FISHES OF TORONTO

A GUIDE TO THEIR REMARKABLE WORLD

• City of Toronto Biodiversity Series •

TORONTO

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Livegreen Toronto

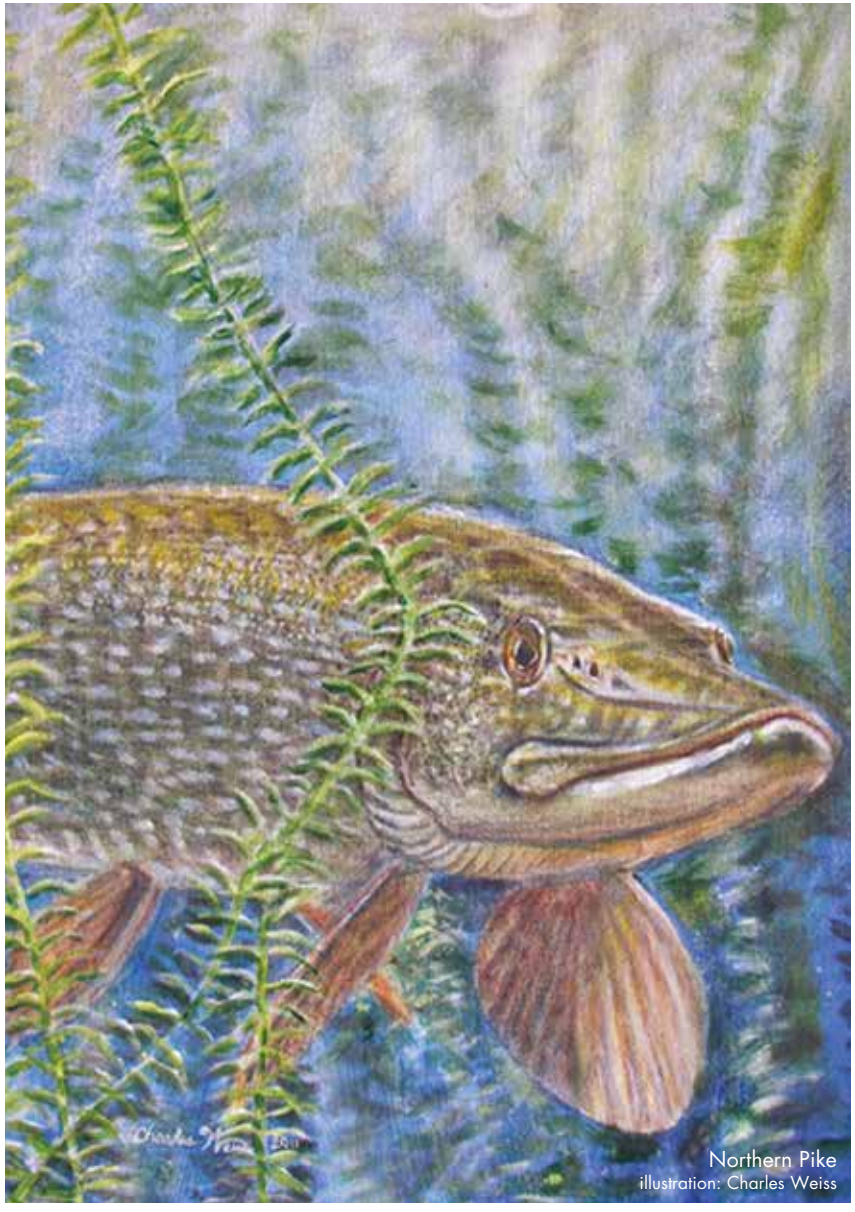
Imagine a Toronto with flourishing natural habitats and an urban environment made safe for a great diversity of wildlife species. Envision a city whose residents treasure their daily encounters with the remarkable and inspiring world of nature, and the variety of plants and animals who share this world. Take pride in a Toronto that aspires to be a world leader in the development of urban initiatives that will be critical to the preservation of our flora and fauna.

RECYCLED Paper FSC FSC® C005879

Cover photo: Jon Clayton

Trout in the Humber River – A migrating Brown Trout attempts to jump a weir near the Old Mill Bridge, just north of Bloor Street. Between late September and early November migrating trouts and salmons can be seen at any of the weirs in the Humber River upstream of Bloor Street. These weirs are barriers to fish migration and were modified (notched) to enable at least the larger jumping fishes to migrate upstream to their spawning grounds. The removal of these migration barriers is a significant component of efforts associated with the restoration of the previously extirpated (locally extinct) native Atlantic Salmon.

ISBN 978-1-895739-63-3



Northern Pike
illustration: Charles Weiss

"Indeed, in its need for variety and acceptance of randomness, a flourishing natural ecosystem is more like a city than like a plantation. Perhaps it will be the city that reawakens our understanding and appreciation of nature, in all its teeming, unpredictable complexity." – Jane Jacobs

Atlantic Salmon
illustration: Charles Weiss

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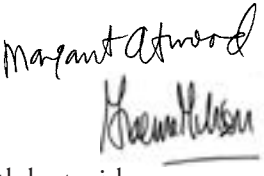
Welcome!

To encourage the celebration of all life on earth, the United Nations declared 2010 to be the Year of Biodiversity. We congratulate the City of Toronto for honouring this special year with this Biodiversity Series celebrating the flora and fauna of our city. Each booklet within the series – written by dedicated volunteers, both amateurs and professionals – offers Torontonians a comprehensive look at a major group of flora and fauna within our city.

We hope that this Biodiversity Series will achieve its main goal: to cultivate a sense of stewardship in Toronto area residents. If each of us becomes aware of the rich variety of life forms, their beauty and their critical roles within the varied ecosystems of Toronto, we will surely be inspired to protect this natural heritage. After all, our own health and ultimately our very survival is linked to the species and natural spaces that share the planet with us. Without plants, there would be no oxygen; without the life of the soil, there would be no plants; without unpolluted fresh water, we would die.

While there are many organizations actively engaged in protecting our city's flora and fauna, the support of ordinary citizens is critical to the conservation of our natural habitats. We hope you'll take a walk in one of our parks and open spaces, lower your blood pressure, look around you, and enjoy the diversity of trees, animals, fishes, birds, flowers, and even fungi that flourish among us.



With best wishes,
Margaret Atwood and
Graeme Gibson
January 2011

Need for Action

Two centuries of pollution and poor environmental stewardship have dramatically changed Lake Ontario and its tributaries (streams). Many urban watercourses have been buried in pipes or their forested riparian zones (vegetated banks and floodplain) have been decimated. Water pollution and traditional development methods continue to be serious threats to habitat and the fishes in our waters. The new Toronto Green Standard, encompassing many of the City's environmentally friendly initiatives, is one step in the right direction toward improving both the water quality and the natural ecology of our watersheds (area of land where surface water from rain or melting snow flows towards a stream, lake, or other waterbody). But we must all do our part to reduce pollution, be it from our vehicles, industry, or our homes. It's not too late, and it is the sincere hope of the City of Toronto and its partners that this informative booklet will help residents and visitors appreciate the wonders living in our waters and do everything they can to protect the fishes of Toronto for current and future generations to enjoy.

City of Toronto Biodiversity Series

Fishes of Toronto is part of the Biodiversity Series developed by the City of Toronto in honour of the Year of Biodiversity 2010. A number of the non-human residents of Toronto will be profiled in the Series. It is hoped that despite severe biodiversity loss due to massive urbanization, pollution, invasive species, habitat loss and climate change, the Biodiversity Series will help to re-connect people with the natural world, and raise awareness of the seriousness that biodiversity loss represents and how it affects them directly. The Series will inform residents and visitors of opportunities to appreciate the variety of species inhabiting Toronto and how to help reduce biodiversity loss by making informed individual decisions.

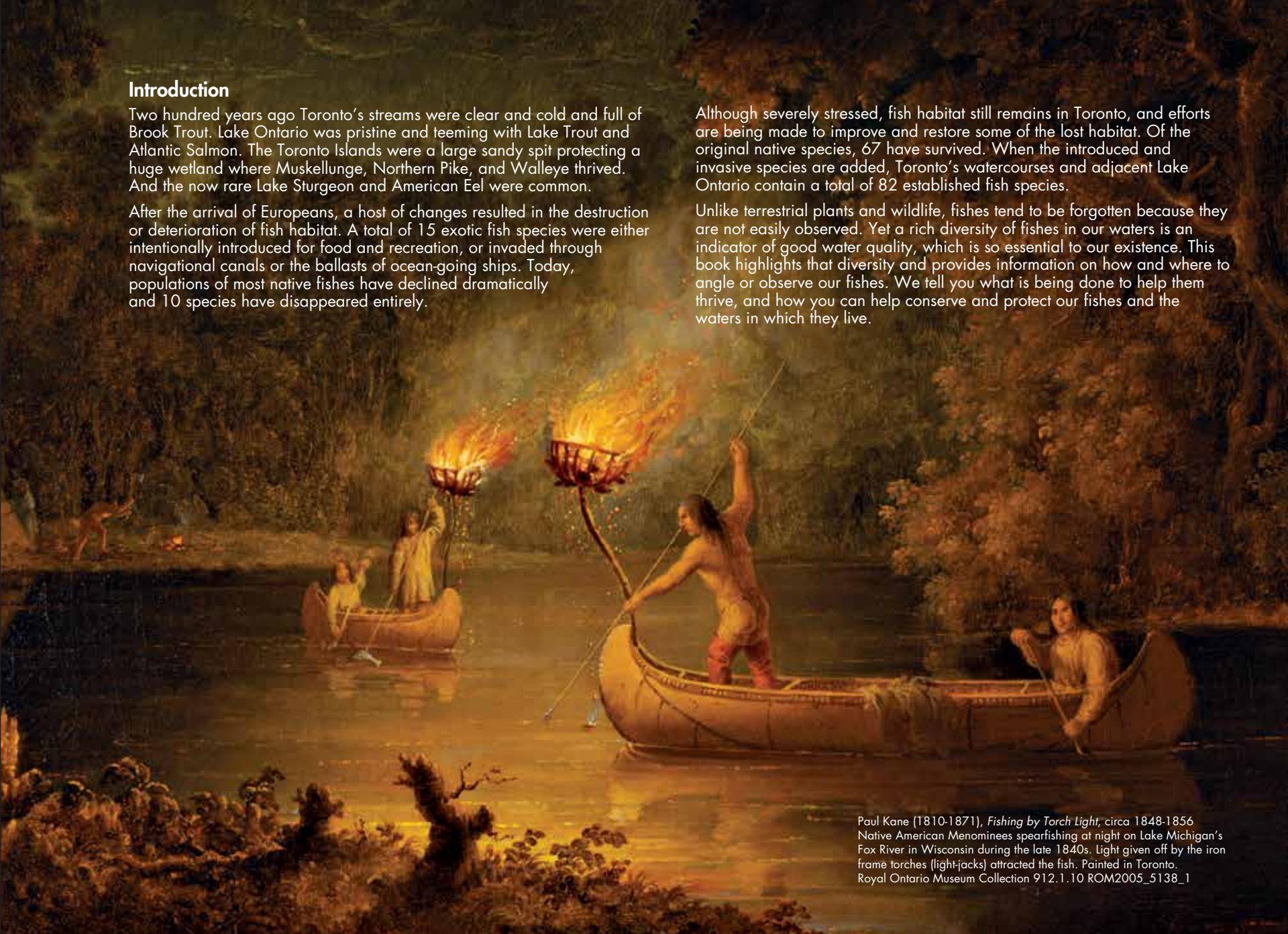
Introduction

Two hundred years ago Toronto's streams were clear and cold and full of Brook Trout. Lake Ontario was pristine and teeming with Lake Trout and Atlantic Salmon. The Toronto Islands were a large sandy spit protecting a huge wetland where Muskellunge, Northern Pike, and Walleye thrived. And the now rare Lake Sturgeon and American Eel were common.

After the arrival of Europeans, a host of changes resulted in the destruction or deterioration of fish habitat. A total of 15 exotic fish species were either intentionally introduced for food and recreation, or invaded through navigational canals or the ballasts of ocean-going ships. Today, populations of most native fishes have declined dramatically and 10 species have disappeared entirely.

Although severely stressed, fish habitat still remains in Toronto, and efforts are being made to improve and restore some of the lost habitat. Of the original native species, 67 have survived. When the introduced and invasive species are added, Toronto's watercourses and adjacent Lake Ontario contain a total of 82 established fish species.

Unlike terrestrial plants and wildlife, fishes tend to be forgotten because they are not easily observed. Yet a rich diversity of fishes in our waters is an indicator of good water quality, which is so essential to our existence. This book highlights that diversity and provides information on how and where to angle or observe our fishes. We tell you what is being done to help them thrive, and how you can help conserve and protect our fishes and the waters in which they live.



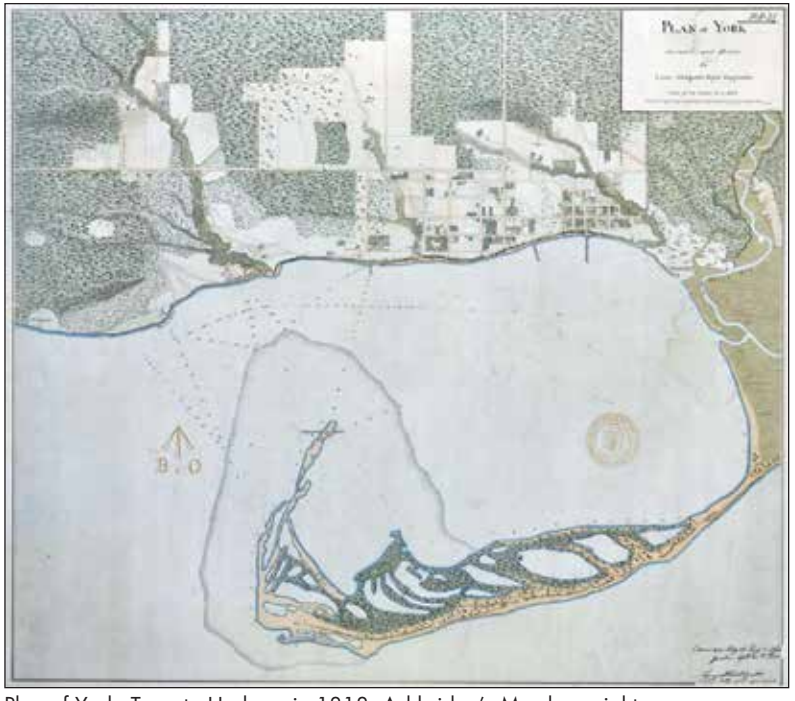
Paul Kane (1810-1871), *Fishing by Torch Light*, circa 1848-1856
Native American Menominees spearfishing at night on Lake Michigan's Fox River in Wisconsin during the late 1840s. Light given off by the iron frame torches (light-jacks) attracted the fish. Painted in Toronto.
Royal Ontario Museum Collection 912.1.10 ROM2005_5138_1

Yesterday's Habitats of Toronto

Historically, the Toronto waterfront was a rich mosaic of aquatic and terrestrial habitats, including bluffs and beaches, cobble reefs, estuaries and bays with productive marshes, wooded shorelines, and meadows. Rivers and creeks supplied clear, cool water and provided habitats for river-spawning fishes such as Atlantic Salmon. Nutrient-rich estuaries supported wetlands teeming with wildlife. Narrow sandy peninsulas (spits) provided protection from winds and wave action. Sheltered stretches of shoreline were lined with lush stands of wetland vegetation. Much of nearshore Lake Ontario was covered with sand, gravel, and stone.

European settlement of the Toronto watersheds in the late 1700s and early 1800s resulted in profound changes to physical conditions in the rivers and creeks, which in turn affected waterfront habitats, as well as fishes and other wildlife.

These changes began with extensive clearing of the dense forest cover that originally blanketed the uplands. As the forests were removed, and the land altered by grading, water and sediment runoff to the creeks and rivers increased, resulting in excessive flooding and bank erosion downstream. Productive fish habitat in estuaries and wetlands at the mouths of streams were choked by sediments. Numerous sawmills and gristmills were built along the banks of the streams. The mills discharged wastewater directly into the watercourses, resulting in water pollution and burying of fish spawning grounds. The millponds increased water temperatures, trapped sediments and altered flow patterns. The mill dams also created barriers to fishes moving upstream. The Atlantic Salmon that were once plentiful in this area declined rapidly, with the last recorded catch in Toronto Harbour occurring in 1874.



Plan of York, Toronto Harbour in 1818, Ashbridge's Marsh on right
credit: Surveyed and drawn by Lieutenant George Phillpotts, Royal Engineer

From 1850-1910 stonehooking (the removal of gravel and rocks from the lake bottom for use in construction) was a major force in changing physical conditions and shoreline processes. During this time period, one million cubic metres of aggregate were removed from Toronto Harbour alone – enough to cover the entire waterfront from Etobicoke Creek to the Rouge River with a layer one metre thick and extending 25 metres offshore. Stonehooking destroyed large amounts of valuable

"All men are equal before fish."
– Herbert Hoover

Map showing Toronto's shoreline, 1913
credit: Ontario Department of Lands Forests & Mines - Bureau of Mines

Fishing in the Don River, circa 1908
© City of Toronto Archives, fonds 1244, item 8159

aquatic habitat, and the shoreline was exposed to accelerated erosion from waves and currents.

Other early shoreline alterations included weed removal, filling in of wetlands and small streams, hardening (using concrete, metal, and boulders) of the shoreline, and channelization of watercourses. A map of Toronto Harbour in 1818 (see previous page) shows early shoreline modifications in the form of docks, jetties and filling of small creeks. By 1913, further alterations included navigable channels such as the Western and Eastern Gaps and the Keating Channel (at the mouth of the Don River). During the industrial period from 1900-1960, extensive lakefilling transformed the lakefront. The huge Ashbridge's Marsh, approximately 8 km^2, one of the largest wetlands in Eastern Canada, was drained and filled between 1912 and 1920 to create the Port Industrial District (the land currently around Cherry and Commissioners Streets). Other lakefilling sites included most of the central waterfront south of Front Street, portions of the Toronto Islands including the airport, the Leslie Street Spit, Ontario Place, and Sunnyside and Woodbine Beaches.

Brief History of Lake Ontario Fishes and Fish Habitat

1600s Prominent aboriginal fisheries for Atlantic Salmon (e.g., Credit River, Mississauga)

1615 Étienne Brûlé becomes the first European to visit the land that eventually became Toronto while on a mission to build alliances with native peoples

1656 Jesuits capture Atlantic Salmon, catfish, and eels on the Oswego River (near Oswego, New York)

1670 Large numbers of Atlantic Salmon observed spawning in the Humber River

1700s Beaver trapping was widespread. The trapping of beaver (and loss of their dams) was the first major ecological change of trout and salmon habitats by humans

1749 Lake Ontario described as "very transparent; at 18 feet, the bottom can be seen as if one saw it through polished glass"

1750 Fort Toronto (Fort Rouillé) was built by the French near the mouth of the Humber River

1792 Observer reports "Lake Ontario and all rivers that fall into it, abound with excellent salmon and many different kinds of sea fish which come up the St. Lawrence"

1793 English ships enter Toronto Bay (Toronto Harbour) and begin the British era of settlement and control

1793 Atlantic Salmon noted in the Don River

1793 Large flocks of passenger pigeons were still prominent around Castle Frank (Don River)

1793 Sawmill on the Humber River

1795 Grist and sawmills on the Don River

1796 Red trout (likely Brook Trout) were caught through holes in the ice on the Don River

1796 Bears, wolves, deer, and bald eagles are observed around York (Toronto)

1798 York (Toronto) newspaper, announcing a farm sale, extolled the property "above all, it affords an excellent salmon fishery, large enough to support a number of families…"

1800s The quantity of Lake Whitefish and other species taken in nets was described as "immense." Whitefish were used as fertilizer, and small Lake Whitefish, Cisco, and Lake Sturgeon were "destroyed as nuisances".

1807 First fishing regulation for the preservation of salmons, forbids the use of commercial fishing equipment in or at the mouth of any river in the Home (Toronto, York, Peel, Halton) and Newcastle (Durham and Northumberland) districts. A provision states "nothing in this Act shall be constructed to prevent persons at any time from taking salmon with a spear or hook and line".

1810 1807 regulation was revoked; new regulations imposed a closed season from October 25 to January 1, along with fishing within 100 yards of a dam and netting at river mouths in the Home District

1810 Salmons… "swarmed the rivers so thickly that they were thrown out with a shovel and even with the hand".

1815 Stone hooking started along Lake Ontario shoreline/nearshore environments.

1824 At least 13 mills existed on the Humber River and its tributaries.

1825 Erie Canal construction begins connecting Lake Ontario to the Hudson River.

1835 Record of Sea Lamprey in Duffins Creek (near Ajax)

1846 Evidence to suggest that salmon stocks were considerably less abundant than formerly

1846 60 mills on the Humber River and its tributaries

1850s 87 mills on the Credit River

1851 Record of Sea Lamprey parasitizing Atlantic Salmon

1860s Lake Trout begin to decline.

1860s Cultivation of the land reached its peak in the Lake watershed.

1860 90 mills on the Humber River and its tributaries

1864 50 mills on the Don River and its tributaries

1864 Suggestion that certain salmon streams in Ontario should be set apart specifically and solely for natural propagation purposes, with the Moira (near Belleville) and Credit Rivers being recommended

1866 Conservationist and fish culture pioneer Samuel Wilmot created the first Canadian hatchery for Atlantic Salmon on Wilmot Creek, near Newcastle.

1870s Common Carp introduced into USA side of Lake Ontario

1870 Seth Green, the "Father of Fish Culture in North America", introduces American Shad fry

1870 Oakville (16 Mile) Creek, Highland Creek, Rouge River, Duffins Creek, Bowmanville Creek set aside for natural and artificial propagation of salmons

1873 Alewife reported in abundance

1874 Rainbow Trout introduced to New York State side of the Lake

1874 68,000 juvenile Chinook Salmon released into Wilmot Creek (taken from the Sacramento River, California)

1875 Wilmot states that "shoals of herring do not, as formerly, come so near the shore because the gravel, which composed the bottom almost to the shore, has gradually become covered with sand"

1878 Brief increase in Atlantic Salmon population until their ultimate crash in the 1890s

1880s Resident Brook Trout were gone from lower portions of Lake Ontario tributaries and scarce in the upper portions by 1890

1880s Northern Pike populations increased

1880 Common Carp introduced into Ontario

1880 75-80% of forests in southern Ontario cleared for farming and urban uses

1881 Samuel Wilmot notes broad environmental change on land through removal of trees, cultivation of land, runoff from farms, construction of dams, and the addition of industrial and human sewage. Wilmot gives up trying to rehabilitate Lake Ontario's Atlantic Salmon, lamenting that "I cannot disguise from myself that the time is gone by

forever for the growth of salmon and speckled trout (Brook Trout) in the frontier streams of Ontario"

1882 Chinook Salmon stocking abandoned

1884 Passenger pigeons functionally extinct

1890s Freshwater mussels harvested for button industry

1890 Lake Trout considered essentially gone from Lake Ontario

1890 Alewife considered the most abundant fish in the lake

1898 Atlantic Salmon extirpated from Lake Ontario

1900s Beaver populations were scarce

1900s Bronte Creek (Halton Region near Burlington/ Oakville) watershed reduced to 4% forest cover through deforestation from roughly 100% cover a century before

1900s Credit River watershed reduced to 3-5% forest cover through deforestation

1916 Chinook stocking reinstated; 100,000 Chinook Salmon from the Fraser River (British Columbia) were stocked

1918 Ontario Department of Game and Fisheries introduces policy designed to establish wild-reproducing, self-sustaining populations of Rainbow Trout in the Great Lakes

1919 Numerous reports of returning adult Chinook Salmon, and reports of successful wild spawning in the Credit River and Twelve Mile Creek (Bronte Creek)

1922 Rainbow Trout stocked into Bronte Creek and the Humber River

1929 Ontario introduces Brown Trout into tributaries of Lake Ontario

1931 Rainbow Smelt first reported in Lake Ontario

1933 Chinook Salmon stocking considered a failure; lack of self-sustaining permanent populations

1940 Beaver populations begin to recover

1940s Reforestation projects begin in southern Ontario (e.g., Ganaraska Forest)

1940s Abundant Rainbow Trout populations established in Canadian tributaries of Lake Ontario

1940s Contamination from dioxins and similar chemicals were high enough to eliminate all natural reproduction in Lake Trout.

1944 Atlantic Salmon stocked into Duffins Creek until 1947

1947 Confirmed spawning of Rainbow Trout in Duffin's Creek

1948 White Perch found to have invaded.

1969 Coho Salmon introduced.

1971 Large increase in the numbers of Chinook Salmon stocked

1972 USEPA Clean Waters Act passed

1972 Canada/USA Great Lakes Water Quality Agreement

1987 Toronto & Region designated as one of 43 Areas of Concern (AOC) in the Great Lakes by the International Joint Commission, initiating the first stage of the area's Remedial Action Plan (RAP)

1988 Zebra Mussel invaded

1990s Large numbers of wild juvenile Chinook and Coho Salmon discovered on north shore tributaries

1998 Round Goby invaded

2003 City of Toronto adopted the Wet Weather Flow Master Plan (WWFMP) to improve the quality of the City's surface waters

2005 August 19, a massive 100-year storm hits the Toronto area, dropping over 150 mm of rain in under 2 hours, causing severe damage to many urban streams

2006 Full-scale Atlantic Salmon restoration begins in Lake Ontario streams

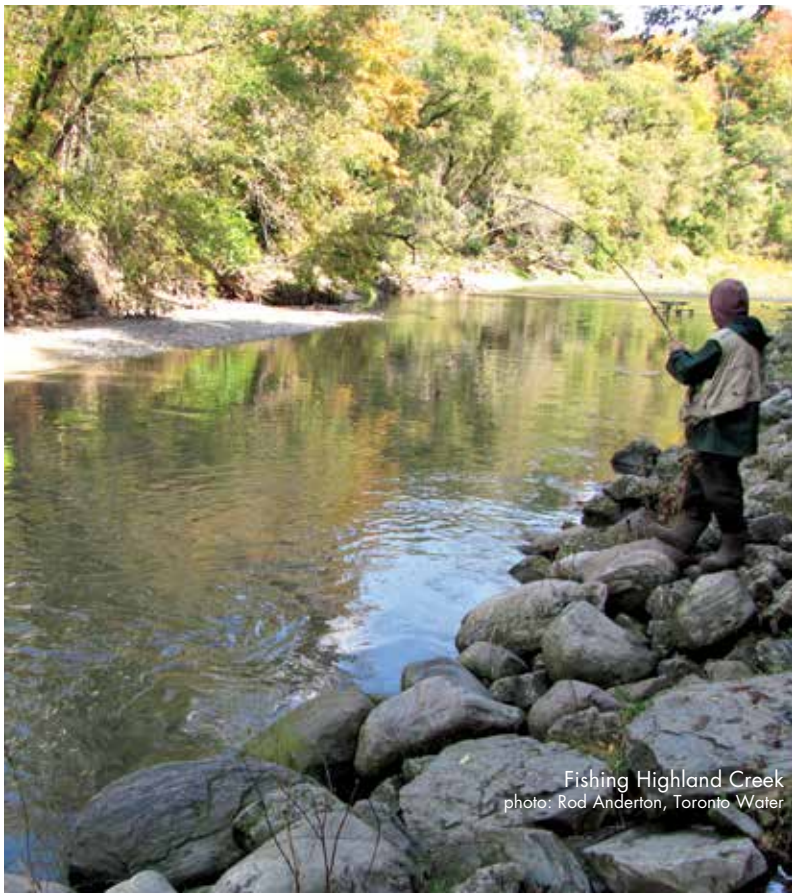
2011 Atlantic Salmon restoration on the Humber River begins with the stocking of 100,000 fry

Ice Fishing at the Toronto Islands, circa 1910

Fishing at High Park's Grenadier Pond, circa 1939

Today's Habitats of Toronto

Within the City of Toronto there are six watersheds (from west to east: Etobicoke Creek, Mimico Creek, Humber River, Don River, Highland Creek, Rouge River) totaling over 320 km of streams, and including the Toronto Islands, there is approximately 150 km of Lake Ontario shoreline. These surface waters currently provide habitat for fishes and have all been subject to varying degrees of urbanization with subsequent negative impacts to fish habitat.



Fishing Highland Creek
photo: Rod Anderton, Toronto Water

The Highland Creek watershed (entirely contained within the City) is the most developed watershed in Toronto with over 85% urbanization. The other watercourses have lower percentages of urbanization because their watersheds also include the rural areas north of Toronto. The extent of development has left little in terms of riparian vegetation along many segments of Toronto's rivers and creeks. This has an adverse effect on fish habitat by limiting cover, reducing shade and causing warming, and increasing erosion. Large sections of the streams have been channelized which results in these reaches being essentially void of aquatic life. There are also numerous in-stream barriers which restrict both jumping and non-jumping fish movement and migration to upstream habitat.

Through the development of watershed-based Fisheries Management Plans, Toronto and Region Conservation (TRCA), in conjunction with its partner agencies, non-governmental organizations, and the public, protect and enhance aquatic habitat in each of the watersheds throughout Toronto. The fisheries management plans for the Don and Humber Rivers identified in-stream barriers as one of the limitations to the health of the aquatic community. Many barrier removal projects have been completed, and migrating salmonids, such as Chinook Salmon and Rainbow Trout, are now found as far as 20-30 km upstream of Lake Ontario.

Even though there is little in Toronto that has not been impacted by urbanization, there are still many locations where there are thriving fish populations (see Exceptional Sport Fishing Locations in Toronto, pages 44-46). The City's watercourses still offer productive habitat for fishes and other aquatic life. Many of the fishes found in the Lake use these habitats for various stages of their life cycles. The Rouge River,

"The two best times to fish is when it's rainin' and when it ain't."
– Patrick F. McManus

being the least urbanized watershed in Toronto, has a fish community that includes even sensitive species such as Redside Dace, Brook Trout, American Brook Lamprey, Mottled Sculpin, and Rainbow Darter. Also lightly developed, the Toronto Islands provide a refuge of relatively undisturbed fish habitat and support fishes such as the rare American Eel. Within the Islands, there are areas that have been restored or constructed to provide excellent aquatic habitat. Many other areas of the Lake Ontario waterfront have also been restored/improved and now provide excellent fish habitat. Examples include Colonel Samuel Smith Park, Humber Bay Park, sites within the Inner Harbour, Tommy Thompson Park, and numerous points along the Eastern Beaches and Scarborough Bluffs.

The good news is that there continues to be numerous ongoing and planned initiatives to help the fish community of Toronto thrive. The future looks great for the fishes of Toronto.

Claire Crowly holding a Chinook Salmon caught in the Keating Channel at the mouth of the Don River during TRCA monitoring
photo: TRCA

Aquatic vegetation planting and shoreline restoration at Tommy Thompson Park
photo: TRCA

Toronto Islands – exceptional fish habitat and recreational opportunities
photo: TRCA

Aquatic Ecosystems

Aquatic ecosystems are complex systems made up of many interacting components (fishes, plants, insects, zooplankton, nutrients, rocks, soil). Although water is central to aquatic ecosystems, the water's edge does not strictly define the boundaries of an aquatic ecosystem. Activities taking place in the watershed, such as construction and land-use, influence ecosystem health.

The aquatic ecosystems in the Toronto area can be broadly characterized into several types, including: ponds and small lakes, rivers and creeks, wetlands, and Lake Ontario (both nearshore and offshore). The physical and chemical properties of these aquatic features determine what kind of habitat is available, and in turn, the type and abundance of organisms that live there.

Walleye
illustrations: Charles Weiss

Ponds and Small Lakes

These aquatic ecosystems tend to be shallower and warmer than larger systems. Due to their relatively small volume, ponds and lakes can be influenced quickly and dramatically by adjacent land use, and runoff events from the surrounding watershed. Ponds and small lakes generally host a relatively simple fish community, which may include minnows, sunfishes (Bluegill, Pumpkinseed, Largemouth Bass), and Northern Pike. Unless the pond or small lake is connected to another waterbody, fishes living in small ponds and lakes are permanent residents. Ponds and small lakes are often warm in the summer and covered by ice in the winter, further influencing which species will live there. In the Toronto area, Grenadier Pond in High Park is an example of this type of ecosystem.

Pond in High Park
photo: Rod Anderton, Toronto Water

Rivers and Creeks

These ecosystems are characterized by moving water. They tend to be cooler and shallower, compared to other aquatic ecosystems in the Toronto area. Many fish species spend their entire lives in streams; but other fishes migrate in and out of streams during specific periods in their lives, for example, during spawning. In the Toronto area, White Sucker, Rainbow Trout, Brown Trout, and Chinook Salmon are conspicuous stream-dwellers for at least part of the year. The streams are often ice-free and accessible to fishes all year; however, seasonally fluctuating water levels and man-made barriers can limit fish movement. Within Toronto, there are many smaller streams (creeks and brooks) and three large watercourses: the Humber, Don, and Rouge rivers.

Highland Creek at Kingston Road
photo: Rod Anderton, Toronto Water

"Everyone should believe in something; I believe I'll go fishing."
– Henry David Thoreau

Wetlands

Wetlands are shallow, productive, warmwater areas often located around the margins of streams and lakes. They are usually defined by an abundance of cattails, water lilies, and submerged aquatic vegetation. Wetlands are dynamic, growing and receding seasonally. They play an important role in controlling and regulating water runoff (thereby reducing erosion), filtering and cleansing water, as well as providing important habitat for plants and animals. Many fish species, including minnows, sunfishes, and juvenile sport fishes live in and around wetlands, and use them as feeding and nursery areas. Because of their location, wetlands are frequently areas prized for development. Careful planning and management must be done to prevent degradation of these sensitive areas. The City of Toronto has six "Provincially Significant Wetlands", including the Lower Humber River Wetland Complex, the East Don Valley Wetland Complex and the Rouge River Marshes Wetland Complex.

Rouge River marshes just upstream of the river's mouth at Lake Ontario
photo: TRCA

Lake Ontario

Lake Ontario is the 14th largest lake in the world, and is part of the Laurentian Great Lakes, which collectively contain one-fifth of the world's fresh water. Although Lake Ontario has a small surface area, relative to the other Great Lakes, an average depth of 86 m (283 ft) is second only to Lake Superior. Toronto is located on the north shore of Lake Ontario's Western Basin. Salmonids such as Chinook Salmon, Coho Salmon, Lake Trout and Rainbow Trout are found in this part of the lake. These species contribute to a prized offshore sport fishery in the Toronto area, as well as along the northern shore of Lake Ontario. The nearshore areas of Lake Ontario adjacent to Toronto are much shallower and warmer, providing habitat for species such as sunfishes, Northern Pike, Brown Bullhead, and Channel Catfish. Nearshore habitats are popular angling destinations, with Ashbridge's Bay, Toronto Islands, and Bluffer's Park offering people the chance to catch fishes relatively close to shore.

Lake Ontario at Bluffer's Beach Park – Toronto staff collecting samples for the Beaches' Water Quality Monitoring Program
photo: Toronto Water

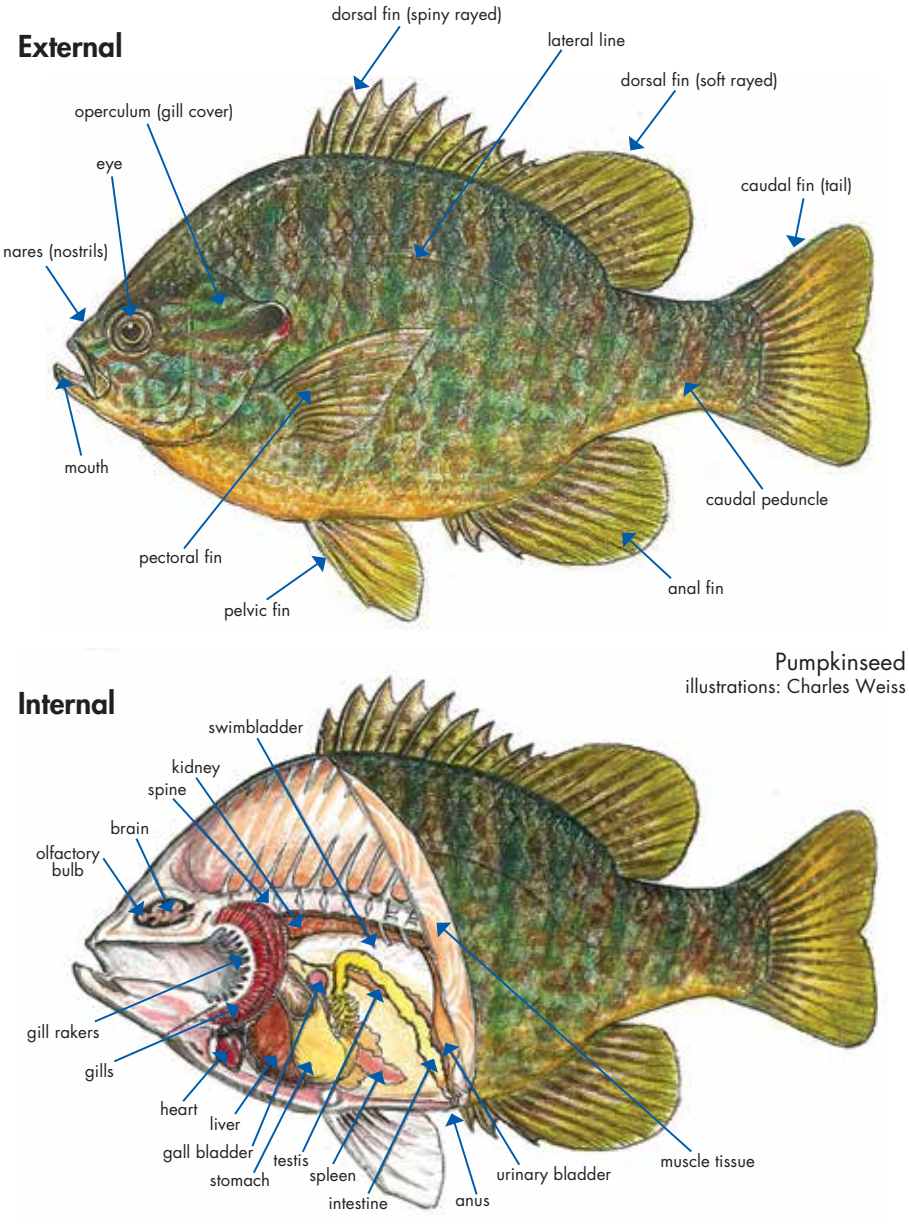
Fish Anatomy

All fishes have fins used for manoeuvring, stabilizing, propulsion, and braking. Fins vary greatly in structure, size, and number of rays between species. Some fishes such as trouts and salmons have a small fleshy adipose fin on the back behind the main dorsal fin.

The mouth of a fish varies from tiny to very large and can be oriented downward, straight ahead, or upward. Some fishes have one or more fleshy whiskers (barbels) around their mouth, which are covered in taste sensors. Teeth may be found not only on the jaws, but on the roof of the mouth, the tongue, or in the throat. The skin of a fish is usually covered with scales varying greatly in size among species and can be smooth (cycloid) as in trouts, rough (ctenoid) as in sunfishes, or bony (ganoid) as in gars. Fishes such as catfishes and lampreys have no scales.

Fishes breathe by extracting dissolved oxygen from water using gills (similar to how our lungs extract oxygen from the air). These gills are located on bony arches, and usually have bony projections called gill rakers. In some fishes, the gill rakers act to filter out and trap prey and food particles. Buoyancy is usually controlled using a gas-filled sac called a swimbladder, where gases can be added or removed from the blood with changes in depth.

Along the side of a fish, there is usually a lateral line, a narrow tube full of sensors, that detect changes in water pressure resulting from other organisms moving through the water. This is useful for schooling, prey detection, and predator avoidance.



Pumpkinseed
illustrations: Charles Weiss

Fishes of Toronto

Toronto's (un)Official Fish: Atlantic Salmon *(Salmo salar)*

Toronto's best known fish in 1800 is today the most forgotten. Considered the greatest freshwater population of the species in the world when European settlers arrived in Ontario, Lake Ontario's Atlantic Salmon population had disappeared by 1898, when the last confirmed native salmon was caught off the Scarborough shoreline. The original population was present in such a high abundance that it was a primary food source for both Aboriginals and settlers before the establishment of farms; property values were enhanced by the presence of Atlantic Salmon, and towns were named after salmon.

Atlantic Salmon arrived in Lake Ontario 12,000 years ago from the Atlantic Ocean as the last ice age came to an end and the ice sheets that once covered Ontario slowly moved northward. The Atlantic Salmon, like most other salmonid species, lays its eggs in cold, freshwater streams, where the eggs hatch and the juvenile fishes migrate out to the saltwater of the ocean. However, because they already live part of their lives in fresh water, these types of fishes can adapt to living entirely in fresh water, using the lake as if it were an ocean. Although some individuals may have migrated through the St. Lawrence River to the Atlantic Ocean, historical evidence suggests the Lake Ontario Atlantic Salmon adapted to living its entire life in fresh water.

~

"The Atlantic Salmon was one of the first Canadian fishes in the Great Lakes region to disappear as a result of man's careless use of natural resources. It was to be the first of many. In Lake Ontario the erection of mill dams on streams denied it access to spawning grounds. It was also the first to suffer from DDT sprays (in New Brunswick), hydro-electric dam construction, domestic pollution, and a thousand and one other indignities thrust upon the environment by man."

– Scott and Crossman, *Freshwater Fishes of Canada*, 1973.

Unfortunately, their reliance on rivers as part of their reproductive cycle was central to their extirpation (local extinction) from Lake Ontario as European settlement progressed through the 19th century. As southern Ontario changed from forest to towns and farmlands, significant changes occurred that were detrimental to Atlantic Salmon. As trees were cut down, stream temperatures and erosion increased, eliminating the cold water and rocky river bottoms needed for spawning and nursery habitat. Pollutants and other materials were also dumped indiscriminately into the streams.

The Atlantic Salmon was also unable to access any remaining good habitat as the need for water power resulted in mill dams being built on almost all tributaries running into Lake Ontario. Toronto's Humber River for example, still had over 110 barriers to fish passage on it in the 1990s. The Atlantic Salmon is a fantastic jumper, its scientific name *Salmo salar* translates as the "leaping salmon," but taller dams and the repeated need to jump meant they could not reach spawning areas.

Atlantic Salmon
photo: Montreal Biodome

The final factor behind the loss of Atlantic Salmon from Lake Ontario was the sustenance fishery, which caught Atlantic Salmon during their spawning runs. Historic records tell of hundreds and thousands of fish being taken in a single night, caught using nets and spears.

Lake Ontario water quality and habitat improvements over the past 30 to 40 years have been so successful that Atlantic Salmon restoration was considered feasible by 2006. That year, a partnership was formed between the Ontario Ministry of Natural Resources, corporate sponsors, and Ontario Federation of Anglers and Hunters to initiate a full restoration program for Atlantic Salmon. Working in five-year phases, best-bet streams will be targeted as new home streams with the goal of returning a self-sustaining population to Lake Ontario. Restoration efforts are focused on four program areas: Fish Production and Stocking; Habitat and Water Quality Enhancement/ Protection; Research and Assessment; and Education and Outreach.

Through early 2011, over 3.5 million Atlantic Salmon have been released, more than 110 habitat projects completed, thousands of students helped raise fish in their schools, and the adult Atlantic Salmon is returning to Ontario's streams and spawning. Recently, stocking of the Humber River of large numbers of young Atlantic Salmon started, adding it to the list of rivers targeted for restoration of this signature species.

Atlantic Salmon – quick biological facts

- spawn in cool and clear water streams, October through November
- females deposit 500 to 1600 eggs/kg of body weight
- reach sexual maturity at 2-4 kg and can grow to over 10 kg
- build redds – shallow nesting depressions "excavated" in clean gravel where eggs are laid and then covered back over after fertilization
- do NOT die after spawning and may live for more than 10 years
- imprint on the stream where hatched and return as adults to spawn after spending 1-3 yrs in the Lake; may return to spawn numerous times
- can jump over 3 m and reach swimming speeds of up to 30 km/h
- only distantly related to Pacific salmons; closely related to Brown Trout

Atlantic Salmon Restoration Program – Each fall, adult Atlantic Salmon, housed in a provincial hatchery, produce millions of eggs that are raised into juvenile fish and released into the wild to restore this species to Lake Ontario.
From left to right: eggs, alevin (sac fry), parr (spring fingerling), parr (yearling).

Adult Atlantic Salmon
photo: John Kendell

Typical Atlantic Salmon Spawning and Life Cycle Facts

- the Lake Ontario Atlantic Salmon is a permanent freshwater resident, spending its adult life in the Lake, instead of migrating to the ocean
- adults turn dark bronze and migrate up the streams in the fall to spawn
- spawning females lay approximately 2000 to 8000 **Eggs** (5 to 7 mm in diameter)
- eggs hatch late winter/early spring, about 3 months after fertilization
- newly hatched **Alevin** (1 to 3 cm) remain buried in the gravel nest (redd) and feed off their yolk-sacs for 1 to 3 months
- emerge from their redd as free swimming **Fry** (3 to 8 cm) and begin foraging for food
- enter the **Parr** stage (6 to 20 cm) at about 3 to 6 months and develop large dark vertical parr marks on the sides of their body
- remain in the stream until 1 to 3 years of age, feeding on aquatic invertebrates (insects and their larvae) and terrestrial insects that fall into the stream or live on the surface
- when ready to swim downstream to Lake Ontario, they change from dark to bright silver and lose their parr markings, becoming **Smolts** (14 to 25 cm)
- grow and mature in the Lake for 1 to 3 more years (40 to 100 cm) until ready to spawn

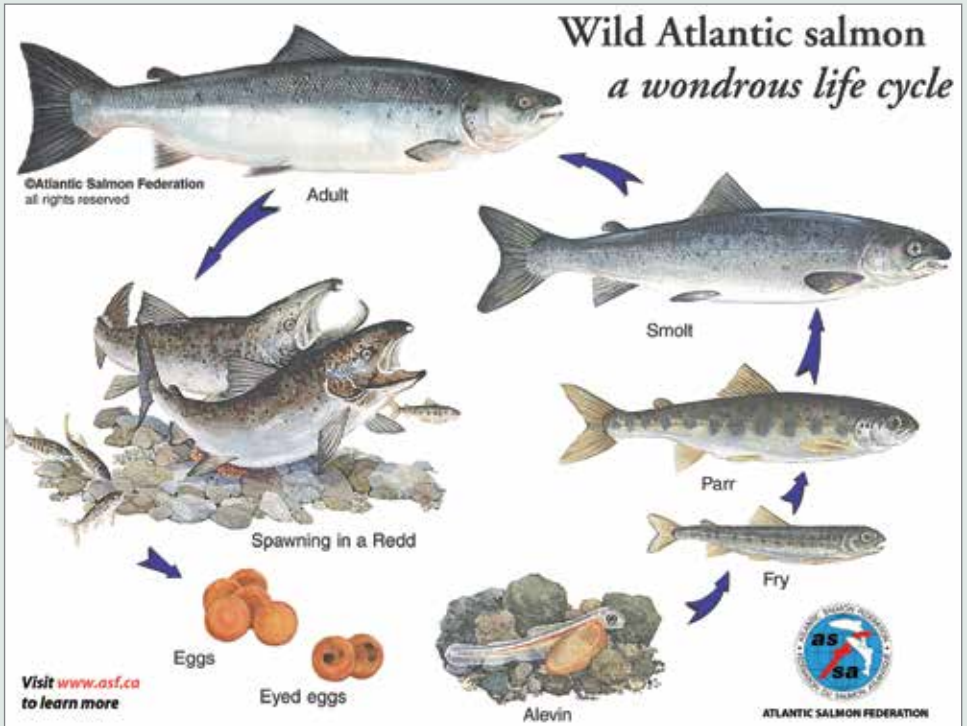
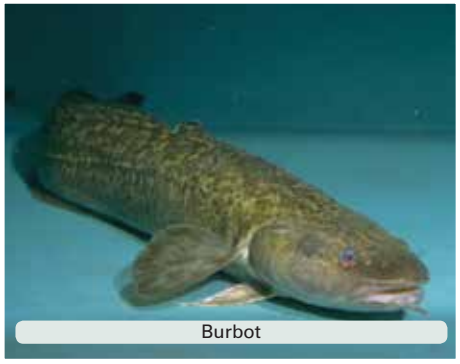


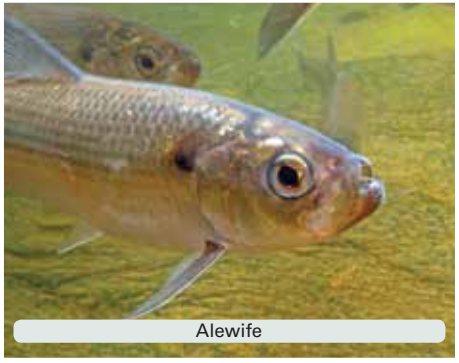
illustration: Judy Pennanen, Atlantic Salmon Federation

- **Adults** feed on invertebrates (insects, crayfishes), Cisco, Alewife, Rainbow Smelt, shiners, and sometimes sculpins and Round Goby
- usually return to their native streams, migrating to the headwaters to spawn at about 3 to 5 years old
- individuals that spawn after only one year in the Lake are called **Grilse**
- of the eggs laid, only about 20% (400-1600) hatch, typically only 5% (100-400) reach Lake Ontario as Smolts, and on average only 0.25% (5-20) actually reach spawning age
- while migrating they typically forage very little until after spawning
- unlike Pacific salmons, most Atlantic Salmon do NOT die after spawning and return to the Lake
- returning adults resume feeding and change back to a silver colour
- a small percentage of Atlantic Salmon survive several spawning runs
- wild Atlantic Salmon can live up to 20 years, but have a typical maximum age of 9 to 11 years
- the adult Lake Ontario Atlantic Salmon is typically 3 to 10 kg
- record catches in Europe have been over 35 kg and 150+ cm; but in Lake Ontario the historic population record is just over 20 kg
- the largest recorded Atlantic Salmon caught from the newly restored (post 1980) Lake Ontario population is 11 kg

Coldwater Fishes

Coldwater fishes are generally found where the water temperature does not exceed 19°C. This includes cold spring-fed streams and the deep waters of lakes where the temperature stays cold in the summertime. Many of them are small-scaled, smooth-skinned, and streamlined fishes that swim continuously. Many migrate great distances from their feeding grounds in lakes to the headwaters of coldwater streams where they spawn in the fall, winter, or early spring in water that is usually below 10°C. Coldwater fishes include all of the trouts, salmons, and whitefishes along with their smaller prey species such as the Alewife, Rainbow Smelt, sculpins, sticklebacks, and Trout-perch. Also included are lampreys, such as the Sea Lamprey, which is a devastating predator of coldwater fishes. Most of the large coldwater fishes are valuable game and commercial fishes.


Burbot


Alewife


American Brook Lamprey


Sea Lamprey


Lake Chub


Slimy Sculpin


Rainbow Smelt


Threespine Stickleback

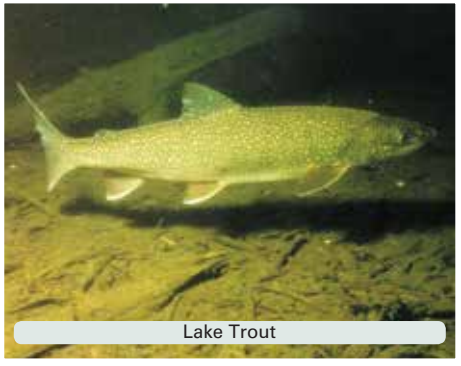

Trout-perch

"One fish. Two fish. Red fish. Blue fish. Black fish. Blue fish. Old fish. New fish. This one has a little star. This one has a little car. Say! What a lot of fish there are." – Dr. Seuss


Brook Trout


Brown Trout

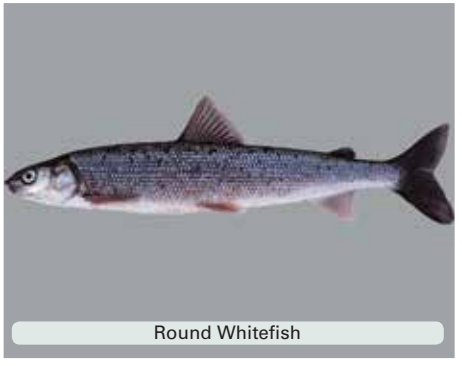

Chinook Salmon


Lake Trout


Rainbow Trout


Cisco


Lake Whitefish


Round Whitefish

"Scattered Alewife and Chinook Salmon"
illustration: Charles Weiss

Featured Coldwater Fish: Mottled Sculpin *(Cottus bairdii)*

The Mottled Sculpin is a small fish (maximum size is about 15 cm) with large eyes located near the top of its head. It has relatively large fins, and lacks scales. The Mottled Sculpin is widespread in eastern Canada from Labrador to Manitoba with isolated populations in southern parts of British Columbia and Alberta. It inhabits cold, clear water in both streams and lakes and is often found over gravel riffles (turbulent shallow water) and along rocky shores. This bottom dwelling fish eats mainly aquatic insect larvae and, to a lesser extent, small fishes and crustaceans. Contrary to fishing folklore, the Mottled Sculpin is not considered to be a significant predator of trout eggs, but in fact is a common food source of many predatory fish species, including Lake Trout, Brook Trout, and Northern Pike. They are occasionally used as bait by anglers, but are not a preferred bait species. The Mottled Sculpin's average life span is 4 to 6 years, and sexual maturity is reached once they are approximately two years old. The females produce anywhere from a couple dozen to a few hundred eggs. The males select and protect the nest for up to 2 months, until the fry disperse about 2 weeks after hatching. Their nests could have many hundreds of fertilized eggs as the larger males may mate with ten or more females each year. The invasive Round Goby is a competitive threat to Mottled Sculpin populations where they co-exist. The goby bears a superficial resemblance to sculpins; however, the Round Goby possesses a distinctive fused pelvic fin (looks like a suction cup) and has scales. Throughout its range the Mottled Sculpin is not typically a threatened or endangered species, but they are known to be very sensitive to certain pollutants, such as heavy metals. As such, they are considered by many to be an indicator species for water quality conditions in streams.

Coolwater Fishes

Coolwater fishes are generally found where the water temperature is between 19°C and 25°C. Compared to cold-water fishes, they occur in the warmer parts of cold spring-fed streams and in the shallower parts of lakes. Many of our coolwater fishes are small-bodied minnows and darters, but a few grow larger, including, Northern Pike, Yellow Perch, and Walleye. Most coolwater fishes are non-migratory, moving only short distances to their spawning grounds. They spawn in the spring or early summer, usually in water that is above 10°C but may be as high as 25°C. A few under-take longer migrations to spawning grounds, including the Lake Sturgeon and American Eel. The most widespread and abundant fishes in Toronto's streams, Blacknose Dace, Longnose Dace, Creek Chub, and White Sucker, are all species tolerant to the poor water quality typical of urban watercourses.


Blacknose Dace

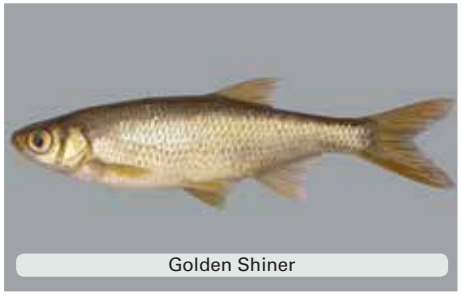

Blacknose Shiner


Brassy Minnow


Common Shiner


Creek Chub


Emerald Shiner


Golden Shiner


Hornyhead Chub


Longnose Dace


Northern Redbelly Dace


Redside Dace


Spottail Shiner


Round Goby

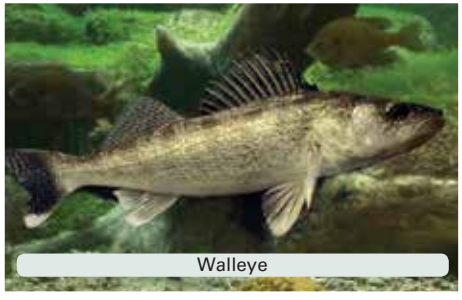

Central Mudminnow


Iowa Darter


Johnny Darter


Logperch


Rainbow Darter


Walleye


Yellow Perch


Brook Stickleback


White Sucker


Rock Bass


Smallmouth Bass

"Sundown on the Lake"
Walleye feeding on Yellow Perch
illustration: Charles Weiss

Featured Coolwater Fish: Lake Sturgeon *(Acipenser fulvescens)*

The Lake Sturgeon is the largest freshwater fish in Ontario, capable of reaching lengths of almost 3 m (9 ft) and weighing over 100 kg (220 lbs). It is a unique member of Lake Ontario's fish community for a variety of reasons: its skeleton is made of cartilage (like a shark) and not bone, it has large bony shields or "scutes" rather than scales, and it uses a combination of sensory pores and barbels to locate its food, which it sucks up from muddy stream and lake beds using a vacuum-like mouth. Females are larger at maturity and live longer than males. Large females have been reported to live for more than 150 years, compared to a maximum age of approximately 50-60 years for males. Sturgeon do not become sexually mature until 8-14 years of age, and spawn at intervals of 4-8 years after that. Its life history traits (slow growth rates, late maturity and low reproductive rates) has made the Lake Sturgeon especially vulnerable to exploitation.

Although originally considered worthless by European settlers, sturgeon were fished intensively from 1860-1900 for their eggs (caviar) and their flesh, which was considered a delicacy when prepared by smoking. Historical documents suggest that sturgeon spawned in the Don River prior to their population declining in the 1840s. Subsequent habitat degradation from damming rivers, dredging, and water pollution further reduced numbers and they have been at a low abundance in the Lake Ontario system for over a century. In an effort to slow the population's rate of decline, recreational and commercial fisheries for Lake Sturgeon was closed in Lake Ontario and its watershed in 1984. Warming waters due to climate change and poisoning from eating contaminated Zebra Mussel and Quagga Mussel may further impact the future of these remarkable fish.

Lake Sturgeon
illustration: Charles Weiss

Sturgeon populations still exist in Lake Ontario and there are signs of small increases in the populations in the lower Niagara River and upper St. Lawrence River. Lake Sturgeon are currently listed as "Threatened" under the Ontario Endangered Species Act.

Lake Sturgeon
photos: Gregory Lashbrook

Northern Pike caught in May of 2010 by Mike Puusa, an avid angler who enjoys the excellent fishing that can be found around the Toronto Islands.
photo: Mike Correa

Featured Coolwater Fish: Northern Pike *(Esox lucius)*

While many of Toronto's fish species are found elsewhere in eastern Canada and North America, few are found throughout both Canada and the rest of the northern hemisphere. The Northern Pike, however, is very widespread. It ranges from Alaska to Missouri, Europe to Siberia and is one of the most well known freshwater species in the world.

A long, narrow fish with a ferocious-looking grin, the Northern Pike is a coolwater predator and a popular sport fish. They spawn in April and May, and require vegetated areas in bays, marshes, and streams in which to scatter their eggs. They often spawn in water less than 20 cm deep, and the young fish need similar habitat, which leaves them vulnerable to changes in water level. Older juvenile and adult pike live in generally similar, but somewhat deeper, habitat – slow-moving rivers or weedy areas of lakes. Young pike grow quickly. Once they are 50 mm or longer, they feed mainly on other fishes, frogs, and crayfishes. Larger Northern Pike will occasionally eat ducks and mice!

Female Northern Pike in Toronto reach maturity between 2 and 4 years of age, with males maturing earlier. While they can live for more than 20 years, a more typical lifespan is 10-12 years. The largest recorded Northern Pike caught in Ontario weighed just over 19 kg (42 lbs).

For exceptional fishing locations in Toronto, see pages 44-46.

Northern Pike
photo: Nature's Images Inc.

Warmwater Fishes

Warmwater fishes are generally found where the maximum water temperature often exceeds 25°C. They are found in the more downstream and slower sections of streams and in the shallowest waters of lakes. They are often more deep-bodied, rough-scaled, and less stream-lined fishes that move slowly or sit still in the water when they are not pouncing on their prey. They include a range of both small and large fishes, the catfishes, the sunfishes, and the temperate basses. They spawn in late spring or summer, usually in water that is warmer than 15°C and often above 20°C. Popular warmwater sport fish species include the Largemouth Bass (page 28), sunfishes, and the non-native Common Carp (page 34).


Bowfin


Freshwater Drum

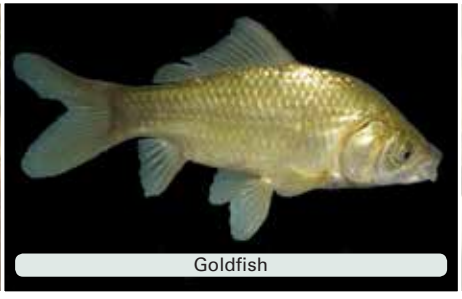

Longnose Gar


Bluntnose Minnow


Central Stoneroller


Common Carp


Fathead Minnow


Goldfish


Rosyface Shiner


Sand Shiner


Spotfin Shiner


Brook Silverside


Brown Bullhead


Channel Catfish


Stonecat


Tadpole Madtom


Northern Hog Sucker


Shorthead Redhorse


Black Crappie


Bluegill


Green Sunfish


Pumpkinseed


White Bass


White Perch

Featured Warmwater Fish: Largemouth Bass *(Micropterus salmoides)*

Largemouth Bass and its cousin the Smallmouth Bass both live in Toronto waters and are similar in appearance. The Largemouth Bass is usually green to olive in colour and has a series of broken up black blotches along the side forming a horizontal line (in Smallmouth Bass these markings form several vertical lines). The Largemouth Bass also has a deep notch between the spiny (front) and soft (rear) rayed portions of the dorsal fin. However, the mouth is the main feature distinguishing it from the Smallmouth Bass. The upper jaw of adult Largemouth Bass extends backwards past the eye; in Smallmouth Bass the upper jaw does not extend backwards beyond the eye.

Spawning takes place when water temperatures reach between 16°C and 23°C, which occurs in May in most Toronto waters, but can be as late as the end of June in Lake Ontario due to cool water upwellings from the main lake basin. It prefers sheltered shorelines or bays with sand and gravel bottoms and aquatic vegetation. Like other members of the sunfish family, the male Largemouth Bass is a single parent. The male will coax a ready female over a nest where she will deposit her eggs for the male to fertilize. She then leaves to recuperate in deeper water, leaving the male to guard their young on his own for several weeks. In and around Toronto, this fascinating ritual typically takes place during the closed fishing season and anglers cannot target bass (even for catch and release) until the season opens, when most bass have finished spawning.

The Largemouth Bass is adaptable and can thrive in a variety of aquatic conditions. The ideal Largemouth Bass habitat provides protection and is found in shallow water (30 cm to 4 m deep). Extensive nearshore Largemouth habitat exists in Toronto including lily pads along with other aquatic plants, man-made structures (docks, pilings), logs, stumps and downed trees or a combination of any of these features.

The Largemouth Bass is regarded as a premier gamefish, not necessarily for its taste (many anglers prefer to live release those they catch), but for its strong fighting skills and willingness to hit artificial lures. Some of the more effective baits that work well in and around Toronto include plastic worms, spinnerbaits, and topwater lures.

Due to an excellent forage base of baitfishes, frogs, and crayfishes, Largemouth Bass from nearshore areas of Lake Ontario, and even within some city ponds, can reach over 2.5 kg (5-6 lbs) in size. In Toronto, there are many opportunities for the shore and boat angler to fish for this battling predator. For exceptional fishing locations in Toronto, see pages 44-46.

Juvenile Largemouth Bass
photo: Erling Holm

Featured Warmwater Fish: Bluegill *(Lepomis macrochirus)*

Sunfishes are popular warmwater species throughout Toronto's urban fisheries. There are two types of sunfishes that are most likely to be caught by anglers in waters ranging from ponds and reservoirs to slow moving rivers and even nearshore areas of Lake Ontario. In many cases, these waters primarily contain Pumpkinseed, but in recent years it appears that the Bluegill is becoming more plentiful.

Bluegill
photo: Erling Holm

Like most sunfishes, the Bluegill is a relatively short and deep-bodied fish. Bluegill average 12-18 cm (5-7 in.) around Toronto, but Bluegill in the range of 20-25 cm are not uncommon. In most cases, the Bluegill is light to dark olive, but larger, older fish may have a purplish tinge. Cheeks and gill covers are often bluish, and the "ear flap" located just behind the eye is entirely black, without a pale edge or red spot.

Pumpkinseed can closely resemble Bluegill, but the easiest way to distinguish the Pumpkinseed is by looking for its bright orange spot at the tip of the ear flap. Secondly, the soft (back) portion of the dorsal fin on the Bluegill has a dark blotch; the Pumpkinseed's soft dorsal fin has many smaller brown spots. During pre-spawn conditions in the spring or early summer, the breeding male Bluegill is marked by bright blue and orange colours. Females and younger Bluegill are less colourful and are often marked by dark vertical bars on their olive backs (see page 27).

Like all sunfishes, the Bluegill is a nest builder – the male builds a nest in shallow waters, often within a colony of many nests. A single female can deposit more than 50,000 eggs. The male then guards the eggs and fry against predators.

The Bluegill's mouth lacks sharp teeth and is quite small; its food sources include bite-sized aquatic insects and other small invertebrates. Young Bluegill will stay in heavy weeds to avoid predators. An interesting characteristic of Bluegill, especially larger ones, is that they can often be seen in large schools feeding heavily on tiny drifting zooplankton a few feet below the surface away from the security of deep weed growth.

The Bluegill is a fun and exciting fish to catch and are especially suited to the variety of shore fishing opportunities Toronto has to offer. They are prolific breeders and their populations are stable or even increasing throughout the city. Bluegill can be caught with a variety of live and artificial baits ranging from earthworms hooked below a float to small plastic or biodegradable grubs on a small jig head. Casting thin, 2.5 - 5 cm hard lures (crankbait) on light line can be especially effective when Bluegill are active. Fly fishers can have a lot of fun fishing for cruising Bluegill using nymph patterns, a variety of floating flies and especially poppers. The Bluegill is also quite tasty! For exceptional fishing locations in Toronto, see pages 44-46.

Endangered Species: American Eel *(Anguilla rostrata)*

Many people are unaware that Ontario has a native eel that lives in Lake Ontario and its tributaries. Other Ontario fishes which may be confused with eels, such as lampreys and Burbot, bear only a superficial resemblance to the American Eel, and are not closely related. American Eel have a complex life cycle. All American Eel are part of a single breeding population that spawns in only one place in the world – the Sargasso Sea in the North Atlantic Ocean (a large shoreless "sea" off the east coast of the United States surrounding Bermuda). From there, young eels drift with ocean currents and then migrate inland into streams and lakes. This journey may take many years to complete, with some eels travelling as far as 6,000 km. After reaching these freshwater bodies, they feed and mature for 10 to 25 years before migrating back to the Sargasso Sea to spawn.

The home range of the eel includes the entire eastern seaboard of North America and its freshwater tributaries which spans the jurisdictions of 19 states, six provinces, and two federal governments. As a result, the historical management of American Eel has not been well coordinated, and the population has declined due to impacts from harvesting, water quality, and in-stream barriers (dams) during the course of their long migration.

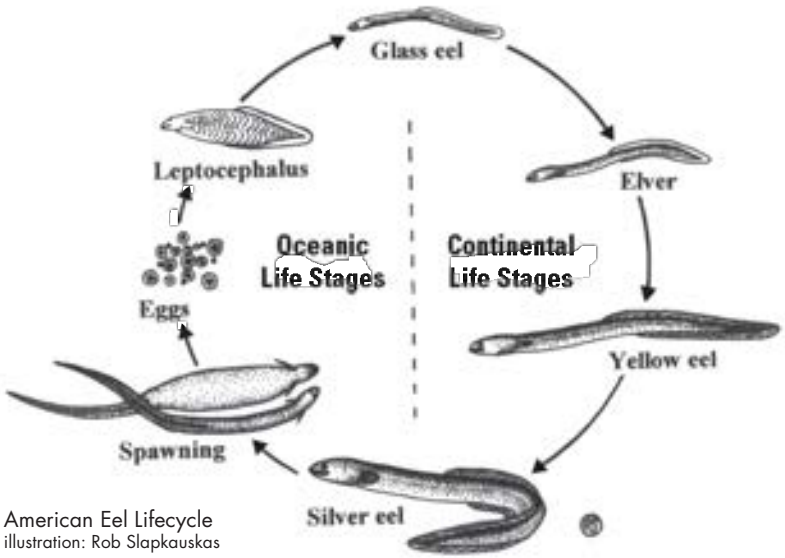
The formerly abundant American Eel has a long history as a food and commercial product for residents of the upper St. Lawrence River and Lake Ontario. Eels were a highly valued fish resource for Aboriginal people, particularly the St. Lawrence Iroquois, who depended upon them as winter and travelling food.

American Eel
photo: Ontario Ministry of Natural Resources

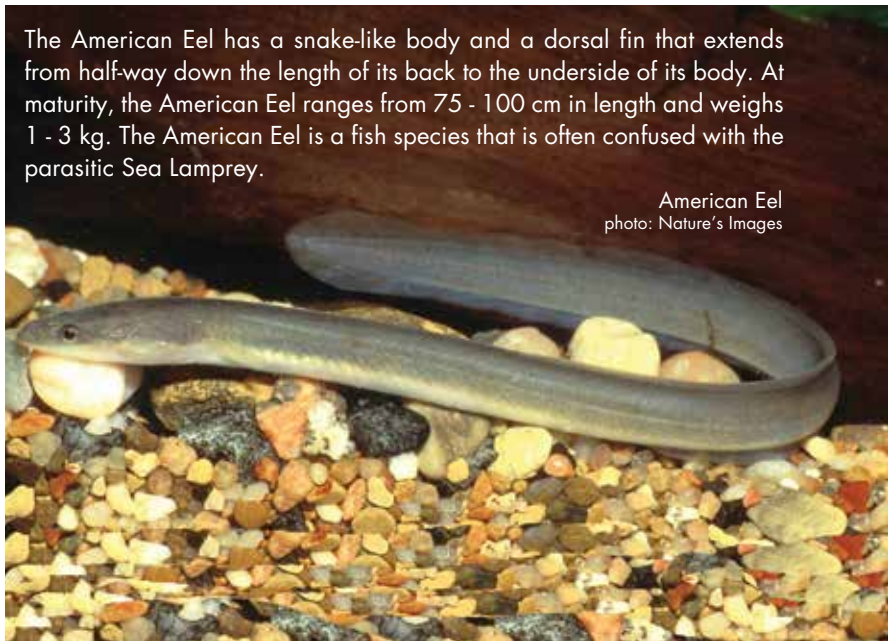
During the 1980s and early 1990s, the American Eel was one of the top three species, in commercial value, to the Lake Ontario fishery. Over recent decades, the number of young American Eel entering the upper St. Lawrence River and Lake Ontario has declined dramatically. For example, the average number of eels migrating up the St. Lawrence River near Cornwall decreased from over one million per year in the 1980s to roughly 12,000 per year since 2000. The American Eel appears to be in decline throughout its global range, but the decline has been most severe in the St. Lawrence River system.

The American Eel is classified as "Endangered" under the Ontario Endangered Species Act, and efforts are being made to help restore eel abundance in Ontario. The commercial and sport fisheries for this species were closed in 2004 and 2005 respectively. Ontario Power Generation has developed an "Action Plan" for the restoration of eels in Lake Ontario. This plan includes the stocking of juvenile eels (captured in the Canadian Maritime Provinces) into Lake Ontario. In addition, a pilot project has been developed to capture large eels above the hydro dams and transport them to below these migration barriers. It has been estimated that up to 40% of the eels that leave Lake Ontario are killed as they pass through hydro turbines during their migration towards the spawning grounds.

An eel ladder was installed in 1974 at the R.H. Saunders Hydroelectric Dam near Cornwall, Ontario, to help young eels climb over the dam as they migrate into Ontario from the Sargasso Sea. By counting the number of eels that pass through the ladder, biologists are able to monitor changes in the size of local eel populations over time.



American Eel Lifecycle
illustration: Rob Slapkauskas



The American Eel has a snake-like body and a dorsal fin that extends from half-way down the length of its back to the underside of its body. At maturity, the American Eel ranges from 75 - 100 cm in length and weighs 1 - 3 kg. The American Eel is a fish species that is often confused with the parasitic Sea Lamprey.

American Eel
photo: Nature's Images

Intentionally Introduced Species

Many people are aware of exotic species such as Zebra Mussel and Round Goby (see pages 47 and 50) that have found their way into the Great Lakes via ballast tanks of ships making trans-Atlantic voyages and other indirect pathways. Many are not aware that several fish species have been intentionally introduced to Lake Ontario by government agencies. Some of the species that were introduced have been in Lake Ontario for so long that many people think of them as native. Not every introduced species is mentioned here, but the following include those that continue to play a significant role in the Lake Ontario ecosystem and bring socio-economic benefits through recreational angling.

Rainbow Trout and Brown Trout

The Rainbow Trout (native to western North America) is also known as "steelhead" in its migratory form. They were first introduced to Lake Ontario by the province in 1922 and became established by the early 1950s. Unlike most salmonids, Rainbow Trout migrate up streams to spawn primarily in the spring, although fall runs are known to occur as well. These migrations support an important fishery popular with avid "steelheaders".

The Brown Trout, native to Europe, was introduced into Lake Ontario in 1883 by the United States and later by Ontario. While some are similar to Rainbow Trout, living in streams as young fish and in Lake Ontario as adults, others remain permanent residents in their home stream. The Brown Trout's spawning run occurs in October and November. While they do not have the same dedicated angler-following as Rainbow Trout, Brown Trout play an important role in Lake Ontario's open-water and in-stream sport fisheries.

Both Rainbow Trout and Brown Trout have become naturalized, but annual stocking is still done in the Lake Ontario watershed to support these popular fisheries. Approximately 400,000 Rainbow Trout and Brown Trout are stocked annually in Lake Ontario.

Bob Izumi and his daughter, Kristin, proudly display a Rainbow Trout caught in Lake Ontario just offshore of Toronto while filming an episode of Bob Izumi's Real Fishing Show
photo: Izumi Outdoors

Rainbow Trout in the Humber River
photo: Jon Clayton

"Many men go fishing all of their lives without knowing it is not fish they are after." – Henry David Thoreau

Pacific salmons

Several species of Pacific salmons have been sporadically stocked in Lake Ontario since the late 19th century, but it wasn't until the late 1960s and early 1970s that fishery managers began focusing their stocking efforts primarily on Coho Salmon and Chinook Salmon. These two salmons are native to the Pacific coast of North America and its rivers. They were introduced into Lake Ontario following their successful introduction into Lake Michigan. The governments of New York State and Ontario introduced these fishes for two reasons: to help control populations of non-native Alewife and Rainbow Smelt and to create an exceptional recreational fishery.

Chinook Salmon migrating up the Humber River
photo: Jon Clayton

The historic loss of both native Atlantic Salmon and Lake Trout left Lake Ontario without any open-water top predators, a key part of the ecosystem. The introduced salmons filled this important niche.

Today, the Chinook Salmon fishery in Lake Ontario (both American and Canadian waters) generates hundreds of millions of dollars for local economies. Salmons and trouts account for approximately three quarters of the recreational fishery in the Canadian waters of Lake Ontario. This fishery also engaged people in caring for the Lake Ontario environment, leading to strong public support for pollution and phosphorous controls, the Great Lakes Water Quality Agreement, and local stream restoration efforts.

The Chinook Salmon is the largest of the Pacific salmons, with individuals in Lake Ontario reaching lengths over one metre, and weighing more than 20 kg. The Ontario record Chinook Salmon was 21.04 kg (46.38 lbs) caught in 2000. As of 2011, Ontario has an annual stocking target of 540,000 Chinook Salmon spring fingerlings, and local clubs still stock small numbers of Coho Salmon fall fingerlings. Some natural reproduction does occur, and an Ontario-New York study is underway to determine the extent that natural reproduction contributes to the Lake Ontario population. Pacific salmons are famous for their long spawning migration from the ocean into freshwater tributaries. For the populations living in Lake Ontario, the lake serves as their ocean, and they migrate a much shorter distance up several streams in the fall to spawn. However, local fisheries management plans limit the amount of river habitat Pacific salmons have access to for reproduction. This habitat is reserved for native species and the two other introduced salmonids: Rainbow Trout and Brown Trout.

"If today were a fish I'd throw it back." – Bertrand Russell

Common Carp *(Cyprinus carpio)*

The Common Carp was one of the first introduced fishes in the Toronto area. Introduced to Lake Ontario in the 1870s, they were originally brought to North America from Europe as early as 1830. The Common Carp was raised in ponds to offer fishing opportunities and control weed growth. Carp uproot and consume large amounts of underwater vegetation – resulting in turbid (muddy) water. Its feeding habits, combined with a spawning ritual that stirs up bottom sediments, suffocates the eggs of native fishes such as Largemouth Bass. As a result, carp have disrupted the nearshore aquatic ecosystems of much of the Toronto waterfront and inland waters. Carp are a popular food fish in some cultures, and many anglers enjoy fishing for this large fish. Around Toronto it is not uncommon to catch carp that are up to 18 kg (40 lbs). As bottom feeders, Common Carp require different fishing techniques, tackle, and bait.

Common Carp
photo: TRCA

Rainbow Smelt *(Osmerus mordax)*

The Rainbow Smelt was originally from the Atlantic coast and eastern waters of North America, and was first noted in Lake Ontario in 1931. Rainbow Smelt most likely came from New York's inland waters, where they were intentionally introduced in 1917.

A small (up to 27 cm), silvery fish, they live in schools in the ocean or lakes as adults, and spawn in streams or along the shore of lakes in the spring (March-May). When spawning, they can be legally fished for with nets (see the regulations for details) and are a valued food fish. They are voracious predators of larval fishes, but a prey fish for most trout and salmon species.

Rainbow Smelt
photo: Kazutoshi Hiyeda

Checklist of Coldwater Fishes of Toronto

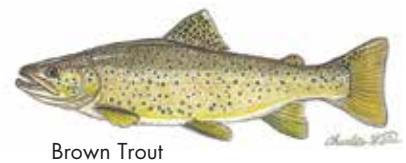
Fish Status: (N) Native (I) Introduced or Invasive (XP) Extirpated
Fish Statistics: (Average Ontario Length, Record Ontario Length, Maximum Age)

Common Name	Status	Comments
Cods		
☐ **Burbot** (38.0 cm, 95.3 cm, 20 yrs)	N	Most cods are marine, but the Burbot is one of a few that occur entirely in fresh water. It can be identified by a single barbel or whisker at the tip of its lower jaw. Once abundant in Lake Ontario, it declined in 1970 and remained uncommon until 1985 when numbers increased. After 1998, population numbers declined abruptly again, and the future of this species in Lake Ontario is uncertain.
Herrings		
☐ **Alewife** (15.0 cm, 30.9 cm, 9 yrs)	I	The Alewife is common in Lake Ontario at the thermocline (depth where temperature drops quickly). The Alewife makes up the majority of the diet of trouts and salmons in the lake and is also a popular food of fish eating birds such as gulls and terns. See page 48.
Lampreys		
☐ **American Brook Lamprey** (18.7 cm, 23 cm, 5 yrs)	N	Like the Sea Lamprey, this jawless fish spends most of its life as a blind toothless larva (ammocoete) buried in the sediment of streams where it feeds on microscopic organisms. The non-parasitic adult does not feed on other fishes, dying shortly after spawning.
☐ **Sea Lamprey** (43.9 cm, 58.3 cm, 12 yrs)	N, I	As adults, the jawless Sea Lamprey uses its tooth-filled, suction cup-like mouth, and sharp, file-like tongue to rasp through prey fishes' skin to feed on blood and body fluids. If prolonged, these attacks usually kill the fish. First documented in Lake Ontario in the 1830s, its origins continue to be a subject of debate. One theory is that it invaded via canals and waterways connecting the Hudson River to Lake Ontario, but recent genetic evidence supports another theory that it is native to the lake. Welland Canal modification in 1919 unfortunately allowed the Sea Lamprey to bypass Niagara Falls and spread to all the other Great Lakes with catastrophic effects. Lake Trout populations collapsed, resulting in severe damage to the fisheries. During the late 1950s, intensive control efforts using barriers, traps, and lampricides were initiated. In Lake Ontario, Sea Lamprey control has had a positive impact, allowing for the rehabilitation of both native Lake Trout and Atlantic Salmon populations, and also benefiting the introduced/stocked salmons and trouts prized by the recreational fishery.
Minnows		
☐ **Lake Chub** (10.0 cm, 20.7 cm, 10+ yrs)	N	The Lake Chub spends its adult life in Lake Ontario except in early spring when schools migrate up streams to spawn. The Lake Chub is the most widely distributed minnow in Canada ranging from Nova Scotia to the Northwest Territories.
Sculpins		
☐ **Mottled Sculpin** (7.5 cm, 13.3 cm, 4 yrs)	N	The Mottled Sculpin is more common and widespread in Toronto than the closely related Slimy Sculpin. It tolerates slightly higher temperatures and occurs at shallower depths in Lake Ontario than the Slimy Sculpin. See page 19.
☐ **Slimy Sculpin** (7.5 cm, 11.5 cm, 7 yrs)	N	The Slimy Sculpin is found in cold streams and in deep waters of Lake Ontario. Slimy Sculpins and Mottled Sculpins are very similar to each other and difficult to distinguish. They occasionally hybridize with each other in Lake Ontario.
Smelts		
☐ **Rainbow Smelt** (19.0 cm, 27.3 cm, 6 yrs)	I	The Rainbow Smelt constitutes about 20% of the diet of species such as Chinook Salmon. As a result, population numbers have been greatly reduced from the 1970s. See page 34.
Sticklebacks		
☐ **Ninespine Stickleback** (6.5 cm, 8.9 cm, 5 yrs)	N, XP	The Ninespine Stickleback typically has nine dorsal spines. Males turn black during breeding season and, like other sticklebacks, construct tubular nests. It has not been seen in the Toronto area since 1929 and may no longer be here.
☐ **Threespine Stickleback** (5.0 cm, 7.5 cm, 4 yrs)	N	Threespine Stickleback occur in large schools in Lake Ontario. In the spring, they migrate inshore to mate. The brightly coloured male builds a barrel-shaped nest of sticks and plant material held together by kidney secretions. One or more females are lured into the nest with a zig-zag courtship dance. The male then chases them away and guards the eggs and fry until they are ready to leave the nest.
Trout-perches		
☐ **Trout-perch** (9.0 cm, 15.0 cm, 4 yrs)	N	The Trout-perch gets its name from having features characteristic of both trout (adipose fin) and perch (fin spines and ctenoid scales). It occurs in Lake Ontario in deep water during the day and moves into shallow water at night to feed.

Checklist of Coldwater Fishes of Toronto

Fish Status: (N) Native (I) Introduced or Invasive (XP) Extirpated
Fish Statistics: (Average Ontario Length, Record Ontario Length, Maximum Age)

Common Name	Status	Comments
☐ **Atlantic Salmon** (46.0 cm, 88.9 cm, 13 yrs)	**N, I, XP**	Mounts of Atlantic Salmon taken from Samuel Wilmot's hatchery in the late 1800s are stored at the Royal Ontario Museum. DNA from these mounts is being analysed in order to select the best stock to use for reintroduction to Lake Ontario. See page 13.
☐ **Brook Trout** (28.0 cm, 80.0 cm, 7 yrs)	**N**	The Brook Trout can be recognized by pale yellow spots on the body, pale wavy lines on the back, and lower fins with white leading edges followed by a black stripe. This prized sport fish prefers coldwater streams where temperatures usually do not exceed 17°C.
☐ **Brown Trout** (41.0 cm, 96.5 cm, 38 yrs)	**I**	The Brown Trout, introduced from Europe, tolerates warmer temperatures than the Brook Trout. Individuals in streams are brown with prominent dark and orange spots, whereas individuals from Lake Ontario are silvery. See page 32.
☐ **Chinook Salmon** (88.0 cm, 119.4 cm, 9 yrs)	**I**	Chinook Salmon, the largest of the salmons, has been stocked in Lake Ontario since the 1960s, primarily to reduce the large Alewife population. Recent studies suggest a large portion of Lake Ontario Chinook Salmon are from naturalized populations. See page 33.
☐ **Coho Salmon** (48.0 cm, 107.0 cm, 5 yrs)	**I**	Similar to the Chinook Salmon, it has paler gums and its black spots are restricted to the upper lobe of the tail fin. Sexually mature adults have a light pink or rose belly. The Conook is a hybrid with Chinook which grows much larger and is occasionally caught in Lake Ontario.
☐ **Lake Trout** (44.5 cm, 130.9 cm, 50 yrs)	**N**	Lake Trout restoration efforts began in earnest during the 1970s. Today there is some natural reproduction; however, the population in Lake Ontario is currently sustained by stocking hatchery reared fish.
☐ **Rainbow Trout** (53.0 cm, 99.9 cm, 11 yrs)	**I**	The Rainbow Trout gets its name from its pinkish lateral stripe. It is more closely related to Pacific salmons than to other trouts. Rainbow Trout populations are maintained in Lake Ontario by a combination of stocking and natural reproduction. See page 32.
☐ **Cisco** (25.0 cm, 59.7 cm, 11 yrs)	**N**	Sometimes also referred to as Lake Herring, the Cisco is the most common and widespread cisco species. It is generally found in shallower waters than the deepwater ciscoes (Bloater, Kiyi, and Shortnose Cisco).
☐ **Bloater** (23.0 cm, 39.5 cm, 10 yrs)	**N, XP**	The smallest of the deepwater ciscoes, gets its name from becoming bloated when pulled up from deep water. Ciscoes are whitefishes with terminal mouths (point forward), unlike Lake and Round Whitefishes which have subterminal mouths (point downward).
☐ **Kiyi** (25.0 cm, 32.5 cm, 10 yrs)	**N, XP**	Like all ciscoes in the Great Lakes, the demise of the Kiyi in Lake Ontario is generally linked to overfishing, population /reproductive failure (due in part to historically poor water quality), and predation of larval ciscoes by the non-native Rainbow Smelt and Alewife. Eventually the flourishing Alewife populations also competed with the Kiyi for both food sources and breeding territories. During the 1920s, Kiyi made up more than half of all ciscoes caught in gill nets, but by 1942 it had almost disappeared. The Kiyi was last seen in Lake Ontario in 1964. Although the Kiyi is still extant in Lake Superior, the populations in Lakes Huron, Michigan, and Ontario have been extirpated (become locally extinct).
☐ **Lake Whitefish** (38.0 cm, 74.9 cm, 50 yrs)	**N**	The population of Lake Whitefish crashed coincident with the collapse of its favoured food, *Diporeia hoyi*. This small shrimp-like amphipod declined abruptly following the invasion of Zebra Mussel and Quagga Mussel into Lake Ontario.
☐ **Round Whitefish** (25.0 cm, 54.2 cm, 20 yrs)	**N**	The smaller Round Whitefish is less well known than the Lake Whitefish, but has been recently captured in Lake Ontario around the Toronto area. In comparison to the better known Lake Whitefish, it is sleeker and more round in cross-section.
☐ **Shortnose Cisco** (25.0 cm, <36 cm, 8 yrs)	**N, XP**	The Shortnose Cisco lived in lakes Ontario, Huron and Michigan. It disappeared from Lake Ontario in1964 and was last seen in Lake Huron in 1985. Classified by the Committee on the Status of Endangered Wildlife in Canada as Endangered, it may actually be Extinct.



Brown Trout
illustration: Charles Weiss

illustration: Charles Weiss

illustration: Karen Klitz, University of Michigan Museum of Zoology

Checklist of Coolwater Fishes of Toronto

Fish Status: (N) Native (I) Introduced or Invasive (XP) Extirpated
Fish Statistics: (Average Ontario Length, Record Ontario Length, Maximum Age)

Common Name	Status	Comments
Freshwater Eels		
☐ **American Eel** (90.0 cm, 120.0 cm, 43 yrs)	**N**	The American Eel is occasionally caught in Toronto Harbour, but the population has drastically declined. Efforts in Ontario are helping to restore populations, and more American Eels are showing up in our area. See page 30.
Gobies		
☐ **Round Goby** (7.5 cm, 24.4 cm, 4 yrs)	**I**	Because of its abundance, the Round Goby has become one of the best known fishes in the Great Lakes. It threatens to reduce the biodiversity of native bottom-dwelling fishes such as sculpins and darters in both Lake Ontario and Toronto streams. See page 50.
Herrings		
☐ **Gizzard Shad** (25.0 cm, 50.4 cm, 14 yrs)	**N, I**	The Gizzard Shad is a large freshwater herring that can be found in Lake Ontario and the slow sections of rivers such as the Humber and Rouge rivers. Like other herrings, it can be recognized by its saw-toothed belly. It's not clear if this species is native or invasive.
Lampreys		
☐ **Silver Lamprey** (25.5 cm, 30.6 cm, 8 yrs)	**N, XP**	The Silver Lamprey was recorded in Toronto Harbour in 1858 but has not been seen since. This native parasitic lamprey is not as destructive as the larger Sea Lamprey and has been negatively affected by Sea Lamprey control measures.
Minnows		
☐ **Blacknose Dace** (8.0 cm, 10.0 cm, 3 yrs)	**N**	The Blacknose Dace is one of Toronto's four most common and tolerant species of fishes that occur in small to medium streams. The other three are Creek Chub, Longnose Dace, and White Sucker. These four species can tolerate the degraded conditions in urban streams.
☐ **Blacknose Shiner** (6.5 cm, 9.5 cm, 8 yrs)	**N**	The Blacknose Shiner is found in clear, shallow lakes and quiet areas of streams with many aquatic plants. It has been declining from many areas of southern Ontario.
☐ **Brassy Minnow** (6.5 cm, 9.6 cm, 3 yrs)	**N**	The Brassy Minnow gets its name from its body colour. This uncommon species is frequently confused with the much hardier Fathead Minnow, which is similar in appearance.
☐ **Common Shiner** (9.0 cm, 18.0 cm, 4 yrs)	**N**	A large shiner, this is our most common stream shiner and can be seen spawning in shallow streams in May over nests often built by the Creek Chub. It is most common in streams, but can also be found in lakes.
☐ **Creek Chub** (10.0 cm, 29.4 cm, 10+ yrs)	**N**	The Creek Chub is one of the most abundant and widespread fishes in Toronto's streams. The male, sometimes over 25 cm in length, builds a nest of pebbles, which he moves one by one with his large mouth. Males battle for possession of a nest (a depression in the gravel that is kept clear of silt), chasing each other away. Surprisingly, he will allow males and females of other species such as the Common Shiner and the Redside Dace to spawn in his nest.
☐ **Emerald Shiner** (7.5 cm, 12.4 cm, 4 yrs)	**N**	The Emerald Shiner is most common in lakes, but during the spring will move into lower sections of streams where it spawns. It is often at this time that tens of thousands are caught for use as bait. Because it is so abundant in Lake Ontario, it is often used as food by fish-eating birds such as gulls and terns as well as larger predatory fishes.
☐ **Golden Shiner** (10.0 cm, 23.0 cm, 5 yrs)	**N**	The Golden Shiner is common in both the shallow waters of lakes and ponds, and in the pools of streams where there are usually plenty of aquatic plants. Large adults become golden in colour.
☐ **Hornyhead Chub** (9.0 cm, 16.0 cm, 4 yrs)	**N**	Like many other minnows, the male Hornyhead Chub develops nuptial tubercles (sharp horns) on his head, which are used in battles with other males during mating season.
☐ **Longnose Dace** (7.5 cm, 15.2 cm, 5 yrs)	**N**	The Longnose Dace is tolerant of high temperatures, low oxygen levels, and high turbidity, and therefore does well in urban watersheds. It is found in the very fast-flowing water of streams, as well as the wave-swept shallows of Lake Ontario. Its inferior mouth (a mouth located on the underside of the fish's head) is reminicscent of a sucker.
☐ **Northern Pearl Dace** (9.0 cm, 16.0 cm, 10+ yrs)	**N**	The Northern Pearl Dace is very rare in Toronto streams, only found in Etobicoke Creek and the Don River, where it is has not been recorded since 1966 despite numerous scientific surveys.

Checklist of Coolwater Fishes of Toronto

Fish Status: (N) Native (I) Introduced or Invasive (XP) Extirpated
Fish Statistics: (Average Ontario Length, Record Ontario Length, Maximum Age)

Common Name	Status	Comments
Minnows (cont'd)		
☐ **Northern Redbelly Dace** (5.5 cm, 8.0 cm, 7 yrs)	N	The Northern Redbelly Dace is one of Toronto's most colourful minnows. Some individuals have bright red or bright yellow bellies. They are much more common up north where they are easily captured in minnow traps.
☐ **Redside Dace** (7.5 cm, 10.7 cm, 4 yrs)	N	The majority of the Canadian range of the Redside Dace is in the Greater Toronto Area. The introduction of predators such as Northern Pike may also be threatening the Redside Dace in other parts of its range where urbanization is not a threat. See page 55.
☐ **River Chub** (10.0 cm, 23.9 cm, 5 yrs)	N	This uncommon chub is occasionally found in Etobicoke Creek and the Humber River. Like other chubs, the male is larger than the female and builds a nest of pebbles that is used for spawning and rearing of young.
☐ **Spottail Shiner** (7.0 cm, 14.2 cm, 5 yrs)	N	A common and widespread shiner, the Spottail Shiner is characterized by a large black spot at the base of its tail fin. Like the Emerald Shiner, it is more commonly found in lakes than streams.
☐ **Striped Shiner** (8.0 cm, 23.8 cm, 4 yrs)	I	The Striped Shiner was captured once in the Humber River where it was probably introduced by man. It is very similar in appearance to the Common Shiner and once was considered the same species.
Mudminnows		
☐ **Central Mudminnow** (7.5 cm, 14.0 cm, 9 yrs)	N	This small fish is not a minnow, but is closely related to the pikes. Like members of the pike family, it lurks in cover, waiting to ambush prey. It is currently classified as a separate family, but recent studies indicate that it should be classified in the pike family.
Perches		
☐ **Blackside Darter** (6.0 cm, 9.9 cm, 4 yrs)	N, I	Darters are small fishes that dart about on the bottom. The Blackside Darter is a recent arrival to Toronto streams, first discovered in the Humber River in 1992. The adult is characterized by very large black blotches on the side.
☐ **Fantail Darter** (5.0 cm, 8.2 cm, 4 yrs)	N	This darter is named after its fan-shaped tail. The spawning male develops small white knobs on his dorsal fin. These knobs are thought to mimic eggs and are used to trick the female into thinking that there are already eggs laid in his nest. When spawning, a female is more likely to enter a nest that already has eggs in it.
☐ **Iowa Darter** (5.0 cm, 7.2 cm, 3 yrs)	N	This darter is uncommon in Toronto. The spawning male is brightly coloured, his body and fins having blue and red stripes and bars. In the spring, the Iowa Darter migrates into shallow water preferring to spawn among underwater roots and vegetation.
☐ **Johnny Darter** (5.0 cm, 7.2 cm, 4 yrs)	N	The Johnny Darter is the most common and widespread darter in the Toronto area, found in a variety of stream and lake habitats. It is charactrerized by X, W, and Y-shaped black markings on the body.
☐ **Least Darter** (2.5 cm, 4.2 cm, 2 yrs)	N, XP	Once recorded in Grenadier Pond sometime between 1910-1930, this darter has not been seen since. As its name suggests, it is Canada's smallest vertebrate. Ontario and World record size being 4.2 cm in length.
☐ **Logperch** (9.0 cm, 18.0 cm, 3 yrs)	N	Toronto's largest darter is the Logperch. This common darter has a long snout, which it uses to turn over pebbles as it searches for aquatic invertebrate prey. It is distinguished by numerous narrow dark bars which are sometimes formed into a tear drop.
☐ **Rainbow Darter** (5.5 cm, 7.9 cm, 3 yrs)	N	The Rainbow Darter is common in Toronto streams. Although juveniles and females are rather drab brown, the male is perhaps Canada's most colourful fish.
☐ **Sauger** (33.0 cm, 58.4 cm, 7 yrs)	N, XP	The Sauger was last recorded in Toronto Harbour in 1913, but has not been seen since. The Sauger is similar to the Walleye, but differs in having a spotted dorsal fin and in lacking a white tip on the lower lobe of the caudal fin.
☐ **Tessellated Darter** (5.5 cm, 8.1 cm, 4 yrs)	N	The Tessellated Darter is very similar to, and extremely difficult to separate from, the Johnny Darter. In Toronto, it is usually only found in Lake Ontario and the lower sections of streams.
☐ **Walleye** (42.0 cm, 92.7 cm, 29 yrs)	N	Frequently referred to as pickerel; the official common name for this fish is Walleye. It has large eyes that are very sensitive to light. This highly predatory species is making a comeback in the Toronto Harbour and Lakefront, an indication that the fish habitat has improved.
☐ **Yellow Perch** (18.0 cm, 38.4 cm, 11 yrs)	N	The Yellow Perch is a widespread common species that is a valuable commercial and sport fish. It is easily recognized by its six or seven prominent dark bars on the body.

Checklist of Coolwater Fishes of Toronto

Fish Status: (N) Native (I) Introduced or Invasive (XP) Extirpated
Fish Statistics: (Average Ontario Length, Record Ontario Length, Maximum Age)

Common Name	Status	Comments
Pikes		
☐ **Northern Pike** (61.0 cm, 134.6 cm, 30 yrs)	N	Northern Pike has been scarce in the Toronto area for many years, but it is making a successful comeback primarily because the Lake Ontario habitat has improved. See page 25.
Sticklebacks		
☐ **Brook Stickleback** (5.0 cm, 8.7 cm, 3 yrs)	N	The Brook Stickleback is a common species that becomes very abundant in habitats where few other fishes can survive. Like other sticklebacks, the male lures the female into a tubular nest. After the eggs are laid, he chases the female away and guards the eggs and fry.
Sturgeons		
☐ **Lake Sturgeon** (117.0 cm, 223.5 cm, 154 yrs)	N	The Lake Sturgeon is very vulnerable to exploitation and its harvest in Lake Ontario declined abruptly around 1900. It was last seen in Toronto in 1927. See page 23.
Suckers		
☐ **Shorthead Redhorse** (41.0 cm, 61.5 cm, 20 yrs)	N	Redhorses are suckers often with red fins and a horse-like face. Toronto is home to the most common of six species known in Ontario. The Shorthead Redhorse is named for its relatively small head.
☐ **Quillback** (31.5 cm, 62.0 cm, 11 yrs)	N	The Quillback is a type of carpsucker. Its body and fins are similar to a carp, but it has a ventral (downward) sucking mouth with thick fleshy lips like a sucker. The front of the dorsal fin has an elongated fin ray similar to a quill. It is very rare in the Toronto area of Lake Ontario.
☐ **White Sucker** (41.0 cm, 58.9 cm, 12 yrs)	N	The White Sucker is very abundant and widespread occurring in a variety habitats from pristine trout streams to degraded urban streams. Large schools of this fish, which can grow to over 50 cm and 2 kgs, can be seen spawning in Toronto streams from April to early June.
Sunfishes		
☐ **Rock Bass** (20.0 cm, 29.2 cm, 10 yrs)	N	The Rock Bass is often found over rocky bottoms. It is easily recognized by the numerous black spots on its body arranged in regular rows and its six anal spines. Except for both the Black Crappie and White Crappie, all other Ontario sunfishes have only three anal spines.
☐ **Smallmouth Bass** (30.0 cm, 61.0 cm, 26 yrs)	N	True basses, such as White Bass, have two separate dorsal fins and a relatively shallow body. The Smallmouth Bass is actually a sunfish that looks like a bass. In addition to its shallow body, it has a deeply notched dorsal fin that could be mistaken for two fins.
Topminnows		
☐ **Banded Killifish** (7.0 cm, 9.9 cm, 3 yrs)	N	Often confused with minnows, this little fish can be distinguished from them by its rounded (vs. forked) tail and the prominent bars on the body. It can also be confused with the Central Mudminnow, but has a smaller mouth. It feeds primarily near the surface of the water on invertebrates such as mosquito larvae.

White Sucker
illustration: Charles Weiss

Northern Pike
illustration: Charles Weiss

Checklist of Warmwater Fishes of Toronto

Fish Status: (N) Native (I) Introduced or Invasive (XP) Extirpated
Fish Statistics: (Average Ontario Length, Record Ontario Length, Maximum Age)

Common Name	Status	Comments
Bowfins		
☐ **Bowfin** (54.0 cm, 83.5 cm, 12 yrs)	**N**	The primitive Bowfin is a predatory fish that can be found in Grenadier Pond and in the waters around Toronto Islands. It can be distinguished by a large bony (gular) plate on the underside of its head and by a very long dorsal fin, which runs from its mid-back all the way to the base of the tail. The Bowfin has a short anal fin, unlike the non-native snakehead fishes with which it's often confused.
Drums		
☐ **Freshwater Drum** (48.0 cm, 88.9 cm, 10 yrs)	**N**	Like other drums and croakers, the Freshwater Drum is named after the loud drumming sound produced by the male by flexing muscles against its swim bladder. He probably makes this sound to attract the female during the early summer spawning season. The Freshwater Drum can be found in shallow waters of the Toronto Islands and Tommy Thompson Park.
Gars		
☐ **Longnose Gar** (76.0 cm, 129.5 cm, 36 yrs)	**N**	The Longnose Gar can tolerate very warm water with low oxygen because of its ability to breathe air. The jaws of this predatory fish are armed with sharp needle-like teeth, which it uses to catch small fishes. Once a fish is captured, the Longnose Gar swallows it head first.
Minnows		
☐ **Bluntnose Minnow** (6.5 cm, 10.1 cm, 5 yrs)	**N**	The Bluntnose Minnow is a very common fish found in a wide variety of quiet or slow-moving waters. Part of its success may be due to the great care that the male exerts in building a nest and caring for his offspring.
☐ **Central Stoneroller** (10.0 cm, 15.0 cm, 5 yrs)	**I**	The Central Stoneroller was first seen in the Rouge River in 1984, and its population probably resulted from a bait bucket introduction. Sometimes called a "stream cow", it does well in small to medium streams that have high nutrients and abundant algae attached to rocks. The stoneroller scrapes off the algae with its cartilaginous lower lip.
☐ **Common Carp** (37.0 cm, 99.1 cm, 20 yrs)	**I**	In addition to the normally scaled Common Carp (see page 34), another variety, the Mirror Carp, is occasionally encountered. Mirror Carp have several enlarged scales and patches of naked skin. Domesticated varieties resembling Goldfish are called Koi. See page 49.
☐ **Fathead Minnow** (5.0 cm, 10.0 cm, 6 yrs)	**N**	The Fathead Minnow is widespread throughout the City's streams and ponds and in shallow inshore areas of Lake Ontario. It often does well in poor quality water where there is little or no competition from other fishes.
☐ **Goldfish** (19.0 cm, 39.9 cm, 30 yrs)	**I**	Like the native Fathead Minnow, the introduced Goldfish often does well in poor quality water where there is little or no competition from other fishes. Goldfish occasionally hybridize with Common Carp. See page 49.
☐ **Grass Carp** (<90 cm, 125 cm, 11 yrs)	**I**	Two individuals of this Asian carp, one from Grenadier Pond and the other from the mouth of the Don River, have been captured in Toronto. Grass Carp have been introduced to some areas in the U.S. for weed control. To prevent reproduction in nature, before release, the eggs are shocked with a rapid change in temperature or pressure to produce sterile fish with three sets of chromosomes.
☐ **Rosyface Shiner** (6.5 cm, 8.7 cm, 3 yrs)	**N**	The Rosyface Shiner is found in streams such as Etobicoke Creek, Humber River, Don River, Highland Creek, and Rouge River. It appears to have declined or been extirpated from many areas.
☐ **Sand Shiner** (6.5 cm, 8.5 cm, 3 yrs)	**N**	The Sand Shiner is a small and poorly known shiner that was once more widespread in Toronto streams. Small populations still occur in the Humber and Rouge rivers, but it has disappeared from Mimico Creek and Highland Creek.
☐ **Spotfin Shiner** (7.5 cm, 11.5 cm, 5 yrs)	**N**	The male Spotfin Shiner becomes bluish silver with white fin tips and courts the female by raising his dorsal fin and vibrating. Eggs are laid in crevices where they are better protected from predation.
Mooneyes		
☐ **Mooneye** (28.0 cm, 40.0 cm, 10 yrs)	**N, XP**	The Mooneye was last seen in Toronto in 1913. It is more common in Lake Erie and migrates up the Grand River in early spring where it is sought after by fly fisherman.
New World Silversides		
☐ **Brook Silverside** (7.5 cm, 10.8 cm, 2 yrs)	**N**	The Brook Silverside is capable of leaping out of the water to catch flying insects near the water's surface. It is a short-lived species, dying shortly after spawning at typically only one year old.