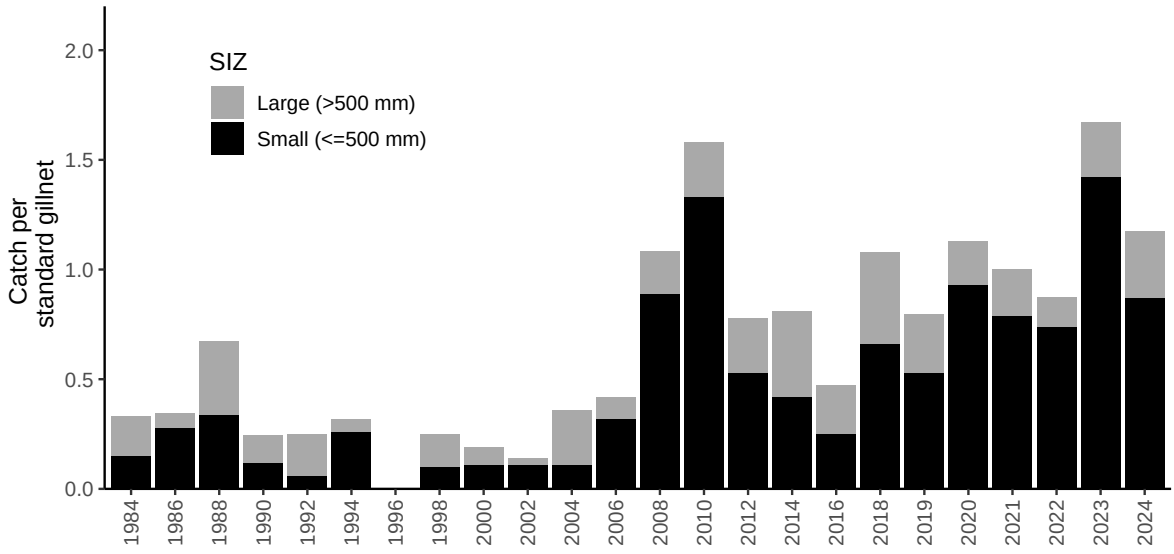


Figure 1.8.10: Catches of small (≤ 500 mm fork length) and large (> 500 mm fork length) Walleye per standard gill net set in Lake St. Francis, 1984-2024.

Table 1.8.1: Summary of catches per gill net set in the Lake St. Francis Fish Community Index Gill Netting Program, 1984 - 2024. All catches prior to 2002 were adjusted by a factor of 1.58 to be comparable to the new netting standard initiated in 2002. No survey was conducted in 1996.

Species	1984-2010	2012	2014	2016	2018	2019	2020	2021	2022	2023	2024
Lake sturgeon	0.007	0.03	–	0.03	–	–	–	–	–	–	0.22
Longnose gar	0.11	0.22	–	0.28	–	0.07	1.13	0.15	0.2	0.11	0.04
Bowfin	0.002	–	–	–	–	–	–	–	–	–	–
Alewife	0.02	0.14	0.03	–	–	0.2	–	–	–	–	–
Gizzard shad	–	–	–	0.06	–	–	–	–	–	–	–
Chinook salmon	–	–	–	–	–	–	–	–	–	–	0.04
Salvelinus sp.	0.002	–	–	–	–	–	–	–	–	–	–
Northern pike	2.25	0.19	0.31	0.14	0.14	0.2	0.13	0.08	0.13	0.22	0.22
Muskellunge	0.005	–	0.03	–	–	–	–	–	–	–	–
White sucker	1.16	1.17	1.25	0.56	0.47	0.33	0.67	0.15	0.8	1.22	0.74
Silver redhorse	0.03	0.06	0.03	0.06	0.11	–	0.07	–	0.13	–	0.39
Shorthead redhorse	–	0.28	0.06	0.03	0.03	0.07	–	0.38	0.27	0.33	0.26
Greater redhorse	0.005	–	–	–	–	–	–	–	0.07	–	–
River redhorse	0.01	–	–	–	–	–	–	–	–	–	–
Moxostoma sp.	0.03	–	–	–	0.11	–	–	–	–	–	–
Common carp	0.03	–	–	–	–	–	–	–	–	–	–
Golden shiner	0.005	–	–	0.06	0.22	–	–	–	–	–	–
Spottail shiner	–	–	–	–	–	–	–	–	–	–	–
Creek chub	0.004	–	–	–	–	–	–	–	–	–	–
Fallfish	0.006	–	–	0.03	0.14	–	0.13	0.54	0.53	0.33	1
Brown bullhead	1.05	0.25	0.14	0.03	–	–	–	–	0.13	0.11	–
White perch	0.002	–	–	0.03	–	–	0.07	–	–	–	0.04
Rock bass	3.09	3.94	2.97	2.72	1.64	0.67	2	1.31	2.2	5.22	6.83
Pumpkinseed	1.07	0.33	0.17	0.17	0.17	–	–	–	–	0.22	0.09
Bluegill	0.02	–	–	0.03	–	–	0.07	–	–	–	–
Smallmouth bass	0.66	0.47	0.67	0.28	0.44	0.27	0.27	0.46	0.87	0.78	2.74
Largemouth bass	0.18	1.53	–	0.69	0.22	–	0.13	–	0.27	0.78	0.22
Black crappie	0.03	–	–	0.08	0.03	–	–	–	–	–	–
Yellow perch	16.13	20.64	16.67	9.36	6.5	11.8	8.8	5.23	8.2	7	12.09
Walleye	0.48	0.78	0.81	0.47	1.08	0.8	1.13	1	0.87	1.67	1.17
Round goby	–	–	–	–	–	–	–	–	–	–	–
Freshwater drum	0.005	–	–	0.03	–	–	–	–	–	–	0.04
Total	26.4	30.03	23.14	15.14	11.3	14.41	14.6	9.3	14.67	17.99	26.13

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

A. Row, Lake Ontario Management Unit

Traditionally, the Lake Ontario Management Unit (LOMU) conducts a Fish Community Index Gill Netting Survey in the Thousand Islands every other year in early fall. In 2019, the St. Lawrence River Fish Community Index Gill Netting Survey (Thousand Islands and Lake St. Francis) was redesigned to be conducted annually. Netting effort is allocated to randomly selected sites within four depth zones (1-3, 3-6, 6-12, 12+ meters) based on their proportional representation in the study area. The catches are used to estimate abundance, measure biological attributes, and collect materials for age determination, stomach contents and tissues for contaminant analysis and pathological examination. The survey is part of a larger collaborative effort with New York State Department of Environmental Conservation (NYSDEC), monitoring changes in the fish communities in four sections of the St. Lawrence River (Thousand Islands, Middle Corridor, Lake St. Lawrence, and Lake St. Francis) to provide comprehensive assessment of the river's fisheries resources. In 2024, the survey was conducted between September 3rd and September 11th. Twenty-five nets were deployed, using standard gill nets consisting of 25-foot panels of monofilament meshes ranging from 1.5 to 6 inches in half-inch increments (Figure 1.9.1). The nets fished for approximately 24 hours. The overall catch was 826 fish comprising 19 species (Table 1.9.1). The average number of fish per gillnet set was 33, a decrease from the past two years but consistent with the previous 10-year average (34 fish per net; Figure 1.9.2). Yellow Perch remained the dominant species caught followed by Rock Bass and Smallmouth Bass. Notably, two Lake Sturgeon were captured during the program.

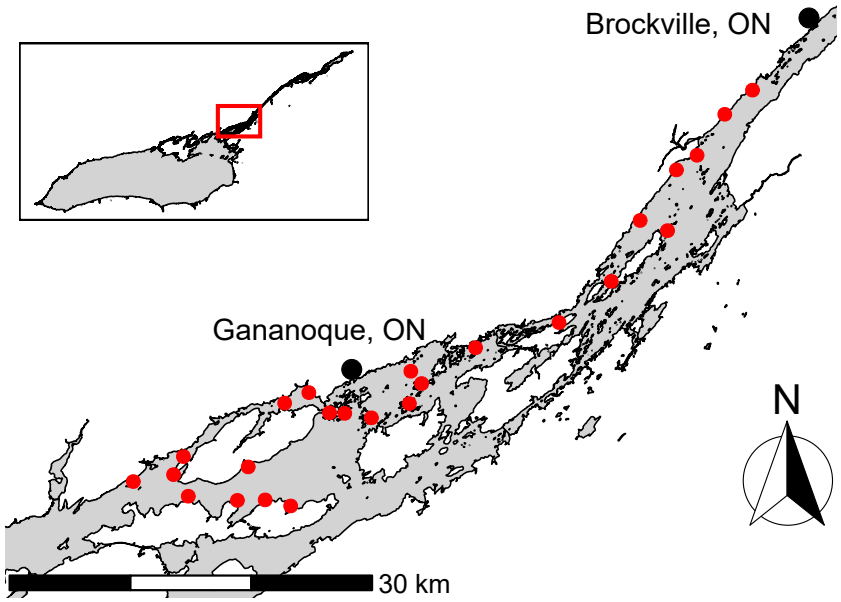


Figure 1.9.1: Gill net site locations during the 2024 St. Lawrence River Fish Community Index Gill Netting in the Thousand Islands Area. In 2024, 25 gillnet sets were deployed from September 3rd to September 11th.

Species Highlights

Yellow Perch

In 2024, Yellow Perch catch estimates increased from 19 fish per net in 2023 to 20.5 fish per net. Yellow Perch represented 62% of the total catch by number and 20% by biomass in 2024 (Figure 1.9.3). Catches of Yellow Perch in 2024 are comparable to the previous 10-year average (19 fish per net). The proportion of large fish (>220 mm) observed in catches (15.6% of the catch in 2024) is lower than the previous year's surveys (17% in 2023, Figure 1.9.4). Length at age for Yellow Perch is above the time series average for age-2, age-4, and age-6 (Figure 1.9.5). The age distribution of Yellow Perch in 2024 is summarized in Figure 1.9.6.

Centrarchids

The centrarchids are represented by six species in the upper St. Lawrence River: Rock Bass, Pumpkinseed, Bluegill, Smallmouth Bass, Largemouth Bass and Black Crappie. Rock Bass were the most abundant centrarchid species in the 2024 survey, representing 11.6% of the total catch by number, whereas Smallmouth Bass represented the largest amount of biomass (34% of total biomass, Figure 1.9.3). The catch of Smallmouth Bass decreased in 2024 from 6 fish per net in 2023 to 3.5 fish per net (Figure 1.9.7). Bluegill, Largemouth Bass and Black Crappie are historically at much lower levels than Rock Bass and Smallmouth Bass (Figure 1.9.8). The decrease in 2024 falls below the previous 10-year average (4.4 fish per net). Length at age for Smallmouth Bass is above the time series average for age-3, and age-5 but is slightly below average for age-1 (Figure 1.9.9). The age distribution of Smallmouth Bass in 2024 is summarized in Figure 1.9.10.

Northern Pike

Northern Pike remain at low levels, reached after a steady decline spanning almost the entire history of the survey (Figure 1.9.11). Total catches of Northern Pike in 2024 were consistent with the previous seven surveys dating back to 2015 (Figure 1.9.11). Catches of small Northern Pike (≤500 mm) have been limited over the past 17 surveys, with only eight caught in the last six surveys (three in 2024; Figure 1.9.11).

Walleye

Walleye represented 3% of the total catch and 21% of total biomass with 23 individuals caught (Figure 1.9.3). The average catch per net was 0.9, which is above the previous 10-year average (0.7 fish per net, Figure 1.9.12). Small fish (≤ 500 mm) represented 30.4% of the catch, while 69.6% of the catch were large fish (>500 mm, Figure 1.9.12). Walleye ages ranged from 0 to 22 years old.

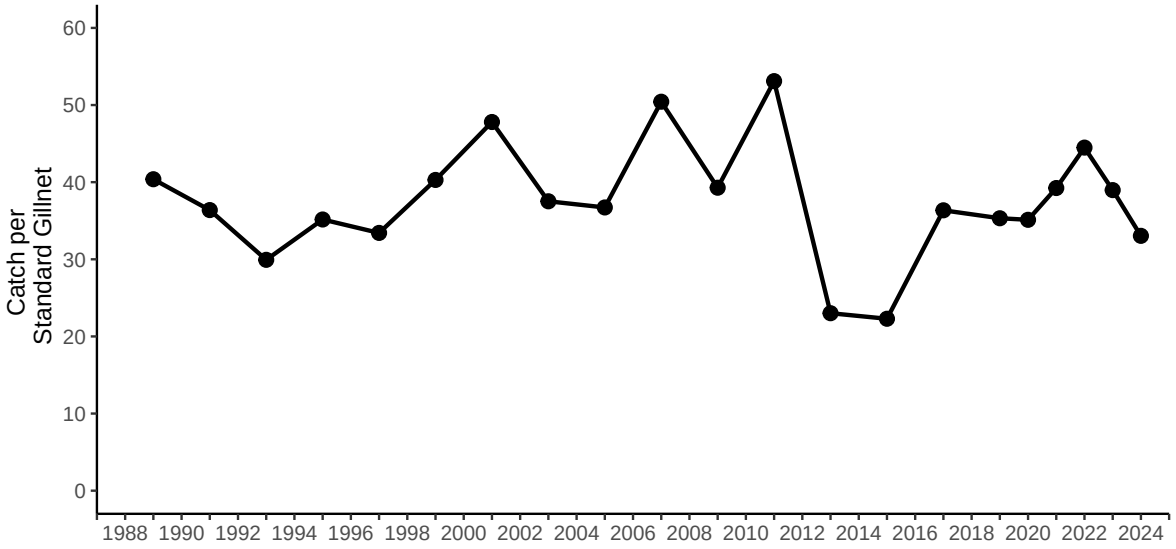


Figure 1.9.2: Total number of fish (all species) per standard gill net set in the Thousand Islands area of the St. Lawrence River, 1989-2024.

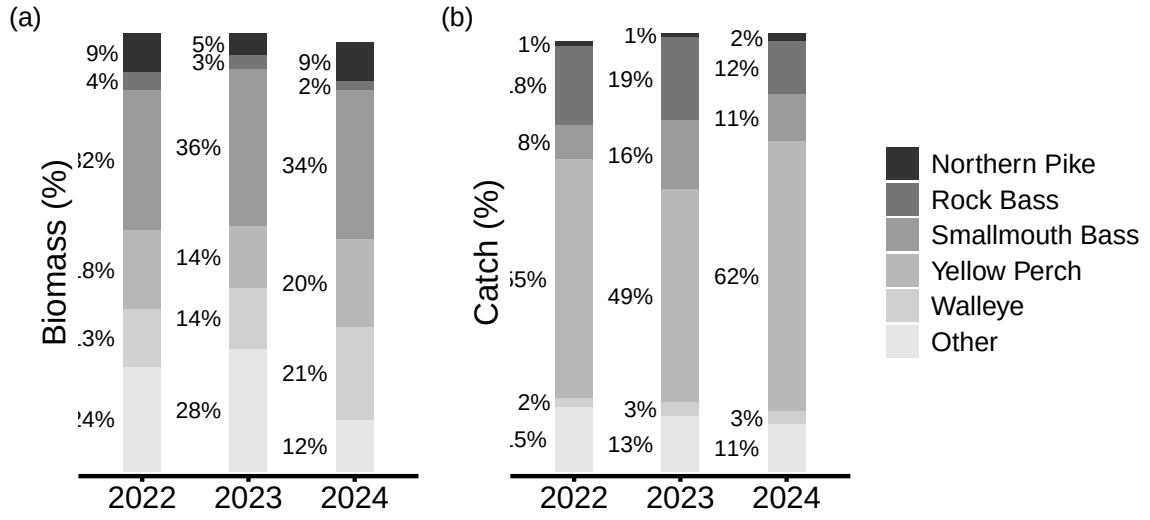


Figure 1.9.3: Species composition by (a) biomass and (b) catch in the Thousand Islands area of the St. Lawrence River (2022-2024).

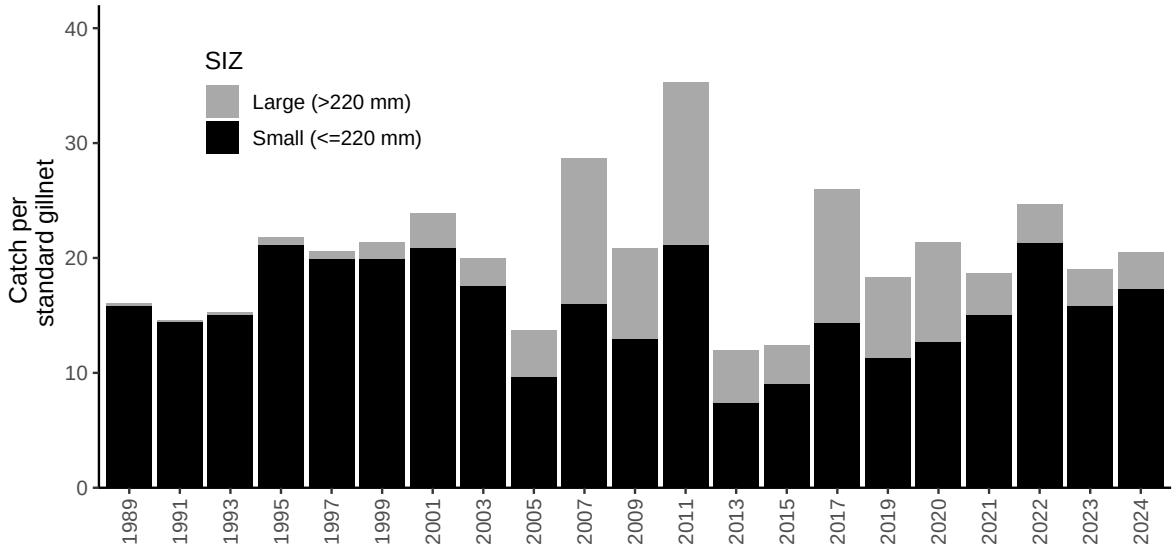


Figure 1.9.4: Proportion of small (≤220 mm fork length) and large (>220 mm fork length) Yellow Perch per standard gill net set in the Thousand Islands area of the St. Lawrence River, 1989-2024.

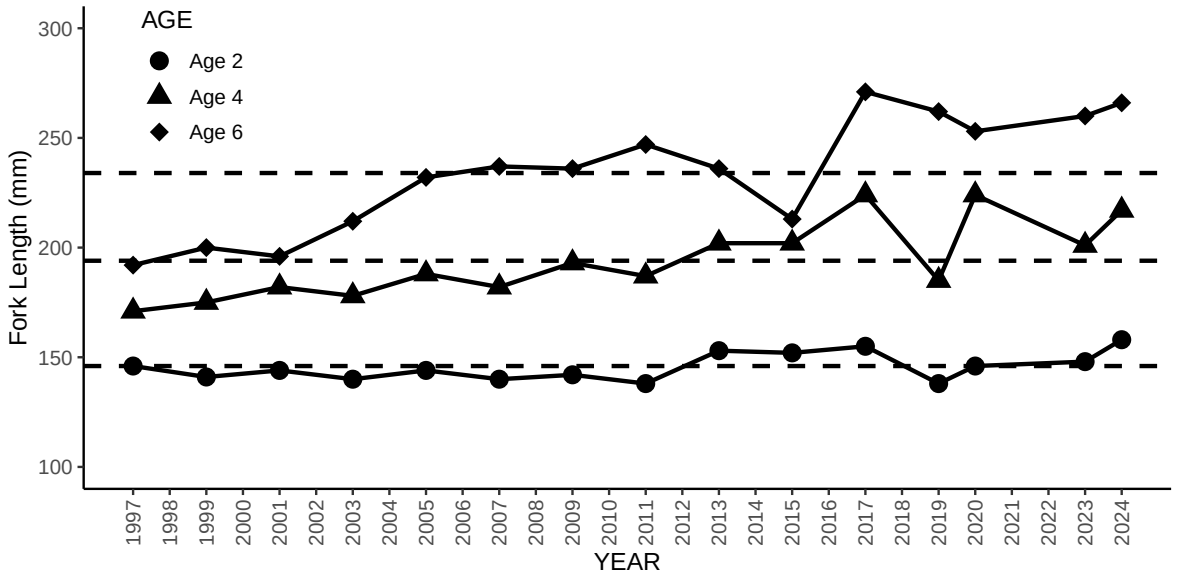


Figure 1.9.5: Mean fork length (mm) of age-2 (circle), age-4 (triangle) and age-6 (diamond) Yellow Perch from 1997 to 2024. Dashed lines represent the average fork length from 1997 to 2024 for the aforementioned ages.

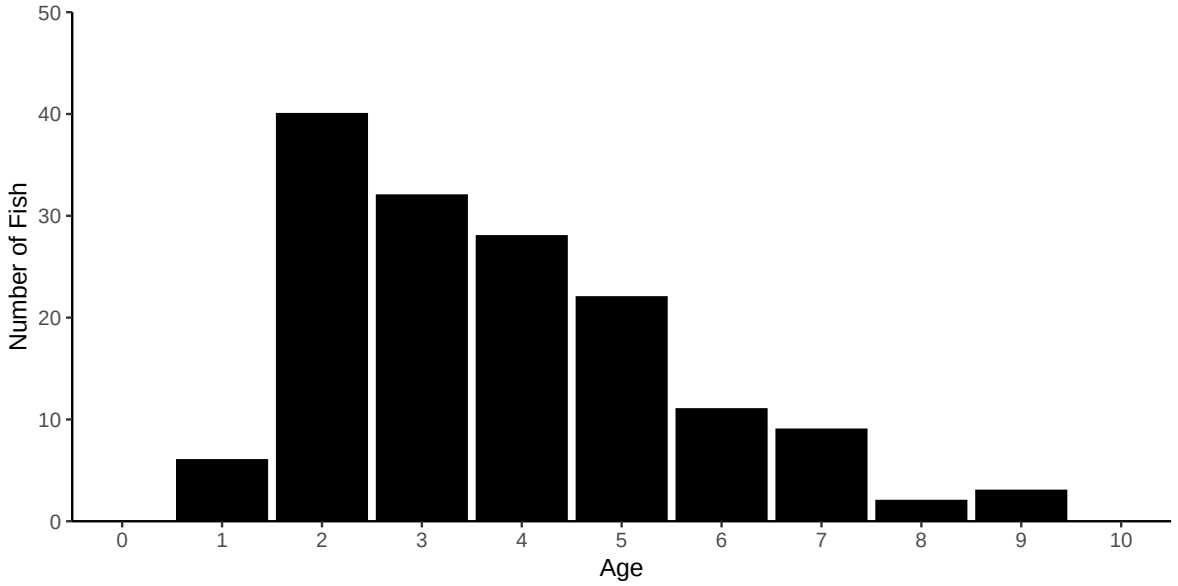


Figure 1.9.6: Age distribution (bars) of Yellow Perch caught in the Thousand Islands area of the St. Lawrence River, 2024.

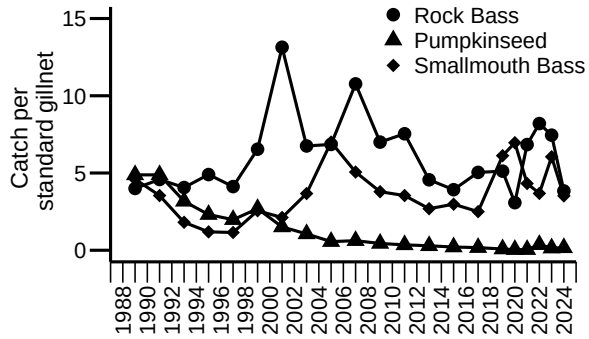


Figure 1.9.7: Rock Bass (circle), Pumpkinseed (triangle) and Smallmouth Bass (diamond) catches per standard gill net set in the Thousand Islands area of the St. Lawrence River, 1989-2024.

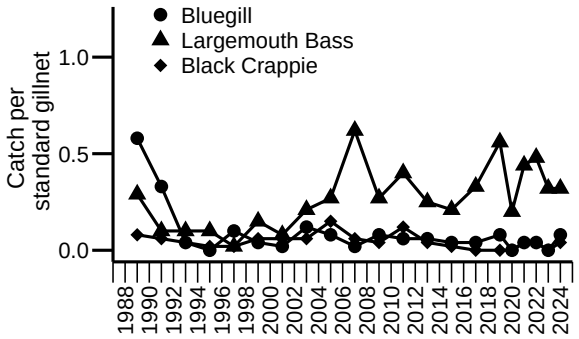


Figure 1.9.8: Black Crappie (circle), Bluegill (triangle) and Largemouth Bass (diamond) catches per standard gill net set in the Thousand Islands area of the St. Lawrence River, 1989-2024.

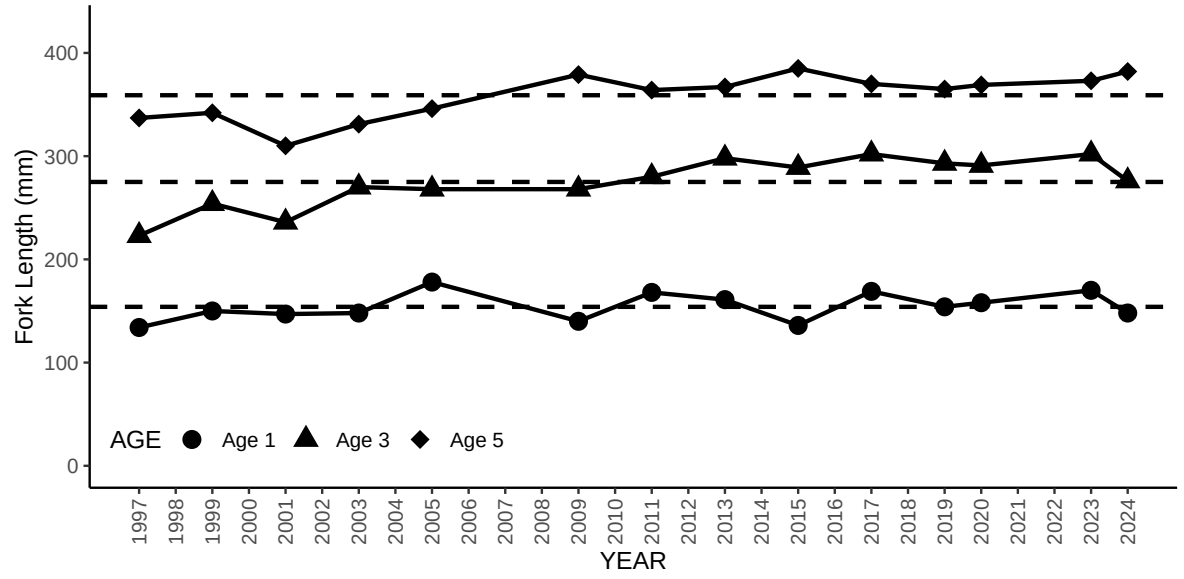


Figure 1.9.9: Mean fork length (mm) of age-1 (circle), age-3 (triangle) and age-5 (diamond) Smallmouth Bass from 1997 to 2024. Dashed lines represent the average fork length from 1997 to 2024 for the aforementioned ages.

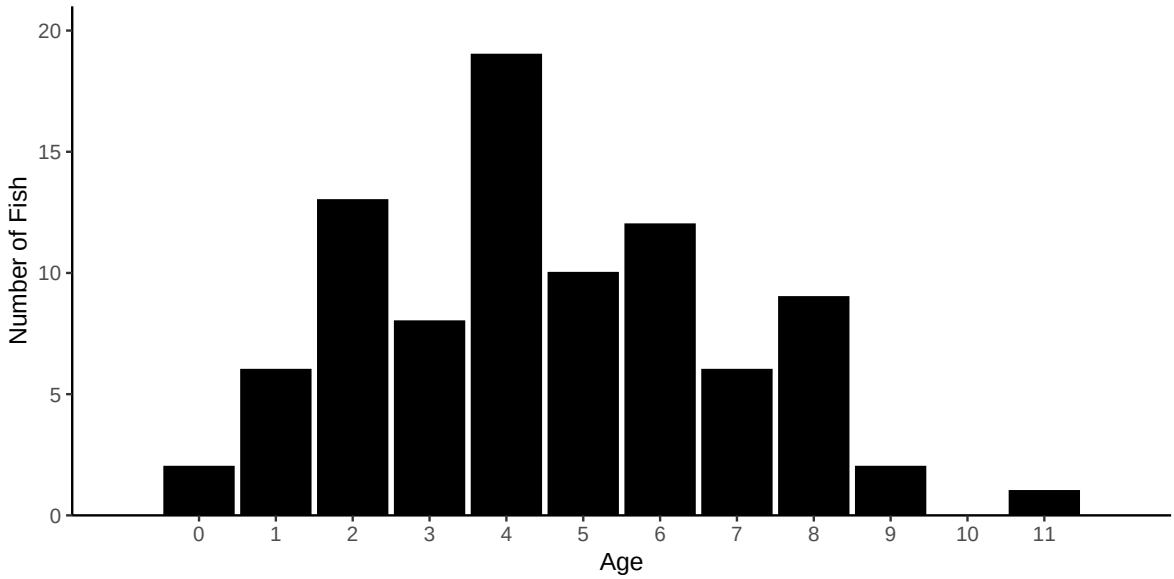


Figure 1.9.10: Age distribution (bars) of Smallmouth Bass caught in the Thousand Islands area of the St. Lawrence River, 2024.

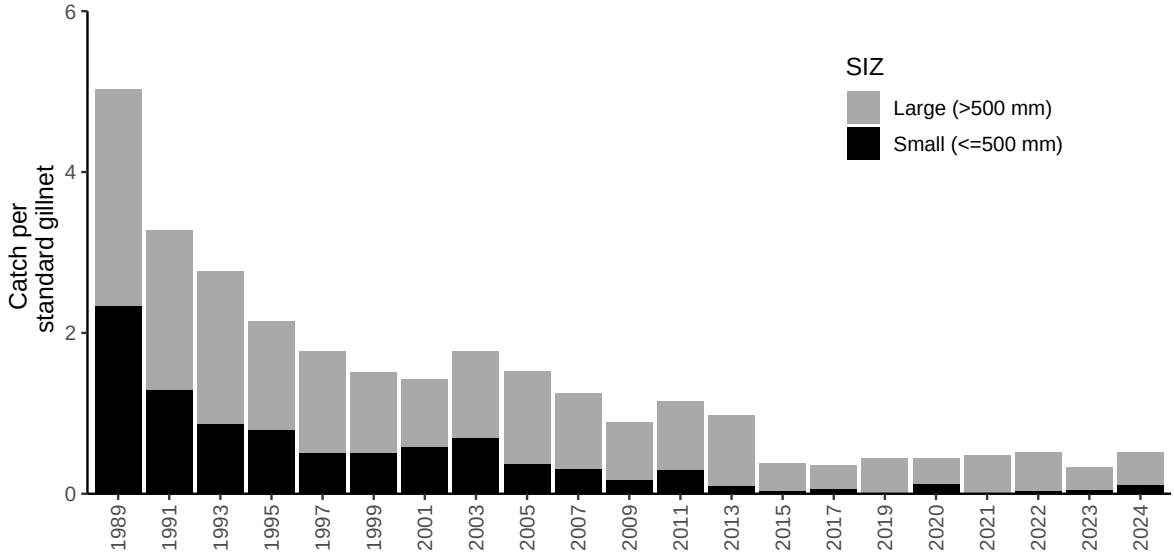


Figure 1.9.11: Proportion of small (≤500 mm fork length) and large (>500 mm fork length) Northern Pike per standard gill net set in the Thousand Islands area of the St. Lawrence River, 1989-2024.

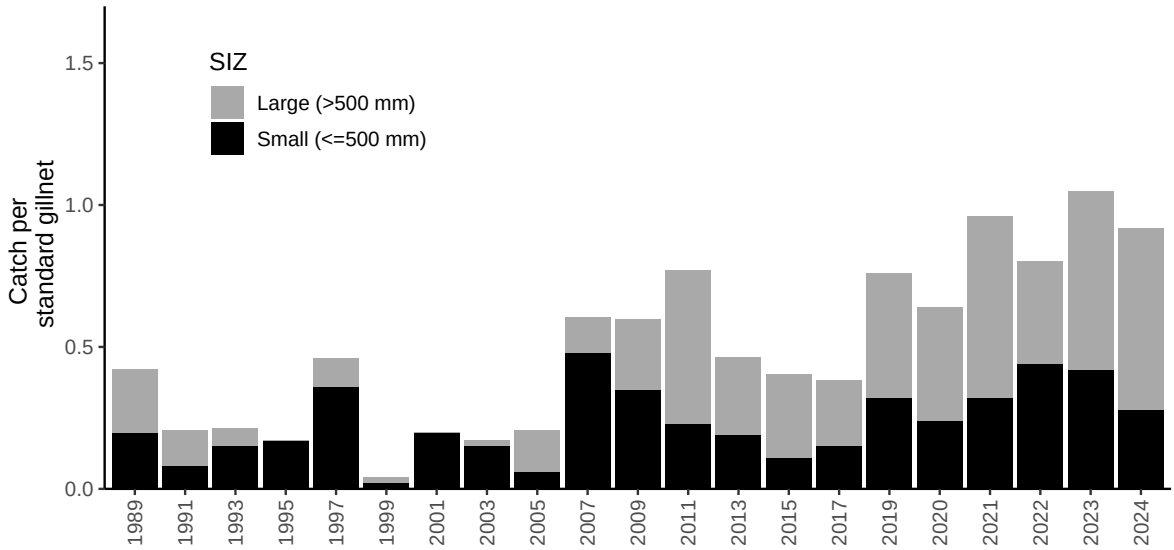


Figure 1.9.12: Proportion of small (≤500 mm fork length) and large (>500 mm fork length) Walleye per standard gill net set in the Thousand Islands area of the St. Lawrence River, 1989-2024.

Table 1.9.1: Summary of catches per gill net set in the Thousand Islands area of the St. Lawrence River Fish Community Index Gill Netting Program, 1989 - 2024. All catches prior to 2002 were adjusted by a factor of 1.58 to be comparable to the new netting standard initiated in 2002.

Species	1989-2009	2011	2013	2015	2017	2019	2020	2021	2022	2023	2024
Lake sturgeon	0.01	0.04	–	–	–	0.12	–	0.04	0.04	0.05	0.08
Longnose gar	0.02	0.04	–	–	–	0.08	0.08	–	–	0.86	–
Bowfin	0.04	0.12	0.02	0.02	0.02	0.04	0.08	–	–	–	–
Alewife	0.03	–	0.1	0.23	0.46	1.32	–	0.52	0.4	0.5	0.68
Gizzard shad	0.08	0.08	0.12	0.1	0.08	–	0.12	5.64	0.72	–	0.24
Chinook salmon	0.005	0.02	–	–	–	–	–	–	–	–	–
Rainbow trout	0.002	–	–	–	–	–	–	–	–	–	–
Brown trout	0.002	0.04	0.02	–	–	–	–	–	–	–	–
Lake trout	0.03	–	–	–	0.02	–	–	–	–	–	–
Lake herring	0.005	–	–	–	–	–	–	–	–	–	–
Chub	0.002	–	–	–	–	–	–	–	–	–	–
Northern pike	2.12	1.15	0.98	0.38	0.35	0.44	0.44	0.48	0.52	0.32	0.52
Muskellunge	0.009	–	–	–	–	–	–	0.04	–	–	–
Chain pickerel	0.002	–	–	–	–	–	–	–	–	–	–
Quillback	0.002	–	–	–	–	–	–	–	–	–	–
White sucker	0.88	0.58	0.27	0.19	0.33	0.4	0.2	0.28	0.52	0.27	0.32
Silver redhorse	0.03	0.1	0.06	0.02	–	0.04	–	–	–	–	–
Shorthead redhorse	0.002	–	–	–	–	–	–	–	–	–	–
Greater redhorse	0.01	–	–	–	–	–	–	–	–	–	–
Moxostoma sp.	0.04	–	–	–	–	–	–	–	–	–	–
Common carp	0.07	0.04	–	–	–	0.04	0.04	0.04	0.08	0.05	–
Golden shiner	0.05	0.12	0.08	0.23	0.42	0.12	0.36	0.16	0.68	0.09	0.04
Fallfish	0.002	–	–	–	0.02	–	–	0.04	0.12	0.23	0.28
Yellow bullhead	–	–	–	–	0.02	–	–	–	–	–	–
Brown bullhead	2.25	1.67	0.58	0.48	0.17	1.24	1.04	0.44	2.4	2.05	1.24
Channel catfish	0.3	0.62	0.25	0.19	–	0.08	0.08	–	–	–	–
White perch	0.06	–	0.1	–	–	0.04	0.04	0.04	0.2	0.27	0.04
White bass	0.1	0.29	–	0.02	–	0.04	0.04	–	–	–	–
Rock bass	6.61	7.54	4.56	3.92	5.04	5.12	3.08	6.84	8.2	7.45	3.84
Pumpkinseed	2.19	0.35	0.29	0.21	0.17	0.08	0.04	0.04	0.36	0.14	0.16
Bluegill	0.13	0.06	0.06	0.04	0.04	0.08	–	0.04	0.04	–	0.08
Smallmouth bass	3.32	3.54	2.69	2.98	2.5	6.12	6.96	4.32	3.68	6.05	3.52
Largemouth bass	0.2	0.4	0.25	0.21	0.33	0.56	0.2	0.44	0.48	0.32	0.32
White crappie	0.004	–	–	–	–	–	–	–	–	–	–
Black crappie	0.06	0.12	0.04	0.02	–	–	–	0.04	0.04	–	0.04
Yellow perch	19.71	35.27	11.98	12.42	25.96	18.36	21.36	18.68	24.64	19	20.52
Walleye	0.3	0.77	0.46	0.4	0.38	0.76	0.64	0.96	0.8	1.05	0.92
Round goby	0.1	0.02	0.02	0.04	0.02	0.12	0.16	0.08	–	0.09	0.04
Freshwater drum	0.07	0.12	0.08	0.19	0.02	0.12	0.16	0.08	0.56	0.18	0.16
Total	38.85	53.1	23.01	22.29	36.35	35.32	35.12	39.24	44.48	38.97	33.04

1.10 Spring Muskellunge Netting

T. Gristey, Lake Ontario Management Unit

The Spring Muskellunge Netting and Electrofishing (SMNE) program is aimed at acquiring information on the distribution, relative abundance and biological characteristics of Muskellunge (*Esox masquinongy*) populations in the Canadian waters of the upper St. Lawrence River. The index utilizes live capture trap-net or hoop-net gear set in areas of known or presumed Muskellunge spawning habitat and the live capture of Muskellunge using vessel-based electrofishing. Captured fish are internally tagged to monitor their movements, estimate their home ranges and spawning locations, and estimate population size from recapture rates. The protocol was developed after speaking with experienced MNR biologists in Lakes Huron, Erie and St. Claire, as well as Dr. John Farrell of SUNY-ESF.

The main objective of this survey is to evaluate the status of Muskellunge in the upper St. Lawrence River and to complement the ongoing survey conducted in New York waters. This year (2024) will mark the third year that LOMU has conducted this work and the first year utilizing predominantly boat electrofishing as the capture method Table 1.10.1. This method resulted in significant numbers of muskellunge being observed, however fish capture was difficult.

Table 1.10.1: Summary of sampling efforts for the 2024 spring Muskellunge survey.

Week	Start Date	End Date	Efish-hrs	Efish-kms	Muskellunge Captured	Muskellunge Observed	N. Pike Sampled
1	29-Apr-24	03-May-24	0	0.0	0	0	73
2	06-May-24	09-May-24	10	75.0	0	6	0
3	13-May-24	16-May-24	12	90.0	1	31	0
4	21-May-24	23-May-24	9	67.5	0	12	0
5	27-May-24	30-May-24	12	90.0	1	17	0
Total	-	-	43	322.5	2	66	73

1.11 Lake Trout Gillnetting Program

E. Bloomfield, Lake Ontario Management Unit

Lake Trout are a native deep-water top predator that play an important role in the Lake Ontario food web and recreational fishery. They were extirpated by the 1950's due to overharvest, habitat destruction, and invasive species, particularly sea lamprey. Sea lamprey control, starting in the 1970's, combined with stocking, has been important for Lake Trout restoration. Restoring a self-sustaining population of Lake Trout that can support a sustainable recreational fishery is one of Lake Ontario's Fish Community Objectives. One way the status of Lake Trout rehabilitation is assessed is through the Lake Trout Gill Netting Program, a lake-wide cold-water gill netting program in collaboration with the US Geological Survey (USGS) and New York Department of Environment and Conservation (NYSDEC). This program was previously done in 2008 and from 1985 – 1995, with USGS and NYSDEC continuing to sample US waters throughout the time series.

In 2024, the MNR portion of the Lake Trout Assessment included six transects of five sites each between Oshawa and Point Traverse and six fixed sites in the Kingston Basin (Figure 1.11.1). To target the cold-water fish community, the shallowest and second shallowest net set in each transect were made where the water temperature 2-3m off bottom was 12°c and 10°c, respectively. The other three net sets were made at 10m bottom depth intervals along the transect. The Kingston Basin sites were sampled as part of the Community Index Gill Netting Program, with data being shared between programs (See community index netting Section 1.1 for details). Gill nets were set overnight and were a single gang of nine 50ft panels with 2-6 inch monofilament mesh. The configuration of community index gill nets is slightly different (three gill nets set together and include 1.5 inch mesh panels), so data have been corrected to align with the configuration used for the transect. A total of 45 gill nets were set at 33 sites between August 6th and September 4th.

Full catch data are presented in Table 1.11.1. A total of 107 Lake Trout were caught, with data on their size distribution presented in Figure 1.11.2, age distribution in Figure 1.11.3, and number caught per net in each area Figure 1.11.4. Lake trout ages ranged from 1-20 years old, with 93% of individuals between 3-10 years old. The average number of Lake Trout caught per net in different areas was between 0.6-5.4 individuals. The percent of un-clipped and un-tagged (presumed wild) Lake Trout was 24% overall, with the highest percent on the north shore of Lake Ontario between Oshawa and Chub Point.

The stomach contents of 77 Lake Trout (all others were empty) are presented in Figure 1.11.5. Alewife were Lake Trout's primary prey, found in over 65% of the stomachs, and Round Goby were a secondary prey item, found in 4% of the stomachs. Prey fish that were unidentifiable because of digestion were also prevalent.

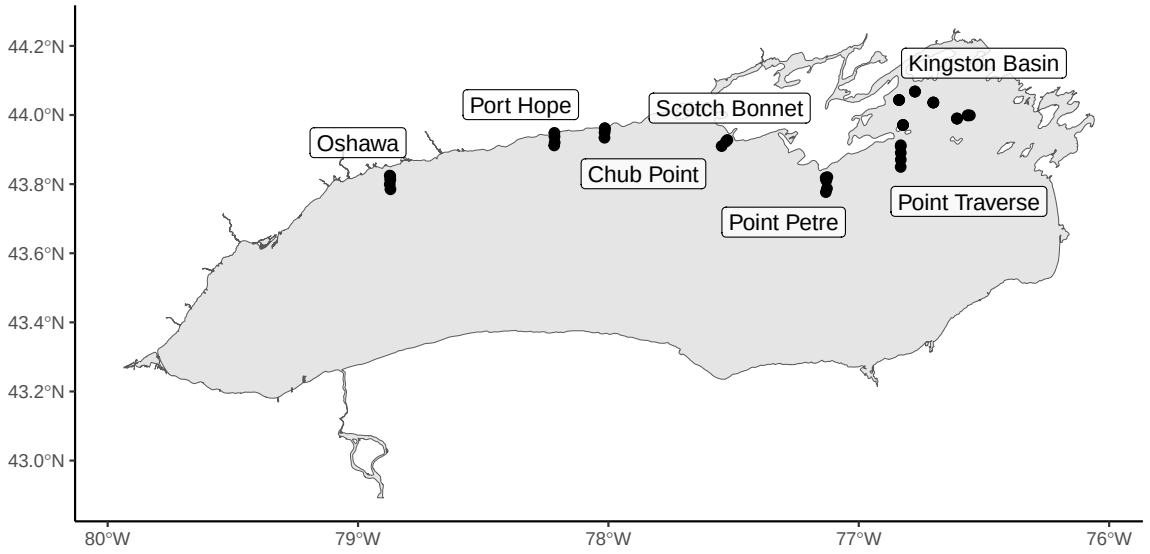


Figure 1.11.1: Map of Lake Ontario with the location of gill netting sites completed by the MNR during the 2024 Lake Trout Gillnetting Program.

Table 1.11.1: Total catch of each species caught by the MNR during the 2024 Lake Trout Gillnetting Program. Results are presented by number, weight (kg), and the percent of nets with each species (occurrence).

Species	Total Catch	Occurrence (%)	Total Weight (kg)
Lake trout	107	73	377
Alewife	55	29	2
Lake herring	20	13	13
Lake whitefish	12	18	13
Chinook salmon	8	13	35
Brown trout	2	4	5
Burbot	2	4	5
Coho salmon	1	2	3
Smallmouth bass	1	2	2
Walleye	1	2	3

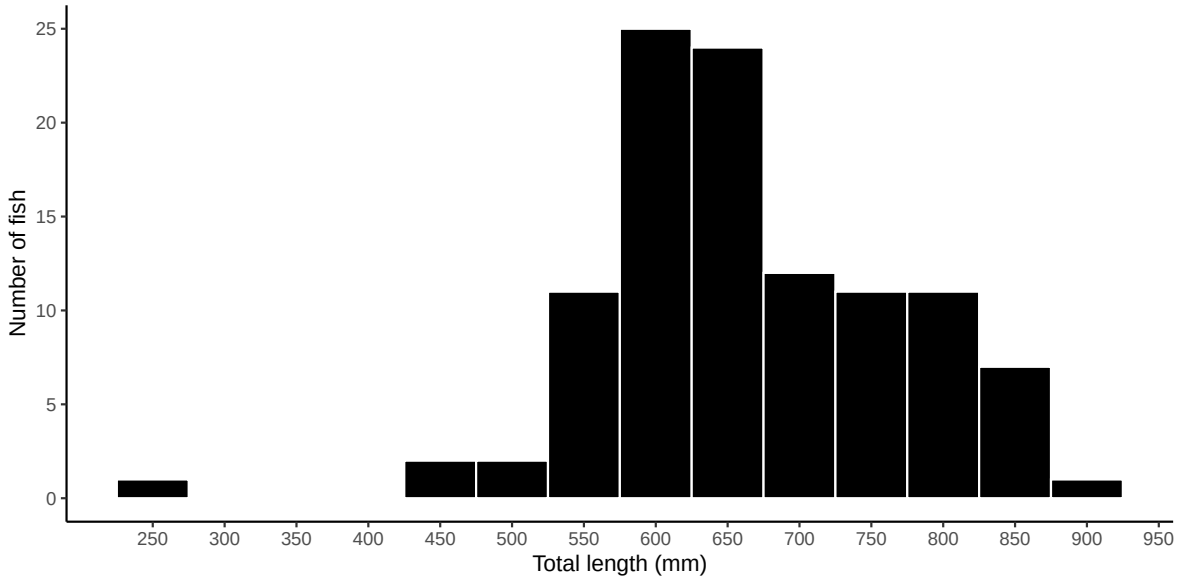


Figure 1.11.2: Length distribution for Lake Trout caught by the MNR during the 2024 Lake Trout Gillnetting Program. Fish length is total length, grouped into 50mm size bins.

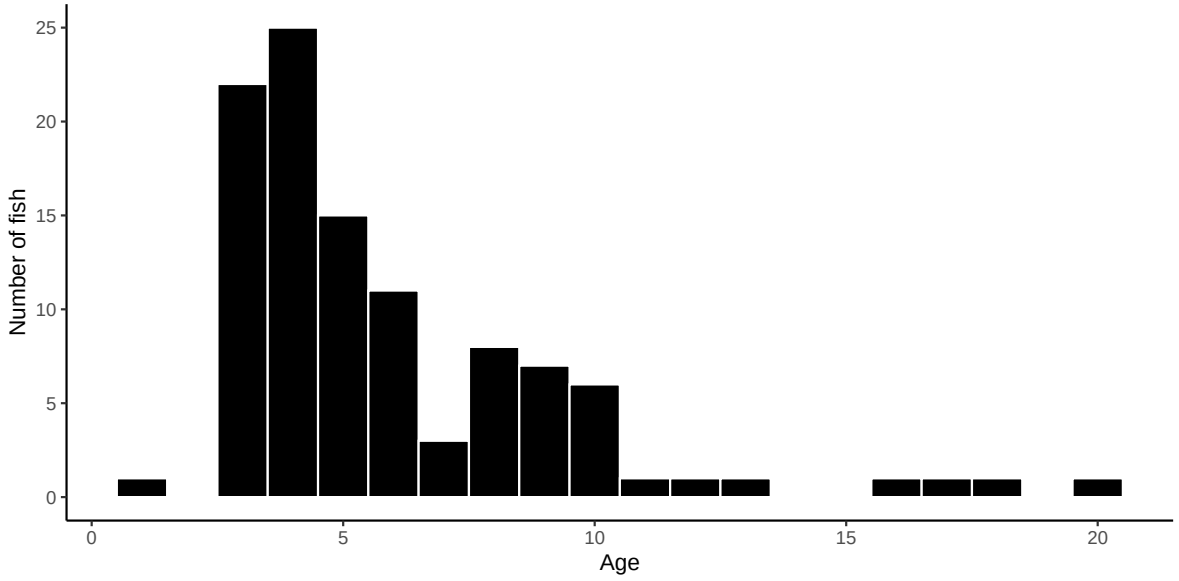


Figure 1.11.3: Age distribution for Lake Trout caught by the MNR during the 2024 Lake Trout Gillnetting Program.

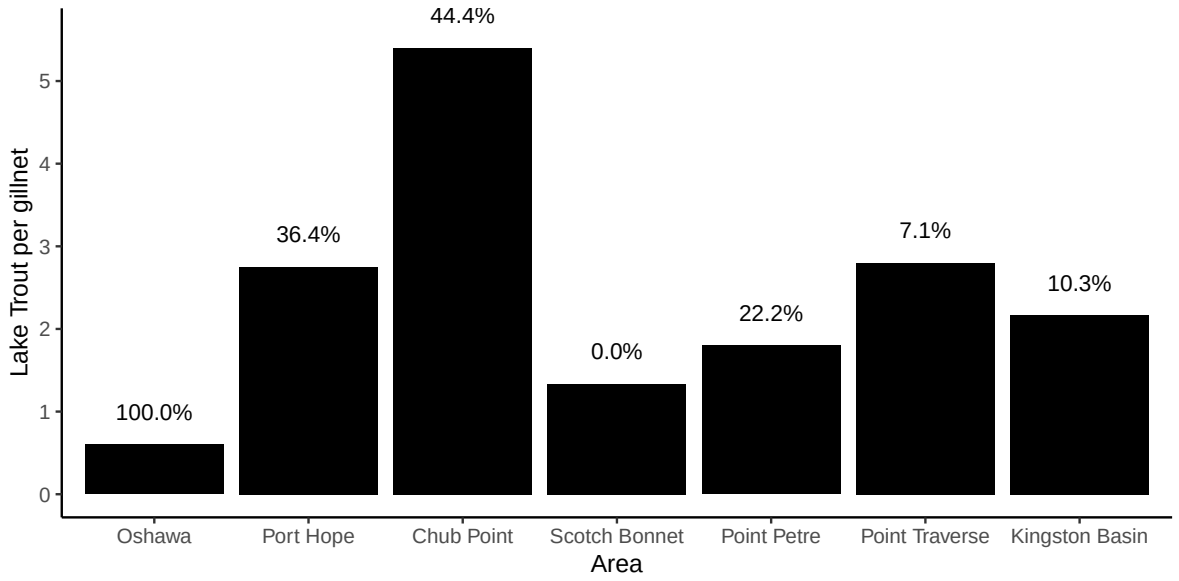


Figure 1.11.4: Number of Lake Trout per net caught by the MNR during the 2024 Lake Trout Gillnetting Program. Results are divided by sampling area. The values on top of each bar are the percent of fish without fin clips or coded wire tags (presumed wild).

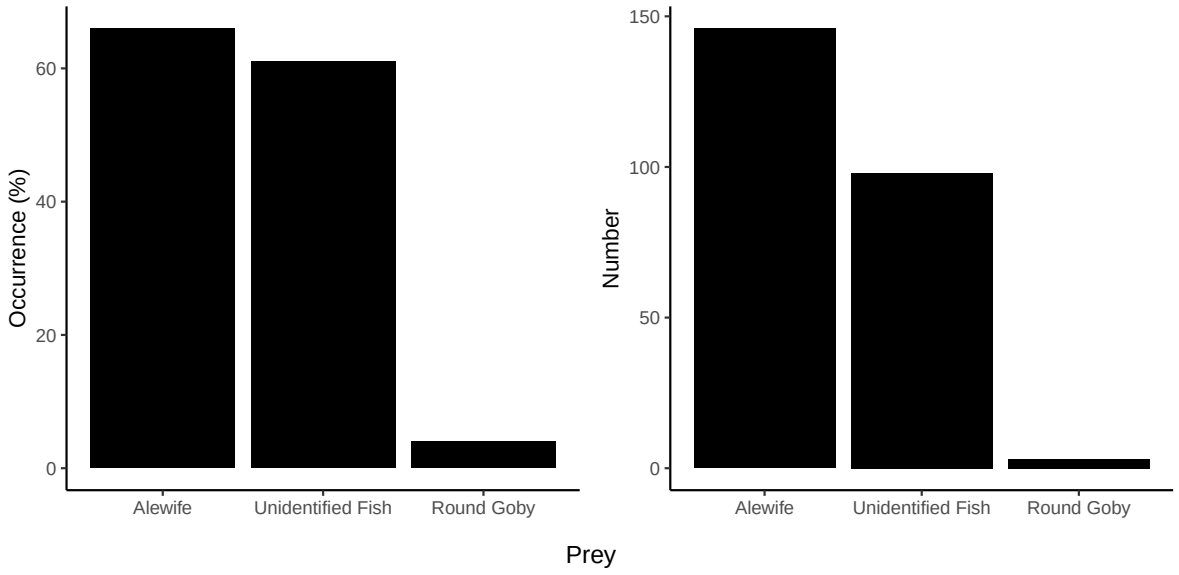


Figure 1.11.5: Stomach contents of 77 Lake Trout caught by the MNR during the 2024 Lake Trout Gillnetting Program. Contents are presented as the percent of Lake Trout stomachs with contents that contained a specific prey type (percent occurrence) and the total number of each prey type.

2 Recreational Fishery

2.1 Fisheries Management Zone 20 Council (FMZ 20) / Volunteer Angling Clubs

C. Lake, Lake Ontario Management Unit

Fisheries Management Zone 20 (FMZ20) Council provides advice to the Lake Ontario Management Unit regarding the management of Lake Ontario recreational fisheries. The FMZ20 Council was established in 2008, and has been instrumental in shaping the future of the Lake Ontario recreational fishery. Over the past decade, the FMZ20 Council has been involved in renewing the Fish Community Objectives, developing a stocking plan, identifying issues and concerns and acting as liaison to improve broader public awareness about the fishery. In 2024, the Council played a significant role in the development of new regulations related to the extension of the existing fish sanctuary surrounding Corbett's Dam on the Ganaraska River (Section 2.2).

FMZ20 Council members represent a broad spectrum of interests across the zone including: Muskies Canada, competitive bass anglers, Bay of Quinte and Upper St. Lawrence River Guides, Central Lake Ontario Sport Anglers, Metro East Anglers, Port Credit Salmon and Trout Association, Halton Region Salmon and Trout Association, St. Catharines' Game and Fish Association, Ontario Sportfishing Guides Association, Ontario Commercial Fish Association, Ontario Federation of Anglers and Hunters, tributary anglers, academia, environmental interests and several unaffiliated anglers.

Many of our volunteer clubs (council-affiliated and others) also help with the physical delivery of several management programs. Multiple clubs help with planning and implementation of Lake Ontario's net pen rearing initiatives for Chinook Salmon (Section 5.2), for example.

Other groups help with the annual delivery of our stocking program through the operation of community-based hatcheries. The Napanee Rod and Gun Club, Credit River Anglers and Metro East Anglers stock various species including Rainbow Trout, Brown Trout and Coho Salmon. The Islington Sportsman Club, Belfountain Community Hatchery and Ontario Streams stock Atlantic Salmon. Volunteers at the Ganaraska River-Corbett Dam Fishway assist MNR staff to maintain and operate the fish counter. Numerous anglers and clubs also participate regularly by supplying catch and harvest information in our volunteer angler diary programs.

2.2 Ganaraska River Extended Fall Season Angler Survey

M. Jarvie, Lake Ontario Management Unit

The Ganaraska River has long provided an important recreational fishery for migratory trout and salmon. This tributary also provides crucial spawning habitat for both naturalized (e.g., Chinook Salmon, Rainbow Trout) and stocked (e.g., Atlantic Salmon) salmonids. In 2024, the Ontario Ministry of Natural Resources and partners stocked over 1.6 million migratory salmon and trout into Lake Ontario tributaries and Lake Ontario for the put-grow-take fishery (Section 5.1).

In August of 2024, changes to the Ontario Fishing Regulations were approved, which extended the existing fish sanctuary surrounding Corbett's Dam on the Ganaraska River downstream to the southernly limit of the C.N.R. right-of-way during the period of September 1st to October 14th. This would allow for the high densities of vulnerable Chinook Salmon congregating downstream of Corbett's Dam in the various step pools and shallow stretches to be protected during their spawning migration. In addition, the extended fall season on the Ganaraska River, which typically allows for fishing from September 30th to December 31st from the south side of the C.P.R. bridge to the southerly limit of the C.N.R right-of-way, was expanded upstream to the south side of the Jocelyn St. bridge from October 15th to December 31st. The area downstream of the southerly limit of the C.N.R. right-of-way to Lake Ontario remains open to fishing year-round.

While data from the fish counter located at the Ganaraska Fishway show lower densities of fish in the river after October 14th (Section 1.4), expanded fishable areas during the extended fall season may alter angler effort, catch, and harvest in this region. The fish counter has shown that Chinook Salmon will still be present in the river in fishable waters during the extended fall season, however, their densities will be significantly lower. In addition, Rainbow Trout will utilize the lower Ganaraska River during the fall.

This program, which ran from October 15, 2024 to November 30, 2024, provided valuable information on angler effort, catch and harvest during the new extended fall season and allowed for comparisons with the 2014 Lake Ontario Tributary Angling Survey. Similarly, these data can inform on the ecological effects of the fall recreational fishery and the economic value of the extended fall season on the Ganaraska River. Survey questions were related to angling effort, catch and harvest as well as angler preferences (i.e., fishing method) and behaviours (i.e., what river they regularly fish in the fall). The survey area was divided into two subspaces based on the regulation changes and the 2014 survey design: subspace IA (southerly limit of C.N.R. right-of-way downstream to Lake Ontario) open year-round for fishing, and subspace IB (Jocelyn St. downstream to southerly limit of C.N.R. right-of-way) open for the extended fall season.

A total of 1120 anglers were counted and 654 interviews were conducted in 27 survey days between October 15, 2024 and November 30, 2024 (Table 2.2.1). Survey staff also biologically sampled 38 fish harvested by anglers (2 Brown trout, 8 Chinook salmon, 1 Coho salmon, 27 Rainbow trout, Table 2.2.1).

Table 2.2.1: Number of anglers counted, anglers interviewed, and harvested fish biologically sampled from October 15th to November 30th, 2024 on the Ganaraska River for each subspace.

Subspace	Anglers	Interviews	Fish Sampled
IA; C.N.R. bridge to mouth	132	78	3
IB; Jocelyn St. to C.N.R. bridge	988	576	35
Total	1120	654	38

Angler Effort

Total estimated effort for the survey period was 17,109 angler hours (Table 2.2.2). Spatially, 12% and 88% of total estimated effort occurred in subspace IA and IB (respectively), while temporally, 55% of total estimated effort occurred on weekdays compared to 45% on weekends (Table 2.2.2).

Table 2.2.2: Total estimated effort (angler hours) by weekday and weekend for each subspace in the Ganaraska River Extended Fall Season Angler Survey, 2024.

	Effort (angler-hrs)		
Subspace	Weekday	Weekend	Total
IA; C.N.R. bridge to mouth	1344	720	2064
IB; Jocelyn St. to C.N.R. bridge	8132	6913	15045
Total	9476	7633	17109

Catch and Harvest

A total of 870 fish were recorded as released and 85 were harvested by interviewed anglers. Estimated CUE was highest for Rainbow Trout while targeted CUE was highest for Chinook Salmon (Figure 2.2.1, Table 2.2.3). The average and median total lengths of harvested, biologically sampled Rainbow Trout was 22.9 and 23.4 inches respectively (n=27) and 34.6 and 34.9 inches for Chinook Salmon respectively (n=8, Figure 2.2.2).

Angler Behaviour

During the survey, staff recorded the angling method used by each interviewed angler (Figure 2.2.3). Drift fishing was the most common fishing method used (72%) followed by spin casting (20%), fly fishing (7%) and still fishing (1%). Of the anglers interviewed, the majority (74%) regularly fish the extended fall season in Lake Ontario's north shore tributaries, but the majority (73%) had not previously fished the Ganaraska River during that time. When anglers were asked which tributary they normally fished in the fall (not restricted to the extended fall season), the majority (29%) were regulars at the Ganaraska River, followed by Bowmanville Creek (19%), Credit River (19%), Oshawa Creek (9%), Cobourg Creek (8%), and Wilmot Creek (5%), amongst others (Figure 2.2.4). Sixteen percent of interviewed anglers responded that they do not typically fish the tributaries in the fall,

highlighting the potential attraction that this new opportunity provides for those that normally fish outside of the fall season and for those that are new to tributary fishing.

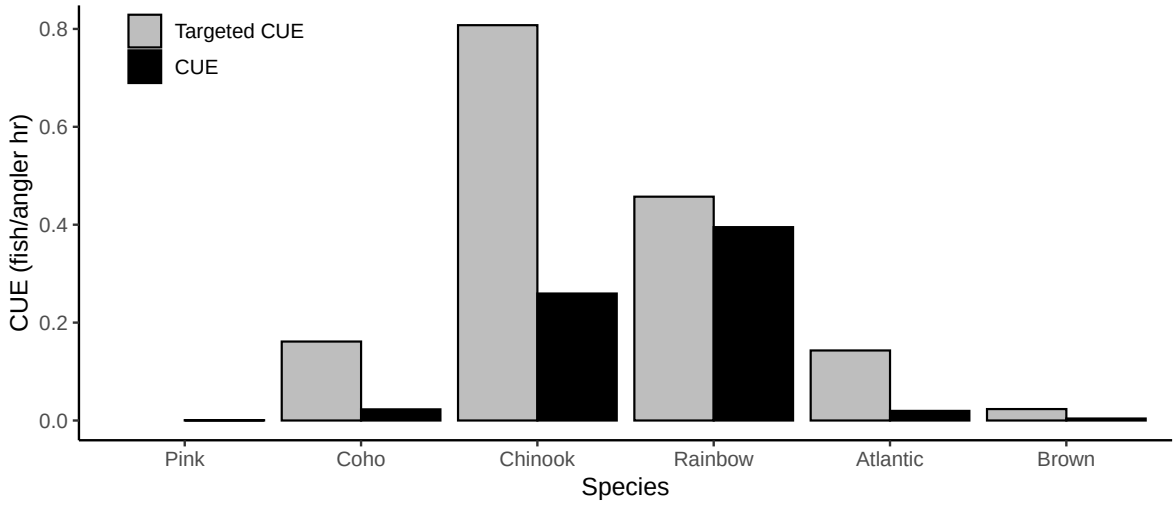


Figure 2.2.1: Catch per unit effort (black) and targeted catch per unit effort (grey) for each migratory salmon and trout species observed in the Ganaraska River Extended Fall Season Angler Survey, 2024.

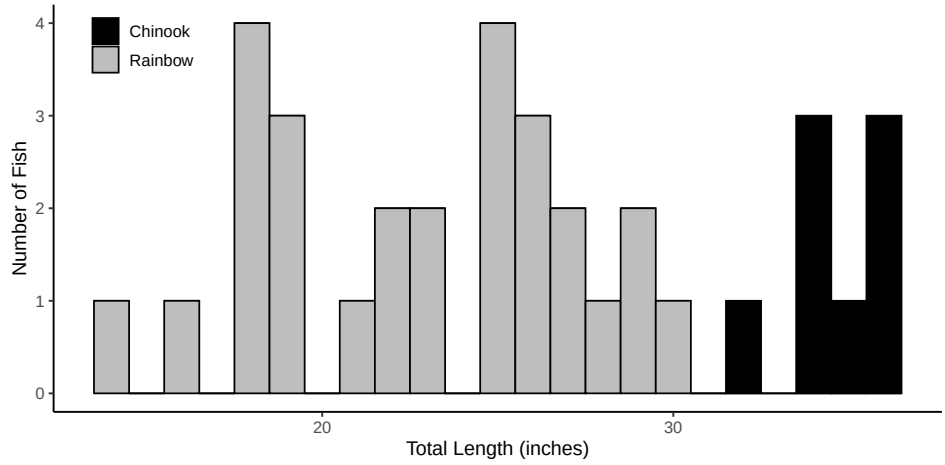


Figure 2.2.2: Distribution of total lengths (in inches) of sampled, harvested Chinook Salmon (black) and Rainbow Trout (grey) from the Ganaraska River Extended Fall Season Angler Survey, 2024.

Table 2.2.3: Estimated catch per unit effort for all anglers (rate), anglers specifically targeting the species (targeted), total estimated catch, total estimated harvest, harvest per unit effort and percent of catch released during the survey period (October 15 to November 30, 2024) for each species encountered.

	Catch			Harvest		
Species	Rate	Targeted	Number	Rate	Number	% Released
Pink Salmon	0.001	–	12	0.000	0	100
Coho Salmon	0.023	0.161	390	0.002	26	93
Chinook Salmon	0.259	0.808	4438	0.018	308	93
Rainbow Trout	0.395	0.457	6759	0.037	631	91
Atlantic Salmon	0.020	0.143	336	0.000	0	100
Brown Trout	0.004	0.023	69	0.001	19	72

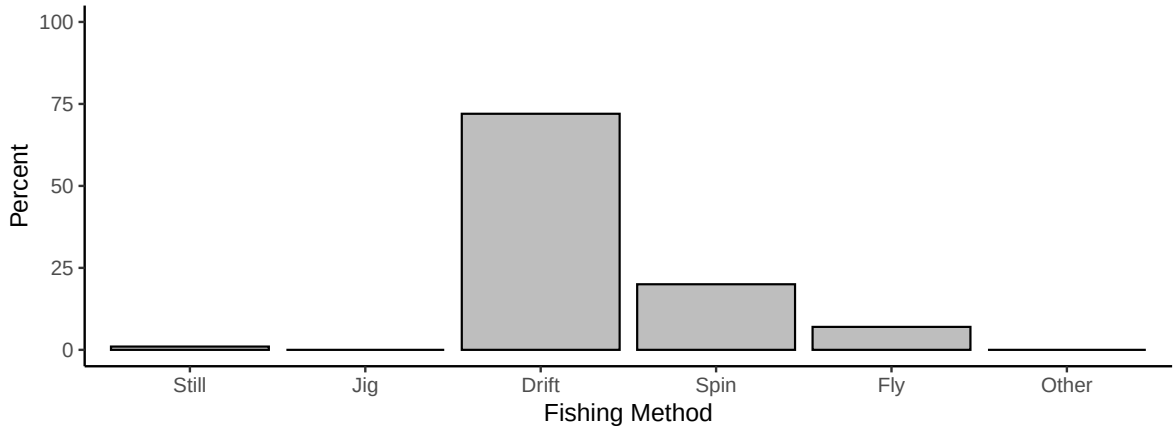


Figure 2.2.3: Distribution of angling methods employed by anglers interviewed in the Ganaraska River Extended Fall Season Angler Survey, 2024.

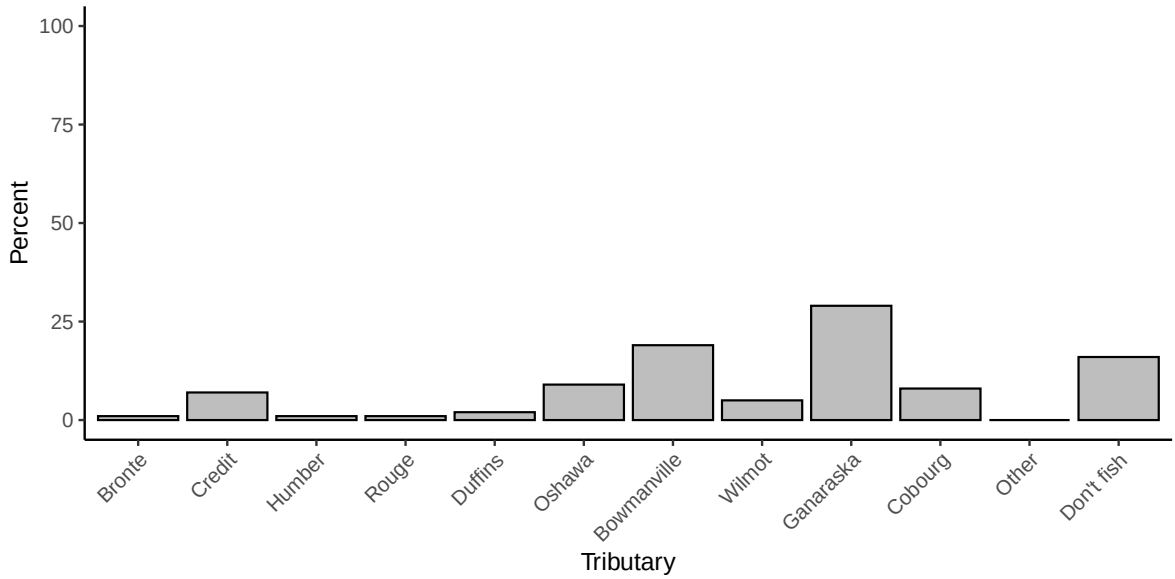


Figure 2.2.4: Distribution of rivers most regularly fished in the fall by anglers interviewed in the Ganaraska River Extended Fall Season Angler Survey, 2024.

Angler Residency

Of the 638 anglers that provided postal codes, 98% resided in Ontario and 2% resided in Québec (Figure 2.2.5). Travel time to Port Hope, ON was estimated in ArcGIS using the first three digits of anglers' postal codes. The majority of anglers (62%) travelled 1 hour to the Ganaraska River, followed by 2 hours (20%), <0.5 hours (10%) and >3 hours (9%, Figure 2.2.6).

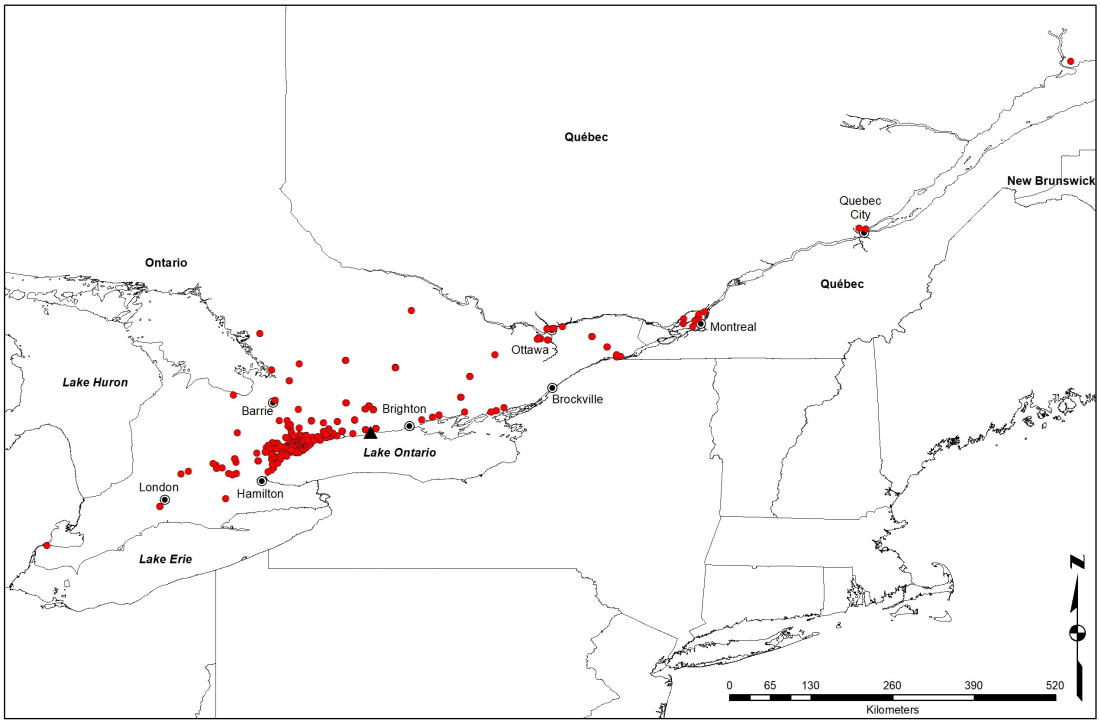


Figure 2.2.5: Map of anglers' origins given the first three digits of their postal codes (red dots, n=638). The mouth of the Ganaraska River is shown by the black triangle and reference cities are shown with black circles.

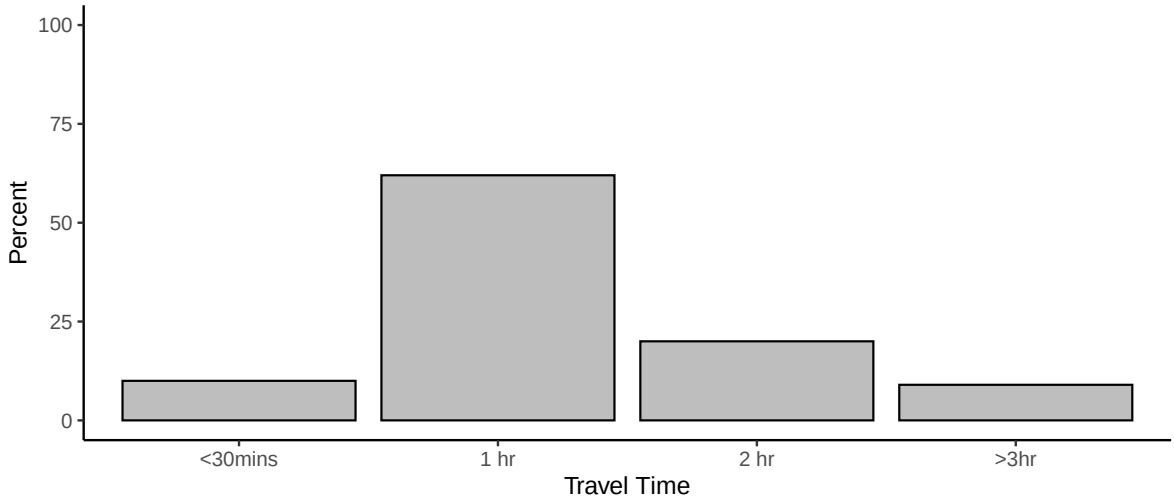


Figure 2.2.6: Distribution of estimated angler travel time to the lower Ganaraska River given the first three digits of their postal code.

Comparison of Angler Effort on the Ganaraska River in 2014 and 2024

In 2014-2015, the Lake Ontario Management Unit conducted a Lake Ontario Tributary Angling Survey which included the Ganaraska River (Ontario Ministry of Natural Resources 2016) as part of a large-scale assessment of angling effort, catch, and harvest across Lake Ontario's north shore. Between October 15th and November 30th, 2014, in the same subspaces (though reduced in size relative to the new 2024 regulation change), 165 anglers were counted and 104 interviews were conducted on the Ganaraska River. While total estimated angler effort in this fall period of 2014 was comparable to that of 2024, the majority (98%) of effort was seen in subspace IA (C.N.R bridge to mouth) due to the reduced fishable area available upstream of the C.N.R. bridge in 2014 (Table 2.2.4). CUE and HUE were higher in 2024 for both subspaces and for the river overall despite similar total angling hours (Table 2.2.4). When comparing the estimated release rates of individual species between years, 2024 saw a decrease from 98% to 91% for Rainbow Trout and an increase from 0% to 93% for Chinook Salmon.

In 2014, of the 104 anglers interviewed, 24% of anglers were local (<30mins travel time) while 61% travelled 1 hour, 9% travelled two hours, and 6% travelled >3 hours. Like those interviewed in 2024, the majority of anglers in 2014 used drift fishing (93%) followed by still (6%) and spin cast (1%).

Table 2.2.4: Comparison of angler survey results from the 2014 Lake Ontario Angling Survey and the 2024 Ganaraska River Extended Fall Season Angler Survey on the Ganaraska River, Port Hope, Ontario. Statistics include total estimated angling hours (effort), catch per unit effort (CUE), and harvest per unit effort (HUE) for the two subspaces in common for the surveys.

	2014 Survey			2024 Survey		
Subspace	Effort	CUE	HUE	Effort	CUE	HUE
IA; C.N.R. bridge to mouth	15522	0.199	0.008	2064	0.391	0.043
IB; Jocelyn St. to C.N.R. bridge	306	0.000	0.000	15045	0.744	0.059
Total	15827	0.195	0.008	17109	0.702	0.057

Reference

Ontario Ministry of Natural Resources. 2016. Lake Ontario Fish Communities and Fisheries: 2015 Annual Report of the Lake Ontario Management Unit. Ontario Ministry of Natural Resources, Picton, Ontario, Canada. Available at: http://www.glfc.org/lakecom/loc/mgmt_unit/index.html

2.3 Black Bass Aerial Survey

A. Row, Lake Ontario Management Unit

A black bass aerial recreational angling survey was conducted in the spring of 2024 on the Bay of Quinte, Eastern Basin of Lake Ontario, East Lake, West Lake, and Wellers Bay. The objective of the survey was to estimate black bass angling effort during the catch and release early season. The black bass angling season was changed in 2021 to allow anglers to target Largemouth and/or Smallmouth Bass during the pre-spawn period ending on May 10th. Angler effort was estimated using aerial counts of boats and anglers across the entire survey area. Catch and harvest information was not possible due to limited angler interviews and inclement weather.

The aerial survey was conducted from April 6th 2024 to May 10th, the last day of the early catch and release angling season. Sampling was stratified by geographic area (10 areas; Figure 2.3.1), day-type (weekday and weekend days), walleye opening day (before; April 6th to May 3rd, and after; May 4th to May 10th), and time-of-day (morning; 9:00 to 14:00 and afternoon; 14:00 to 19:00).

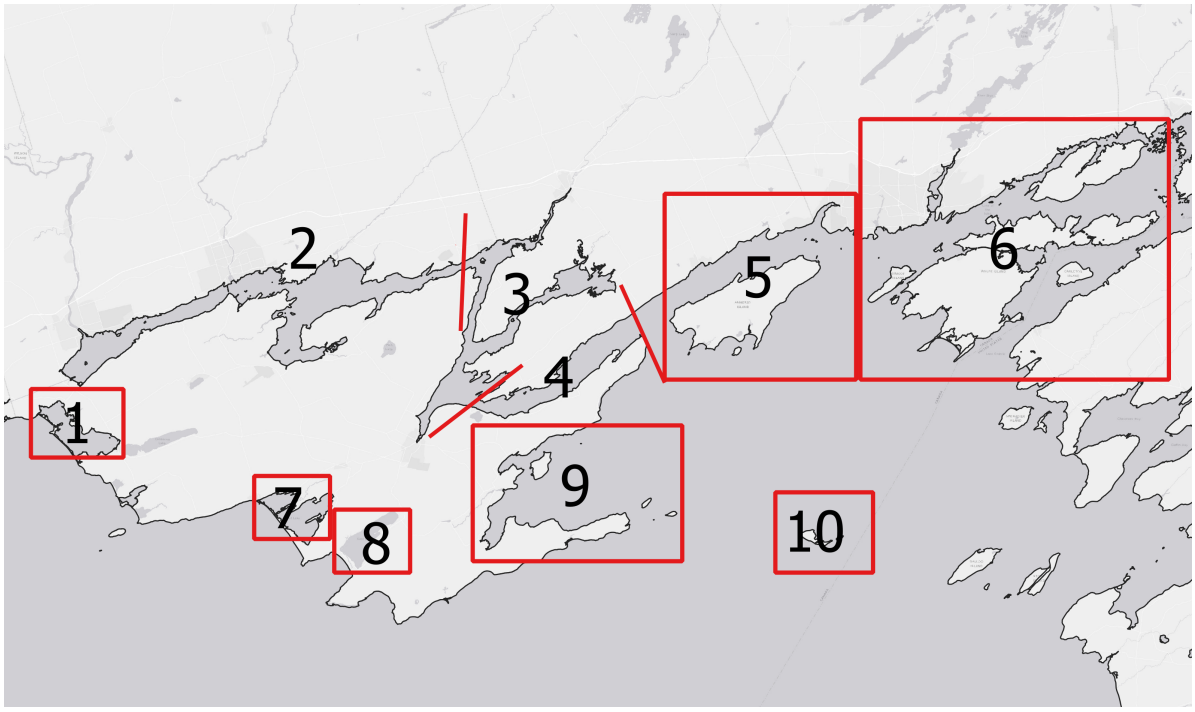


Figure 2.3.1: Map of the survey area for the black bass aerial creel. Each red box indicates a distinct geographic area within the survey. 1: Wellers Bay 2. Upper Bay of Quinte 3. Middle Bay of Quinte 4. Lower Bay of Quinte 5. Amherst Island 6. Kingston 7. West Lake 8. East Lake 9. Waupoos 10. Main Duck Island

Flights occurred low enough to count anglers and categorize each boat into one of four categories; stationary fishing boat, trolling fishing boat (<4 mph consistent speed with fishing gear trailing behind

the boat), running boat (>4 mph with no angling gear trailing behind the boat), and fishing kayak (kayak with person or persons angling). All stationary fishing boats and fishing kayaks were considered angling for black bass during the survey since most anglers do not use trolling to target bass.

Aerial counts were conducted on all areas and were scheduled for four days per week (20 flights total; two weekdays and two weekend days). Due to adverse weather, a total of 18 flights occurred during the survey period. Flights began (approximately) at one of two start times (9:00, 14:00), selected at random prior to the survey. Separate counts of boats and anglers were made for each area.

The opening day of Walleye on May 4th 2024 overlapped with the end of the catch and release early season for bass on May 10th 2024. Due to confidence in determining a black bass angling boat from a walleye angling boat, only counts until May 3rd 2024 (inclusive) were used for analysis (12 flights). It is worth noting that the final days of the black bass angling season are popular as water temperatures rise and fish activity increases.

Aerial surveys recorded a total of 285 black bass angling boats and 503 black bass anglers from April 6th 2024 to May 3rd 2024 (Figure 2.3.2). The average number of anglers per boat was 1.8. The largest number of boats were in the Kingston area (105 boats), followed by the Upper Bay of Quinte (59 boats), and Amherst Island (51 boats; Figure 2.3.3). These three areas combined account for 76% of the total effort across the sampling area (Kingston: 37%, Upper Bay of Quinte: 21%, Amherst Island: 18%). Using environmental conditions and survey methods to estimate effort on days with no flights, the survey estimates a total of 462 boats and 830 anglers fishing for black bass from April 6th 2024 to May 3rd 2024.

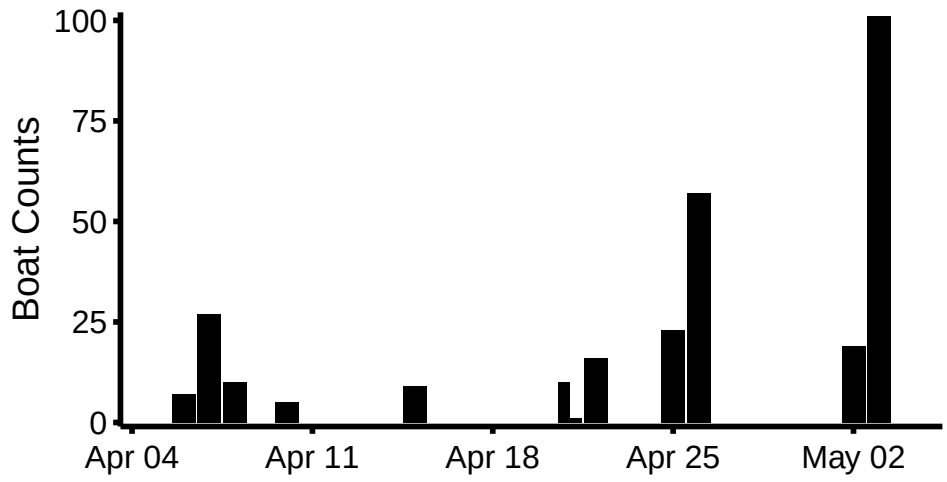


Figure 2.3.2: Number of Bass angling boats observed during the black bass aerial survey from April 6th to May 3rd 2024.

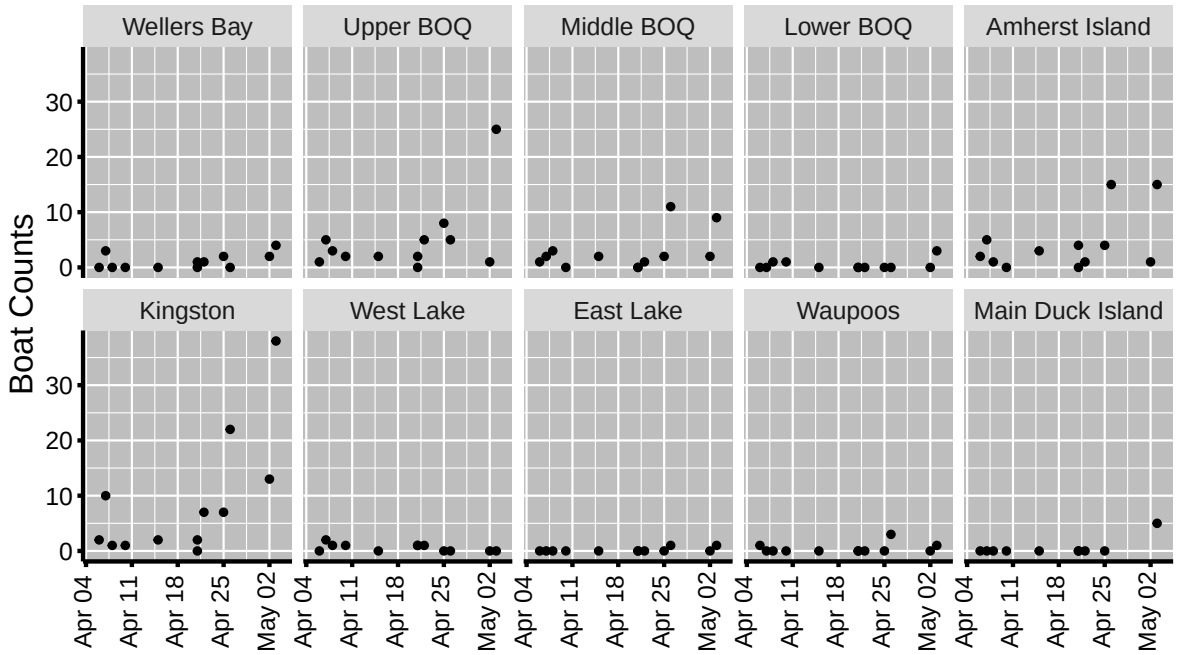


Figure 2.3.3: Number of Bass angling boats observed during the black bass aerial survey across each geographic area from April 6th to May 3rd 2024.

3 Commercial Fishery

3.1 Lake Ontario and St. Lawrence River Commercial Fishing Liaison Committee

A. Todd, Lake Ontario Management Unit

The Lake Ontario and St. Lawrence River Commercial Fishery Liaison Committee (LOLC) consists of Ontario Commercial Fishing License holders that are appointed to represent each of the quota zones as well as representatives of the Ontario Commercial Fisheries' Association and the MNR.

This committee provides advice to the Lake Ontario Manager on issues related to management of the commercial fishery and provides a forum for dialogue between the MNR and the commercial industry. The Lake Ontario Commercial Fishery Annual General Meeting (CFAGM) was not held in 2024.

The LOLC met twice during 2024 (March 28th and August 22nd). Topics of discussion at these LOLC meetings included commercial fish license administration and updates, commercial fish modernization updates, commercial harvest summaries, an overview of the eel trap and transport program, and Lake Whitefish stock and quota management.

3.2 Quota and Harvest Summary

S. Beech, Lake Ontario Management Unit

Lake Ontario supports a commercial fish industry in the Canadian waters of Lake Ontario east of Brighton (including the Bay of Quinte, East and West Lakes) and the St. Lawrence River (Figure 3.2.1). The waters west of Brighton (quota zone 1-8) currently have no commercial licences. Commercial harvest statistics for 2024 were obtained from the commercial fish harvest information system (CFHIS) which is managed by MNR. Commercial quota, harvest and landed value statistics for Lake Ontario, the St. Lawrence River and East and West Lakes, for 2024, are shown in Table 3.2.1 (base quota), Table 3.2.2 (issued quota), Table 3.2.1 (harvest, landed value, and price per pound).

The total harvest (landed value) of all species was 409,060 lb ($779,429 in 2024), slightly higher than 2023 (366,344 lb and $657,806). The harvest (landed value) for Lake Ontario, the St. Lawrence River, and East and West Lakes was 302,619 lb ($557,198), 59,534 lb ($159,389), and 46,906 lb ($62,851), respectively. Yellow Perch, Lake Whitefish, and Sunfish were the dominant species in the harvest for Lake Ontario (including East and West Lakes) (Figure 3.2.2). Yellow Perch was dominant in the St. Lawrence River followed by Black Crappie (Figure 3.2.2).

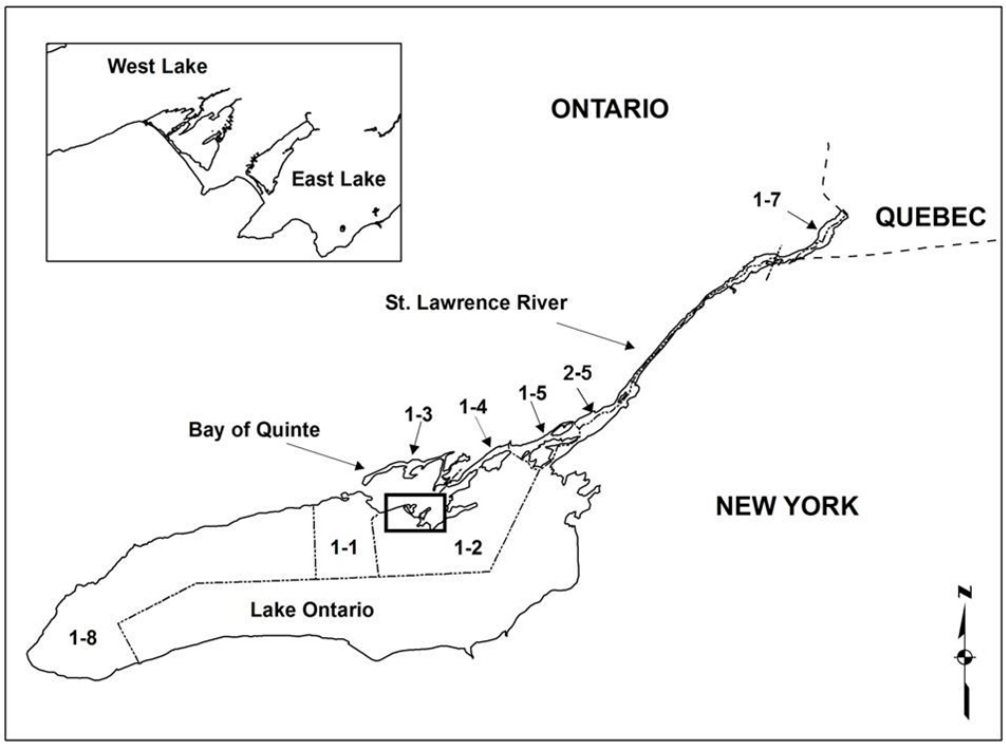


Figure 3.2.1: Map of Lake Ontario and the St. Lawrence River showing commercial fishing quota zones in Canadian waters.

Table 3.2.1: Commercial fish base quota (lb), by quota zone, in the Canadian waters of Lake Ontario and the St. Lawrence River, East and West Lakes (two Lake Ontario embayments), 2024.

			Lake Ontario				St Lawrence River		
Species	East L	West L	1-1	1-2	1-3	1-4	1-5	2-5	1-7
Black Crappie	3100	9850	4540	3000	14823	1100	14170	17590	4840
Lake Whitefish			6549	97744	12306	18282			
Sunfish	14600	18080	28130						
Walleye			4210	32933		10952			
Yellow Perch	896	2829	18223	73459	88818	88822	51787	53000	14438

Table 3.2.2: Commercial fish issued quota (lb), by quota zone, in the Canadian waters of Lake Ontario and the St. Lawrence River, East and West Lakes (two Lake Ontario embayments), 2024.

			Lake Ontario				St Lawrence River		
Species	East L	West L	1-1	1-2	1-3	1-4	1-5	2-5	1-7
Black Crappie	3100	9850	2270	1500	15370	550	9470	8795	4840
Lake Whitefish			2068	96883	9359	21913			
Sunfish	14600	18080	28130						
Walleye			2183	15197		29943			
Yellow Perch	896	2829	10888	38186	68752	78558	40092	40810	11550

Table 3.2.3: Commercial harvest (lb), by quota zone, for fish species harvested from the Canadian waters of Lake Ontario and the St. Lawrence River, East and West Lakes (two Lake Ontario embayments), 2024.

			Lake Ontario				St Lawrence River					
Species	East L	West L	1-1	1-2	1-3	1-4	1-5	2-5	1-7	Total Harvest	Total Landed Value	Price per lb
Black Crappie	46	3662	11	0	8072	2	3141	8	461	15402	51781	3.42
Bowfin								135	13	148	162	1.09
Brown Bullhead			33	452	558	7	191	347	2114	3702	1586	0.35
Cisco		273	12	1477	2019	489				4271	1089	0.25
Common Carp	0	60			69	7			6	141	37	1.08
Freshwater Drum			151	295	6007	13901				20353	2081	0.1
Lake Whitefish			1	44115	4715	13096				61927	96150	1.55
Northern Pike	595	6591	820	572	10659	1340	1025			21602	6131	0.3
Rock Bass	2686	2286	1528	2636	4193	758	89			14175	9108	0.65
Rudd							1			1		
Suckers					100					100	10	0.1
Sunfish	8136	12274	1388	8	34005	1	1370	48	1240	58469	90825	1.49
Walleye			1048	1351		21517				23916	43597	1.82
White Bass				2	62	1194				1258	832	0.66
White Perch	108	6261	53	151	13594	8062	58			28288	11484	0.43
White Sucker	49	344	31	75	9075	3356	126			13056	1779	0.12
Yellow Perch	831	2704	1596	11303	35608	41048	18907	19037	11217	142251	462775	3.25

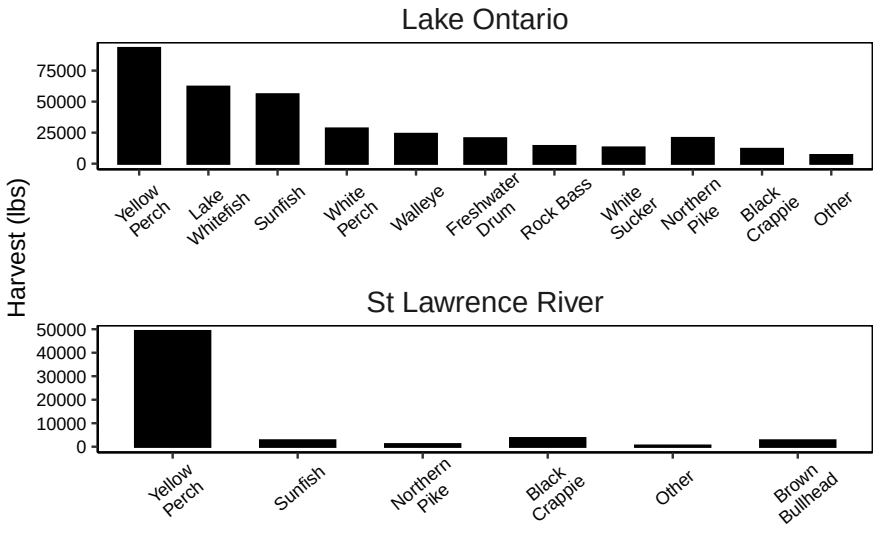


Figure 3.2.2: Commercial harvest by species in the St. Lawrence River (Quota Zones 1-7,1-5, 2-5) and Lake Ontario (Quota Zones 1-1, 1-2, 1-3 ,1-4 and 1-8) including embayments (East Lake and West Lake), 2024.

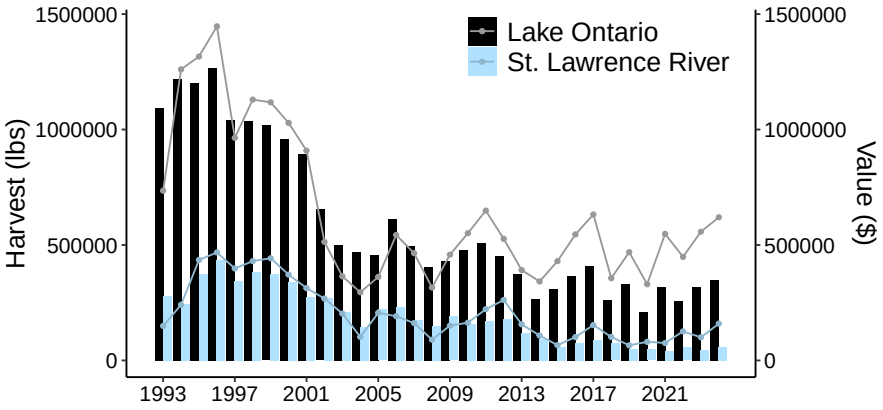


Figure 3.2.3: Total commercial fishery harvest (bars) and value (points) for Lake Ontario (Quota Zones 1-1, 1-2, 1-3 ,1-4 and 1-8) and embayments (East Lake and West Lake), and the St. Lawrence River (Quota Zones 1-5, 2-5 and 1-7), 1993-2024.

Fishery Trends

Annual harvest and landed value for Lake Ontario (including East and West Lakes) and the St. Lawrence River from 1993-2024 is shown in Figure 3.2.3. Commercial harvest declined in the early 2000s and appeared to stabilize between 2003-2012 at about 400,000 lb and 150,000 lb for Lake Ontario and the St. Lawrence River respectively. After 2012, harvest varied annually, and remained at lower levels. Overall, average harvest over the past decade in both geographic areas has declined from the 2003-2013 average, however, average harvest was higher in the past five years compared to the previous five years (2015-2019).

Major Species

For major species, annual trends of commercial harvest, landed value and quota, across quota zones or geographic areas, is shown in Figure 3.2.4 to Figure 3.2.10. Species-specific price-per-lbs used to calculate values are means across quota zones and waterbodies.

Yellow Perch

Yellow Perch 2024 commercial harvest relative to base quota by quota zone is shown in Figure 3.2.7. Overall, 36% (142,251 lb) of the Yellow Perch base quota (392,272 lb) and 49% of issued quota (292,561 lb) was harvested in 2024. The highest Yellow Perch harvest came from quota zone 1-4. Trends in Yellow Perch quota (base), harvest and landed value are shown Figure 3.2.7. In 2019, quota was reduced 20% in quota zone 1-7 and left unchanged in all other quota zones. Harvest increased in 2024 in all quota zones. Yellow Perch price-per-lb has generally increased since 2018 reaching $3.25 in 2024.

Lake Whitefish

Lake Whitefish 2024 commercial harvest relative to base quota by quota zone is shown in Figure 3.2.4. Overall, 46% (61,927 lb) of the Lake Whitefish base quota (134,881 lb) and 48% of the issued quota (130,223 lb) was harvested in 2024. Most of the Lake Whitefish harvest came from quota zone 1-2. Harvest increased in quota zone 1-4 and decreased in quota zone 1-2 compared to 2023. Lake Whitefish is managed as one population across quota zones, therefore, quota can be transferred among quota zones. Trends in Lake Whitefish quota (base), harvest and landed value are shown in Figure 3.2.4.

Seasonal whitefish harvest and biological attributes (e.g., size and age structure) information are reported in Section 3.2. Lake Whitefish price-per-lb was $1.55 in 2024 and has had a slightly decreasing trend since 2018.

Walleye

Walleye 2024 commercial harvest relative to base quota by quota zone is shown in Figure 3.2.5. Walleye harvest increased slightly in 2024. Overall, 50% (22,509 lb) of the Walleye base quota (48,095 lb) and 51% of the issued quota (23,917 lb) was harvested. The highest Walleye harvest came from quota zone 1-4. Very small proportions of quota were harvested in quota zones 1-1 and 1-2. Walleye (like Lake Whitefish) is managed as one fish population across quota zones. Therefore, quota can be transferred among quota zones 1-1, 1-2 and 1-4. In most years, this results in issued quota and harvest being considerably higher than base quota in quota zone 1-4. Quota has remained consistent since the early 2000s (just under 50,000 lb for all quota zones combined). Walleye price-per-lb increased between 2011 and 2018 but declined in subsequent years averaging $1.82 in 2024.

Black Crappie

Black Crappie 2024 commercial value and harvest relative to base quota for Lake Ontario, East and West Lakes, and the St. Lawrence River is shown in Figure 3.2.9. Overall, 20% (15,403 lb) of the Black Crappie base quota (73,013 lb) was harvested in 2024. The highest Black Crappie harvest came from quota zone 1-3 and West Lake. Black Crappie harvest has been generally trending down in all geographic areas since the early 2010's but increased over the past two years. Average price-per-lb remains high, reaching $3.42 in 2024.

Sunfish

Sunfish 2024 commercial harvest relative for Lake Ontario, East and West Lakes, and the St. Lawrence River is shown in F@fig-CF-8. Only quota zones 1-1 (embayment areas only), East Lake and West Lake have quotas for Sunfish; quota is unlimited in the other zones. Most Sunfish harvest was from quota zone 1-3. In 2024, harvest increased in all geographic areas. Price-per-lb declined between 2018-2020 but increased between 2021 and 2024 ($1.49 in 2024).

Cisco

Cisco 2024 commercial value and harvest for Quota zones 1-1, 1-2, 1-3 and 1-4 is shown in Figure 3.2.6. The majority of harvest was taken from Quota Zone 1-3 and 1-2 with minimal amounts taken from other zones. Current harvest levels have increased relative to the early 2000's, particularly in quota zone 1-3 and 1-2. Price-per-lb increased slightly in 2024 to $0.25 compared to $0.24 in 2023.

Northern Pike

Northern Pike commercial harvest and landed value trends for Lake Ontario, East and West Lakes, and the St. Lawrence River is shown in Figure 3.2.10. In 2018-2023, the harvest season was closed from April 1st to the first Saturday in May. Historically, this time period accounted for a significant amount of the annual harvest. Harvest increased in 2024 compared to 2023 and predominantly came from Quota zone 1-3 and West Lake.

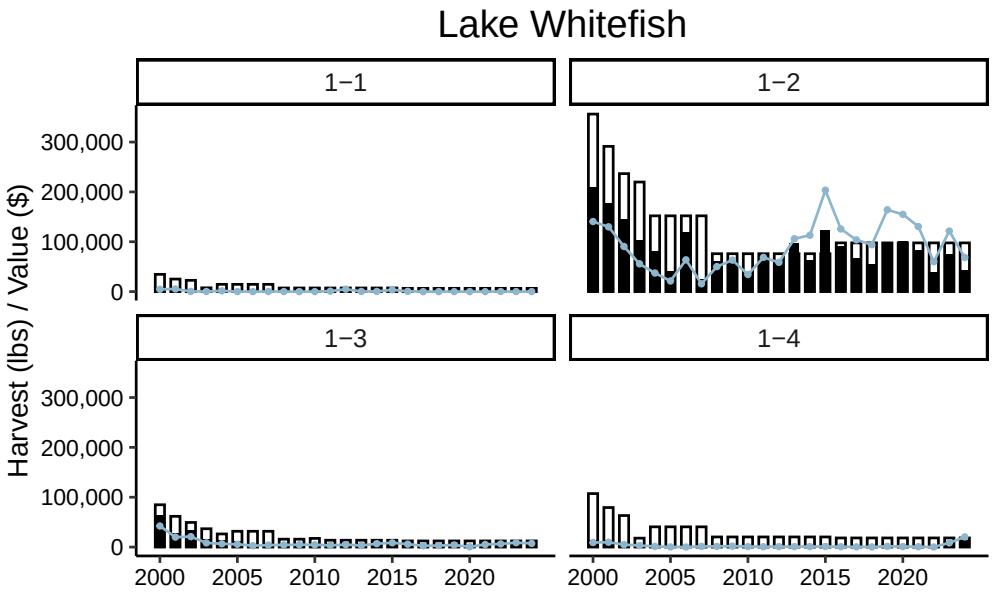


Figure 3.2.4: Commercial base quota, harvest and price-per-lb for Lake Whitefish in Quota Zones 1-1, 1-2, 1-3 and 1-4, 2000-2024.

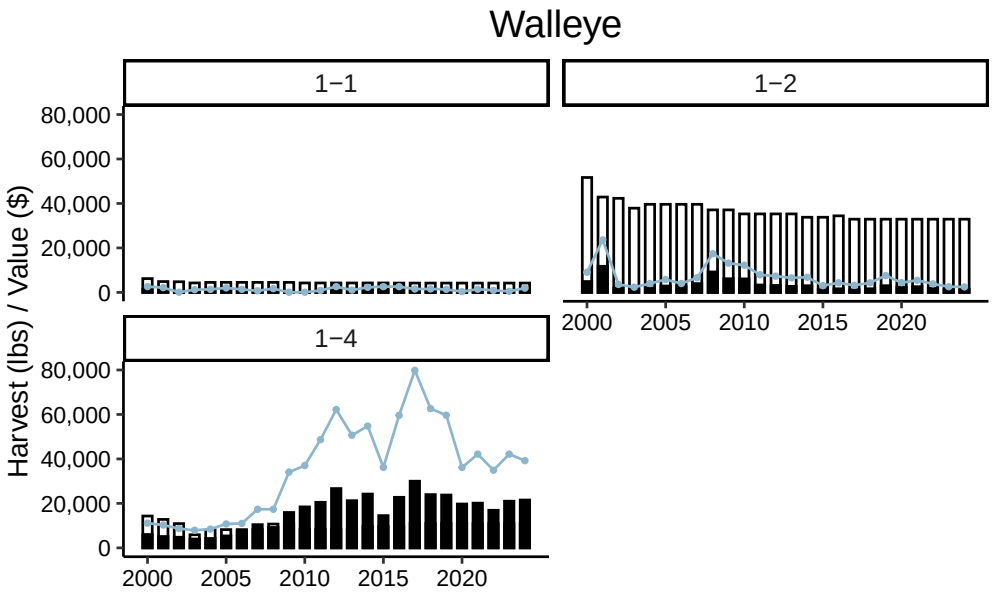


Figure 3.2.5: Commercial base quota, harvest and price-per-lb for Walleye in Quota Zones 1-1, 1-2 and 1-4, 2000-2024.

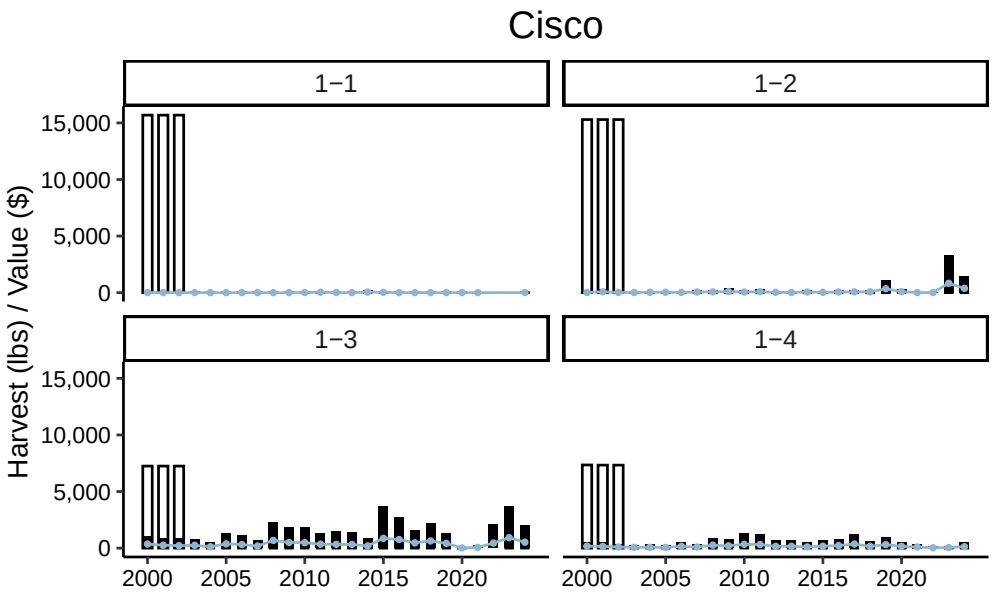


Figure 3.2.6: Commercial base quota, harvest and price-per-lb for Cisco in Quota Zones 1-1, 1-2, 1-3 and 1-4 2000-2024.

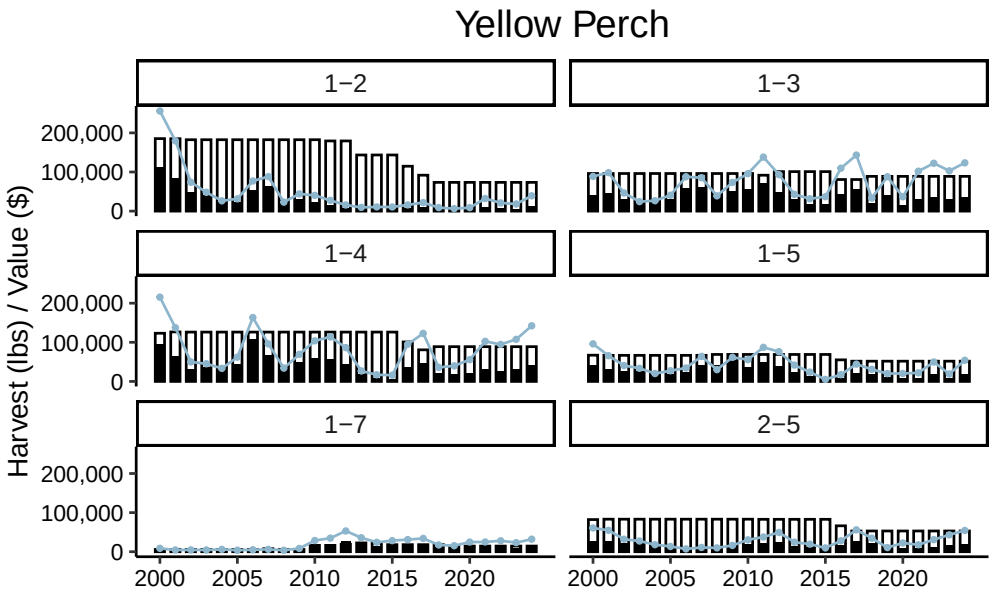


Figure 3.2.7: Commercial base quota, harvest and price-per-lb for Yellow Perch in Quota Zones 1-2, 1-3, 1-4, 1-5, 2-5 and 1-7, 2000-2024.

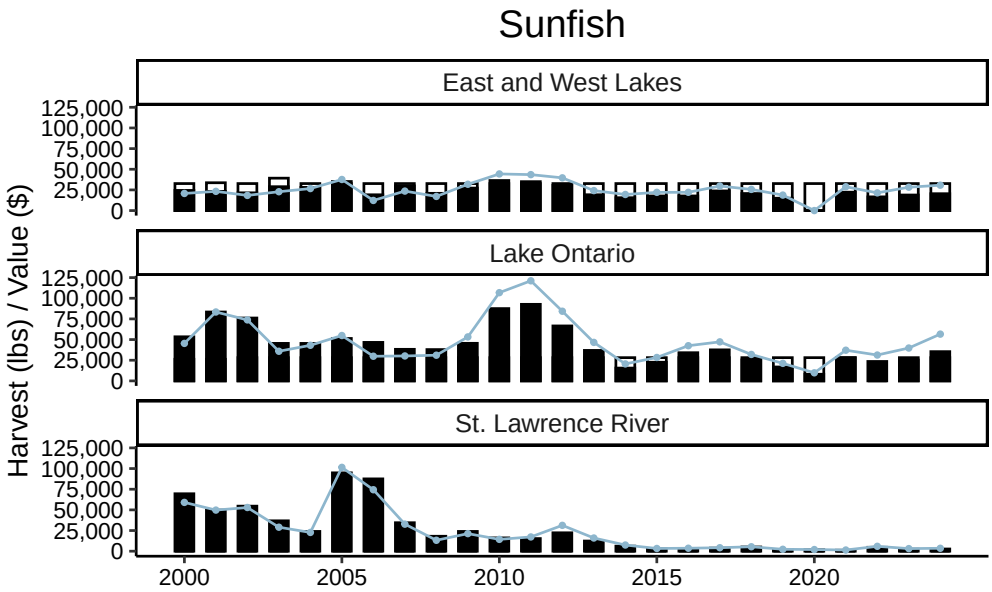


Figure 3.2.8: Commercial base quota, harvest and price-per-lb for Sunfish in Quota Zones 1-1, 1-3, 1-4, 1-5, 2-5, 1-7, East Lake and West Lake 2000-2024.

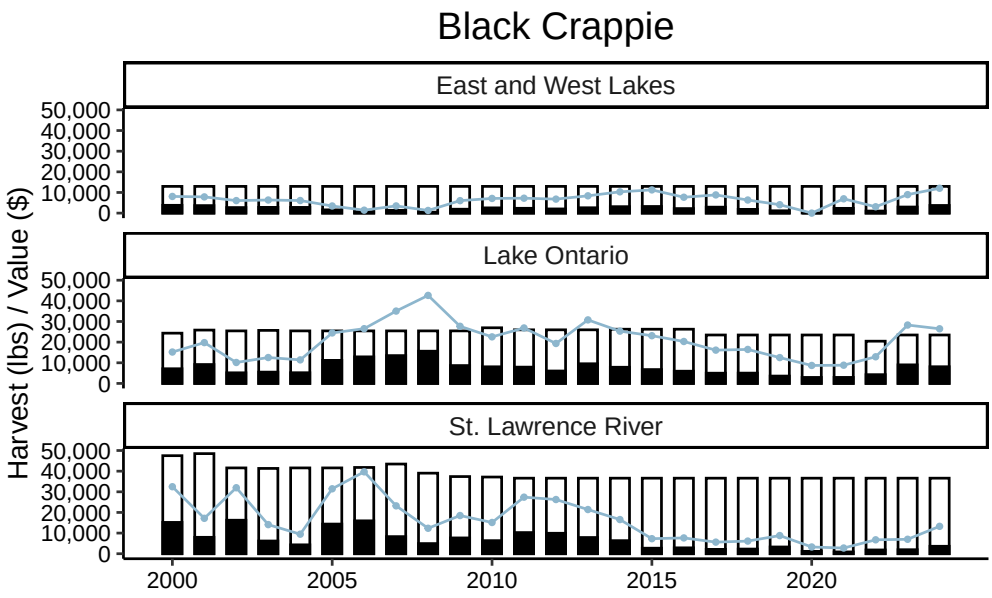


Figure 3.2.9: Commercial base quota, harvest and price-per-lb for Black Crappie in Quota Zones 1-1, 1-3, 1-5, 2-5, 1-7, and West Lake 2000-2024.

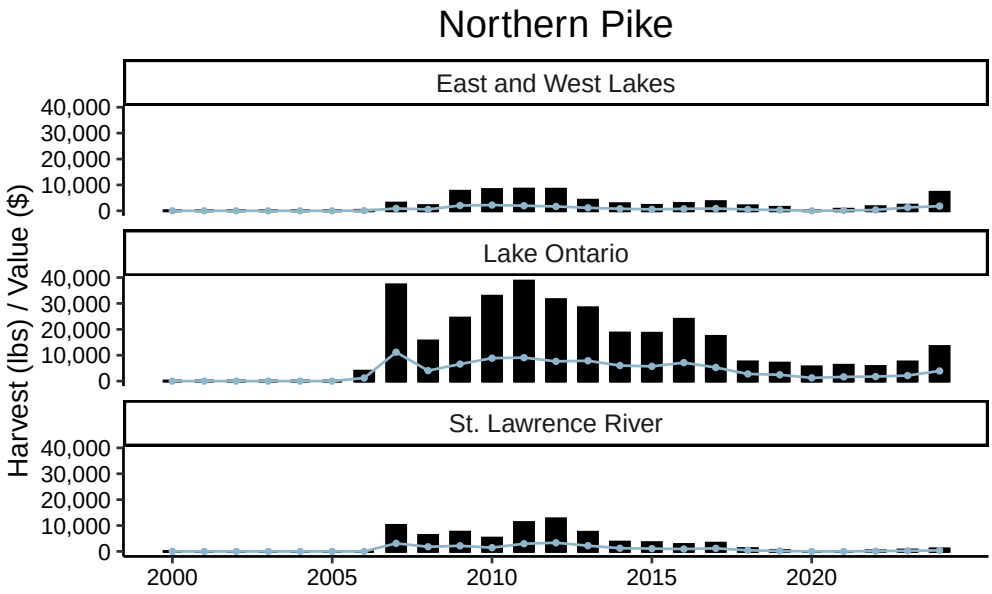


Figure 3.2.10: Commercial base quota, harvest and price-per-lb for Northern Pike in Quota Zones 1-1, 1-2, 1-3, 1-4, 1-5, East Lake and West Lake 2000-2024.

3.3 Lake Whitefish and Cisco Commercial Catch Sampling

S. Beech, Lake Ontario Management Unit

Commercially harvested Lake Whitefish and Cisco are sampled annually (when possible) for biological information. Biological sampling of the catch is necessary to breakdown total harvest (see Daily Catch Reports; Section 3.1), into size and age-specific harvest.

Commercial catch sampling collected biological information from spawning-time fisheries in the Bay of Quinte and the south shore of Prince Edward County (quota zone 1-2) from October 28 to December 03. Biological information is obtained through taking large numbers of length tally measurements as well as a length-stratified sub-sample for more detailed biological sampling for each quota zone. In total, fork length was measured for 2839 fish and age was interpreted using otoliths for 270 fish (Table 3.3.1 and Table 3.3.2).

Lake Whitefish

Commercial Lake Whitefish cumulative daily harvest by quota zone in 2024 is reported in Figure 3.3.1. Total Lake Whitefish harvest was 61927 lb; 48% of the issued quota.

Most of the Lake Whitefish harvest was taken in quota zone 1-2 in gillnets, totaling 44115 lbs with the most harvest taken in November (15540 lbs). In quota zone 1-3, only impoundment gear is permitted and harvest peaked in November totaling 4715 lbs. The only other substantial harvest (13096 lbs) occurred in quota zone 1-4 predominantly in gillnets, however fish were not sampled from this area.

Lake Ontario Gill Net Fishery (quota zone 1-2)

The mean fork length and age of Lake Whitefish harvested during the gill net fishery in quota zone 1-2 were 495 mm and 11 years respectively (Figure 3.3.4 and Figure 3.3.5). Fish ranged from ages 3 - 32 years (Table 3.3.2). The most abundant age-classes in the fishery were ages 9 and 12 which together comprised 33% of the harvest by number (34% by weight). It was determined through diet analysis that 94% of fish had empty stomachs. The remaining fish had stomach contents consisting of fish eggs and unidentified invertebrates.

Bay of Quinte Impoundment Gear Fishery (quota zone 1-3)

Mean fork length and age for Lake Whitefish harvested in quota zone 1-3 were 462mm and 10 years, respectively (Figure 3.3.2 and Figure 3.3.3). Fish ranged from ages 5 - 31 years. The most abundant age-classes in the fishery were ages 10 and 11 which together comprised 43% of the harvest by number (40% by weight). It was determined through diet analysis that 98.8% of fish had empty stomachs. The remaining fish had stomach contents consisting of fish eggs and unidentified invertebrates.

Condition

Lake Whitefish (Bay of Quinte and Lake Ontario spawning groups; sexes combined) relative weight (see Rennie et al. 2008) is shown in Figure 3.3.6. Condition declined markedly in 1994 and has remained low but stable. Relative weight in 2024 was generally higher for the Lake group (76) than the Bay group (74.4). Visceral fat index was also recorded with a higher score (4 maximum) indicating more

fat present. Males (1.35) from both groups had higher Visceral fat scores than females (0.75) on average.

Cisco

Cisco cumulative daily harvest by quota zone in 2024 is reported in Figure 3.3.7. Commercial harvest of Cisco totaled 4271 lbs with 47% harvested (by weight) in quota zone 1-3 and the majority of the harvest taken in November. Harvest in all quota zones has been minimal since 2000 but has increased in recent years, particularly in quota zone 1-3.

Bay of Quinte Impoundment Gear Fishery (quota zone 1-3)

Mean fork length and age for Cisco harvested in quota zone 1-3 were 371 mm and 8 years, respectively (Figure 3.3.8 and Figure 3.3.9). Fish ranged from ages 3- 16 years (Table 3.3.3). The most abundant age-classes in the fishery were ages 7 and 10 which together comprised 51% of the harvest by number (52% by weight). Diet analysis indicated 100% of stomachs were empty.

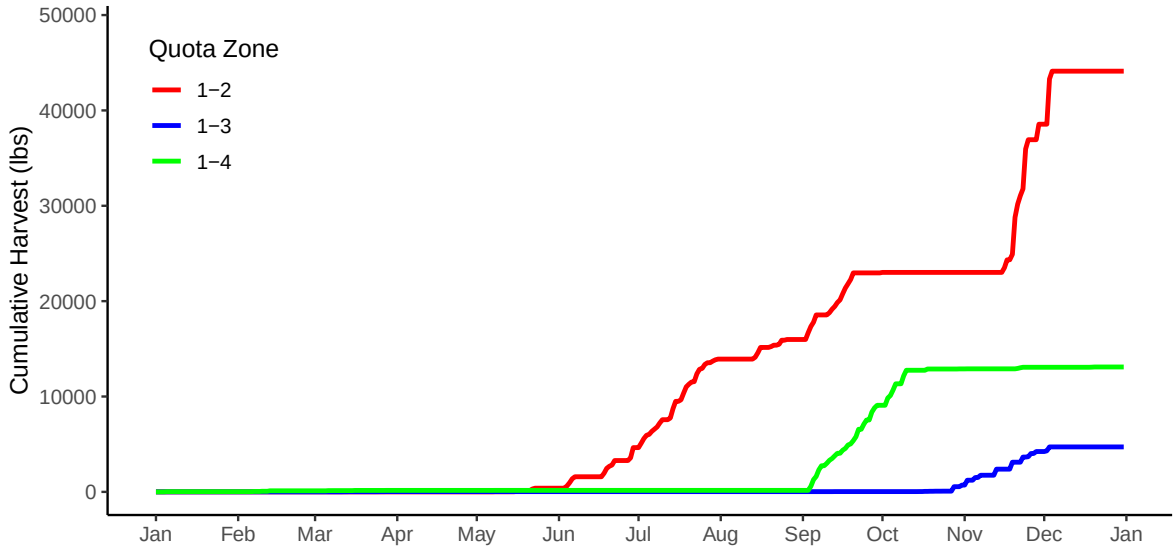


Figure 3.3.1: Lake Whitefish daily cumulative harvest (lbs) in 2024 by quota zone (limited harvest occurred in quota zone 1-1 and is not shown).

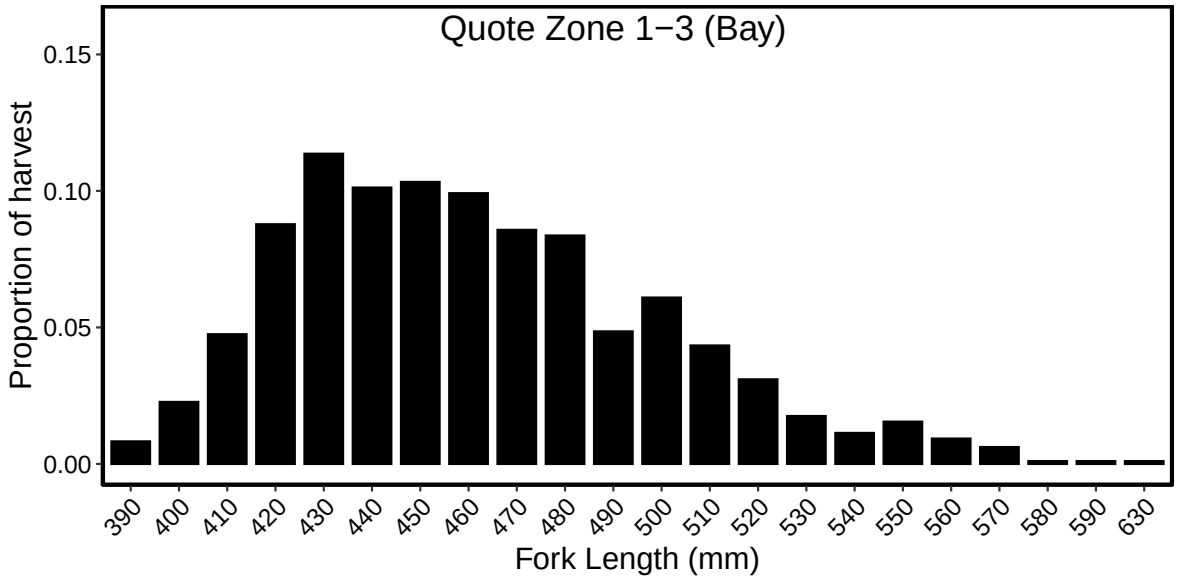


Figure 3.3.2: Size and age distribution (by number) of Lake Whitefish sampled in quota zone 1-3 during the 2024 commercial catch sampling program.

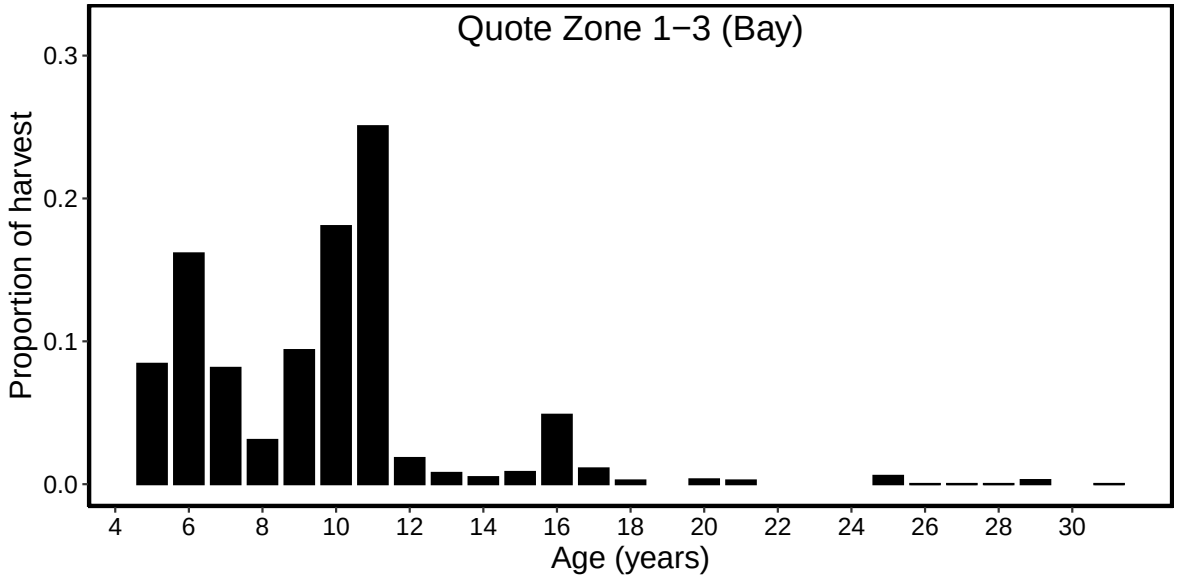


Figure 3.3.3: Size and age distribution (by number) of Lake Whitefish sampled in quota zone 1-3 during the 2024 commercial catch sampling program.

Table 3.3.1: Age-specific vital statistics of Lake Whitefish sampled and harvested in 2024, including number aged, number measured for length, proportion by number of fish sampled, mean weight (kg) and fork length (mm) of fish sampled, and harvest by number and weight (kg) for quota zone 1-3.)

	Sampled		Harvested				
Age	Number aged	Number lengthed	Proportion	Number	Weight (kg)	Mean weight (kg)	Mean length (mm)
5	8	82	0.0842	152	126	0.825	426
6	14	156	0.1615	292	321	1.099	466
7	8	79	0.0814	147	139	0.942	440
8	4	30	0.0309	56	57	1.019	457
9	10	91	0.0938	170	196	1.154	469
10	24	175	0.1806	327	406	1.243	483
11	21	243	0.2506	453	460	1.014	456
12	2	18	0.0183	33	43	1.298	494
13	2	8	0.0079	14	21	1.463	526
14	2	5	0.0049	9	17	1.956	554
15	2	8	0.0085	15	33	2.166	565
16	4	47	0.0486	88	141	1.608	514
17	1	11	0.011	20	22	1.105	461
18	1	2	0.0026	5	8	1.76	548
19							
20	1	3	0.0034	6	11	1.865	559
21	1	2	0.0026	5	9	1.883	546
22							
23							
24							
25	1	6	0.0058	10	14	1.363	500
26		<1	0.0001	<1	1	2.207	593
27		<1	0.0001	<1	1	2.403	590
28		<1	0.0001	<1	1	2.286	566
29	1	3	0.0028	5	10	2.026	546
30							
31		<1	0.0001	<1	1	2.314	585

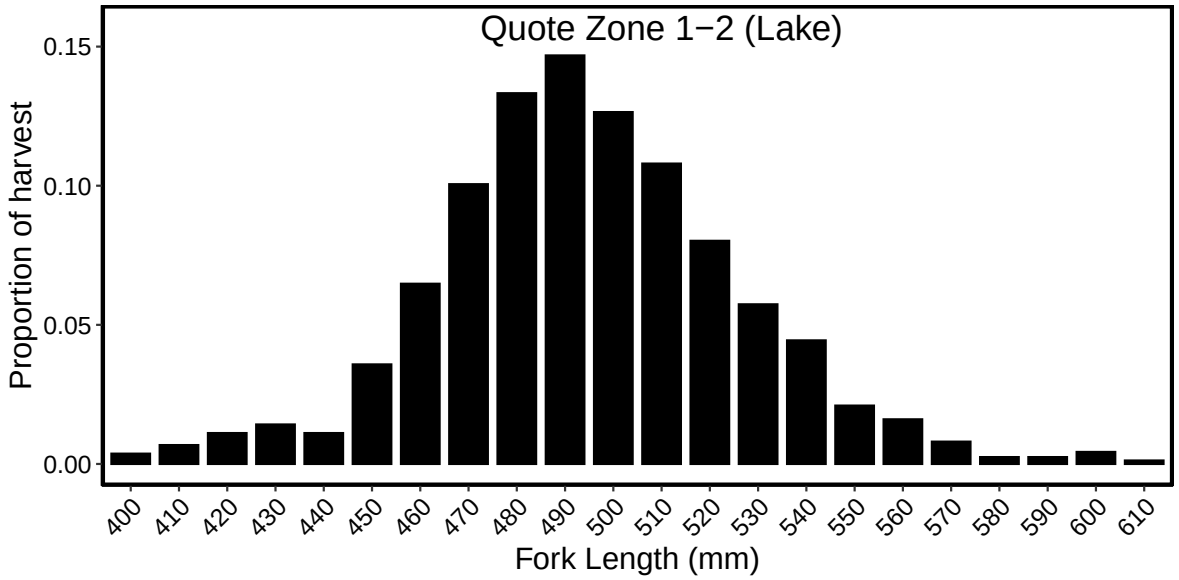


Figure 3.3.4: Size and age distribution (by number) of Lake Whitefish sampled in quota zone 1-2 during the 2024 commercial catch sampling program.

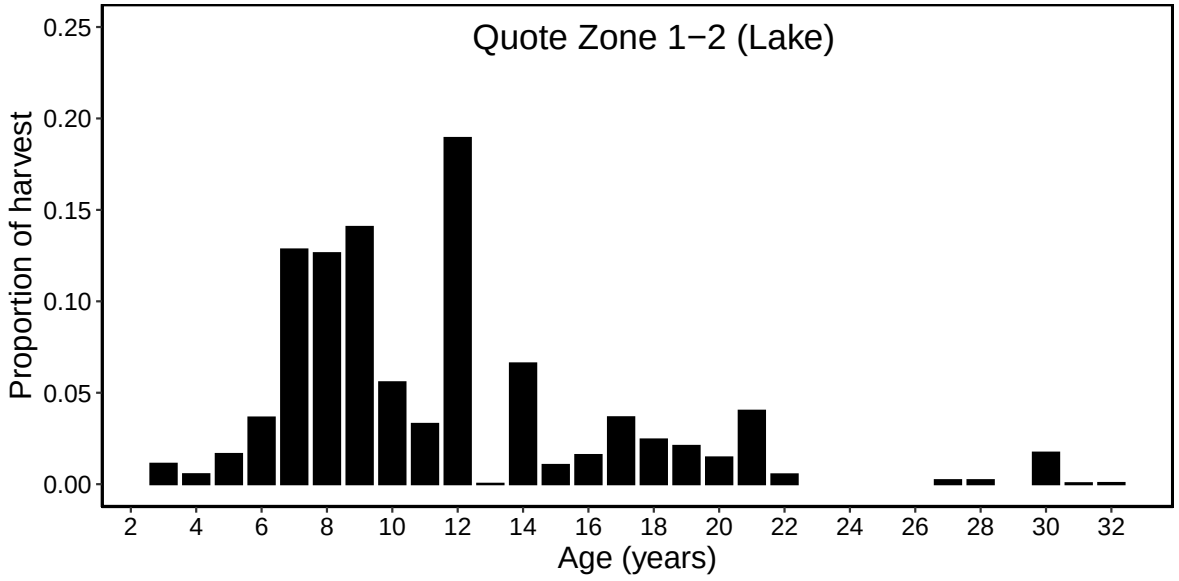


Figure 3.3.5: Size and age distribution (by number) of Lake Whitefish sampled in quota zone 1-2 during the 2024 commercial catch sampling program.

Table 3.3.2: Age-specific vital statistics of Lake Whitefish sampled and harvested including number aged, number measured for length, proportion by number of fish sampled, mean weight (kg) and fork length (mm) of fish sampled, and harvest by number and weight (kg) for quota zone 1-2.

	Sampled		Harvested				
Age	Number aged	Number lengthed	Proportion	Number	Weight (kg)	Mean weight (kg)	Mean length (mm)
3	8	18	0.0111	166	122	0.731	410
4	3	9	0.0054	81	65	0.805	418
5	4	27	0.0165	246	233	0.947	448
6	5	59	0.0364	544	519	0.954	453
7	9	208	0.1283	1916	2338	1.22	478
8	9	205	0.1263	1885	2244	1.19	478
9	12	228	0.1407	2100	2626	1.251	480
10	4	90	0.0557	831	1024	1.232	482
11	3	53	0.0329	492	583	1.186	483
12	14	307	0.1893	2826	4198	1.486	509
13		<1	0.0002	3	5	1.644	521
14	6	107	0.066	986	1318	1.337	493
15	1	17	0.0105	157	267	1.708	546
16	1	26	0.0159	238	380	1.597	510
17	4	59	0.0366	546	1035	1.896	533
18	3	40	0.0244	365	705	1.933	541
19	3	34	0.0209	312	445	1.425	498
20	5	24	0.0146	218	536	2.459	575
21	4	65	0.0402	599	974	1.624	494
22	1	9	0.0053	80	178	2.228	558
23							
24							
25							
26							
27		4	0.0022	32	65	2.011	566
28		4	0.0022	32	64	1.994	558
29							
30	1	28	0.0172	257	382	1.486	520
31		1	0.0005	7	12	1.636	527
32		1	0.0006	9	22	2.399	610

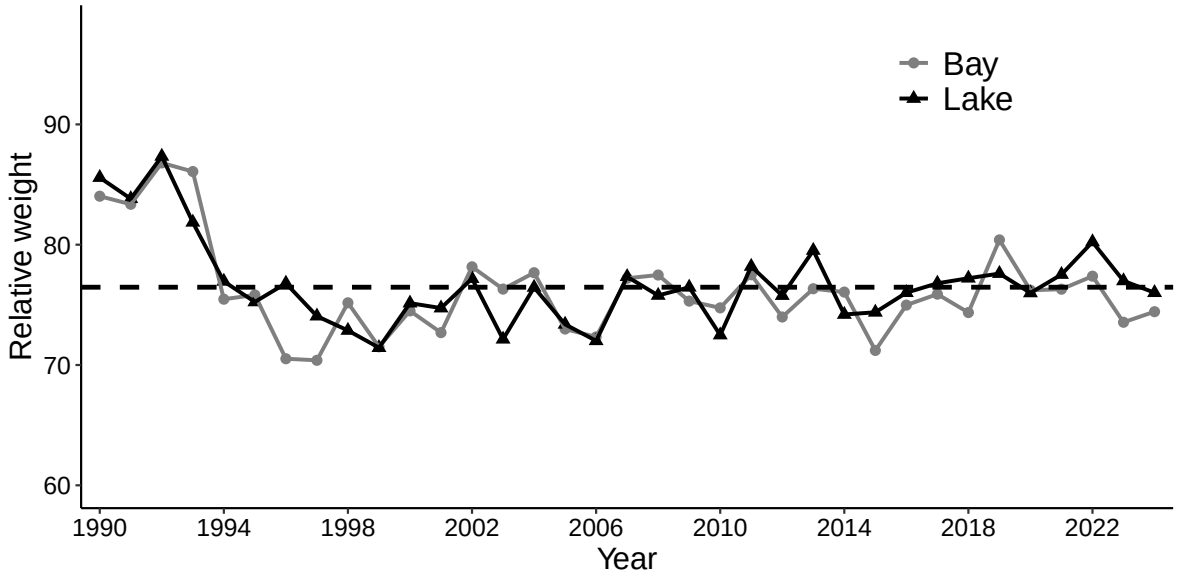


Figure 3.3.6: Lake Whitefish (sexes combined) relative weight for the Lake Ontario and Bay of Quinte spawning groups 1990-2024 (see Rennie et al. 2008).

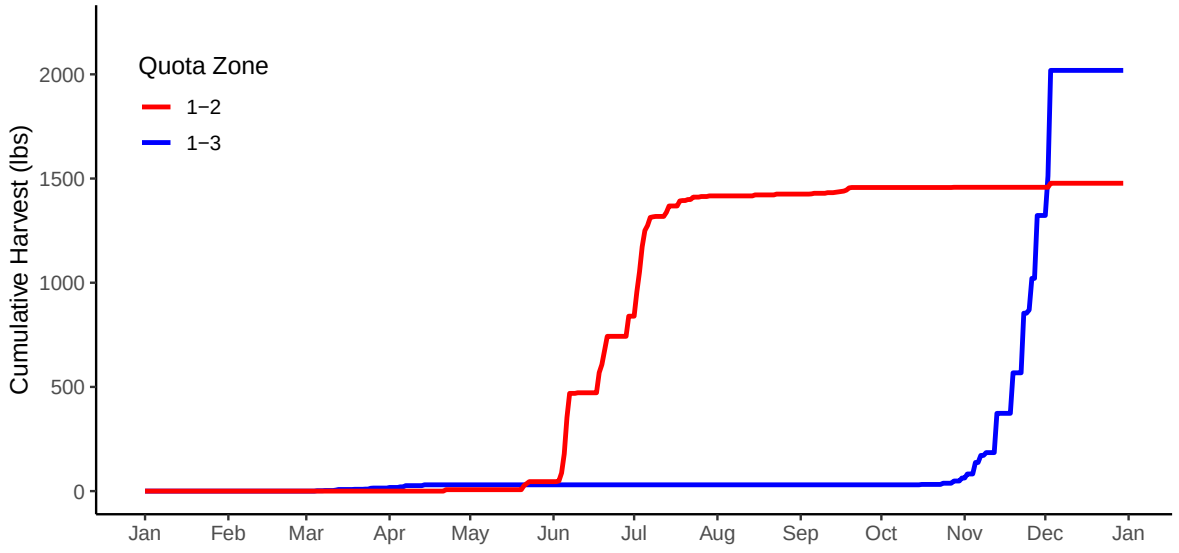


Figure 3.3.7: Cisco cumulative daily harvest (lbs) in 2024 by quota zone (limited harvest occurred in quota zones 1-1, 1-4 and West Lake and is not shown).

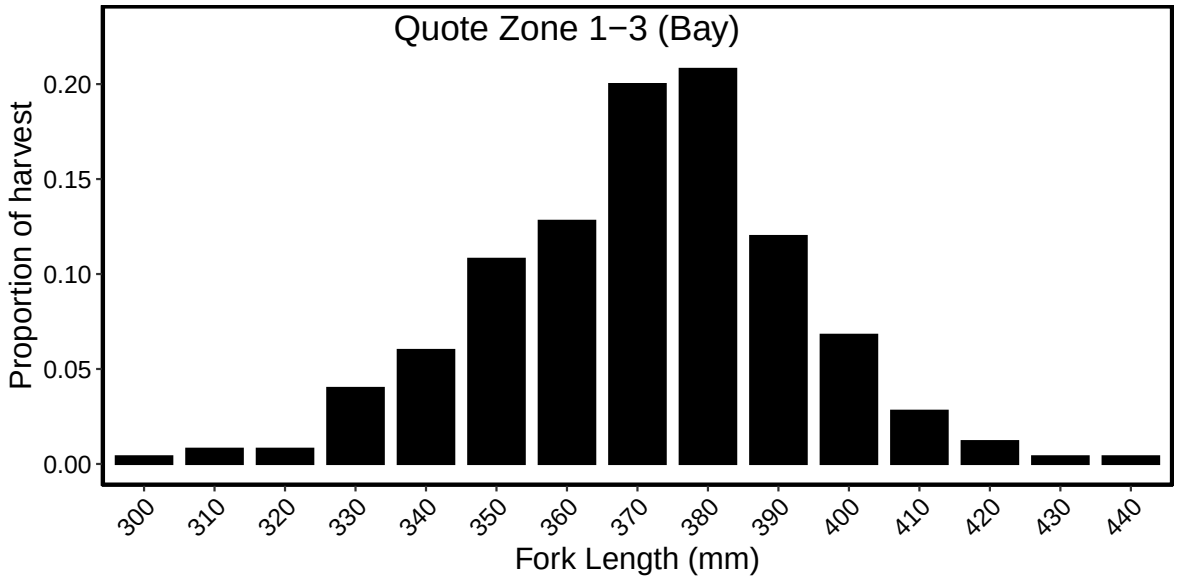


Figure 3.3.8: Size distribution (by number) of Cisco sampled in quota zone 1-3 during the 2024 commercial catch sampling program.

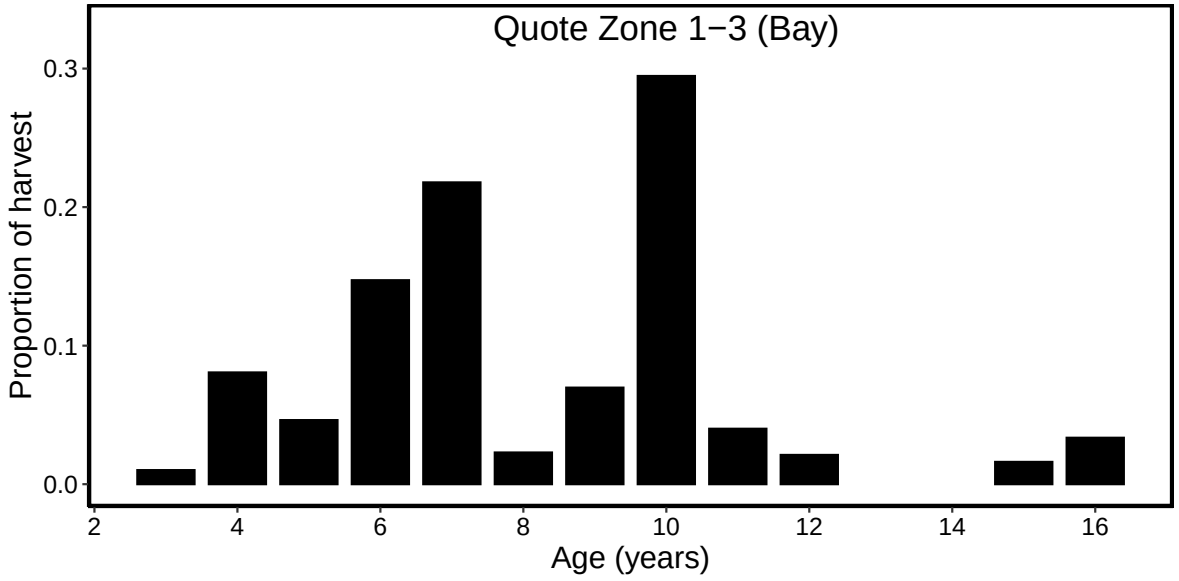


Figure 3.3.9: Age distribution (by number) of Cisco sampled in quota zone 1-3 during the 2024 commercial catch sampling program.

Table 3.3.3: Age-specific vital statistics of Cisco sampled and harvested including number aged, number measured for length, proportion by number of fish sampled, mean weight (kg) and fork length (mm) of fish sampled, and harvest by number and weight (kg) for quota zone 1-3.

	Sampled		Harvested				
Age	Number aged	Number lengthed	Proportion	Number	Weight (kg)	Mean weight (kg)	Mean length (mm)
3	1	3	0.01	29	9	0.318	318
4	4	20	0.081	227	138	0.606	364
5	4	12	0.046	130	72	0.55	342
6	8	37	0.147	415	304	0.733	377
7	14	54	0.218	614	391	0.637	360
8	2	6	0.023	64	56	0.875	382
9	3	17	0.07	196	123	0.625	359
10	17	73	0.295	830	608	0.732	383
11	5	10	0.04	113	88	0.779	386
12	2	5	0.021	59	51	0.861	398
13							
14							
15	1	4	0.016	45	34	0.752	364
16	1	8	0.034	94	42	0.449	368

References

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 Age and Growth Summary

B. Maynard and S. Beech, Lake Ontario Management Unit

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 2024, a total of 3992 structures were processed from 27 species (Table 4.0.1) collected during 17 different field projects (Table 4.0.2).

Table 4.0.1: Species-specific summary of age and growth structures interpreted in 2024.

Species	Anal fin	Cleithra	Operculum	Otoliths	Scales	Total
Yellow Perch	–	–	–	–	759	**759**
Walleye	–	–	–	422	107	**529**
Alewife	–	–	–	422	–	**422**
Chinook Salmon	–	–	–	308	–	**308**
Lake Trout	–	–	–	281	–	**281**
Lake Whitefish	–	–	–	247	–	**247**
Smallmouth Bass	–	–	–	–	216	**216**
Cisco	–	–	–	166	–	**166**
Northern Pike	41	89	–	–	27	**157**
Rainbow Trout	–	–	–	–	150	**150**
Pumpkinseed	–	–	–	–	148	**148**
Largemouth Bass	–	–	–	–	140	**140**
Bluegill	–	–	–	–	138	**138**
Black Crappie	–	–	–	–	95	**95**
Rock Bass	–	–	–	–	62	**62**
Atlantic salmon	–	–	–	57	–	**57**
White Perch	–	–	–	–	40	**40**
White Bass	–	–	–	–	21	**21**
Brown Trout	–	–	–	16	2	**18**
White Sucker	–	–	13	–	–	**13**
Rudd	–	–	–	–	11	**11**
Burbot	–	–	–	5	–	**5**
Silver Redhorse	–	–	3	–	–	**3**
Coho Salmon	–	–	–	1	1	**2**
Freshwater Drum	–	–	–	2	–	**2**
Atlantic Salmon	–	–	–	–	1	**1**
Deepwater Sculpin	–	–	–	1	–	**1**
Total	**41**	**89**	**16**	**1928**	**1918**	**3992**

Table 4.0.2: Project-specific summary of age and growth structures interpreted in 2024.

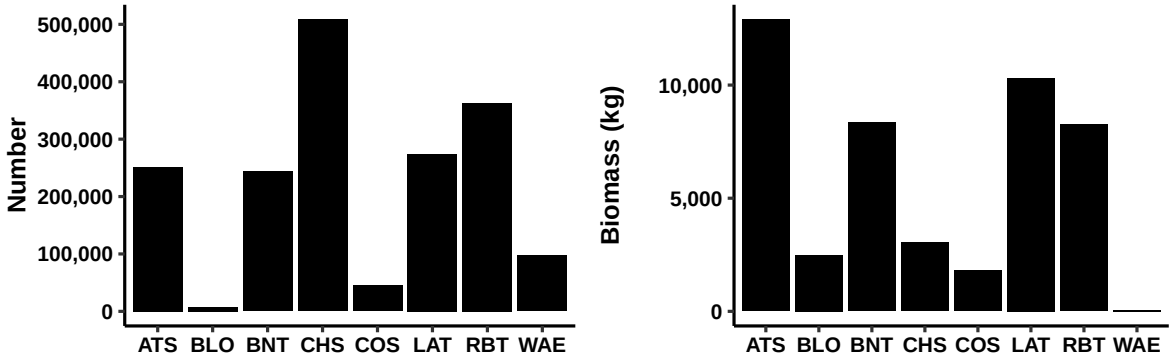
Species	Structure	N	Species	Structure	N
Lake Ontario and Bay of Quinte Community Index Gillnetting			**Hamilton Harbour Nearshore Community Index Netting**		
Lake Whitefish	Otoliths	24	Walleye	Otoliths	37
Walleye	Otoliths	300	Yellow Perch	Scales	12
Walleye	Scales	77	Bluegill	Scales	32
Northern Pike	Cleithra	22	Pumpkinseed	Scales	19
Northern Pike	Anal fin	7	Black Crappie	Scales	32
Largemouth Bass	Scales	12	White Perch	Scales	37
Smallmouth Bass	Scales	22	Northern Pike	Scales	4
Black Crappie	Scales	3	Northern Pike	Cleithra	4
Silver Redhorse	Operculum	3	Atlantic Salmon	Scales	1
Bluegill	Scales	27	**Toronto Harbour Nearshore Community Index Netting**		
Pumpkinseed	Scales	42	Walleye	Otoliths	7
Yellow Perch	Scales	192	Walleye	Scales	7
Cisco	Otoliths	26	Northern Pike	Anal fin	20
Deepwater Sculpin	Otoliths	1	Northern Pike	Scales	22
Burbot	Otoliths	4	Northern Pike	Cleithra	22
Brown Trout	Otoliths	13	Smallmouth Bass	Scales	1
Chinook Salmon	Otoliths	26	Largemouth Bass	Scales	19
Lake Trout	Otoliths	204	Black Crappie	Scales	17
Lake Ontario and Bay of Quinte Community Index Trawling			Yellow Perch	Scales	34
Lake Whitefish	Otoliths	3	Bluegill	Scales	13
Cisco	Otoliths	70	Pumpkinseed	Scales	28
Lake Trout	Otoliths	4	Rudd	Scales	11
Yellow Perch	Scales	136	**Lake St. Francis Community Index Netting**		
Largemouth Bass	Scales	36	Northern Pike	Cleithra	13
White Bass	Scales	20	Smallmouth Bass	Scales	88
Black Crappie	Scales	2	Largemouth Bass	Scales	8
Freshwater Drum	Otoliths	2	Walleye	Otoliths	22
White Sucker	Operculum	13	Yellow Perch	Scales	153
Northern Pike	Cleithra	1	**Thousand Islands Community Index Netting**		
Northern Pike	Scales	1	Northern Pike	Cleithra	13
Walleye	Otoliths	4	Smallmouth Bass	Scales	88
Walleye	Scales	23	Largemouth Bass	Scales	8
Upper Bay of Quinte Nearshore Community Index Netting			Yellow Perch	Scales	153
Walleye	Otoliths	28	Walleye	Otoliths	22
Northern Pike	Cleithra	11	**Credit River Chinook Assessment**		
Northern Pike	Anal fin	11	Chinook Salmon	Otoliths	153
Smallmouth Bass	Scales	17	**Ganaraska River Chinook Assessment**		
Largemouth Bass	Scales	32	Chinook Salmon	Otoliths	123
Black Crappie	Scales	38	**Lake Ontario Atlantic Salmon Assessment**		
Yellow Perch	Scales	48	Atlantic salmon	Otoliths	57
Bluegill	Scales	36	**Ganaraska River Creel**		
Rock Bass	Scales	32	Rainbow Trout	Scales	25
Pumpkinseed	Scales	33	Brown Trout	Scales	2
Presquile Bay Nearshore Community Index Netting			Coho Salmon	Scales	1
Walleye	Otoliths	2	**Lake Ontario Spring Prey Fish Survey**		
Northern Pike	Anal fin	3	Alewife	Otoliths	422
Northern Pike	Cleithra	3	**Lake Ontario Lake Trout Index Netting**		
White Bass	Scales	1	Brown Trout	Otoliths	3
White Perch	Scales	3	Coho Salmon	Otoliths	1
Largemouth Bass	Scales	25	Cisco	Otoliths	7
Black Crappie	Scales	3	Lake Whitefish	Otoliths	4
Yellow Perch	Scales	31	Burbot	Otoliths	1
Bluegill	Scales	30	Chinook Salmon	Otoliths	6
Rock Bass	Scales	30	Lake Trout	Otoliths	73
Pumpkinseed	Scales	26	**Lake Whitefish Tagging**		
Commercial Catch Sampling			Lake Whitefish	Otoliths	9
Lake Whitefish	Otoliths	207	**Ganaraska River Spring Rainbow Trout Spawn Index**		
Cisco - Bay	Otoliths	63	Rainbow Trout	Scales	125
			Total		3992

5 Stocking Program

5.1 Stocking Summary

C. Lake, Lake Ontario Management Unit

Fish stocking is a fisheries management tool used to meet specific goals including supporting recreational fisheries and species restoration. In 2024, 1,792,407 fish were stocked into Lake Ontario (Figure 5.1.1a), equaling 51,544 kilograms of biomass (Figure 5.1.1b). Fish are allocated to one of seven sub-zones based on several factors, including: natural reproduction within the zone, size of local fisheries and suitable available habitat (Figure 5.1.2). More detail on the stocking zones and fish allocation can be found in the Stocking Strategy for the Canadian Waters of Lake Ontario (2015). The St. Lawrence River is not stocked.



(a) Numbers stocked.

(b) Biomass stocked.

Figure 5.1.1: Fish stocked into the Ontario waters of Lake Ontario and tributaries in 2024. Data for both numbers (a) and biomass (b) are presented by species. Note: adult, egg and non-feeding fry life stages not included in totals. ATS = Atlantic Salmon, BLO = Bloater, BNT = Brown Trout, CHS = Chinook Salmon, LAT = Lake Trout, RBT = Rainbow Trout, WAE = Walleye.

The Stocking Strategy provides production targets for MNR (Ministry of Natural Resources) Fish Culture Stations (Table 5.1.1). These facilities also provide healthy, disease-free fish (eggs and fry) to a number of facilities participating in the Community Hatchery Program (Table 5.1.1). In 2024, MNR provided the following eggs to community hatcheries for stocking into Lake Ontario: Atlantic Salmon (136,600), Brown Trout (98,000) and Rainbow Trout (24,000).

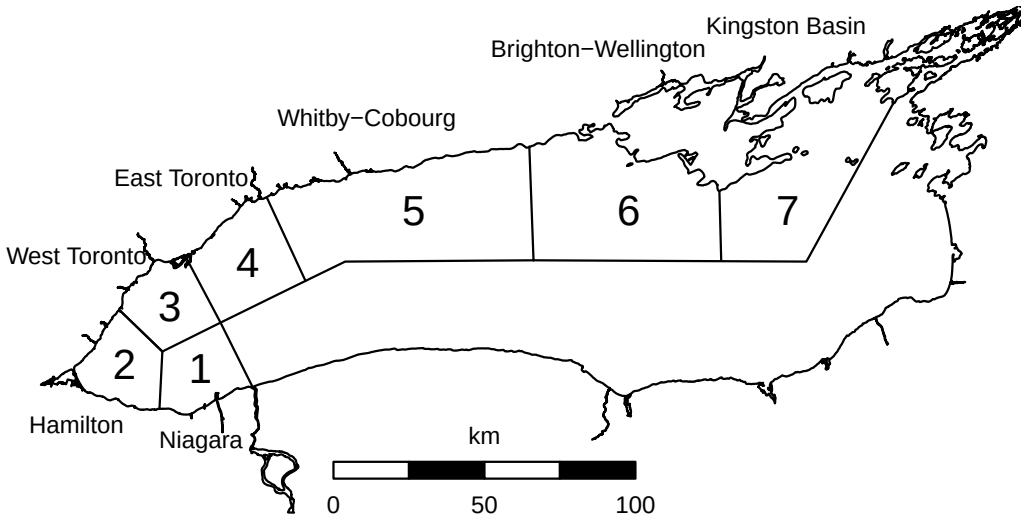


Figure 5.1.2: Lake Ontario stocking zones.

Table 5.1.1: Numbers of fish stocked into the Ontario waters of Lake Ontario. Numbers reflect both MNR-produced fish and those raised by community groups.

Species	Lifestage	Number	Biomass	Facility	Target	Percent
Atlantic Salmon	Fry	12,499	2	CFIP	–	–
Atlantic Salmon	Fry	736	0	WATERBODY	–	–
Atlantic Salmon	Spring Fingerling	129,234	736	MNR	120,000	108%
Atlantic Salmon	Spring Yearling	565	14	CFIP	95,000	1%
Atlantic Salmon	Spring Yearling	97,589	9,554	MNR	95,000	103%
Atlantic Salmon	Fall Yearling	218	54	CFIP	10,000	2%
Atlantic Salmon	Fall Yearling	10,579	2,544	MNR	10,000	106%
Atlantic Salmon	Adult	1,677	4,140	MNR	–	–
Bloater	Sub-adult	7,419	2,480	MNR	–	–
Brown Trout	Spring Fingerling	35,000	105	PRIVATE	–	–
Brown Trout	Fall Fingerling	40,000	1,200	CFIP	–	–
Brown Trout	Spring Yearling	164,628	6,448	MNR	165,000	100%
Brown Trout	Fall Yearling	4,089	597	MNR	1,000	409%
Chinook Salmon	Spring Fingerling	508,680	3,038	MNR	450,000	113%
Coho Salmon	Fall Fingerling	45,000	1,800	CFIP	–	–
Lake Trout	Spring Yearling	274,414	10,301	MNR	282,000	97%
Rainbow Trout	Spring Fingerling	16,000	400	CFIP	–	–
Rainbow Trout	Fall Fingerling	81,935	1,985	MNR	150,000	55%
Rainbow Trout	Spring Yearling	264,564	5,868	MNR	300,000	88%
Rainbow Trout	Adult	109	223	MNR	–	–
Walleye	Summer Fingerling	97,472	54	MNR	100,000	97%

Stocking data for 2024 can be found for Lake Ontario (as well as other Great Lakes) on the Great Lakes Fishery Commission stocking data portal: http://fsis.glfc.org/stocking/events/2024/.

Figure 5.1.3 shows salmon and trout stocking trends in the Ontario waters of Lake Ontario for the most recent five years, broken down by species and stocking zone. Table 5.1.2 and Table 5.1.3 provide detailed information on fish stocking by species, location and life stage for 2024.

Atlantic Salmon (253,097; 17,045 kg.) were stocked in support of an ongoing program to restore self-sustaining populations of this native species to Lake Ontario. Atlantic Salmon are produced at MNR hatcheries, with some eggs being delivered to academic and community volunteer facilities for rearing. In addition to these regular stocking activities, surplus brood Atlantic Salmon (adults) are occasionally available for release. These fish are tagged, and tracked as part of an angler outreach program (Section 5.3).

Bloater (7,419; 2,480 kg.) were stocked in 2024. This small relative of the Lake Whitefish was an important prey item for Lake Trout until the late 1950's when both Bloater and Lake Trout were extirpated. A coordinated program involving staff from the US and Canada resulted in the initial stocking of approximately 15,000 Bloater in 2013. MNR Fish Culture Section staff continue to work with our partner agencies to advance our understanding of the complicated process of rearing Bloater.

Chinook Salmon spring fingerlings (508,680; 3,038 kg.) were stocked to provide put-grow-and-take fishing opportunities. All Chinook Salmon for the Lake Ontario program were produced at Normandale Fish Culture Station. A significant number of Chinook were transferred to volunteer-run net pens to enhance imprinting and growth during the last month of captivity. See Section 5.2 for a full description of the 2024 net pen program.

Coho Salmon are produced and stocked by Community Hatchery Program partner Metro East Anglers at the Ringwood Fish Culture Station (45,000; 1,800 kg.)

Lake Trout spring yearlings (274,414; 10,301 kg.) were stocked in 2024 as part of an established long-term rehabilitation program, supporting the Lake Trout Stocking Plan.

Rainbow Trout (362,608; 8,476 kg.) and Brown Trout (243,717; 8,350 kg.) were stocked at various locations to support shore and boat fisheries. Community hatcheries contribute to the stocking of both species – see Table 5.1.3 for details.

Walleye stocking began in 2012 in an effort to re-establish this native, predatory fish to the fish communities of Hamilton Harbour and Toronto Harbour and to promote urban, near-shore angling. Walleye stocking alternates annually between Toronto Harbour and Hamilton Harbour. In 2024, 97,472 Walleye (54 kg.) were stocked in Toronto Harbour.

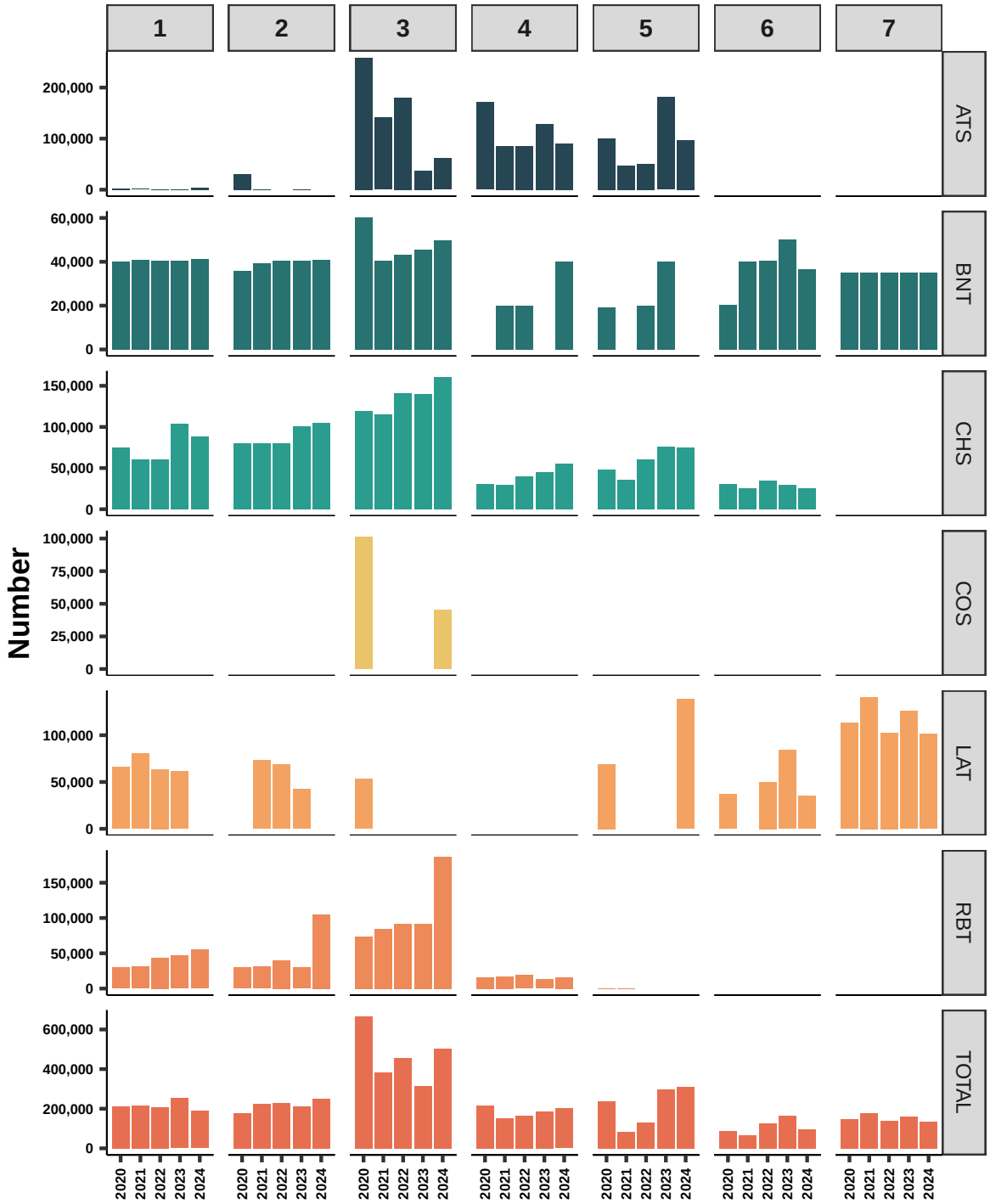


Figure 5.1.3: Numbers of salmon and trout stocked in the Ontario waters of Lake Ontario for the most recent five years. Data are presented by species (rows) and by stocking zone (columns). The bottom panel ("Total") shows the total for all six species for the same time frame. Note that the y-axes are variable. ATS = Atlantic Salmon, BNT = Brown Trout, CHS = Chinook Salmon, COS = Coho Salmon, LAT = Lake Trout, RBT = Rainbow Trout.

Table 5.1.2: Native species stocked into the Ontario waters of Lake Ontario and its tributaries.

Lifestage	Waterbody	Site	Hatchery	Strain	Marks	Stocking Month	Age (Months)	Weight (g)	Biomass (kg)	Number
Atlantic Salmon										
Fry	Credit R.	W. Credit - Shaw's Cr. Rd.	Belfountain	Sebago Lk.	–	4	2	0.1	1.4	12316
Fry	Humber R.	Coffey Cr.	Humber R.	Sebago Lk.	–	5	1	0.5	0.4	736
Fry	Humber R.	YMCA Cedar Glen	Islington	Sebago Lk.	–	5	1	0.5	0.1	183
Spring Fingerling	Duffins Cr.	E. Duffins Cr. - Durham Outdoor Centre	MNR-NM	Sebago Lk.	–	5	6	3.6	50.5	14037
Spring Fingerling	Duffins Cr.	E. Duffins Cr. - Hwy 7	MNR-NM	Sebago Lk.	–	5	6	6.5	130.0	19946
Spring Fingerling	Duffins Cr.	E. Duffins Cr. - Pickering Museum	MNR-NM	Sebago Lk.	–	5	6	4.6	63.3	13921
Spring Fingerling	Duffins Cr.	W. Duffins - Whitevale Seton Trail	MNR-NM	Sebago Lk.	–	5	6	3.0	42.5	13987
Spring Fingerling	Ganaraska R.	Carscadden Rd.	MNR-NM	Sebago Lk.	–	5	6	7.0	70.3	9976
Spring Fingerling	Ganaraska R.	Kendal - MNR Property	MNR-NM	Sebago Lk.	–	5	6	7.2	85.8	11964
Spring Fingerling	Ganaraska R.	Newtonville Rd.	MNR-NM	Sebago Lk.	–	5	6	6.3	95.3	15010
Spring Fingerling	Ganaraska R.	Shiloh Rd.	MNR-NM	Sebago Lk.	–	5	6	6.5	97.0	15000
Spring Fingerling	Ganaraska R.	Soper Rd.	MNR-NM	Sebago Lk.	–	5	6	6.6	101.3	15393
Spring Yearling	Central Basin	Port Hope - Eldorado Place	MNR-NM	Sebago Lk.	–	4	16	95.2	2864.9	30181
Spring Yearling	Credit R.	Don Rowing Club	MNR-NM	Sebago Lk.	–	5	17	105.3	2670.0	25991
Spring Yearling	Credit R.	Pt. Credit Hrbr.	MNR-NM	Sebago Lk.	–	5	17	113.4	410.0	3616
Spring Yearling	Credit R.	W. Credit - Shaw's Cr. Rd.	Belfountain	Sebago Lk.	–	4	18	25.0	6.1	244
Spring Yearling	Duffins Cr.	Rotary Park Ramp	MNR-NM	Sebago Lk.	–	4	16	98.4	2674.6	27939
Spring Yearling	Humber R.	Old Church Road	Islington	Sebago Lk.	–	5	12	25.0	3.0	121
Spring Yearling	Humber R.	Palgrave Mill Dam	Islington	Sebago Lk.	–	5	12	25.0	4.0	160
Spring Yearling	Humber R.	YMCA Cedar Glen	Islington	Sebago Lk.	–	5	12	25.0	1.0	40
Spring Yearling	Western Basin	Lakefront Promenade	MNR-NM	Sebago Lk.	AD	5	17	94.8	935.0	9862
Fall Yearling	Humber R.	Hopeful Cr.	Islington	Sebago Lk.	–	11	18	250.0	54.5	218
Fall Yearling	Western Basin	Lakefront Promenade	MNR-NM	Sebago Lk.	AD	11	22	302.0	2402.2	7956
Fall Yearling	Western Basin	Port Dalhousie East	MNR-NM	Sebago Lk.	–	12	12	54.0	141.6	2623
Adult	Ganaraska R.	Port Hope - Mill St. boat ramp	MNR-HW	Sebago Lk.	–	12	43	2300.0	526.7	229
Adult	Western Basin	Port Dalhousie East	MNR-NM	Sebago Lk.	–	9	41	2588.9	3613.4	1448
Bloater										
Sub-adult	Central Basin	Cobourg Hrbr. Pier	MNR-WL	Lk. Michigan	–	5	50	504.2	2480.4	7419
Lake Trout										
Spring Yearling	Central Basin	Cobourg Hrbr. Pier	MNR-CH	Seneca Lk.	LPAD	4	15	27.3	1859.5	68273
Spring Yearling	Central Basin	Cobourg Hrbr. Pier	MNR-CH	Slate Is.	LPAD	3	15	26.6	1888.8	70112
Spring Yearling	Central Basin	Ogden Point	MNR-HW	Seneca Lk.	LPAD	5	16	57.7	2020.0	35009
Spring Yearling	Eastern Basin	Adolphus Reach	MNR-HW	Seneca Lk.	LPAD	5	16	55.2	645.3	11690
Spring Yearling	Eastern Basin	Amherst Isl. - Ferry	MNR-WL	Slate Is.	LPAD	5	17	40.5	903.4	22305
Spring Yearling	Eastern Basin	Amherst Isl. - Grape Isl.	MNR-WL	Slate Is.	LPAD	5	17	37.0	837.4	22633
Spring Yearling	Eastern Basin	Amherst Island	MNR-HW	Seneca Lk.	LPAD	5	16	55.6	688.4	12381
Spring Yearling	Eastern Basin	Amherst Island	MNR-WL	Slate Is.	LPAD	5	17	38.0	788.7	20755
Spring Yearling	Eastern Basin	Pigeon Isl.	MNR-HW	Seneca Lk.	LPAD	5	16	59.4	669.1	11256
Walleye										
Summer Fingerling	Hamilton Harbour	Pier 4 Park	MNR-WL	Bay of Quinte	–	6	3	0.6	53.6	97472

MNR Fish Culture Stations: CH = Chatsworth, HW = Harwood, NM = Normandale, WL = White Lake.
Marks (fin clips): AD = adipose, LPAD = left ventral and adipose.

Table 5.1.3: Recreational species stocked into the Ontario waters of Lake Ontario and its tributaries.

Lifestage	Waterbody	Site	Hatchery	Strain	Marks	Stocking Month	Age (Months)	Weight (g)	Biomass (kg)	Number
Brown Trout										
Spring Fingerling	Eastern Basin	Finkle's Shore Ramp	Springside	Ganaraska R.	–	5	5	3.0	105.0	35000
Fall Fingerling	Central Basin	Frenchman's Bay	MEA-RW	Ganaraska R.	–	10	11	30.0	1200.0	40000
Spring Yearling	Central Basin	Wellington Channel	MNR-CH	Ganaraska R.	AD	4	16	41.6	1510.0	36722
Spring Yearling	Western Basin	Col. Sam Smith Park	MNR-CH	Ganaraska R.	AD	3	14	35.2	884.8	25137
Spring Yearling	Western Basin	Fifty Point CA	MNR-CH	Ganaraska R.	AD	3	14	37.0	750.0	20248
Spring Yearling	Western Basin	Grimsby - Forty Mile Cr. Park	MNR-CH	Ganaraska R.	AD	3	14	35.2	724.7	20587
Spring Yearling	Western Basin	Humber Bay Park	MNR-CH	Ganaraska R.	AD	3	14	37.4	770.0	20588
Spring Yearling	Western Basin	Port Dalhousie East	MNR-CH	Ganaraska R.	AD	4	16	43.6	1808.2	41346
Fall Yearling	Western Basin	Col. Sam Smith Park	MNR-CH	Ganaraska R.	AD	11	22	146.0	597.0	4089
Chinook Salmon										
Spring Fingerling	Bronte Cr.	5th Side Rd. Bridge	MNR-NM	Credit R.	–	5	6	4.7	95.0	20042
Spring Fingerling	Bronte Cr.	Lowville Park	MNR-NM	Credit R.	–	5	6	5.0	300.0	60000
Spring Fingerling	Central Basin	Bluffer's Park - Netpen	MNR-NM	Credit R.	–	5	7	7.5	338.0	45065
Spring Fingerling	Central Basin	Oshawa Netpen	MNR-NM	Credit R.	–	5	7	8.2	206.5	25028
Spring Fingerling	Central Basin	Port Darlington - Netpen	MNR-NM	Credit R.	–	5	7	7.5	187.7	25024
Spring Fingerling	Central Basin	Wellington - Netpen	MNR-NM	Credit R.	–	5	7	6.4	160.8	25118
Spring Fingerling	Central Basin	Whitby Netpen	MNR-NM	Credit R.	–	5	7	6.3	157.6	25019
Spring Fingerling	Credit R.	Eldorado Park	MNR-NM	Credit R.	–	5	6	5.0	298.0	60081
Spring Fingerling	Credit R.	Norval	MNR-NM	Credit R.	–	5	6	4.9	295.8	60009
Spring Fingerling	Hamilton Harbour	Grindstone Cr. - Hidden Valley	MNR-NM	Credit R.	–	5	6	4.7	47.5	10021
Spring Fingerling	Highland Cr.	Colonel Danforth Park	MNR-NM	Credit R.	–	5	6	4.8	48.5	10189
Spring Fingerling	Humber R.	Boyd Conservation Area	MNR-NM	Credit R.	–	5	6	4.8	143.0	30042
Spring Fingerling	Western Basin	Bronte Netpen	MNR-NM	Credit R.	–	5	7	7.1	106.5	15000
Spring Fingerling	Western Basin	Pt. Credit Netpen	MNR-NM	Credit R.	–	5	7	7.3	72.8	10005
Spring Fingerling	Western Basin	Port Dalhousie East	MNR-NM	Credit R.	–	5	6	5.7	159.0	27895
Spring Fingerling	Western Basin	Pt. Dalhousie Netpen	MNR-NM	Credit R.	–	5	7	7.0	421.0	60142
Coho Salmon										
Fall Fingerling	Credit R.	Norval Dam	MEA-RW	Wild Egg Collection	–	10	11	40.0	1800.0	45000
Rainbow Trout										
Spring Fingerling	Rouge R.	Milne Reservoir	MEA-RW	Ganaraska R.	–	4	11	25.0	400.0	16000
Fall Fingerling	Bronte Cr.	Cedar Springs Rd.	MNR-NM	Ganaraska R.	–	10	8	23.2	722.6	30238
Fall Fingerling	Credit R.	Eldorado Park	MNR-NM	Ganaraska R.	AD	11	8	24.9	502.1	20032
Fall Fingerling	Humber R.	Boyd Conservation Area	MNR-NM	Ganaraska R.	–	11	8	24.0	760.5	31665
Spring Yearling	Bronte Cr.	5th Side Rd. Bridge	MNR-HW	Ganaraska R.	–	5	15	25.0	376.5	15059
Spring Yearling	Bronte Cr.	Lowville Park	MNR-HW	Ganaraska R.	–	5	15	21.0	585.5	28110
Spring Yearling	Credit R.	Black Cr. - Stewarttown	MNR-WL	Ganaraska R.	AD	5	13	20.5	465.9	22727
Spring Yearling	Credit R.	Churchville	MNR-WL	Ganaraska R.	AD	5	13	21.0	659.0	31380
Spring Yearling	Credit R.	Eldorado Park	MNR-WL	Ganaraska R.	AD	5	13	20.5	922.2	44987
Spring Yearling	Credit R.	Norval	MNR-WL	Ganaraska R.	AD	5	13	21.0	782.0	37238
Spring Yearling	Humber R.	Boyd Conservation Area	MNR-HW	Ganaraska R.	–	5	15	27.2	408.2	15006
Spring Yearling	Humber R.	King Vaughan Line	MNR-HW	Ganaraska R.	–	5	15	27.5	412.5	15000
Spring Yearling	Niagara R.	Queenston	MNR-HW	Ganaraska R.	–	4	13	25.0	626.0	25042
Spring Yearling	Western Basin	Port Dalhousie East	MNR-HW	Ganaraska R.	–	4	13	21.0	630.3	30015
Adult	Ontario, L.	Marie Curtis Park - Boat Launch	MNR-HW	Ganaraska R.	–	7	86	2050.0	223.4	109

MNR Fish Culture Stations: CH = Chatsworth, HW = Harwood, NM = Normandale, WL = White Lake. Volunteer and other hatcheries: Belfountain = Belfountain Hatchery, Islington = Islington Sportsman Club, MEA-RW= Metro East Anglers—Ringwood, Springside = Springside Park Hatchery.
Marks (fin clips): AD = adipose, RV = right ventral, LV = left ventral, RP = right pectoral, LP = left pectoral

5.2 Chinook Salmon Stocking Net Pen Program

C. Lake, Lake Ontario Management Unit

The stocking net pen is a floating enclosure that is tied to a pier or other near shore structure used to temporarily house and acclimatize young Chinook Salmon prior to their release into Lake Ontario.

The fish are held in the net pen for approximately 4-5 weeks, and are tended by local angler groups who monitor the health of the fish and ensure that the fish are fed and the pens are cleaned regularly. Several of the clubs also use the net pens as an outreach tool, involving their local community during delivery and/or release of the fish. Up to eight net pen sites are located around the lake (Figure 5.2.1), however not every site is necessarily used each year. In 2024, all sites participated.

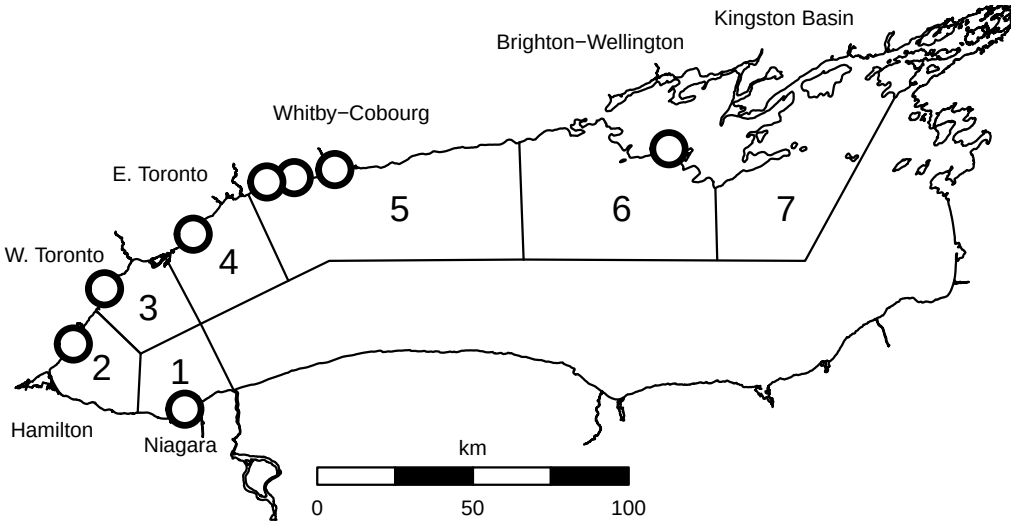


Figure 5.2.1: Map of Lake Ontario stocking zones and net pen locations.

Compared to fish released directly from the hatchery, net pen fish are larger, survive better and may have a greater degree of site fidelity, or imprinting, to the stocking site based on marking experiments conducted by the New York State Department of Environmental Conservation (NYSDEC). Because of their time in the net pens as young fish, it is expected that sexually mature fish will return to the area and provide a quality near shore fall fishery for anglers. A thorough review of the history of the program was described in the 2014 Annual Report.

A total of 230,401 Chinook Salmon were released from eight sites (17 net pens, total) in 2024. This represents 45.3% of the total number (508,680) of Chinook Salmon stocked in the Ontario waters of Lake Ontario in 2024 (Figure 5.2.2).

Fish were reared and delivered by MNR staff at the Normandale Fish Culture Station, and survival and growth was good at all sites. Fish were delivered at an average size of 3.2g., and kept in the net pens for an average of 33.9 days, gaining an average of 4.24g. across all sites. In 2024, volunteers spent a total of 271 days caring and feeding for the penned fish. See Table 5.2.1 and Table 5.2.2 for site-specific data on project duration and growth.

Table 5.2.1: Fish delivery and release dates for the net pen program.

Site	Club	Pens	Delivery	Release	Duration
Oshawa	MEA	2	April 03	May 11	39
Whitby	MEA	2	April 03	May 10	38
Wellington	CLOSA	2	April 04	May 03	30
Darlington	MEA	2	April 04	May 07	34
Bluffers	MEA	3	April 05	May 10	36
Bronte	HRSTA	1	April 06	May 05	30
Credit	PCSTA	1	April 06	May 08	33
Dalhousie	SCGFA	4	April 10	May 10	31

Table 5.2.2: Fish delivery size, growth and total numbers by pen site.

Site	Club	Stocking Size	Release Size	Growth	Number
Credit	PCSTA	2.73	7.28	4.55	10,005
Bronte	HRSTA	2.74	7.10	4.36	15,000
Whitby	MEA	3.03	6.30	3.27	25,019
Darlington	MEA	3.10	7.50	4.40	25,024
Oshawa	MEA	3.04	8.25	5.21	25,028
Wellington	CLOSA	2.98	6.40	3.42	25,118
Bluffers	MEA	3.01	7.50	4.49	45,056
Dalhousie	SCGFA	2.81	7.00	4.19	60,142

Long-term trends in pen duration and growth are illustrated in Figure 5.2.3 and Figure 5.2.4, respectively.

For the duration of the time in the net pen, fish health is paramount. To help ensure fish remain healthy, a maximum of 15,000 fish are placed in each net pen, keeping the overall density under the guideline of 32g of fish per litre of water. Net pen sizes have been standardized, and each have a volume of approximately 4,000 litres. Figure 5.2.5 shows the average density of fish (at time of release) in the net

pens. Each site is issued a combination temperature/dissolved oxygen data logger, allowing the various sites' water quality to be monitored and compared (see Figure 5.2.6 for temperature; see Figure 5.2.7 for dissolved oxygen). The loggers are suspended mid-depth inside the net pen, and measurements are recorded every five minutes.

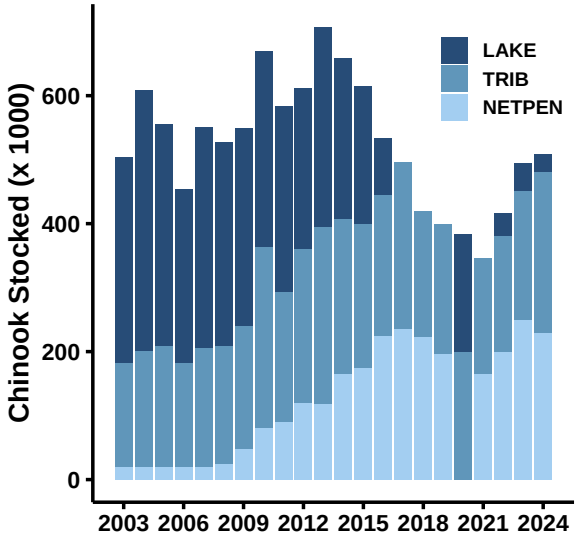


Figure 5.2.2: Chinook Salmon stocking methods.

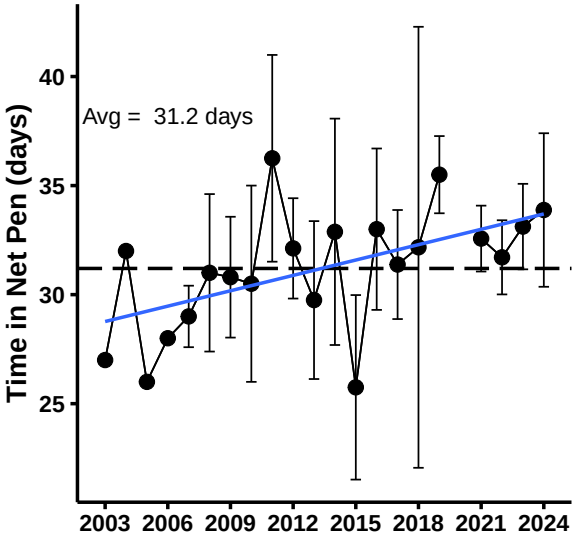


Figure 5.2.3: Mean annual net pen duration .

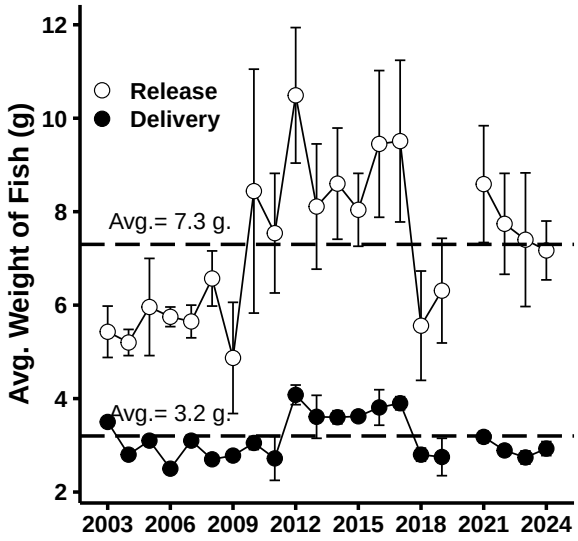


Figure 5.2.4: Size at delivery and release.

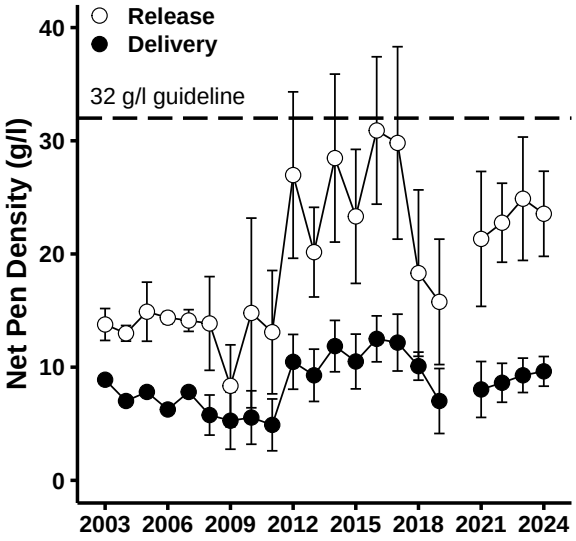


Figure 5.2.5: Average pen density at release.

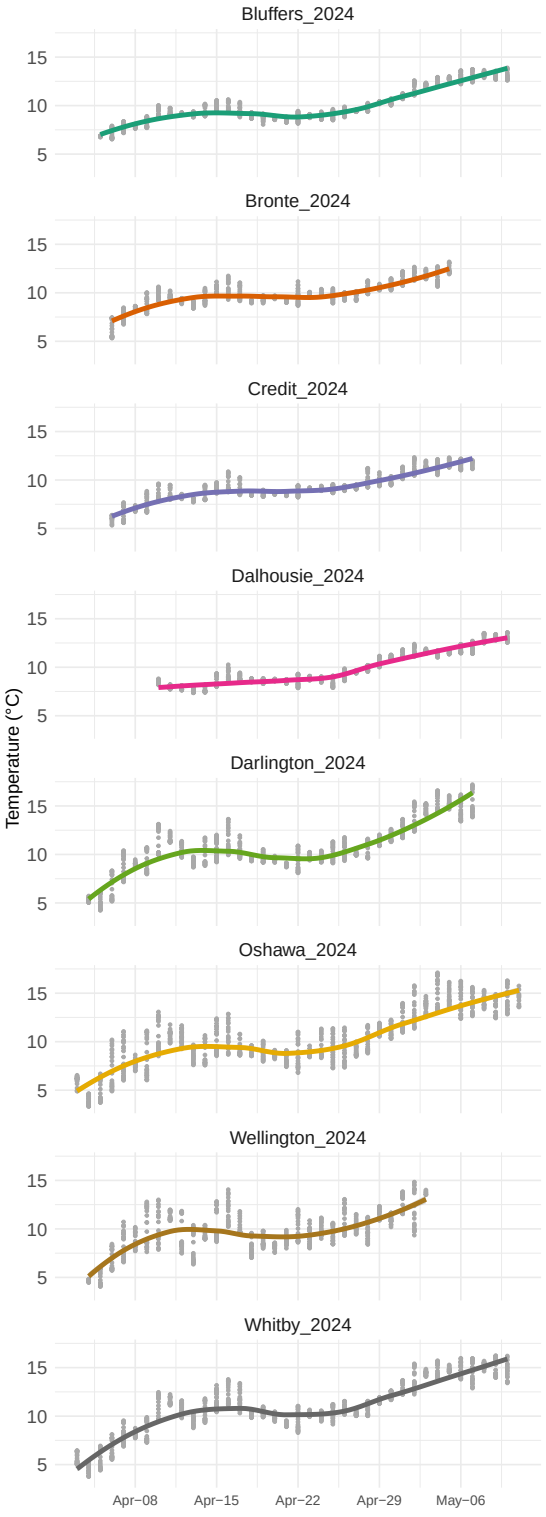


Figure 5.2.6: Net pen temperatures.

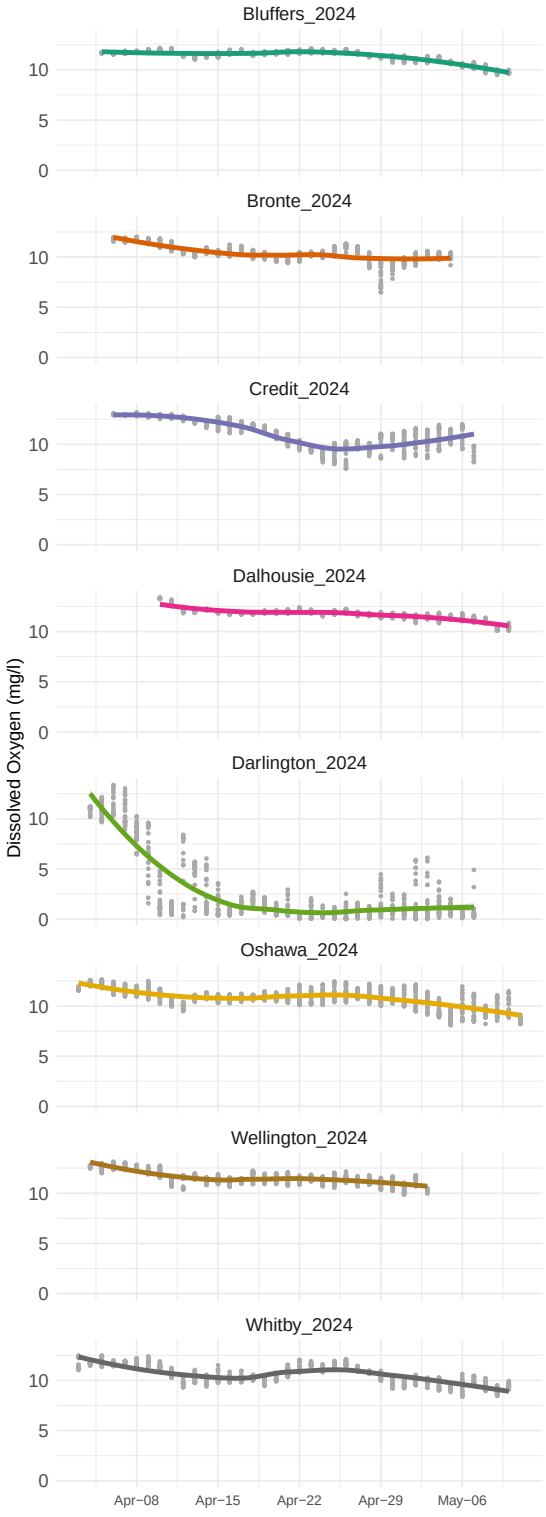


Figure 5.2.7: Net pen dissolved oxygen.

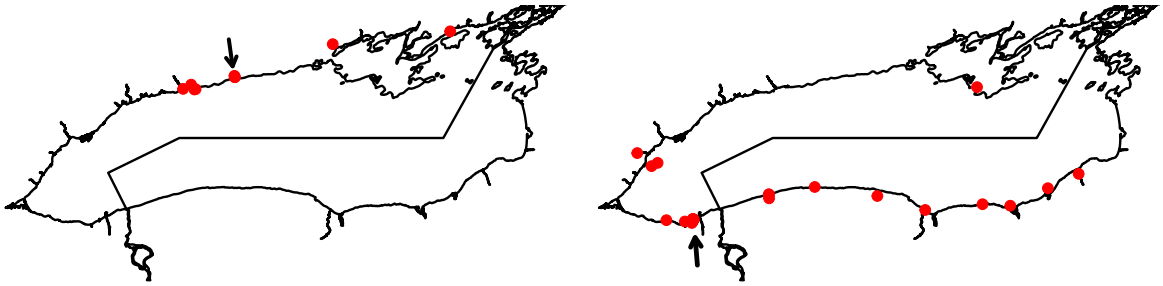
5.3 Atlantic Salmon Surplus Brood Stock Tagging

C. Lake, Lake Ontario Management Unit

To support ongoing restoration efforts, the Ministry of Natural Resources maintains Atlantic Salmon 'brood stock' in several provincial fish culture stations. Brood stock are adult (sexually mature) fish that are kept in the hatchery so that their offspring can be raised and eventually stocked at various life stages. As brood stock age, the quality of their gametes may decline. Keeping these large fish in a hatchery environment right up to the end of their lives is costly in terms of space and food – it's more efficient to 'retire' these fish a bit early in favour of younger, more productive individuals.

To make the best use of these 'surplus' fish, they are released into Lake Ontario to provide angling opportunities. To better understand survival and movement, fish were tagged near the dorsal fin with a coloured streamer tag labelled with a unique identifying number and phone number printed on it.

The total number of tagged fish released in 2024 was 696. A total of 41 tagged fish were captured in 2024, (27 of which were stocked in 2024, the other recaptures were stocked in earlier years). Reported recapture locations by release site are shown in Figure 5.3.1.



(a) Recaptures released at Port Hope.

(b) Recaptures released at Port Dalhousie.

Figure 5.3.1: Locations of tagged Atlantic Salmon brood stock that were recaptured in 2024 for fish initially stocked at Port Hope (a) and Port Dalhousie (b).

When anglers report catching one of these fish, basic information on movement is calculated and communicated to the angler. See Table 5.3.1 for numbers released since the start of the brood retirement project. Numbers caught by year and location are given in Table 5.3.2, and the resulting recapture rate is given in Table 5.3.3. ***Note:*** fish may be caught in years after their stocking year, so recapture values may be updated and change slightly in future reports.

The tagging and release of Atlantic Salmon brood stock is opportunistic, and dependent on the operational needs of the fish culture stations, so stocking numbers vary year to year. All project data can be found here - https://geohub.lio.gov.on.ca/datasets/mnrf::lake-ontario-tagged-atlantic-salmon/about.

Table 5.3.1: Numbers of tagged Atlantic Salmon stocked by location and year.

Location	2018	2019	2020	2021	2022	2023	2024	Total
Bronte Harbour	196	–	–	–	–	–	–	196
Cobourg Marina	–	556	–	–	–	–	–	556
Grimsby	–	300	–	–	–	169	–	469
Newcastle	–	249	–	–	–	–	–	249
Port Dalhousie	96	164	313	1081	267	393	473	2787
Port Hope	–	93	215	600	343	1002	223	2476
Total	292	1362	528	1681	610	1564	696	6733

Table 5.3.2: Numbers of tagged Atlantic Salmon recaptured by stocking location and year.

Location	2018	2019	2020	2021	2022	2023	2024	Total
Bronte Harbour	6	–	–	–	–	–	–	6
Cobourg Marina	–	24	–	–	–	–	–	24
Grimsby	–	14	–	–	–	3	–	17
Newcastle	–	14	–	–	–	–	–	14
Port Dalhousie	5	13	14	67	15	27	31	172
Port Hope	–	0	10	51	17	44	7	129
Total	11	65	24	118	32	74	38	362

Table 5.3.3: Recapture percentages of tagged Atlantic Salmon by stocking location and year.

Location	2018	2019	2020	2021	2022	2023	2024	%
Bronte Harbour	3.1%	–	–	–	–	–	–	3.1%
Cobourg Marina	–	4.3%	–	–	–	–	–	4.3%
Grimsby	–	4.7%	–	–	–	1.8%	–	3.6%
Newcastle	–	5.6%	–	–	–	–	–	5.6%
Port Dalhousie	5.2%	7.9%	4.5%	6.2%	5.6%	6.9%	6.6%	6.2%
Port Hope	–	0.0%	4.7%	8.5%	5.0%	4.4%	3.1%	5.2%
Total	3.8%	4.8%	4.5%	7.0%	5.2%	4.7%	5.5%	5.4%

6 Native Species Rehabilitation

6.1 Intro

C.Lake, Lake Ontario Management Unit

Lake Ontario has a long history of fish community changes caused by introduced species (intentional and unintentional), overfishing, habitat loss, industrial development and pollution. OMNR works with many partners - government agencies, non-government organizations and interested individuals at local, provincial, national and international levels to enhance Lake Ontario fisheries through native species rehabilitation.

Actions to rehabilitate native species include fish stocking, habitat enhancement, improved fish passage, monitoring and research to ensure sustainable harvest and management. Rehabilitation efforts are occurring across the Lake Ontario basin including the embayments, tributaries, the lower Niagara River and the St. Lawrence River downstream to the Québec-Ontario boarder.

The following sections describe initiatives to restore Atlantic Salmon, Bloater and Lake Trout. These species have either been extirpated or greatly reduced in numbers. Successful restoration of these native species will enhance the overall health of the fish community and support fisheries that provide economic and social benefits to Ontario. Native species restoration also contributes to improving Ontario's biodiversity and meeting the province's commitments under the GLFC's Fish Community Objectives and commitments identified in the Great Lakes Water Quality Agreement.

6.2 Atlantic Salmon Rehabilitation

T. Gristey, Lake Ontario Management Unit

Atlantic Salmon were extirpated from Lake Ontario by the late 1800s, primarily due to the loss of spawning and nursery habitats in tributary streams. As a top predator, they played a key ecological role in the offshore fish community. They were also a vital food source for Indigenous communities and early Ontario settlers. Today, Atlantic Salmon are recognized as an important part of Ontario's natural and cultural heritage.

The Lake Ontario Atlantic Salmon Restoration Program was initiated in 2006 and has grown into a major collaborative effort involving the Ontario Ministry of Natural Resources (OMNR), the Ontario Federation of Anglers and Hunters (OFAH), and numerous corporate and community partners. Significant progress has been made through advancements in fish production, community outreach, research and assessment, and habitat restoration.

The most recent five-year implementation plan (2016–2020) focused on accelerating restoration efforts, particularly improving adult returns. Changes in hatchery rearing and stocking practices were introduced, including a shift toward stocking larger fish and an increased emphasis on spring yearling stocking of the Sebago Lake strain of Atlantic Salmon.

Currently, all stocked Atlantic Salmon are now of the Sebago strain. Both fall and spring yearlings are being stocked at selected locations to support program goals and improve survival and imprinting.

Riverwatcher Observations

Progress of Atlantic Salmon rehabilitation is being monitored using Riverwatcher fish counter and camera systems installed in the fishways at Corbett's Dam on the Ganaraska River and the Reid Milling Dam (Streetsville Dam) on the Credit River. These systems provide valuable insight into the timing, abundance, and movement of Atlantic Salmon and other migratory species.

Ganaraska River

The Ganaraska Riverwatcher has been operational since 2017. Over the course of operation, the system has observed 93 Atlantic Salmon. On average, 13 fish are observed per year. In 2020, the peak of 29 Atlantic Salmon were observed migrating through the fishway. In 2024, four fish were observed (Figure 6.2.1).

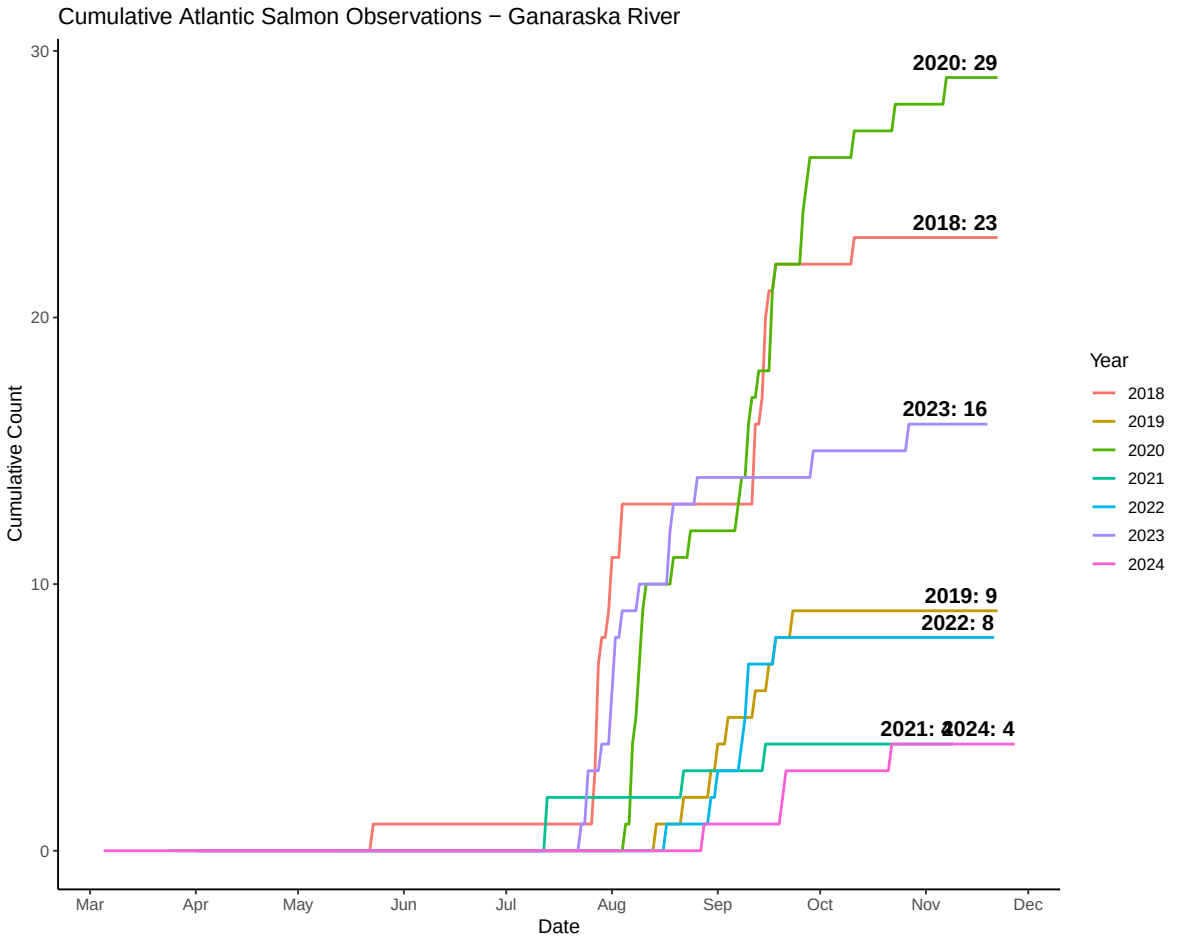


Figure 6.2.1: Historical cumulative Atlantic Salmon observations from the Riverwatcher system installed at Corbett's dam on the Ganaraska River.

Credit River

The Credit Riverwatcher has been operational since 2018. Over the course of operation, the system has observed 191 Atlantic Salmon. On average, 27 fish are observed per year. In 2020, the peak of 29 Atlantic Salmon were observed migrating through the fishway. In 2024, 23 fish were observed (Figure 6.2.2).

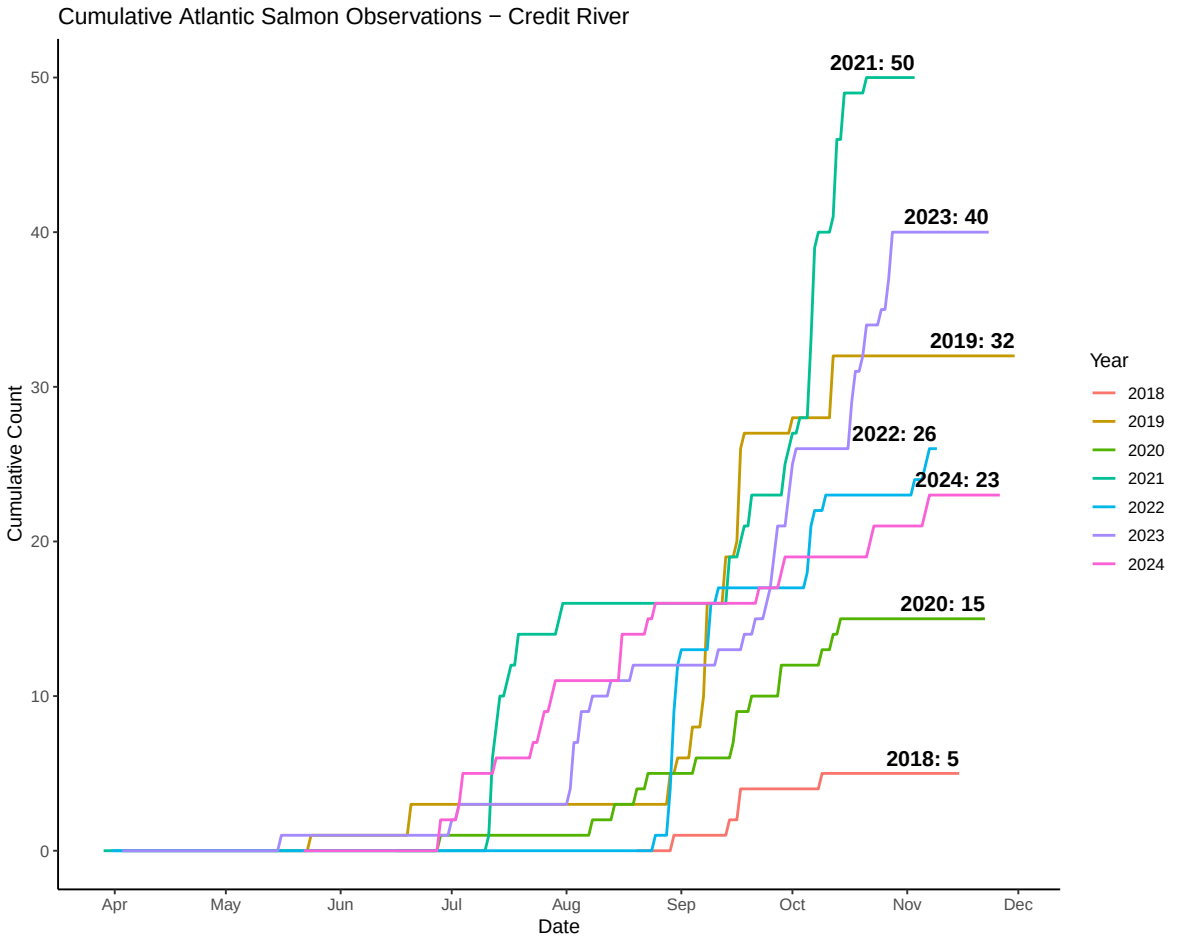


Figure 6.2.2: Historical cumulative Atlantic Salmon observations from the Riverwatcher system installed on the Credit River.

Adult Atlantic Salmon Capture and Sampling

Recent years have shown encouraging developments. LOMU was made aware of large schools of Altantic salmon in the Greater Toronto Area (GTA) by local shoreline anglers. Field crews were dispatched to the area to attempt to capture and sample these schools of fish. In both 2023 and 2024, field crews captured approximately 120 adult Atlantic Salmon. These fish were sampled to assess growth, condition, and thiamine levels. Additional analyses included stable isotope and fatty acid profiling, along with genetic sampling to further support long-term population monitoring and program refinement. Fish were also externally tagged for mark-recapture studies.

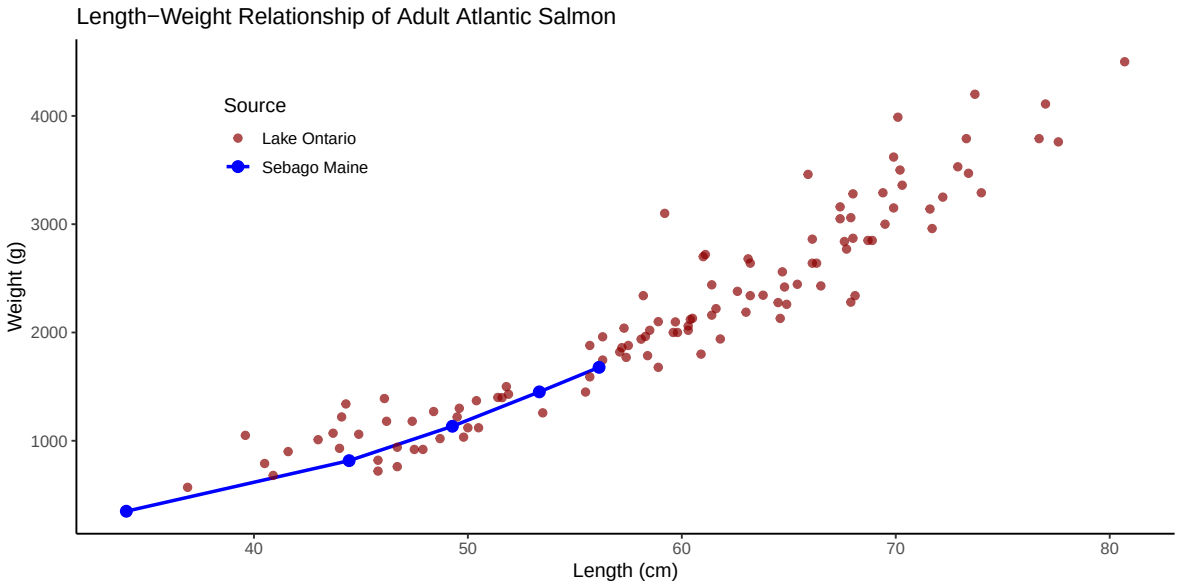


Figure 6.2.3: Length weight relationship comparison of captured adult Atlantic Salmon (2023-2024) and Sebago Lake Maine.

Captured adult Atlantic Salmon were compared against the length-weight relationship of Sebago Lake (Maine) Atlantic Salmon (Figure 6.2.3). Sebago Lake Atlantic Salmon were used as a reference point for Lake Ontario fish as they are found in an ecosystem where the fish are naturally occurring and self-sustaining. The captured fish were found to be heavier than the Sebago Lake fish at similar lengths, indicating that the Lake Ontario fish are in good condition. The average total length of captured fish was 590 mm, with a range of 360 to 810 mm. The average weight was 2,170 g, with a range of 570 g to 4,500 g.

The results of the 2023 and 2024 sampling efforts will be used to inform future stocking strategies and restoration efforts. The data collected will also contribute to a better understanding of the ecological role of Atlantic Salmon in the Lake Ontario ecosystem.

6.3 Lake Trout Rehabilitation

C. Lake and J. Holden, Lake Ontario Management Unit

Once a dominant offshore predator and important commercial fishery, a combination of harvest, habitat destruction and impacts of invasive species resulted in Lake Trout being deemed extirpated in Lake Ontario by the 1950s. Commercial harvest records of Lake Trout began in the 1830s with the peak of the fishery resulting in over a million pounds of landed catch during the 1920s.

Early stocking efforts were unsuccessful at sustaining Lake Trout due to high Sea Lamprey predation of adult Lake Trout. The Sea Lamprey control program began on Lake Ontario in the 1970s and offered new optimism for Lake Trout restoration. The first joint Canada/U.S. plan outlining the objectives and strategies for the rehabilitation efforts was formulated in 1983. The two objectives of the recovery strategy are: 1) increase abundance of stocked adult lake trout to a level allowing for significant natural reproduction and 2) improve production of wild offspring and their recruitment to adult stock.

The Canadian waters of Lake Ontario have had gill net assessments since the 1950s. Sites within the Kingston Basin (also referred to as the East Basin - the portion of the lake bounded by Prince Edward Bay, Main Duck Island, Amherst Island and the Canada/US border) provide the most consistent long-term index of Lake Trout monitoring in Ontario waters dating back to 1957. Index gill netting in the main basin of Lake Ontario began in the 1960s but has not been conducted with standard effort and sites throughout the entire period. Stocking throughout the 1980s was successful in restoring Lake Trout biomass throughout Lake Ontario (Figure 6.3.1). Ecosystem change, stocking cuts and a period of high Sea Lamprey mortality led to declines in Lake Trout abundance throughout the 1990s to 2005 (2008 in the main basin). Since 2005 catches in the Ontario waters of the main basin have remained low relative to the peak in the 1990s but exhibit a moderate increasing trend.

Lake Trout target indices are largely derived from Fish Community Index Gill Net (Section 1.1) and Bottom Trawl (Section 1.2).

Catches by sampling region are also summarized (Figure 6.3.3).

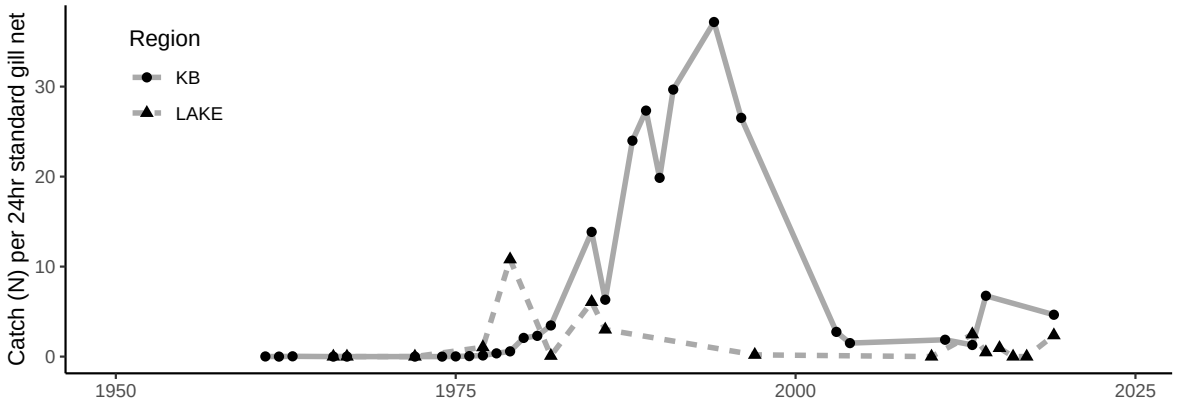


Figure 6.3.1: Relative abundance of Lake Trout captured in the Ontario waters of Lake Ontario from Fish Community Index Gill Netting Section 1.1 sites.

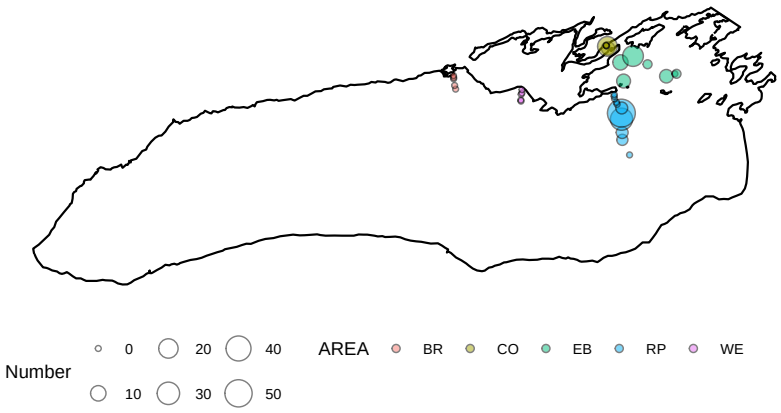


Figure 6.3.2: Main lake gill netting sites in the 2024 Fish Community Index Gill Netting Section 1.1. Points are scaled to Lake Trout catch per 24-hour standard gill net set where the temperature at the net was 15 or colder.

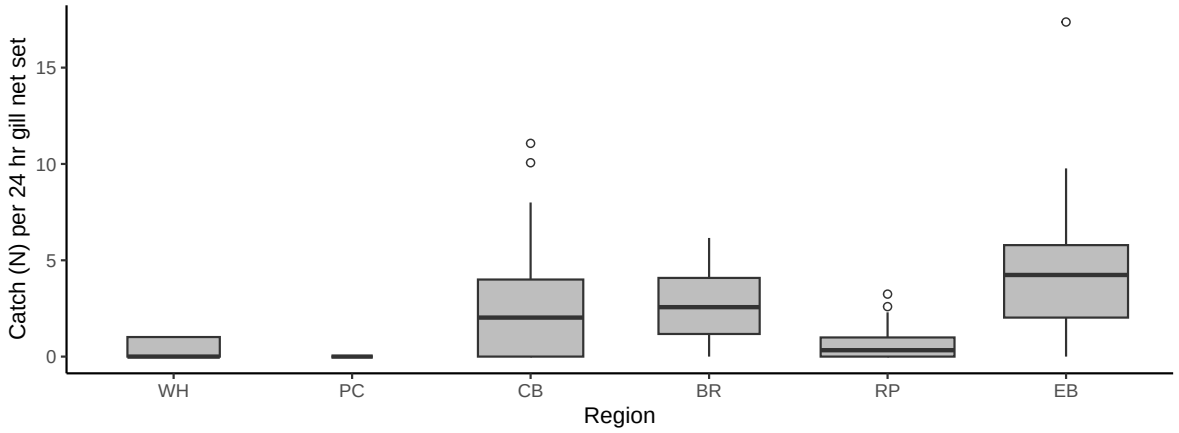


Figure 6.3.3: Relative abundance of Lake Trout captured in the Ontario waters of Lake Ontario from 2015 to 2024 from Fish Community Index Gill Netting Section 1.1 nets in the main basin fishing in water temperatures 15□ or colder by geographic region. Box widths are scaled to the relative number of gill nets fished at a site as effort varied between sites. Boxes encompass 50% of the observations (25th to 75th percentile) with the median catch indicated by the solid line. Whiskers indicate 1.5 * the interquartile range and values beyond that range are plotted individually as open circles.

6.4 Bloater Restoration

C. Lake, J.P. Holden, Lake Ontario Management Unit

Prior to the mid-1950s, Lake Ontario was home to a diverse assemblage of deepwater ciscoes including Bloater (*Coregonus hoyi*), Kiyi (*C. kiyi*), and Shortnose Cisco (*C. reighardi*). Currently, only the Cisco (*C. artedi*) remains in Lake Ontario. The Lake Ontario Committee has set a goal to establish a self-sustaining population of Bloater in Lake Ontario requiring a cooperative, international effort between the Ontario Ministry of Natural Resources (OMNR), the New York State Department of Environmental Conservation (NYSDEC), the U.S. Fish and Wildlife Service (USFWS), the U.S. Geological Survey (USGS) and the Great Lakes Fishery Commission (GLFC). The objectives and strategies for the establishment of Bloater are specified in a draft strategic plan. The plan addresses: sources of gametes, culture facilities, culture capacity, stocking, detection of wild fish, increasing our understanding of ecological consequences, research needs, and public education.

Potential long-term benefits of restoring Bloater include: restoring historical food web structures and function in Lake Ontario, increasing the diversity of the prey fish community, increasing resistance of the food web to new species invasions, increasing wild production of salmon and trout by reducing thiaminase impacts of a diet based on Alewife and Rainbow Smelt, and potentially supporting a commercial fishery. Potential risks associated with the reintroduction of Bloater relate to the unpredictability of food web interactions in an evolving Lake Ontario ecosystem. Accepting some risk and uncertainty, doing the necessary science to increase understanding and minimize risk, and adapting management strategies accordingly are prerequisites for successful restoration of Bloater in Lake Ontario.

Bloater stocking continues as a strategy to meet restoration objectives. OMNR have moved away from production-level stocking in favour of brood-stock development and rearing technique research. The expertise that has been developed by OMNR Fish Culture staff has been shared with partner agencies and has been invaluable to lake-wide restoration efforts. As a result of this research-focused approach, only a small number of Bloater are stocked per year in Ontario waters. Detailed stocking records are reported in Section 5.1. The Fall Benthic Prey Fish Survey (Section 1.7) targets depths and habitat that are likely to have historically encountered Bloater. One Bloater was captured in 2024 during the Fall Benthic Prey Fish Survey.

7 Research Activities

7.1 Station 81: Long-term monitoring at the base of Lake Ontario's food web

Project Leads: Carolina Taraborelli, Emma Bloomfield, and Tim Johnson (OMNR, Aquatic Research and Monitoring Section)
Collaborators: Heather Niblock and Kelly Bowen (Fisheries and Oceans Canada)

Lake Ontario's fishes are supported by the planktonic (tiny aquatic organisms) food web. Energy captured by phytoplankton ("plant-like" plankton) is passed up the food web through zooplankton ("animal-like" plankton) and prey fish (e.g., Cisco [*Coregonus artedi*] and Alewife [*Alosa pseudoharengus*]) to top consumers (e.g., Walleye [*Sander vitreus*] and Lake Trout [Salvelinus namaycush]). Ecological changes that affect plankton (e.g., nutrient levels or climate) can have impacts on the entire food web including top consumers. Monitoring of lower trophic organisms such as plankton and the factors that impact them plays an important role in understanding and managing the fisheries of Lake Ontario.

Lower trophic organisms are monitored in eastern Lake Ontario through the Station 81 program. Due to the short life cycles of plankton (days to weeks) this program is conducted on a biweekly basis to capture seasonal and interannual changes. The program was run by Fisheries and Oceans Canada (DFO) from 1981 to 1995. The project resumed in 2007 as a partnership between MNR's Aquatic Research and Monitoring Section and DFO. Station 81 is located near the center of the Kingston Basin in eastern Lake Ontario (44˚01.02'N, 76˚40.23'W; ~37 m depth). Fourteen sets of lower food web samples were collected between April 30 and Nov 7, 2024. Samples included physical parameters like water temperature profiles, water clarity, and nutrients such as total phosphorus, nitrite, and nitrate, as well as biological measures of chlorophyll a, and composition and abundance of the phytoplankton and zooplankton communities.

Light penetrated deeper into the water column in spring (May-Jun) with an average Secchi disc depth of 9.5 ± 0.3 m, while in summer (July-Sept) the average Secchi disc depth was shallower at 5.7 ± 0.2 m (Figure 7.1.1 A). This corresponded with less chlorophyll (a proxy for algae in the water column) in the spring (1.27 ± 0.12 µg L-1) than in summer (2.44 ± 0.07 µg L-1; Figure 7.1.1 B). Nitrite + nitrate, an essential nutrient for phytoplankton, was higher in spring (0.31 ± 0.01 mg m-3) compared to summer (0.18 ± 0.01 mg m-3; Figure 7.1.1 C). Although some parameters showed clear seasonal differences between spring and summer 2024, total phosphorus did not differ between spring (12.4 ±1.6 mg m-3) and summer (13.9 ±1.4 mg m-3; Figure 7.1.1 D).

There is no clear interannual trend for total phosphorus, Secchi disc depth, and chlorophyll. Total phosphorus undergoes large intra- and inter-annual changes, while Secchi depth and chlorophyll are more consistent between years. Interestingly there is a decreasing trend in nitrate + nitrite since 2007 in both spring and summer (Figure 7.1.1).

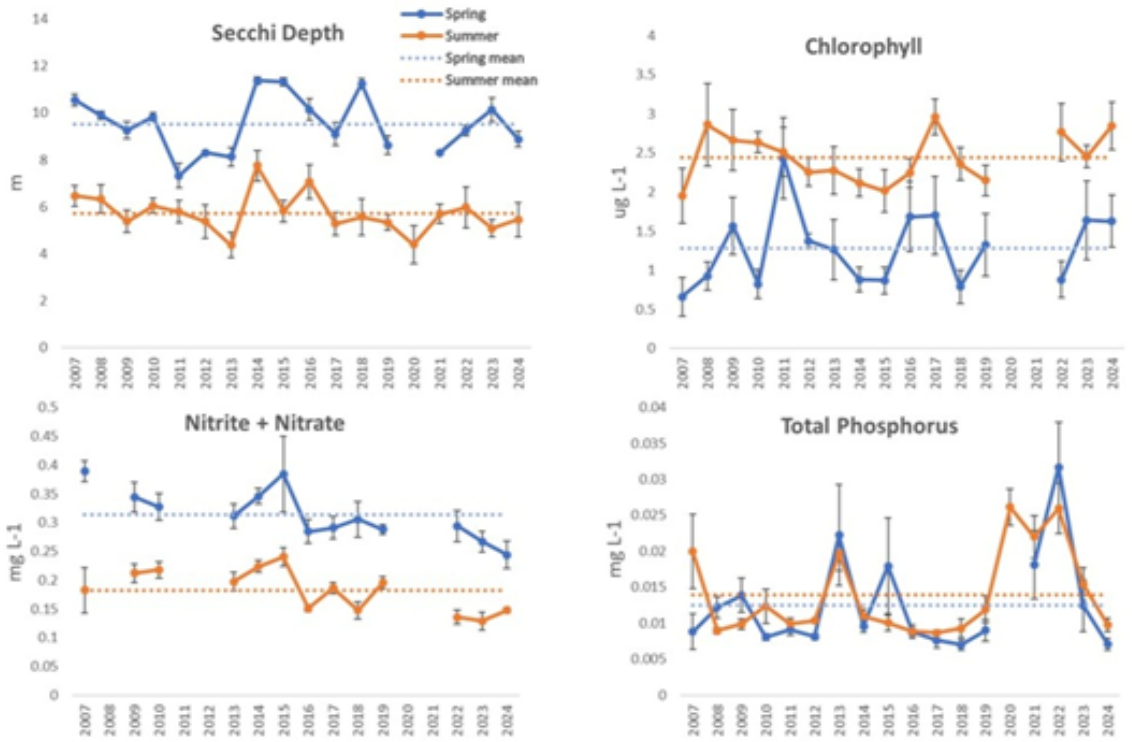


Figure 7.1.1: (A) Secchi disk depth (m), (B) Chlorophyll a (µg/L), (C) Nitrite + Nitrate (mg/L), and (D) Total phosphorus (mg/L) averaged across sampling events at Station 81 (mean ± SE).

Unlike chlorophyll, mean total phytoplankton biomass was not different between spring (475 ± 135 mg m-3) and summer (547 ± 108 mg m-3), but there were clear seasonal differences in composition (Figure 7.1.2). In spring, Diatomeae and Crysophyceae were the dominant taxa, while in the summer, there was more variety among the taxa, with increases in the contribution of Chlorophyta, Cyanophyta, and Dinophyceae to the overall biomass. While Cyanophytes and Cryptophytes are less desired algae, the other groups, which dominate, are important algae that fuel the base of the food web.

Plankton form the base of lake Ontario's food web and are an important food resource for prey fishes. They are a crucial piece of the puzzle for fisheries management in Lake Ontario. Previous reports have presented changes in water temperature, nutrients, and dramatic declines in zooplankton abundance and a change in zooplankton community composition. Continued maintenance and analysis of these

long-term datasets will ensure that resource managers are best equipped to identify and respond to changes that may impact Lake Ontario's ecosystem and fisheries.

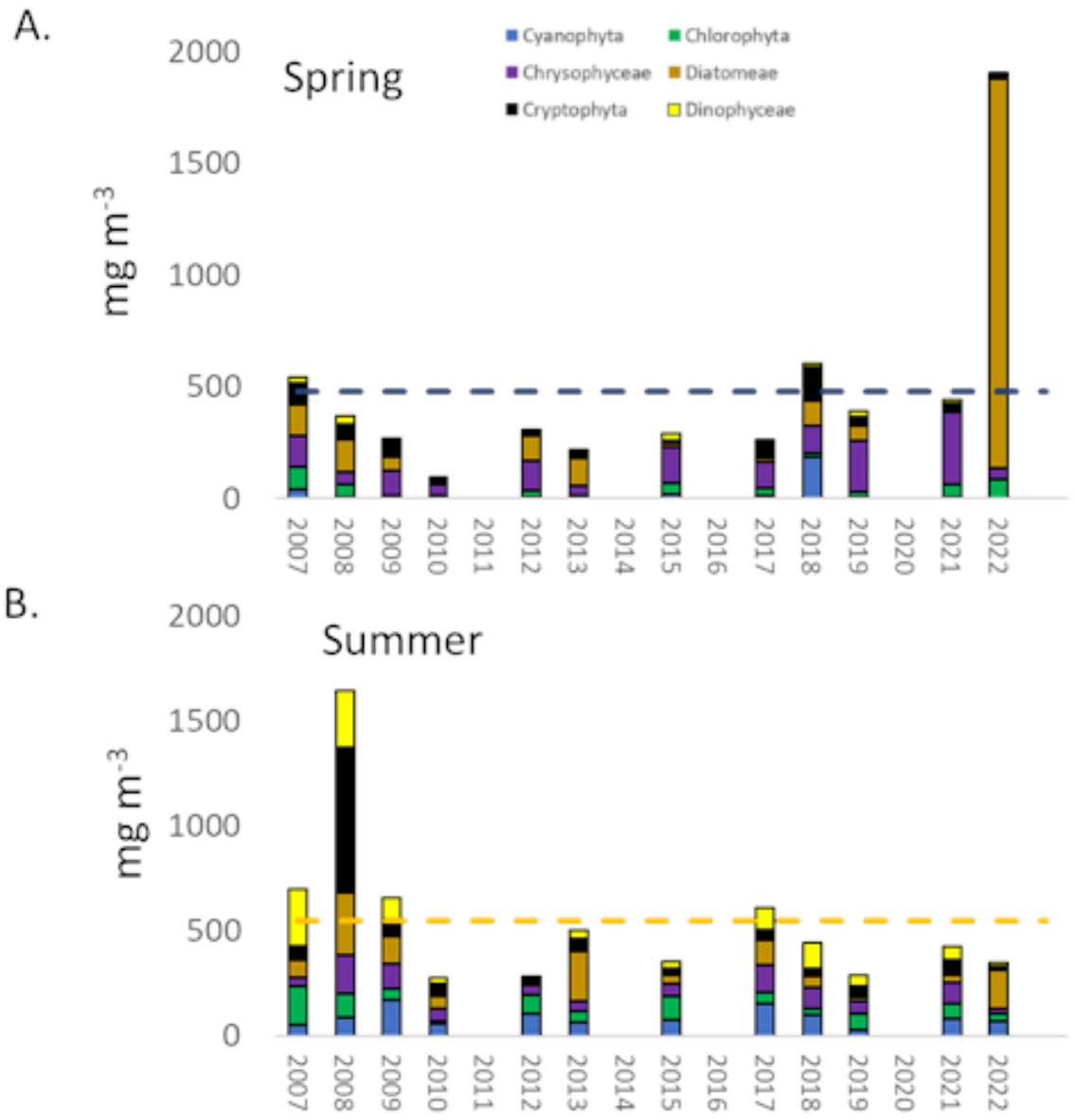


Figure 7.1.2: Phytoplankton groups biomass in spring (A) and summer (B) across years (2007 – 2022).

7.2 Monthly differences in the movement ecology of lake whitefish (*Coregonus clupeaformis*) in eastern Lake Ontario

Project Leads: Benjamin Hlina and Tim Johnson (OMNR, Aquatic Research and Monitoring Section)
Collaborators: Rylie Robinson, Emma Bloomfield, and Brent Metcalfe (OMNR, Aquatic Research and Monitoring Section)

Lake whitefish are a cold-water species that holds cultural and economic importance throughout the Great Lakes region. Human-induced stressors over the last 60 years (e.g., invasive species, habitat alteration, pollution) have caused significant declines in their populations, including in Lake Ontario (see Section 1.1). There is limited knowledge on the movement and habitat use for lake whitefish in Lake Ontario. Therefore, we used acoustic telemetry to quantify movement and depth use to better understand seasonal lake whitefish behaviour over a three-year period (2021-2024). We also evaluated seasonal changes in bottom-oriented versus suspended behaviours. Lake whitefish were heavily concentrated along the central Duck–Galloo Ridge in 20 – 30 m of water during periods of summer stratification (June to September; Figure 7.2.1), while the area used shifted to the south shore of Prince Edward County and 10 – 25 m during periods of consistent temperatures (non-stratified; October to May; Figure 7.2.1) and for spawning. During the period of consistent temperatures, lake whitefish exhibited more bottom-oriented behaviour whereas, when the lake was stratified in the summer, they exhibited both suspended and bottom-oriented behaviours (Figure 7.2.2). These differences in movement and depth use may be driven by changes in habitats (temperature) and / or prey (see section 7.7 of the 2023 report); however, further studies are needed to elucidate the mechanisms. Occupying warmer temperatures, investing more energy searching for food, or consuming new foods could contribute to higher energetic costs, and lower overall growth and production of the species. On-going ecological change will continue to influence lake whitefish distribution and behaviour that may result in changes in growth or vulnerability to assessment or commercial gears. This work helps fishers and fishery managers prepare for and respond to these on-going changes.

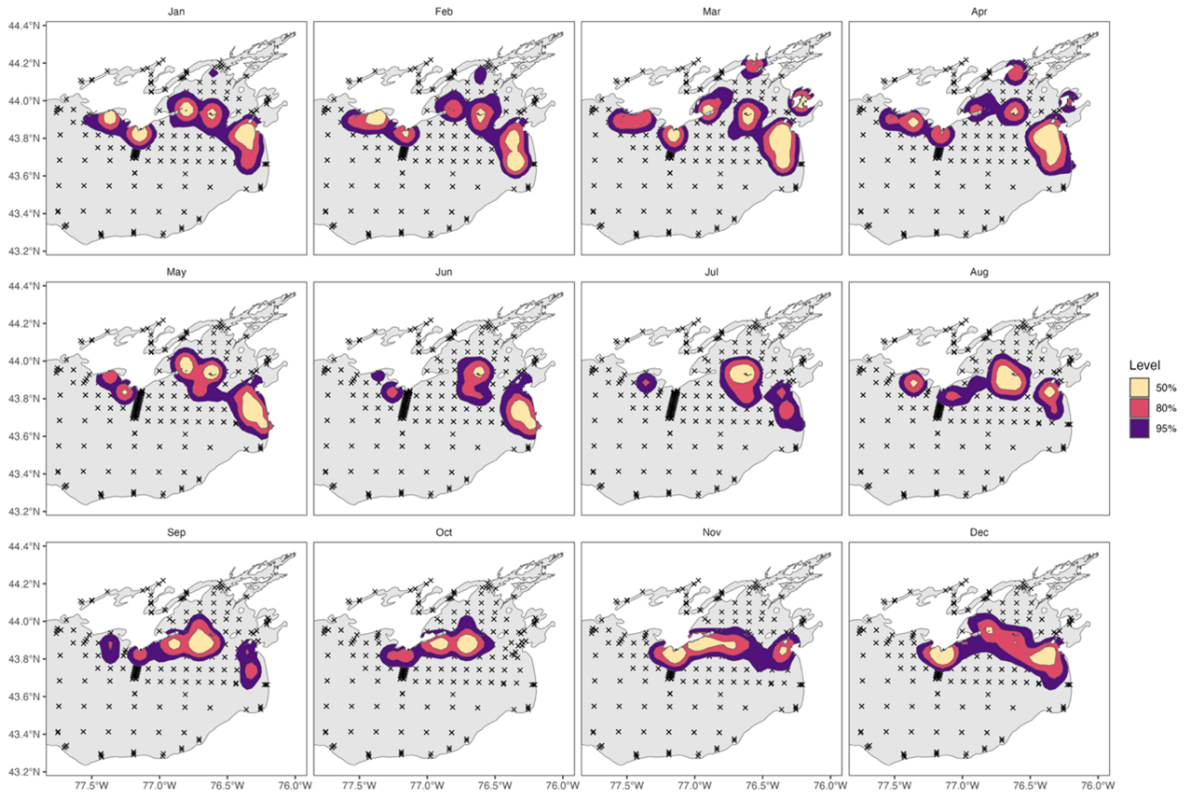


Figure 7.2.1: Monthly kernel utilization densities (KUD – areas of greater occupancy) for the tagged population (aggregation of individual KUDs) of lake whitefish (*Coregonus clupeaformis*) in eastern Lake Ontario. Each '×' represents the location of an acoustic telemetry receiver that a tagged lake whitefish could have been detected on. The orange fill represents the 50% KUD (where the majority fish were detected), the red fill represents the 80% KUD, and the purple fill represents the 95% KUD (the fullest extent of lake whitefish in the present study).

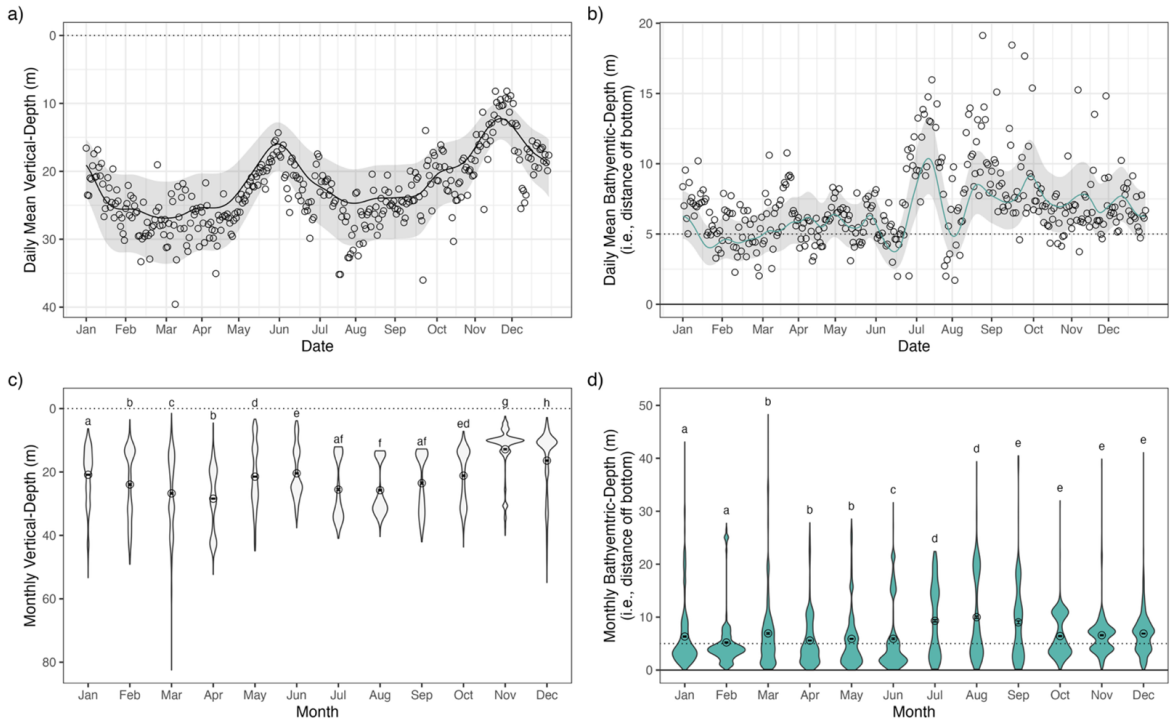
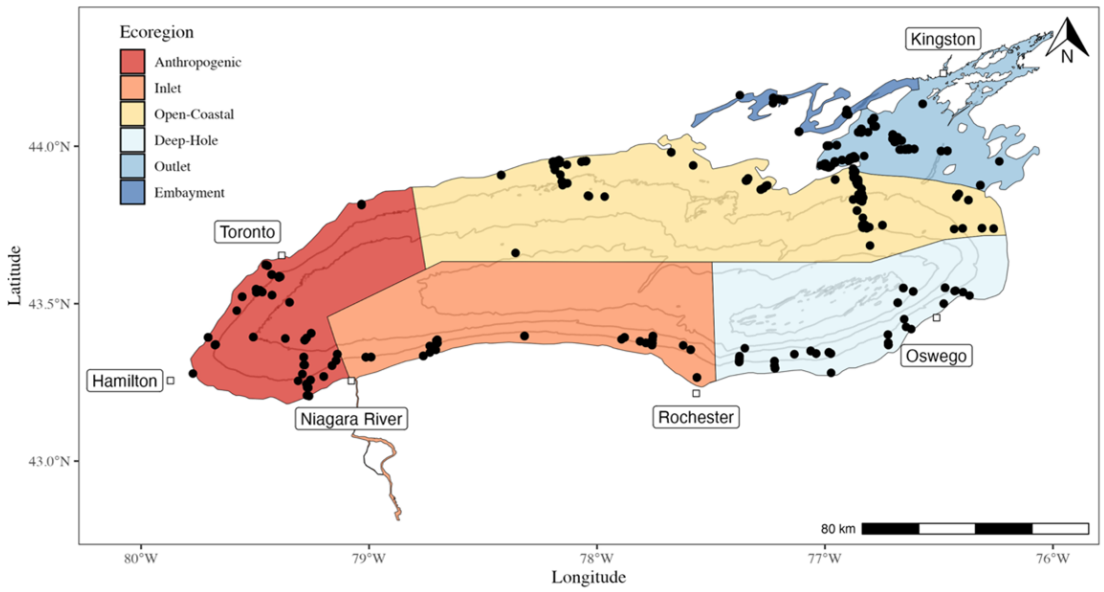


Figure 7.2.2: Daily and monthly fish depth (a and c, respectively) and distance off the bottom (b and d, respectively) for lake whitefish (*Coregonus clupeaformis*) in eastern Lake Ontario. Grey shading indicates the 95% confidence intervals for Generalized Additive Mixed-effects Models (the preferred range of depths), while open-circles are the daily mean for each measurement. Differences in letters represent statistical significance with alpha set to 0.05. Points and error bars in c and d represent the mean ± the standard error of the mean. The dotted line in a and c represents the surface while in b and d it represents 5 m off the bottom of the lakebed.

7.3 Accounting for spatial variation in trophic processes of fishes in large lakes: An ecoregion approach

Project Leads: Benjamin Hlina, Aaron Fisk (University of Windsor), and Tim Johnson (OMNR, Aquatic Research and Monitoring Section)
Collaborators: Brent Metcalfe (OMNR, Aquatic Research and Monitoring Section)

For more than 50 years, Lake Ontario has experienced continuous ecological change. The causes and consequences of these changes are only somewhat understood. Existing monitoring and management programs collect data throughout the lake and provide results and recommendations about lake-wide functions (e.g., nutrient transfer, biological production). Extrapolation or averaging of observations can potentially obscure regionally important functions. We propose a framework that acknowledges these regional differences by partitioning Lake Ontario into six smaller ecological regions (i.e., ecoregions) based on multiple non-biological properties (bathymetry, thermal structure, tributary influence, trophic state, and human influence; Figure 7.3.1). To evaluate whether an ecoregion approach could provide insights on differences in food-web functions across Lake Ontario, we investigated differences in trophic position ($\delta^{15}N$), carbon sources ($\delta^{13}C$), resource partitioning (isotopic niche size), and food-web community metrics for three fish species representing different functional and ecological pathways: round goby (*Neogobius melanostomus*), alewife (*Alosa pseudoharengus*), and lake trout (*Salvelinus namaycush*) in Lake Ontario sampled between 2009-2014 and 2018. We observed the three species responded similarly to differences in bathymetry, nutrient levels, and water temperatures resulting in greater differences among than within an ecoregion. Estimates of trophic position (average number of feeding steps above phytoplankton which are the base of a food web) were low (3.2 ± 0.1) for round goby in ecoregions that had higher nutrient levels compared to those with lower (4.1 ± 0.2), while trophic position for alewife (3.1 – 3.7) and lake trout (4.4 – 5.2) followed similar patterns among ecoregions indicating these species respond similarly to non-biological differences within the lake. Carbon use (where the food energy originates from) by all three fish was either benthic (< 0.30) or pelagic (> 0.70) in ecoregions with higher nutrient levels and less changes in bathymetry. Fish from ecoregions with lower nutrient levels and more changes in bathymetry used a mix of benthic and pelagic carbon, had higher trophic positions, and smaller isotopic niches (the variety of foods consumed) (Figure 7.3.2) that resulted in lower community metrics (the degree of interrelatedness of the three species with respect to feeding pathways) indicating less redundancy of roles within a food-web. This study demonstrates that food-web metrics in Lake Ontario operate in more discrete spatial units (i.e., ecoregions) than as a single, large homogenous mixture (i.e., the entire lake). While many different, often complex factors (e.g., biological, physical, societal, logistical) are considered when managing a resource, an ecoregion spatial framework provides the ability to support regional resource decision-making (i.e., watershed and fisheries) and can help reduce biases potentially created by a whole lake averaging (i.e., intentionally pooling all data, obscuring important regional differences) or extrapolation (i.e., assuming sampling in one area reflects the trend everywhere) approach.



Ecoregion Characteristics

	Anthropogenic	Inlet	Open-Coastal	Deep-Hole	Outlet	Embayment
Depth [mean (max); m]	79.3 (153)	122.9 (192)	71.2 (190)	125.8 (235)	20.6 (54)	15.0 (53)
Inflow[1]	~520 m^3/s/year	~7,500 m^3/s/year	~360 m^3/s/year	~240 m^3/s/year	~150 m^3/s/year	~315m^3/s/year
Trophic State[2]	Eutrophic	Mesotrophic	Mesotrophic	Mesotrophic	Eutrophic	Eutrophic
Nutrient Sources[3,4]	~ 650 mT P/ year	~5,700 mT P/ year	~30 mT P/ year	~ 330 mT P/ year	~ 135 mT P/ year	~ 360 mT P/ year
Thermal Dynamics[5,6]	Prone to upwelling events	Warmer water from Lake Erie	Stable water temperatures	Extensive hypolimnion	Variable temperatures	Warmer water from tributaries
Other	Higher industrial and municipal load	Nutrients from Lake Erie	Least disturbed ecoregion	Deepest region	Integrates all other ecoregions	Agricultural watershed
Expected Trophic Response	Lower trophic positions	Higher littoral carbon	Higher trophic diversity	Higher trophic position	Lower trophic diversity	Larger isotopic niches

Figure 7.3.1: Lake Ontario segregated into six spatially unique ecoregions based on five criteria: depth, inflow (HYDAT – Canadian National Water Data Archive and USGS – National Water Information System), trophic state (Riseng et al. 2018), nutrient source (Makarewicz et al. 2012; Hill and Dove 2021), and thermal structure (Stewart and Robertson 1991; Rao et al. 2004). Black points represent the location that samples were collected for stable isotopes for three species, Round Goby (*Neogobius melanostomus*), Alewife (*Alosa pseudoharengus*), and Lake Trout (*Salvelinus namaycush*) and two baselines (pelagic – dreissenids; benthic - chironomids, amphipods, oligochaetes, and sphaerids). Depth contours are every 50 m ranging from 0-250 m.

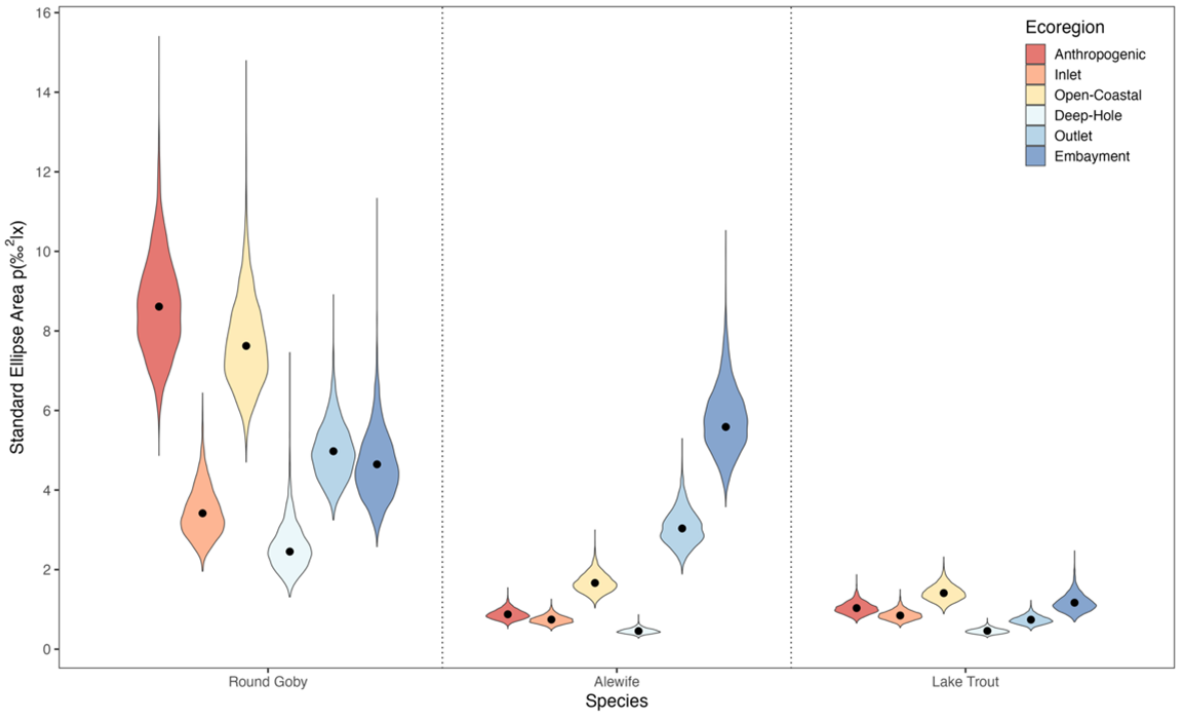


Figure 7.3.2: Posterior distributions of standard ellipse area (i.e., proxy for niche size or the variety of food sources consumed) for Round Goby (*Neogobius melanostomus*), Alewife (*Alosa pseudoharengus*), and Lake Trout (*Salvelinus namaycush*) among six ecoregions in Lake Ontario. Black points represent the median posterior estimate with dotted lines separating each species.

Hill, B., and A. Dove. 2021. Concentrations and loads of nutrients and major ions in the Niagara River, 1975–2018. Journal of Great Lakes Research 47:844–861.

Makarewicz, J. C., W. G. Booty, and G. S. Bowen. 2012. Tributary phosphorus loading to Lake Ontario. Journal of Great Lakes Research 38:14–20.

Riseng, C. M., K. E. Wehrly, L. Wang, E. S. Rutherford, J. E. McKenna, L. B. Johnson, L. A. Mason, C. Castiglione, T. P. Hollenhorst, B. L. Sparks-Jackson, and S. P. Sowa. 2018. Ecosystem classification and mapping of the Laurentian Great Lakes. Canadian Journal of Fisheries and Aquatic Sciences 75:1693–1712.

Rao, Y. R., M. G. Skafel, and M. N. Charlton. 2004. Circulation and turbulent exchange characteristics during the thermal bar in Lake Ontario. Limnology and Oceanography 49:2190–2200.

Stewart, T., and D. Robertson. 1991. Lake Ontario temperature studies. Ontario Ministry of Natural Resources, Lake Ontario Fisheries Unit 1990 Annual Report, LOA 91:1–5.

7.4 MarineNav Oceanus Pro: Remotely Operated Underwater Vehicle

Project Leads: Brent Metcalfe, Kurtis Winter, and Tim Johnson (OMNR, Aquatic Research and Monitoring Section)

The Ministry of Natural Resources' Aquatic Research and Monitoring Section (ARMS), based at the Glenora Fisheries Station, conducts various aquatic science research projects to learn more about the ecology and productive capacity of the fish and invertebrate community of Lake Ontario. As such, the team has acquired and maintains numerous pieces of specialized scientific equipment. In early 2024, the team acquired a remotely operated underwater vehicle (ROV) to assist with various ongoing research projects (Figure 7.4.1). The ROV will allow the team to view and record underwater phenomena, locate and sample underwater habitat features, deploy / recover sampling equipment, and provide a general window to the underwater world.

Features / specifications of the new ROV include:

- 18 kg weight
- 305 m depth rating
- 600 m tether
- Top speed of 6 knots
- Four ultra-bright lights (1500 lumens)
- 1080p front facing camera with photo and video recording capabilities
- Forward facing sonar
- GPS positioning system
- Compass
- Autopilot / position stabilization and hold
- Grabber arm
- Diamond blade, circular cutting tool
- Reference laser lights
- Canadian-made (Prince Edward Island)

Some examples of ways the team has recently used their ROV include:

- Recovery / repair of scientific equipment (Figure 7.4.2)
- Benthic habitat surveys
- In-lake observations of fish and invertebrates (post-stocking release, and wild populations)
- Inspection of vessel hulls and deployed underwater equipment



Figure 7.4.1: ARMS' new Marine Nav Oceanus Pro ROV.

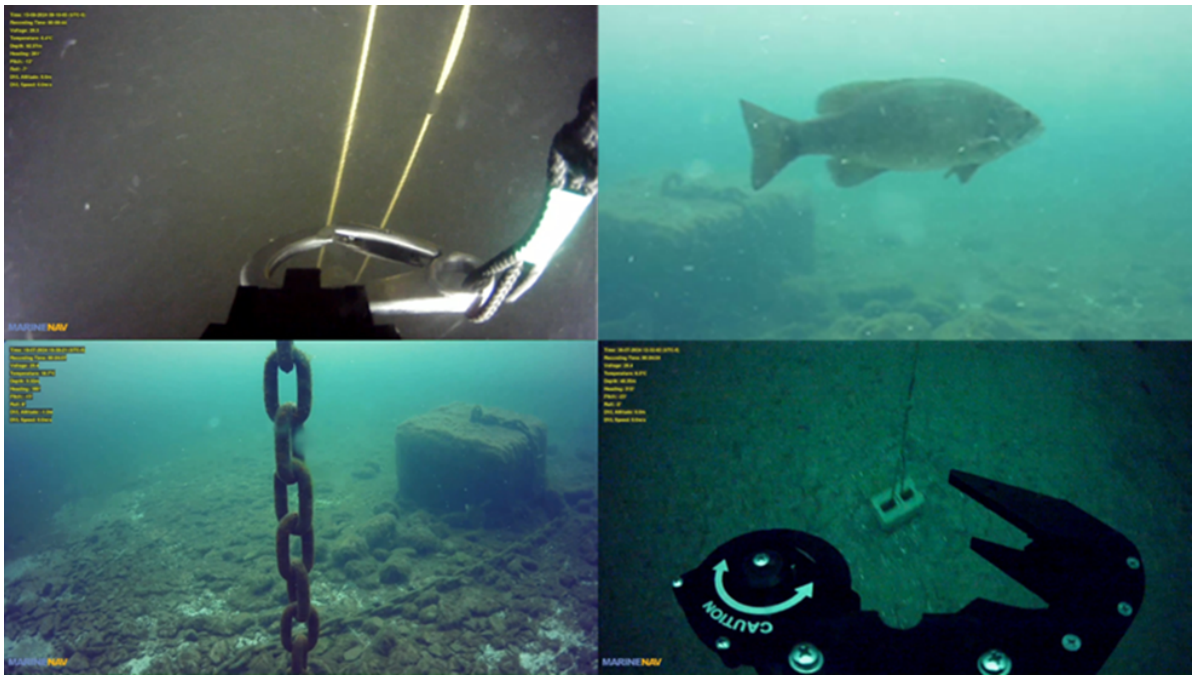


Figure 7.4.2: Underwater images captured by the new ARMS' Oceanus Pro ROV while working beneath the surface of Lake Ontario.

8 Partnerships

8.1 Aquatic Invasive Species Surveillance Using Environmental DNA Sampling

L. Sunderland and E. Bloomfield, Lake Ontario Management Unit

Lake Ontario has experienced multiple significant ecosystem disruptions due to the introduction of aquatic invasive species. For example, the invasions of Dreissenid mussels and Round Goby have drastically altered the trophic structure of the benthic environment. Preventing the spread of an invasive species is more effective than attempting to eradicate an already established population, making the early detection of invasive organisms vital.

Environmental DNA (eDNA) sampling is a technique used to detect the presence of aquatic plant or animal species, which has been used by the MNR as early as 2015. Organisms shed genetic material into their environment (e.g. mucus, scales, pollen or excrement) which can be isolated from surface water samples and analyzed to determine species of origin. In freshwater environments, DNA remains viable for 7-21 days, during which time it can be transported great distances by currents. Therefore, the detection of DNA from a species of interest acts as evidence of their potential presence in an area, although it does not indicate the exact location of the organism or whether the DNA was shed by a living organism or transported to the area via the waste of a predator. In addition, the failure to detect DNA from a species of interest does not serve as definitive proof of its absence.

The current eDNA sampling program is the result of collaboration between three sections of the MNR. The Lake Ontario Management Unit is responsible for collecting and processing water samples which are analyzed for eDNA by the Aquatic Research and Monitoring Section. The Biodiversity and Invasive Species Section selects areas of interest for sampling and receives the results of the eDNA analysis.

In 2024, eDNA sample collection efforts consisted of 59 sites across Lake Ontario and its tributaries and occurred between July 4th and August 19th (Figure 8.1.1). Primarily focusing on areas of high risk, sites were subsequently chosen due to hydrologic factors (e.g. connectivity to other water bodies) or for their proximity to known populations of invasive species. Species of interest include Grass Carp (*Ctenopharyngodon idella*), Tench (*Tinca tinca*), Marbled Crayfish (*Procambarus virginalis*), Water Solider (*Stratiotes aloides*) and Hydrilla (*Hydrilla verticillata*). Table 8.1.1 shows information about the areas that were sampled, including the dates and number of samples collected.

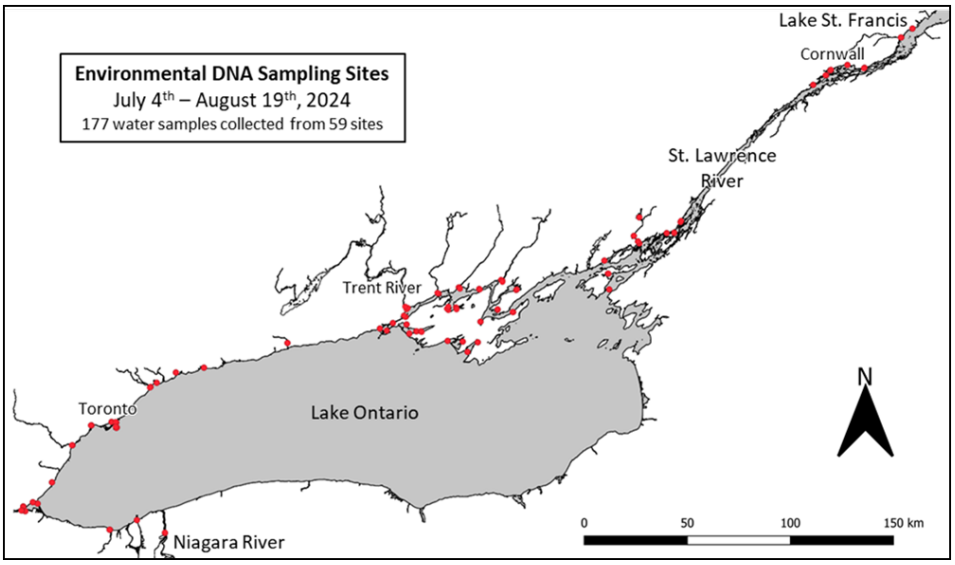


Figure 8.1.1: Map of sites sampled for environmental DNA by the Lake Ontario Management Unit in 2024.

In 2024, there were no positive eDNA detections of Grass Carp, Marbled Crayfish, Water Soldier, or Hydrilla. However, there were positive detections of Tench at two sites in the St. Lawrence River, near Cornwall and Bainsville. Tench are invasive bottom dwelling fish that can outcompete native species for food and degrade water and habitat quality by disturbing sediment. This eDNA result complements ongoing traditional fish community monitoring (i.e. netting programs, see Chapter 1) in the St. Lawrence River, Lake Ontario, and Bay of Quinte, providing up to date distribution information that will aid the Biodiversity and Invasive Species Section in Tench management.

Table 8.1.1: Areas sampled, dates sampled and number of water samples collected for environmental DNA analysis by the Lake Ontario Management Unit in 2024.

Area Name	Area Code	Date Sampled	Sites	Samples
Port Hope and Oshawa Area	OS	July 4th	5	15
St. Lawrence River and Lake St. Francis	SLR	July 9th	7	21
Gananoque River	GAN	July 11th	4	12
Upper Bay of Quinte	UB	July 15th & 25th	7	21
Lower Bay of Quinte	LB	July 17th & 25th	5	15
Thousand Islands	TH	July 23rd	3	9
Toronto Harbour and Tributaries	TOR	July 30th	6	18
Niagara River and Welland Canal	NIA	August 7th	3	9
Hamilton Harbour	HAM	August 7th	5	15
Prince Edward County Lakes and Embayments	PEC	August 13th & 15th	11	33
Wolfe Island	WF	August 19th	3	9
Total	–	–	59	177

8.2 Contaminant Monitoring

B. Maynard and S. Beech, Lake Ontario Management Unit

The Lake Ontario Management Unit (LOMU) cooperates annually with several agencies to collect fish samples for contaminant testing. In 2024, 216 contaminant samples were collected for Ontario's Ministry of the Environment, Conservation and Parks (MECP) Sport Fish Monitoring program (Table 8.2.1).

Samples were primarily collected using existing fisheries assessment programs on Lake Ontario, Bay of Quinte and the St. Lawrence River. The maps below show locations ("Blocks") for contaminant sample collections in Lake Ontario and the St. Lawrence River (Figure 8.2.1). A summary of the number of fish samples collected by species for contaminant analysis by the MECP from 2015 to 2024 is shown in Table 8.2.2.

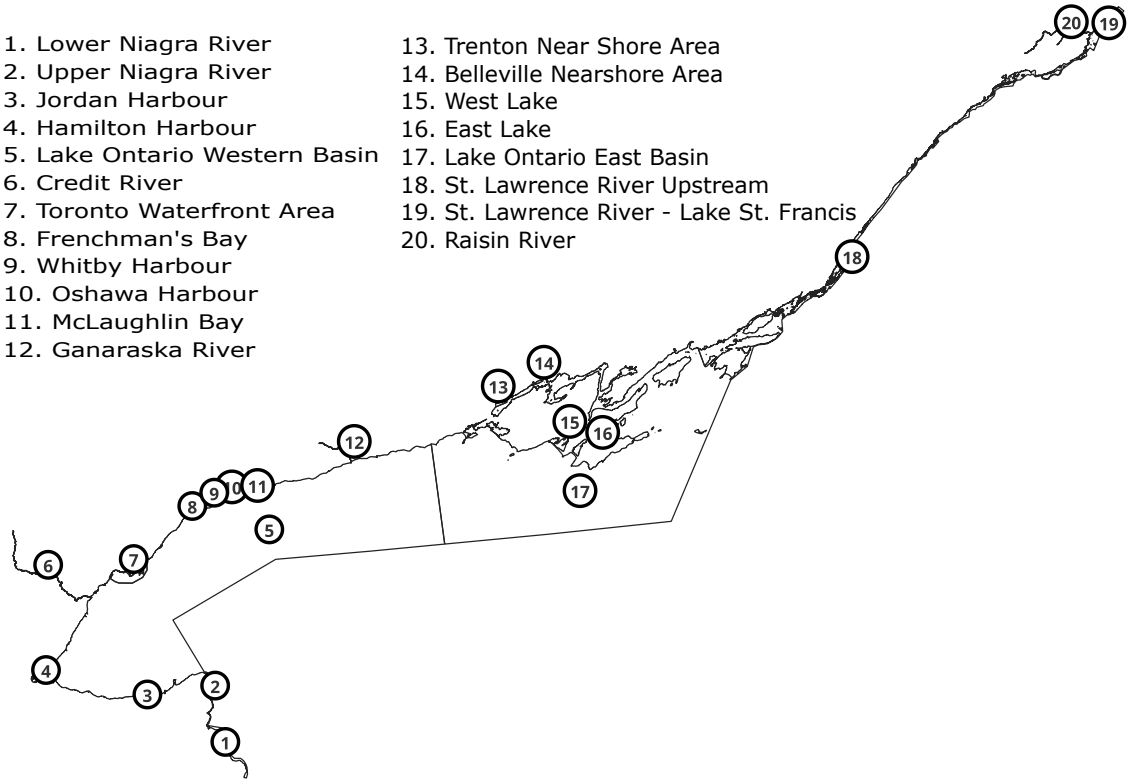


Figure 8.2.1: Map showing locations ("Blocks") for contaminant sample collections.

Table 8.2.1: Number of fish samples provided to MECP for contaminant analysis, by region and species, 2024.

PRJ_CD	Location	Species	Total
LOA_IA24_AT3	Lakefront Promenade - Lake Ontario	Atlantic Salmon	10
LOA_IA24_EX1	Eastern basin	Lake Trout	2
	Western basin	Lake Trout	10
LOA_IA24_GL1	Eastern Basin	Lake Trout	8
		White Bass	1
LOA_IA24_NS1	Eastern Basin, Upper Bay of Quinte	White Bass	1
LOA_IA24_NSH	Hamilton Harbour	Black Crappie	10
		Bluegill	9
		Channel Catfish	10
		Common Carp	10
		Freshwater Drum	10
		Goldfish	9
		Silver Redhorse	1
		White Bass	3
		White Perch	11
		Yellow Perch	10
LOA_IA24_NST	Toronto Harbour	Bluegill	9
		Bowfin	3
		Freshwater Drum	8
		Pumpkinseed	3
		Rock Bass	10
		Smallmouth Bass	1
		Walleye	7
		White Perch	5
		Yellow Perch	10
SLR_IA24_LSF	Upper St. Lawrence River	Freshwater Drum	1
		Rock Bass	8
		White Perch	1
		White Sucker	7
SLR_IA24_THI	Lower St. Lawrence River	Black Crappie	1
		Freshwater Drum	4
		Pumpkinseed	3
		Smallmouth Bass	10
		Walleye	9
		White Perch	1

Table 8.2.2: Summary of the number of fish samples collected for contaminant analysis by the MECP, 2015 - 2024 .

Species	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Atlantic Salmon	–	–	–	–	–	–	–	–	–	10
Black Crappie	14	–	–	–	8	–	1	23	14	11
Bluegill	10	–	–	10	10	–	7	32	31	18
Bowfin	–	–	–	–	–	–	–	6	–	3
Brown Bullhead	52	–	–	9	50	–	15	40	10	–
Brown Trout	1	–	–	20	6	–	–	5	–	–
Centrarchidae hybrids	–	–	–	–	–	–	–	2	–	–
Channel Catfish	–	–	10	–	9	–	4	4	8	10
Chinook Salmon	2	–	–	21	10	–	–	–	10	–
Cisco	18	–	20	–	20	–	–	–	10	–
Coho Salmon	–	–	–	10	–	–	–	–	–	–
Common Carp	–	14	8	–	7	–	1	7	2	10
Freshwater Drum	–	12	18	–	10	–	–	11	21	23
Gizzard Shad	–	7	10	–	–	–	–	1	–	–
Goldfish	–	–	–	–	–	–	–	–	–	9
Greater Redhorse	–	–	–	–	–	–	–	–	5	–
Lake Trout	10	28	10	29	10	–	–	–	10	20
Lake Whitefish	19	8	11	10	22	5	–	–	10	–
Largemouth Bass	18	20	4	10	37	–	27	17	10	–
Longnose Gar	–	–	–	–	–	–	–	8	–	–
Northern Pike	18	24	35	5	13	–	4	27	15	–
Pumpkinseed	–	15	20	–	12	–	–	40	17	6
Rainbow Smelt	3	–	–	4	5	–	12	45	5	–
Rainbow Trout	20	–	–	2	11	–	–	1	–	–
Rock Bass	–	20	20	17	57	–	2	31	–	18
Shorthead Redhorse	–	–	–	–	5	–	–	–	2	–
Silver Redhorse	–	–	–	9	1	1	–	–	3	1
Smallmouth Bass	20	25	37	16	22	–	20	32	11	11
Walleye	67	56	29	53	72	–	30	55	5	16
White Bass	–	–	–	–	11	–	8	2	–	5
White Perch	11	4	–	4	43	–	10	12	10	18
White Sucker	7	21	30	16	14	–	–	21	8	7
Yellow Perch	20	39	50	20	31	–	18	48	10	20
Total	310	293	312	265	496	6	159	470	227	216

8.3 American Eel

J. La Rose, Lake Ontario Management Unit

The American Eel (*Anguilla rostrata*) was historically an important predator in the near shore fish community of Lake Ontario and the upper St. Lawrence River (LO-USLR). They also made up an important component of the LO-USLR commercial fishery during the latter part of the 20th century and are highly valued by Indigenous peoples.

American Eel abundance declined in the LO-USLR system as a result of the cumulative effects from several factors. By 2004, American Eel abundance in Ontario had declined to levels that warranted closure of all commercial and recreational fisheries in the province. In 2007, American Eel was identified as Endangered under Ontario's Endangered Species Act (ESA). Safe downstream passage past hydro turbines during the eel's spawning migration is important to restoration of eel and was identified as a need in the Ontario Power Generation American Eel Action Plan.

Trap and Transport (T&T) of large yellow eels, in its current form, was initiated in 2008 to evaluate it as a means of mitigating mortality of eels in the turbines at the Saunders Hydroelectric Dam. Through this program, commercial fishers in LO-USLR and Lake Saint Francis (LSF) are permitted to retain and deliver large, healthy eel incidentally caught during their commercial fishing operations in exchange for payment by Ontario Power Generation (OPG). Eel are then transported and released below the furthest downstream dam in the St Lawrence River near Beauharnois, Québec. From 2008 to 2014, only eels collected during the spring commercial fishery were included in T&T. Since 2014, eels collected during the fall commercial fishery were also included in the T&T project to increase the numbers of eels transported.

Eel T&T forms part of the current American Eel Implementation Plan developed by OPG and the Ontario Ministry of Environment, Conservation and Parks (MECP). The MECP assumed responsibility of the Endangered Species Act and its authorizations in 2019; while the MNR Lake Ontario Management Unit (LOMU) continues to support T&T operations.

In 2024 OPG introduced a limit of 7000 eel for the T&T program (total for spring and fall). Once the limit was reached, T&T operations would cease and eel would no longer be accepted. Both spring and fall T&T programs were conducted in 2024. Spring T&T began on April 11, and transported 2171 large, healthy eel before ending on June 21. Fall T&T transported 4531 eel between when the program started on September 03 and when it ended on October 18. During the 27 weeks of T&T conducted in 2024, at total of 6702 eel were transported to Lac St. Louis downstream of the Beauharnois Generating Station. The number of eel transported by the program since 2008 is shown in Figure 8.3.1. This year's successful project was accomplished thanks to the diligent, cooperative efforts of commercial fishers, OPG, their consultants, LOMU technicians and data processing experts.

Lake Ontario Fish Community Objective 1.4 focuses on the restoration of American Eel in Lake Ontario and the St. Lawrence River. Eel trap and transport directly contributes to meeting this objective by reducing the mortality of eel as they migrate downstream towards their spawning grounds.

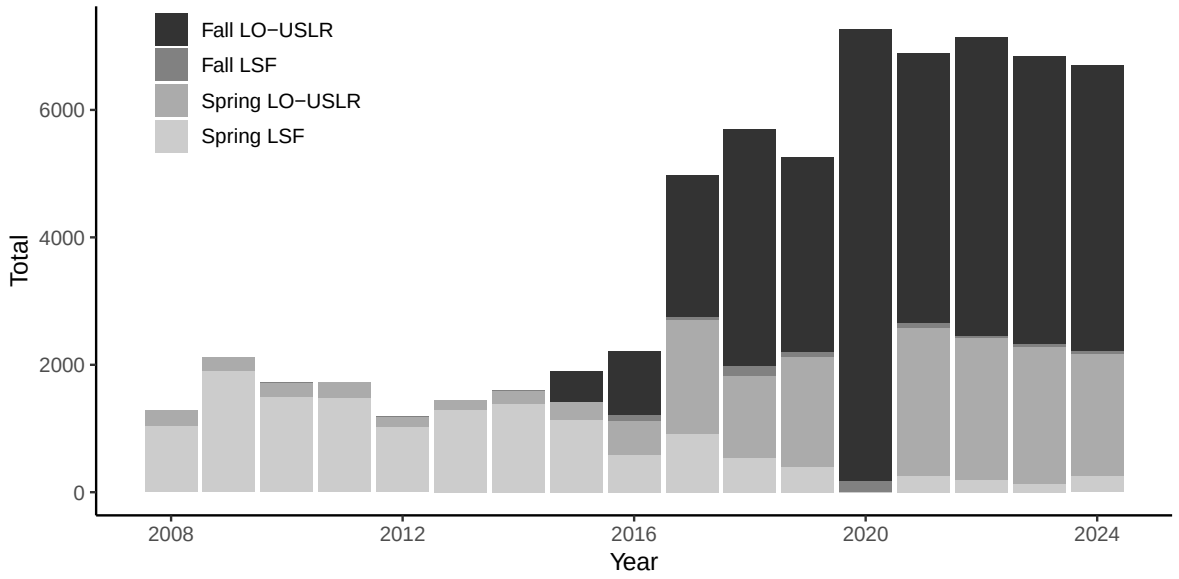


Figure 8.3.1: Total number of eels collected in the Trap and Transport program from 2008- 2024 Each total is divided into the locations (Lake St Francis, Lake Ontario-Upper St Lawrence River) at which the eels were captured in commercial fishery nets and the season (Spring and Fall) of collections.

8.4 Québec-Ontario - Lake St. Francis Collaborative

C. Lake, M. Yuille, Lake Ontario Management Unit

Lake St. Francis is a large, lake-like widening of the St. Lawrence River located downstream of the Moses-Saunders hydroelectric dam in Cornwall. The provinces of Québec and Ontario share a border that bisects the lake, making inter-agency cooperation important for effective ecosystem management. The Ontario portion of Lake St. Francis forms the eastern end of Fisheries Management Zone (FMZ) 20.

A significant step towards understanding lake-wide trends in fish distribution and abundance was taken in 2022, when a coordinated fish community assessment was conducted by both Province's fisheries management agencies (Ontario Ministry of Natural Resources - MNR, Québec's Ministère de l'Environnement, de la Lutte Contre les Changements Climatiques, de la Faune et des Parcs - MELCCFP). For details, see Chapter 8.1 of the 2022 Annual Report of the Lake Ontario Management Unit.

Biologists from both agencies meet on a monthly basis to discuss topics of mutual interest, and look for opportunities to collaborate. MNR staff assist in the deployment and retrieval of acoustic telemetry receivers in the Ontario waters of Lake St. Francis to support lake-wide fish movement studies.

9 Environmental Indicators

9.1 Water Temperature

T. Gristey, Lake Ontario Management Unit

Winter Severity Index:

Winter severity is often correlated with year-class strength in temperate fish species. The Winter Severity Index is measured as the number of days in December through April with a mean water temperature of less than 4°C. The mean daily surface water temperature was obtained from the Belleville Water Treatment Facility in the upper Bay of Quinte. The temperature data comes from water drawn off bottom at a depth of approximately 3.2 m. Water temperatures are homothermous and relatively uniform in this section of the bay.

The figure below (Figure 9.1.1) presents a long-term (1944-2024) winter severity index. The 2023/24 winter was less severe than the long-term average, with 105 days recorded with a mean water temperature of less than 4°C. Eight of the last 20 years have been more severe than the long-term average (124 days).

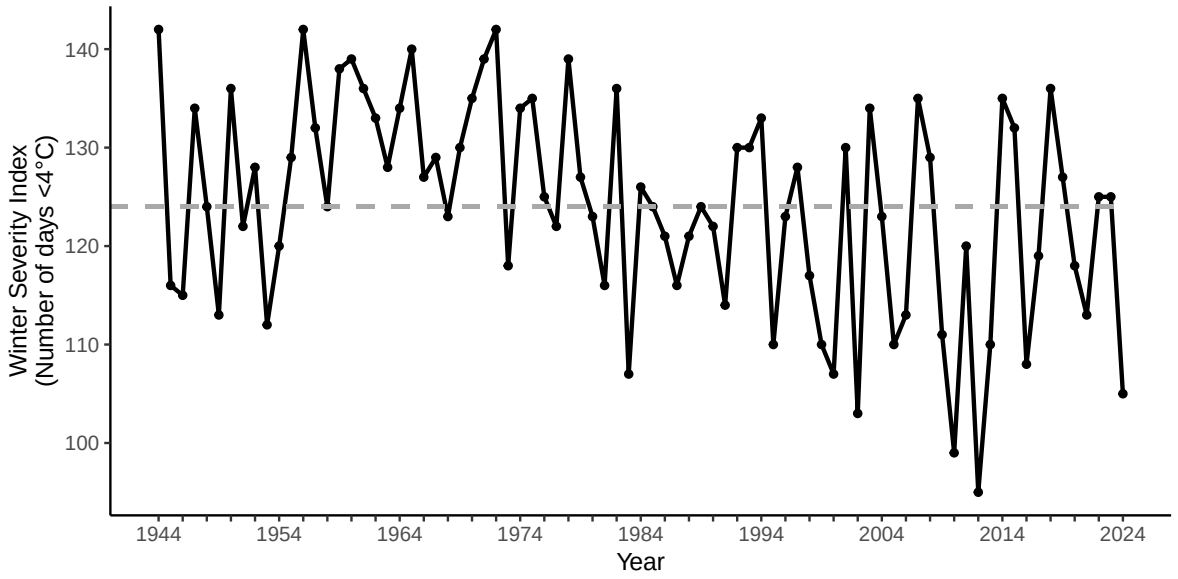


Figure 9.1.1: Winter severity index for the Bay of Quinte, 1944-2024. The long-term average index is depicted with a dashed line. Mean daily surface water temperature data was obtained from the Bellville (Bay of Quinte) Water Treatment Facility.

Mid-summer Water Temperature

Summer water temperatures can impact fish distribution and influence the growth and survival of young of the year fish. The mid-summer water temperature is calculated using the daily temperatures in July and August (mean of 62 days).

Bay of Quinte:

A long-term (1943-2024) mid-summer water temperature index is presented in the figure below (Figure 9.1.2). Mean daily surface water temperature was obtained from the Belleville Water Treatment Facility as described for the winter severity index. Water temperatures in the summer of 2024 were warmer than the long-term average. Fifteen of the last 20 years were above the long-term average.

Lake Ontario:

Main lake surface water temperatures have been collected by the National Oceanic and Atmospheric Administration's National Data Buoy Center (www.ndbc.noaa.gov) at Station 45012 (East Lake Ontario

– 20 nautical miles north of Rochester, NY). Mean summer water temperatures (Figure 9.1.3) in 2024 were 22.14°C and above the average for the time series (21.49°C, 2002-2023).

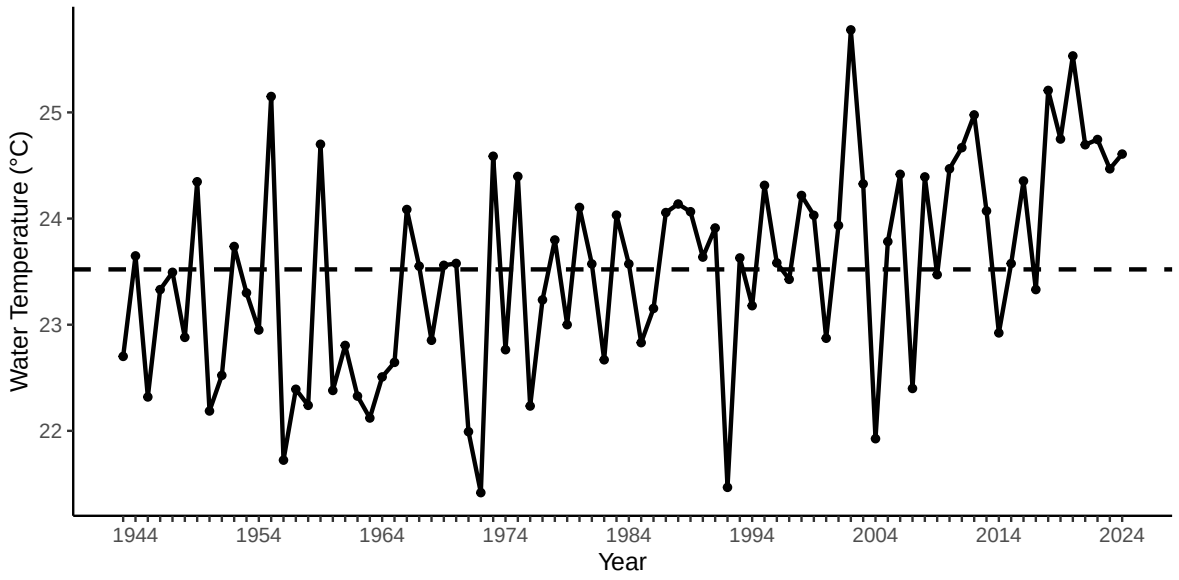


Figure 9.1.2: Mean mid-summer water temperature for the Bay of Quinte, 1943-2024. The long-term average is depicted with a dashed line. Mean daily surface water temperature data was obtained from the Bellville Water Treatment Facility in the upper Bay of Quinte.

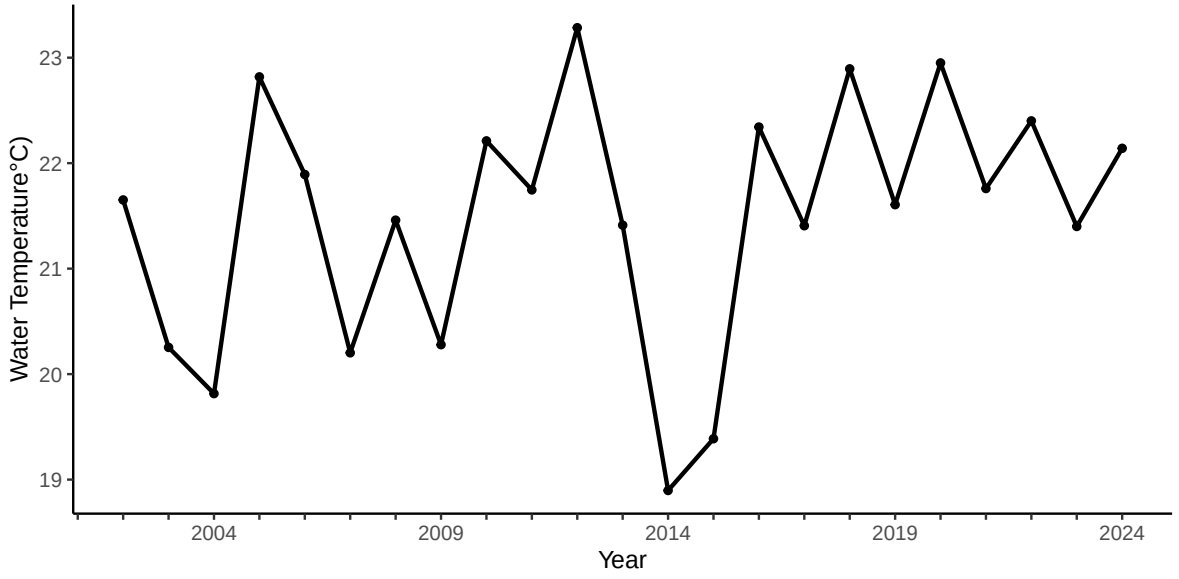


Figure 9.1.3: Mean mid-summer water temperature for Lake Ontario, 2002-2024. The average for the time series is depicted with a dashed line. Data provided by National Data Buoy Center NOAA (http://www.ndbc.noaa.gov/).

9.2 Wind

T. Gristey, Lake Ontario Management Unit

The National Oceanic and Atmospheric Administration (NOAA) records multiple weather variables using a variety of weather buoys deployed throughout Lake Ontario. Buoy data are available through the National Data Buoy Center webpage hosted by NOAA (http://www.ndbc.noaa.gov/). The Rochester weather buoy (Station ID# 45012; located 37 km offshore, north-northeast of Rochester) records several environmental variables, including wind direction and velocity (m/s). Wind direction and velocity can affect the Lake Ontario ecosystem (e.g., thermal mixing, fish distribution) and the recreational fishery (e.g., total angler effort and the distribution of effort on Lake Ontario).

Wind rose plots were generated using the Rochester Weather Buoy for 2022 through 2024, showing the general wind direction and speed annually (Figure 9.2.1). The circular format of the wind rose shows the direction the winds blew from and the length of each "spoke" around the circle shows how often the wind blew from that direction. The different grey scales of each spoke provide details on the wind velocity of the wind from each direction in meters per second (1 meter per second = 3.6 kph). For 2023, just under 25% of the annual wind direction was from the west, and most wind speed was between 6-18 meters per second. In the bottom right of each yearly wind rose plot is the mean wind speed for that year and the percentage of calm events registered as windspeed below 0.5 meters per second. This is consistent with the previous two years at this location. In 2024, 0.9% of the wind readings were considered calm, and the mean wind speed was 5.22 meters per second.

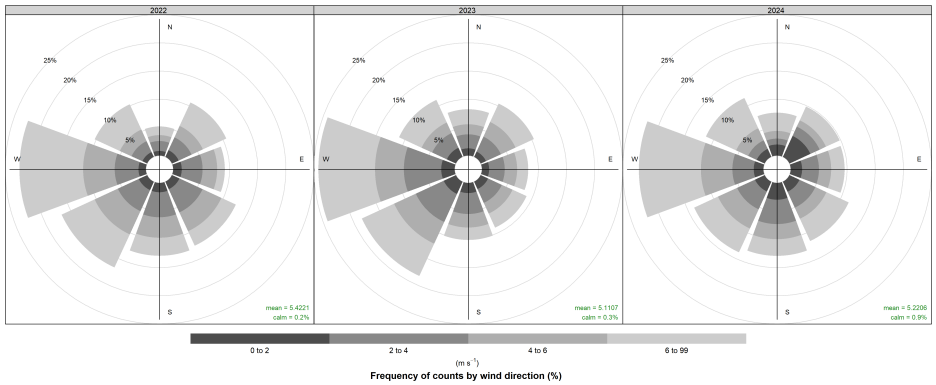


Figure 9.2.1: Annual Wind Rose for the Rochester Weather Buoy for 2022-2024. The circular plot shows the direction the winds blew from, and the length of each "spoke" around the circle shows how often the wind blew. The different grey scales of each spoke provide details on the wind velocity of the wind from each direction in meters per second (1 meter per second = 3.6 kph). Data provided by the National Data Buoy Center, NOAA (http://www.ndbc.noaa.gov/).

Two indices were developed to provide a wind index on Lake Ontario from 2002 – 2024 (Figure 9.2.2). Small Craft Wind Warnings are issued for Lake Ontario by Environment Canada when wind velocities measure 20 – 33 knots (http://weather.gc.ca/marine/). The Small Craft Index represents the total number of hours from July 1st to August 31st each year, where the wind velocity was greater than or equal to 20 knots, and the wave height was greater than 2 meters. Wave height (meters) is calculated as the average of the highest one-third of all the wave heights during the 20-minute sampling period. This index shows that in the last fifteen years, 2010, 2011, 2014, 2017, 2020, and 2023 had higher than average small craft warnings (Figure 9.2.2). In 2024, the number of small craft warning hours was significantly lower than in 2023 and well below the average for the time series.

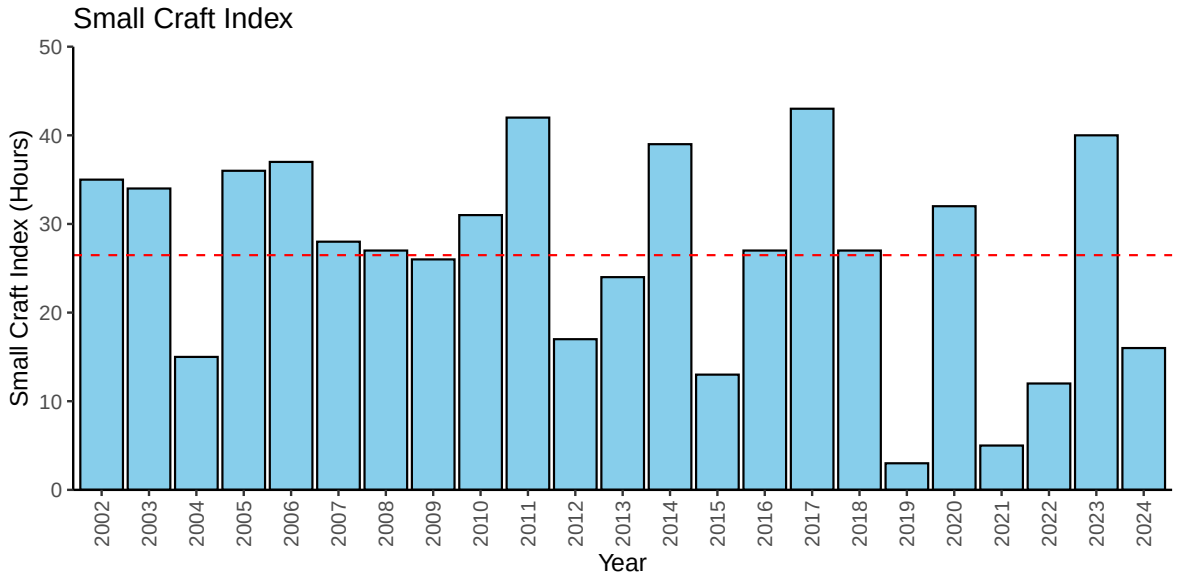


Figure 9.2.2: Small Craft Index represents the total number of hours from July 1st to August 31st each year, where the wind velocity was greater than or equal to 20 knots, and the wave height was greater than 2 meters. Data provided by the National Data Buoy Center, NOAA (http://www.ndbc.noaa.gov/).

A second index, the East Wind Index, was calculated to determine the relative contribution of east winds to the July/August open-water fishing season. This index shows an increase from 2023 to 2024 at 10.7 hours. The relative contribution of east winds was consistent with the time series average (Figure 9.2.3).

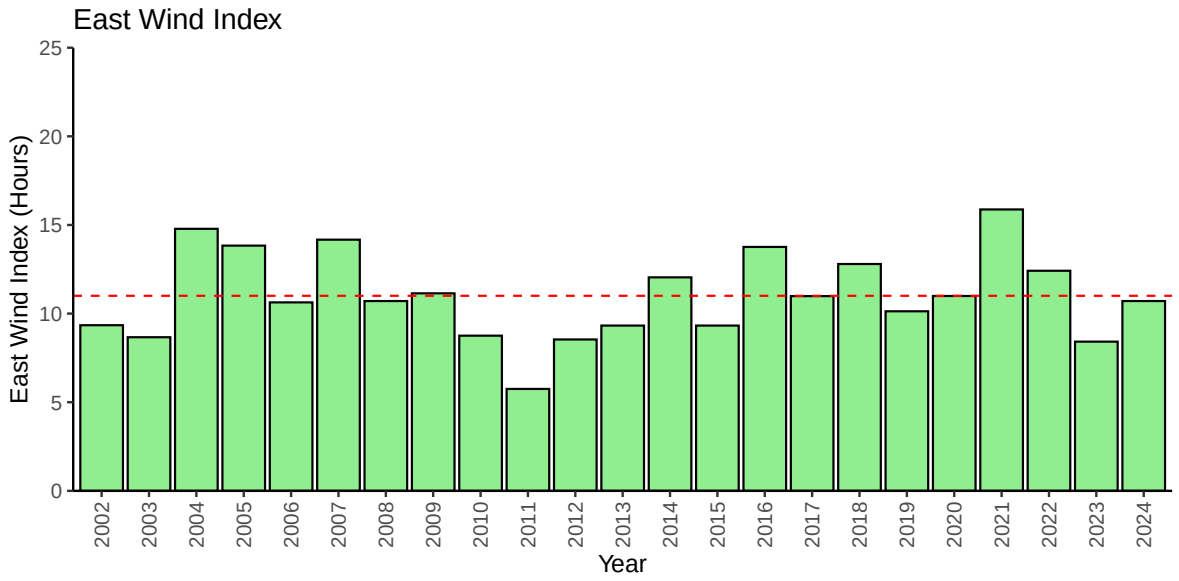


Figure 9.2.3: East Wind Index represents the total number of hours from July 1st to August 31st each year, where the wind direction was from the east. Data provided by the National Data Buoy Center, NOAA (http://www.ndbc.noaa.gov/).

9.3 Tributary Water Flow

T. Gristey, Lake Ontario Management Unit

Tributary water flow regimes can impact fish species that use Lake Ontario's tributaries for migration, spawning and rearing. For example, migratory salmonid species such as Chinook and Coho Salmon, Rainbow Trout and Atlantic Salmon rely on flowing cold water in the tributaries during the spring and fall in areas where natural reproduction occurs. Migratory species also rely on increased seasonal flows to navigate upstream and downstream to access these important habitats. Native cool water species such as Walleye, Northern Pike, and Lake Sturgeon may also use tributary areas for spawning during the spring. Though flow regimes can be described using several metrics, in this report, annual discharge data ($m^3 \cdot s^{-1}$) and central flow timing (i.e., the date at which half the annual discharge has been exceeded) are used. Average annual discharge is used to describe large-scale comparison in flow among years, whereas central flow timing is used to indicate whether the annual discharge occurred early or late in the season relative to the long-term average.

Water Survey of Canada (WSC) collects hydrometric data from gauges across Canada, which are available through the Environment Canada webpage (http://wateroffice.ec.gc.ca/index_e.html). Discharge data from three stations were retrieved in January 2025 and summarized to characterize tributary water flow regimes. At the time of this report, 2024 daily discharge data are considered provisional by Environment and Climate Change Canada and subject to change. The Ganaraska River hydrometric data was only available for a limited time during the 2024 and 2023 recording seasons.

The Ganaraska River receives annual runs of naturalized Chinook Salmon and Rainbow Trout; both species reproduce naturally within this river system. The hydrometric data on the Ganaraska River for 2024 and 2023 was incomplete and only represented 142 and 158 days of the year, respectively. In 2024, the average incomplete annual discharge at the Ganaraska River (Station ID: 02HD012) was 2.14 $m^3 \cdot s^{-1}$. This was below the observed long-term average (Figure 9.3.1). The central flow Julian day date with the incomplete annual data was 251.

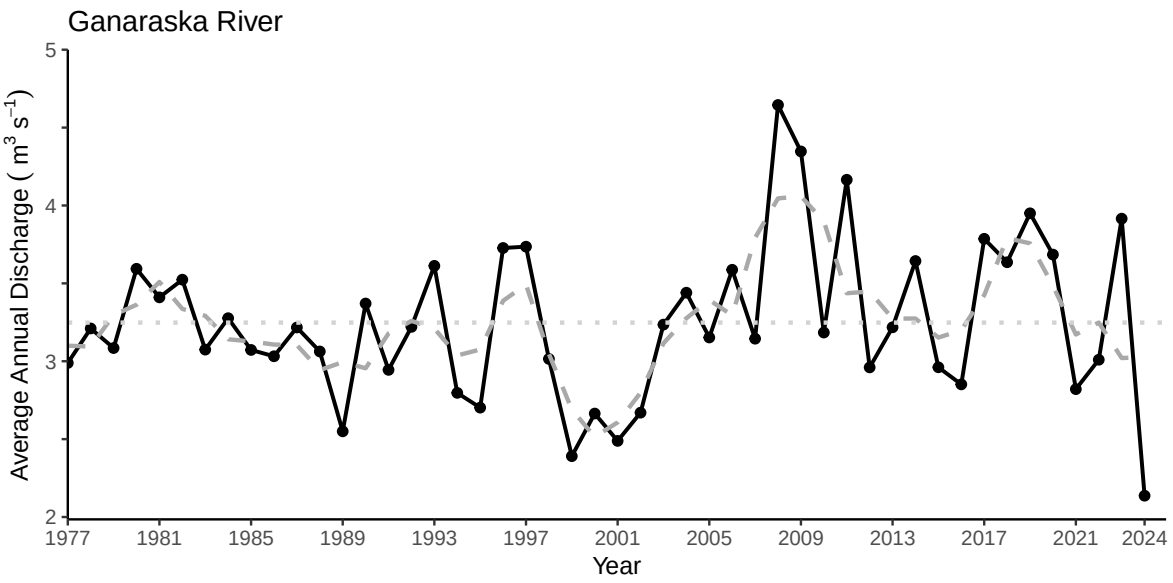


Figure 9.3.1: Average annual discharge (m^3s^{-1}) for the Ganaraska River, Ontario from 1959 to 2024. The horizontal dotted line is the historical average discharge and the dashed line represents the 3-year running mean.

The Credit River drains into the western end of Lake Ontario and provides fishing opportunities for migratory salmonids within the river and lake basin. In 2024, the average annual discharge at the Credit River (Station ID: 02HB029) was 9.23 $m^3 \cdot s^{-1}$. This was above the long-term average of 9.05 $m^3 \cdot s^{-1}$ (Figure 9.3.2). The central flow Julian day date was 138, indicating that flows occurred later than the 5-year average (130).

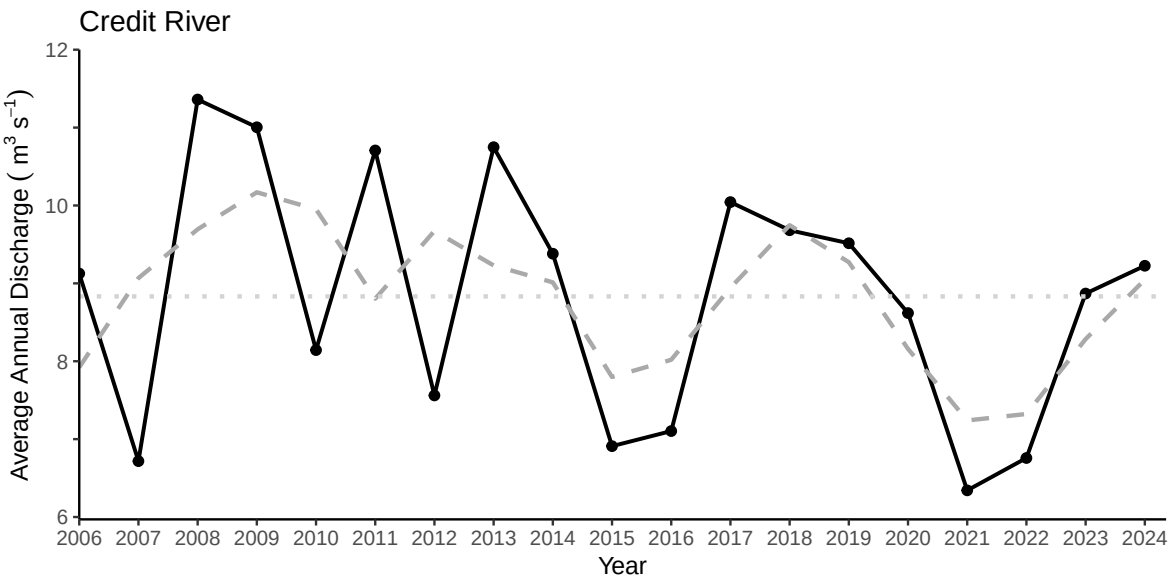


Figure 9.3.2: Average annual discharge (m^3s^{-1}) for the Credit River, Ontario from 1977 to 2023. The horizontal dotted line is the historical average discharge and the dashed line represents the 3-year running mean.

The Salmon River drains into the Bay of Quinte near Shannonville, Ontario. The lower reaches of this system provide spawning and rearing habitat for warm and coolwater species that inhabit the Bay of Quinte and Lake Ontario (e.g. Walleye). In 2024, the average annual discharge at the Salmon River (Station ID: 02HM003) was 10.30 $m^3 \cdot s^{-1}$. This was below the long-term average of 12.17 $m^3 \cdot s^{-1}$ (Figure 9.3.3). The central flow Julian day date was 104, indicating that flows occurred on a similar time period of the 5-year average (105).

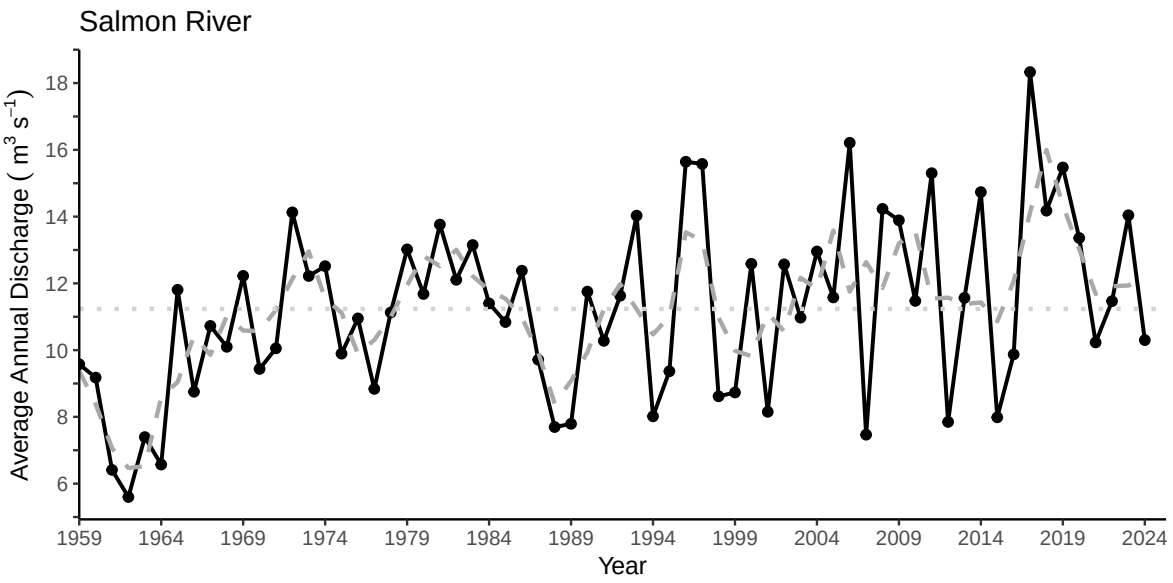


Figure 9.3.3: Average annual discharge (m^3s^{-1}) for the Salmon River, Ontario from 2006 to 2023. The horizontal dotted line is the historical average discharge and the dashed line represents the 3-year running mean.

10 Staff and Operations Schedule - 2024

10.1 Staff 2024

Fish and Wildlife Services Branch - Lake Ontario Management Unit

Andy Todd	Lake Manager
Krista Welsh	Administrative Assistant
Sharon Lake	Support Services/Data Technician
Colin Lake	Lead Management Biologist
Jake LaRose	Lake Ontario COA Coordinator
Marc Desjardins	Management Biologist
Mike Yuille	A/ Lead Management Biologist, A/ Lake Ontario COA Coordinator
Erin Brown	A/ Lake Ontario COA Coordinator
Sarah Beech	A/Assessment Biologist, A/ Ecosystem Biologist
Lucus Sunderland	A/Ecosystems Biologist, A/ Management Project Biologist
Alex Row	Aquatic Ecosytems Intern, A/ Project Support Biologist, A/ Management Project Biologist
Tom Gristey	A/Assessment Biologist
Steve McNevin	Operations Supervisor
Sonya Kranzl	Operations Coordinator
McKayla Jarvie	Lake Ontario Aquatic Ecosytems Intern
Emma Bloomfield	A/ Ecosystem Biologist
Nina Jakobi	Great Lakes Technician RT3 and A/Data Technician
Ben Maynard	A/ Operations Coordinator, Great Lakes Technician RT3
Tyson Scholz	Seasonal Boat Captain RT3 A/ Vessel Master
Alan McIntosh	Great Lakes Technician RT3
Steve Wingrove	Great Lakes Technician RT3
Kevin Campbell	Great Lakes Fisheries Technician RT2, A/ RT3, Great Lakes Technician RT3
Taylor Huff	Great Lakes Fisheries Technician RT2 - A/ RT3, Great Lakes Technician RT3
Jarret Mindle	Great Lakes Fisheries Technician RT2 - A/ RT3
Matt Sweeting	Great Lakes Fisheries Technician RT2
Justin Chan	Great Lakes Fisheries Technician RT2
Kurtis Winter	A/ Vessel Master
Joshua Balogh	Great Lakes Fisheries Technician RT2
Ryan Ballingal	Great Lakes Fisheries Technician RT2
Alicia Anstey	Great Lakes Fisheries Technician RT2
Harley Wager	Great Lakes Fisheries Technician RT2
Max Boswell	Great Lakes Fisheries Technician RT2
Alex Meletis	Great Lakes Fisheries Technician RT2
Paige Andrews	Great Lakes Fisheries Technician RT2
Nash Henley	Summer Experience Student
Kyley McGuinness	Summer Experience Student, Great Lakes Fisheries Technician RT2
Jorja Harrison	Summer Experience Student

Science and Research Branch - Aquatic Research and Monitoring Section

Dr. Tim Johnson	Research Scientist
Brent Metcalfe	Research Biologist
Emma Bloomfield	Research Biologist
Sarah King	Research Biologist
Carolina Taraborelli	Research Biologist
Rylie Robinson	Research Biologist
Cecilia Heuvel	Research Biologist
Kurtis Winter	Research Technician
Nash Green	Summer Student
Claire Matthews	Summer Student

Enforcement Branch

Jarrett McIntyre	Conservation Officer
Mark Curry	Conservation Officer
Kevin Hoare	A/Enforcement Manager, Peterborough

10.2 Operational Field and Lab Schedule 2024

Table 10.2.1: Operational Field and Lab Schedule, 2024 (SPA = Special Purpose Account; COA = Canada Ontario Agreement; OPG = Ontario Power Generation).

Field or Lab Project	Dates	Target Species	Project Lead	Operations Lead	Funding Source
Public Outreach	Year-Round	Public Outreach/Education	McNevin	Maynard	SPA
Atlantic Salmon Classroom Hatchery Program	Jan-May	Public Outreach/Education	Dr. Johnson	Wingrove	COA/SPA
Ganaraska River Fish Counter Salmon and Trout Assessment	Mar-Nov	Migratory Trout & Salmon	Gristey	Sweeting/Balogh	SPA
Credit River Fish Counter Salmon and Trout Assessment	Mar-Nov	Migratory Trout & Salmon	Gristey	Sweeting/Balogh	COA/SPA
Ganaraska Fishway Rainbow Trout Assessment	Mar-Apr	Rainbow Trout	Gristey	Sweeting/Balogh	SPA
Lake Ontario Spring Prey Fish Trawling Survey	April	Alewife/Smelt	Holden	Scholz/Campbell	SPA
Walleye Egg Collection	Mar-Apr	Walleye	Beech	Maynard	SPA
Hoople Creek Habitat Assessment and Monitoring	Mar-November	Walleye	Row	Row	SPA
Commercial Fishery Daily Catch Record Collection	April-December	Multiple Species	McNevin	Maynard	SPA
Lake Trout Tagging	April	Lake Trout	Dr. Johnson	Winter	COA
Environmental DNA collection	May-Sept	Multiple Species	Sunderland	Balogh	COA
Foodweb Dynamics in Lake Ontario	Apr-Nov	Fish Community	Dr. Johnson	Winter	COA/SPA
Bluegill Broodstock Collection - White Lake	May	Bluegill	Lake	Maynard/Chan	SPA
Invasive Species Emergency Response	Apr-Nov	Grass Carp	McNevin	Maynard	SPA
Spring American Eel Trap and Transfer	April-June	American Eel	Sunderland	Anstey	OPG
Chinook Salmon Net Pens	April	Chinook Salmon	Lake	Lake	SPA
Cormorant Count Survey	June	Cormorants	Lake	Mindle	SPA
Fish Contaminant Sampling (MOECP)	Apr-Dec	Sport Fish	Beech/Maynard	Huff	SPA
St. 81 - Offshore Limnology and Zooplankton Survey	May-Oct	Lower Food Web	Dr. Johnson	Metcalfe/Bloomfield	SPA
Bay of Quinte Open Water Early Season Bass Creel Survey	April-May	Bass	Row	Campbell	SPA
Bay of Quinte Aerial Creel Survey	April-May	Bass	Row	Row	SPA
Muskellunge Index Netting	May	Esocids	Lake/Gristey	Gristey	SPA
Lake Trout Tug Stocking	May	Juvenile Lake Trout	Lake	Scholz	SPA
Eastern Lake Ontario and Bay of Quinte Fish Community Index Netting	Jun-Nov	Fish Community	Beech	Maynard	SPA
Index Netting					

Field or Lab Project	Dates	Target Species	Project Lead	Operations Lead	Funding Source
Eastern Lake Ontario and Bay of Quinte Fish Community Index Trawling	Jun-Sep	Fish Community	Beech	Maynard	SPA
Acoustic Telemetry Receiver Servicing	Jun-Aug	Multiple Species	Dr. Johnson	Scholz/Winter	COA/SPA
Lake St. Francis Acoustic Receiver deployment/Retrieval	June, November	Multiple Species	MFFP/Lake	Gristey/Row	SPA
Presquile Bay Nearshore Community Index Netting	September	Nearshore Fish Community	Beech/Jarvie	Wingrove	COA
Toronto Harbour Nearshore Community Index Netting	Aug-Sept	Nearshore Fish Community	Beech/Jarvie	Gristey	COA
Hamilton Harbour Nearshore Community Index Netting	August	Nearshore Fish Community	Beech/Jarvie	Wingrove	COA
Upper Bay of Quinte Nearshore Community Index Netting	September	Nearshore Fish Community	Beech/Jarvie	Ballingall	COA
St. Lawrence River Fish Community Index Netting	September	Fish Community	Yuille/Row	Chan	COA
Lake St. Francis Fish Community Index Netting	September	Fish Community	Yuille/Row	Chan	COA
Fall American Eel Trap and Transfer	Sept-Oct	American Eel	Sunderland	Anstey	OPG
Lake Ontario Fall Benthic Prey Fish Trawling Survey	Sept-Oct	Round Goby/Slimy and Deepwater Sculpin	Holden	Scholz/Campbell	COA
Credit River Chinook Salmon Assessment and Egg Collection	October	Chinook Salmon	Gristey/Yuille	Ballingall	SPA
Ganaraska River Chinook Salmon Assessment	October	Chinook Salmon	Gristey/Yuille	Gristey/Sweeting	SPA
Ganaraska River Extended Season Creel	Oct-Nov	Salmonids	Jarvie	Jarvie/Anstey	SPA
Atlantic Salmon Sampling - Lakefront Promenade	October	Atlantic Salmon	Gristey	Gristey	SPA
Eastern Basin Lake Ontario, Lake Whitefish Acoustic Tagging	November	Lake Whitefish	Dr. Johnson	Metcalfe/Winter	COA / SPA
Lake Whitefish Commercial Catch Sampling	Oct-Nov	Lake Whitefish	Beech	Wager	SPA
Cisco Commercial Catch Sampling	Oct-Nov	Cisco	Beech	Wager	SPA
Age and Growth (Lab)	Year-Round	Multiple Species	Maynard	Scholz/Maynard	SPA/COA
Coded Wire Tag Extraction and Reading (Lab)	December/January	Lake Trout	Beech	Maynard	SPA
Great Lake Information System Migration	Year-Round	Data modernization	Beech	S.Lake, Jakobi	SPA

11 Primary Publications, 2024

Beech, S.J., Elliott, C.W., Ridgway, M.S., **Brown, E.** and Tufts, B.L., 2024. Spatial comparison of two lake whitefish (*Coregonus clupeaformis*) spawning aggregations from the Bay of Quinte and eastern Lake Ontario. Journal of Great Lakes Research, 50(6), p.102443. doi.org/10.1016/j.jglr.2024.102443

Bihun, C.J., Murphy, M.K., **Johnson, T.B.**, Fisk, A.T., Guzzo, M.M., Madenjian, C.P. and Raby, G.D., 2024. Effects of temperature, body size, and sex on the standard metabolic rates of a sexually dimorphic freshwater piscivore, walleye (*Sander vitreus*). Canadian Journal of Fisheries and Aquatic Sciences, 81(7), pp.879-886. doi.org/10.1139/cjfas-2023-0323

Brown, T. A., Rudstam, L. G., Sethi, S. A., Hessell, C., Olsen, E., Jonas, J. L., Rook, B. J., Pothoven, S. A., **Beech, S. J. H.**, Dunlop, E. S., James, S., Smith, J.B., Amidon, Z. J., Carl, D. D., Bunnell, D. B., Tingley, III, R. W., Weidel, B. C., and Honsey, A. E. 2024. Synthesizing professional opinion of Lake Whitefish and Cisco recruitment drivers across the Great Lakes. Great Lakes Fishery Commission, Laurentian 2024-01. doi.org/10.70227/glfc-laur20240101.

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Budnik, R.R., Frank, K.T., Collis, L.M., Fraker, M.E., Mason, L.A., Muir, A.M., Pothoven, S.A., Clapp, D.F., Collingsworth, P.D., Hoffman, J.C., Hood, J.M., **Johnson, T.B.**, Koops, M.A., Rudstam, L.G., and Ludsin, S.A. 2024. Feasibility of implementing an integrated long-term database to advance ecosystem-based management in the Laurentian Great Lakes basin. Journal of Great Lakes Research 50(2): 102308. doi.org/10.1016/j.jglr.2024.102308

Clapp, D.F., Briggs, A.S., Hessenauer, J.-M., **Holden, J.P.**, Kerns, J.A., Kornis, M.S., Redman, R.A., Rudstam, L.G., and Sitar, S.P. 2024. Standard Methods for Sampling North American Freshwater Fishes, second edition. In Standard Methods for Sampling North American Freshwater Fishes, second edition, 2nd edition. U.S. Geological Survey, Nebraska Cooperative Fish; Wildlife Research Unit School of Natural Resources, University of Nebraska–Lincoln 3310 Holdrege Street, Hardin Hall Room 423, Lincoln, Nebraska 68583, USA. doi:10.47886/9781934874769.ch12.

Ivanova, S.V., Fisk, A.T., and **Johnson, T.B.** 2024a. Predicted growth of lake trout and Chinook salmon in a warming lake. Journal of Great Lakes Research 50(2): 102310. doi.org/10.1016/j.jglr.2024.102310

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