Ministry of Natural Resources

Ontario

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Fish and Fisheries Management in Ontario: A Chronology of Events

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Common and Scientific Names of Fishes and Aquatic Organisms Cited in Text

Alewife (*Alosa pseudoharengus*)
American eel (*Anguilla rostrata*)
American shad (*Alosa sapidissima*)
American smelt (*Osmerus mordax*)
Arctic char (*Salvelinus alpinus*)
Atlantic salmon (*Salmo salar*)
Aurora trout (*Salvelinus fontinalis*)
Ayu (*Plecoglossus altivelis*)
Black crappie (*Pomoxis nigromaculatus*)
Bluegill (*Lepomis macrochirus*)
Blue pickerel (*Sander vitreus*)
Brook trout (*Salvelinus fontinalis*)
Brown trout (*Salmo trutta*)
Burbot (*Lota lota*)
Channel catfish (*Ictalurus punctatus*)
Cherry (masu) salmon (*Oncorhynchus masu*)
Chinese mitten crab (*Eriocheir sinensis*)
Chinook salmon (*Oncorhynchus tshawytscha*)
Chum salmon (*Oncorhynchus keta*)
Coho salmon (*Oncorhynchus kisutch*)
Common carp (*Cyprinus carpio*)
Danube salmon (*Hucho hucho*)
Freshwater drum (*Aplodinotus grunniens*)
Kokanee salmon (*Oncorhynchus nerka*)
Kamloops trout (*Oncorhynchus mykiss*)
Lake herring (*Coregonus artedii*)
Lake sturgeon (*Acipenser fulvescens*)
Lake trout (*Salvelinus namaycush*)
Lake whitefish (*Coregonus clupeaformis*)
Largemouth bass (*Micropterus salmoides*)
Mullet (*Catostomus* spp.)
Muskellunge (*Esox masquinongy*)
Northern clearwater crayfish (*Orconectes propinquus*)
Northern pike (*Esox lucius*)
Paddlefish (*Polyodon spathula*)
Papershell crayfish (*Orconectes immunis*)
Pikeperch (*Lucioperca lucioperca*)
Pink salmon (*Oncorhynchus gorbuscha*)
Pumpkinseed (*Lepomis gibbosus*)
Quagga mussel (*Dreissena bugensis*)
Rainbow trout (*Oncorhynchus mykiss*)
Redside dace (*Clinostomus elongates*)
Redspot salmon (*Oncorhynchus rhodurus*)
Round goby (*Neogobius melanostomus*)
Ruffe (*Gymnocephalus cernua*)
Rusty crayfish (*Orconectes rusticus*)
Sea lamprey (*Petromyzon marinus*)
Smallmouth bass (*Micropterus dolomieu*
Spiny water flea (*Bythotrephes cederstroemi*)
Splake (*Salvelinus namaycush* x *S. fontinalis*)
Suckers (*Catostomus* spp.)
Sunfish (*Lepomis* spp.)
Walleye (*Sander vitreus*)
White perch (*Morone americana*)
Yellow perch (*Perca flavescens*)
Zebra mussel (*Dreissena polymorpha*)

List of Acronyms Cited in Text

AFS – American Fisheries Society
AHI – Aquatic Habitat Inventory
A/OFRC – Ashinabek/Ontario Fisheries Resource Centre
AOC – Area of Concern
ARMAC – Aquatic Resource Management Advisory Group
ASPY – Assessment of Stock Prediction and Yields
BAO – Bait Association of Ontario
BNA – British North America Act
BTIN – Brook Trout Index Netting
CARS – Canadian Aquatic Resource Section
CCFAM – Canadian Council of Fisheries and Aquaculture Ministers
CCIW – Canada Centre for Inland Waters
CEAA – Canadian Environmental Assessment Act
CFIP – Community Fisheries Involvement Program
CFWIP – Community Fisheries and Wildlife Involvement Program
CSFA – Crown Forestry Sustainability Act
CLAR – Conference on Lake Trout Research
CNSS – Canadian National Sportsman Shows
CONFAB – Canada Ontario Fisheries Advisory Board
COSEWIC – Committee on the Status of Endangered Wildlife in Canada
COSSARO – Committee on the Status of Species at Risk in Ontario
CPR – Canadian Pacific Railway
CREESYS – Creel Survey Information System
DFO – Department of Fisheries and Oceans
EARP – Environmental Assessment Review Process
EFFM – Ecological Framework for Fisheries Management
ELA – Experimental Lakes Area
ESTN – End of Spring Trap Netting
FAU – Fisheries Assessment Unit
FFMC – Freshwater Fish Marketing Corporation
FISHNET – Fish Netting Information System
FON – Federation of Ontario Naturalists
FWIN – Fall Walleye Index Netting
GEA – Green Energy Act
GLFC – Great Lakes Fishery Commission
GLPC – Great Lakes Power Corporation
IJC – International Joint Commission
IPCC – Intergovernmental Panel on Climate Change
LARS – Large Rivers Symposium
MCI – Muskies Canada Incorporated
MEI – Morphoedaphic Index
MMAH – Ministry of Municipal Affairs and Housing
MNR – Ministry of Natural Resources
NLRS – Northern Lakes Recovery Strategy
NOTO – Northern Ontario Tourist Outfitters
NSCIN – Nearshore Community Index Netting
OCFA – Ontario Commercial Fisheries Association
OCFC – Ontario Competitive Fishing Council
ODLF – Ontario Department of Lands and Forests
OFAH – Ontario Federation of Anglers and Hunters
OFIS – Ontario Fisheries Information System

OFPA – Ontario Fish Producers Association
OSAP – Ontario Stream Assessment Protocol
PERCIS – Percid International Symposium **QUBS** – Queens University Biological Station
RAP – Remedial Action Plan
RESTORE – Restoration of Lake Trout in the Laurentian Great Lakes
SARA – Species at Risk Act
SCOL – Salmonid Communities in Oligotrophic Lakes
SIU – Special Investigations Unit
SLIN – Spring Littoral Index Netting
SLIS – Sea Lamprey International Symposium
SPA – Special Purpose Account
SPOF – Strategic Planning for Ontario Fisheries
STOCS – Stock Concept Symposium
TFM – 3-Trifluoromethyl-4-Nitrophenol
TUC – Trout Unlimited Canada
VHS – Viral Hemorrhagic Septicemia

Introduction

Ontario has a long history of fisheries management dating back well over a century. This report has been prepared in an attempt to identify events of significance to fisheries managers and detail how fisheries management has evolved over the past 200 years. It is a mixture of history, anecdotes, and factual information.

Information has been drawn from a variety of published sources (see References). In addition, many MNR staff have contributed information for the preparation of this chronology. These included Paul Bewick, Joe Churcher, Ed Desson, Paul Drysdale, Warren Dunlop, John Goodier, Gareth Goodchild, Susan Greenwood, Dr. Harold Harvey, Dr. Tim Haxton, Sarah Hogg, Glenn Hooper, Jack Imhof, Dr. Brenda Koenig, Dave Loftus, Dave Maraldo, Terry Marshall, Gary Martin, Darryl McLeod, Ola McNeil, Lloyd Mohr, Tom Mosindy, Charlie Olver, Brian Polhill, Klaas Oswald, Jim Reckahn, Dr. Henry Regier, Dave Reid, Henk Rietveld, Mark Robbins, Audie Skinner, Evan Thomas, Bruce Tomlinson, and Dr. Tom Whillans. Mark Cousins, Ontario Federation of Anglers and Hunters also provided information used in the document. Brenda Koenig and Matt Garvin are gratefully acknowledged for their editorial reviews of an earlier draft of this document.

It is hoped that this document will serve as a useful reference for new MNR staff as well as members of the public having an interest in Ontario's fisheries.

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An Overview of Fisheries Management in Ontario

European exploration of what is now Ontario began early in the 17th century. There are numerous reports from explorers describing the abundance of fish and wildlife which, at the time, appeared to be inexhaustible. This sentiment was later shared by many of Ontario's early settlers: "river, lake, stream and brook teamed with fishes" (Gourlay 1896). The development of the fur trade served to open up northern Ontario and establish fish as a resource for barter and exploitation. Most of the early permanent settlements were fur trading posts and forts. Some of the earlier records of fish distribution were recorded by managers of local fur trading posts. At these posts, fish, particularly lake trout and lake whitefish, were a regular diet item. Fish were also salted, packed in barrels, and distributed to posts further inland

Between 1800 and 1850 settlement of Ontario was well underway particularly in the south. Early settlements followed waterways: the St. Lawrence and Ottawa rivers, Great Lakes and inland waterways. Between 1830 and 1833 the population of Upper Canada increased by fifty percent. Most treaties were signed with First Nations during this period of time. It was also during this period that human impacts on fisheries and aquatic resources were first recognized. Land was cleared, dams and sawmills were constructed on many Great Lakes tributaries and canals were being constructed. Subsistence fishing by both First Nations people and non-aboriginal fishers was important. There are early Jesuit accounts of Crees and Ojibways starving to death during winters when fish and wildlife resources were scarce (Alison 1976). Significant portions of their catch were traded, not sold, for cash. Commercial fishing also became established on the Great Lakes during this period. Between pollution, overexploitation, and dams blocking spawning streams, Atlantic salmon started to display declines in some portions of Lake Ontario. In response, the first laws were enacted to prevent overexploitation and artificial fish propagation was developed in the widely held belief that fish stocking could counterbalance the combined effects of pollution, overfishing, and loss of spawning grounds.

Commercial fisheries grew rapidly and fishing techniques improved dramatically during the period from 1850-1900 (Regier et al. 1999). By the mid 1890s more than twelve million yards of gill net were licensed for Ontario waters of the Great Lakes. By this point, commercial harvest of lake sturgeon from the Great Lakes had peaked. Atlantic salmon had been extirpated in Lake Ontario by the 1890s. Commercial fisheries had intensified on lake whitefish with improved gear and technology (Ebener et al. 2008). Management responses to the overall decline in many species included new regulations and the appointment of the first fisheries overseers. From a fisheries perspective, the period from 1860 to 1900 was focused largely on fish culture lead by the efforts of Samuel Wilmot. Stocking of hatchery-reared fish, including several non-native species such as rainbow trout, common carp and Chinook salmon, increased. Transfers of bass were also initiated in many inland waters. Increasing concerns over the declining status of many fisheries lead to the formation of the first fish and game protective associations and, in 1890, a special Fish and Game Commission was established to determine the status of game and fish in the province. Their report, submitted two years later included a widespread series of regulations, including length and creel limits, on most sport species. This era also represented a period of poor relations between the federal and provincial governments over management of the sport and commercial fisheries. The question of jurisdiction was eventually ceded to the province by the Privy Council in England and *Ontario's Fishery Regulations* were extended to cover many areas of former federal responsibility.

The period from 1900 to 1950 may best be known for the continued deterioration in water quality of the lower Great Lakes and the introduction and spread of several invasive species, notably

American smelt and sea lamprey throughout the Great Lakes. Lake herring stocks had collapsed in Lake Erie and the American eel had been extirpated from waters of Algonquin Park. During the world wars there was a general relaxation of conservation efforts on Great Lakes fisheries on behalf of the war effort (Regier et al. 1999). Fisheries management efforts during this period were directed largely to addressing overexploitation and attempting to enhance resident fisheries. Fish stocking and transfer programs were expanded and several deliberate introductions of non-native species (e.g., brown trout, Kamloops (rainbow) trout, walleye in the Kawartha lakes, bass in northern Ontario, etc.) were undertaken. The provincial government assumed control of all federal fish hatcheries in Ontario. It was during this time that a new provincial Department of Fish and Game was established under direction of a provincial cabinet minister. Some years later, the Department of Fish and Game was amalgamated with the Ontario Department of Lands and Forests. This amalgamation established a unified responsibility for management of natural resources on Crown lands. It also represented a general shift from protection and conservation to scientific management. Also of significance was the fact that several surveys were conducted (and subsequently published) on the province's larger waters in the early 20th century. Increasing concern and attention was being directed to water pollution during this period. Surveys were initiated to investigate occurrences of pollution and an increasing number of cases were prosecuted. The Ontario Water Resources Commission was eventually established in 1957.

As a result of sea lamprey predation and unregulated exploitation, lake trout had been extirpated from Lakes Erie, Ontario and Michigan; were nearly extirpated from Lake Huron; and were at low levels of abundance in Lake Superior by the 1950s. The Great Lakes Fishery Commission was established to coordinate efforts among various Great Lake jurisdictions to control the sea lamprey. Large scale stocking programs for lake trout were also initiated between 1950 and 1975. Several other species of Pacific salmon (e.g., kokanee, coho, pink, chum) were stocked into Ontario waters and experimentation began with a lake trout x brook trout hybrid (splake). The 1950s and 1960s witnessed the continued decline in water quality and fish stocks in the lower Great Lakes (Beeton 1965, Christie et al. 1999). Lake Erie was declared "dead". Blue pickerel were no longer found in Lake Erie and Aurora trout were extirpated from the wild during this time. There were significant population declines of walleye from Black Bay (Lake Superior) and the Bay of Quinte (Lake Ontario). Lake whitefish also declined in the Bay of Quinte. A *Great Lakes Water Quality Agreement* was signed with the United States (U.S.) in 1972 and measures to control the flow of nutrients into the Great lakes were initiated shortly thereafter. In July, 1971, a symposium entitled *Salmonid Communities in Oligotrophic Lakes (SCOL)* was convened in Geneva Park near Orillia, Ontario. The SCOL symposium represented a watershed event in fisheries management by documenting responses of fish communities to various stressors and by introducing the concept of an ecosystem approach to fisheries management. The number of biologists, research scientists and conservation officers increased during the later part of this period and, in 1972, the Ontario Department of Lands and Forests was reorganized to become the Ontario Ministry of Natural Resources. One of the first major initiatives was the implementation of a multi-year provincial Aquatic Habitat Inventory program. This period also marked the construction of several major hydroelectric facilities as well as the opening of the St. Lawrence Seaway. Two new issues which appeared on the horizon were increasing impacts from invasive aquatic species and the deterioration of water quality from acid precipitation (both rain and snow).

Between 1975 and 2000, several major advances were made in fisheries management. The *Strategic Planning for Ontario Fisheries* (SPOF and subsequently SPOF II) initiative introduced several new concepts which sparked new policy development, modernization of the commercial fishery, introduction of a resident sport fishing licence, establishment of fisheries assessment units, the formulation of district fisheries management plans, and the need to manage fisheries on

an ecosystem basis. This period also represented a time when great strides were made in the development of new fisheries science. This included several international symposia (e.g., SLIS, STOCS, CLAR, ASPY, PERCIS and LARS), two science synthesis exercises (lake trout and percid community synthesis) and the development of several provincial sampling protocols (e.g., SLIN and NSCIN). The development of new science can be attributed to a collaborative network which included federal and provincial agencies as well as anglers, commercial fishers and academia. In 1986, the federal government released its fish habitat policy of "no net loss." From a regulatory perspective, the provincial *Game and Fish Act* was replaced by the *Fish and Wildlife Conservation Act*. During this time, provincial policy development priorities also included wetlands, fish stocking, lake trout, baitfish, aquaculture and contributions to Ontario's Lands for Life and, subsequently, the Living Legacy land use planning initiative.

Prior to 1997, the Ontario Ministry of Natural Resources (MNR) had been the primary agency responsible for fish habitat management in Ontario with the federal Department of Fisheries and Oceans (DFO) retaining the authority to authorize the harmful alteration, disruption, and destruction of fish habitat. In 1997, by way of a Memorandum of Understanding between MNR and DFO, the federal government reassumed responsibility for the enforcement of harmful alteration of habitat offences and the introduction of deleterious substance provisions of the *Fisheries Act*. This memorandum has evolved over the years to involve more and more agencies with an interest in fish habitat and the quality of natural waters to the point were the 2007 Inter-Jurisdictional Protocol for Fish Habitat and Associated Water Quality engaged four federal and four provincial agencies and incorporated 16 different statutes.

Since 2000, the most significant undertaking has been the *Ecological Framework for Fisheries Management (EFFM)*. This has involved designation of new Fisheries Management Zones (FMZ), streamlining regulations, creation of FMZ Advisory Councils, and the development and implementation of a state of the resource monitoring program. The EFFM represents a shift in management from a waterbody by waterbody basis to management at a landscape level. Major issues involved the continued introduction and spread of invasive species, and habitat-related impacts from a number of sources including increased hydroelectric development and climate change. With the passing of the provincial *Endangered Species Act (2007)*, more emphasis was directed to rare and threatened species. The fisheries (commercial and recreational) for lake sturgeon and American eel were closed and recovery efforts were initiated. Other significant policy development activities included a framework for watershed-based fisheries management planning and a food fish safety policy.

Chronology of Events

Pre European Contact

- Historically, the waters of Ontario were extensively fished by First Nations people for personal, community, and ceremonial purposes. Fish remains, dating several hundred years old, have been discovered at several archaeological sites in Ontario (McAllister 1961, 1962, Qadri and McAllister 1967). On the upper Great Lakes, lake whitefish were an important staple in the diet of aboriginal people and many villages were located near whitefish spawning grounds. Aboriginal people depended heavily on subsistence fishing (Quimby 1960, Rogers 1972, Hansen 1986). Fish were a regular and predictable food source during the spring and fall spawning seasons (Bogue 2000). Fish could also be dried and stored for longer periods of time than meat. Early European explorers reported First Nations people fishing with gill nets (often made of hemp or twisted and knotted strands of willow bark), hoop nets, baited bone hooks,

and spears. Resource use by First Nations has been and continues to be recognized in treaty and aboriginal fishing rights across the province.

1610

- Lake Huron is believed to have been the first of the Great Lakes to be discovered by Europeans. Etienne Brulé, accompanied by Huron Indians, paddled from Lake Nipissing to Georgian Bay via the French River. By 1620, Brulé is believed to have travelled as far west as Lake Superior.

1611

- Searching for the northwest passage, Henry Hudson visits Hudson Bay and claims the region for Great Britain.

1615

- Samuel de Champlain's expedition up the Ottawa River, overland to Lake Nipissing, and down the French River to eastern Georgian Bay. Champlain was reportedly enthused about hunting and fishing and made note of large quantities of fish caught by the Huron Indians using weirs at the Atherly Narrows between Lakes Simcoe and Couchiching. He also reported observations of Indians fishing with gill nets through the ice in Georgian Bay.
- On a trip up the Ottawa River with the Huron nations, Récollets priest Joseph Le Caron noted: "In places on the river and the lakes where they might catch fish they dragged behind them a line, putting on and fastening to the hook a piece of skin cut from a frog, and sometimes they caught fish with it, which gave a taste to the pot. But when not pressed for time, as on their way down [the Ottawa], some of them would go and set their nets in the rivers in which they often caught good fish, such as pike, sturgeon, and carp (not like ours however, neither so good nor so big) and several other kinds of fish which we have not got here [in France]" (Greening 1961).

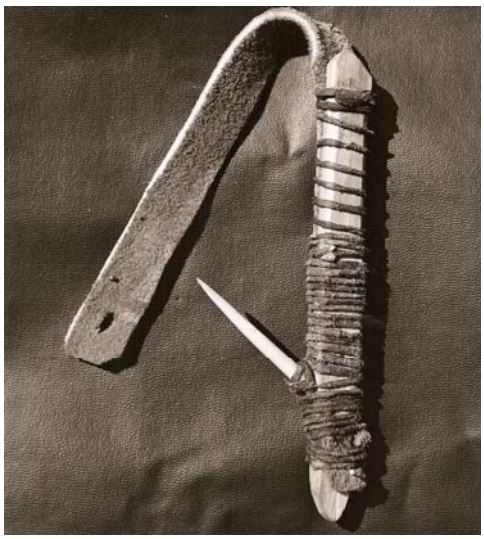


Figure 1. Early fish hook made of caribou bone and tied with caribou thongs (T. Jenkins photo)

1623

- Recorded observations by Gabriel Sagard of fish caught in nets set in Lake Huron: "In this freshwater sea, there are lake sturgeon, *Assihendos* (whitefish), trout and pike of such monstrous size that nowhere else are they found bigger and it is the same with many other species of fish that are unknown to us here [in France]" (Bogue 2000).

1624

- Reports of Huron Indians on Lake Simcoe "putting aside the biggest and fattest *Assihendo* (believed to be whitefish) to boil in great kettles in order to get oil from them" (MacCrimmon and Skobe 1970).

1634

- Jesuit mission to the Hurons. A permanent mission (Sainte Marie among the Hurons) was established by 1639 but was burned to the ground during a war with the Iroquois in 1649.

1640

- Jesuits describe a large camp of native people fishing on the Grand River.

1655

- A Jesuit missionary, Father Claude Dublon, guided by Indians, canoed into Lake Ontario from the north shore.

1659

- Radisson and Grosselier were believed to be the first Europeans to land at the head of the Great Lakes.

1664

- Jesuits make general reference to the pike and perch in the Great Lakes (Thwaites 1898).

1667

- Jesuits describe the importance of Lake Superior fisheries to the natives of the area (Thwaites 1898).

1669

- Father Claude Daplon reported observations of local Indians fishing with hoop nets in the rapids of the St. Marys River for whitefish (Bogue 2000).
- Louis Jolliet was the first documented European to sight Lake Erie (Hatcher 1945). Lake Erie was the last of the Great Lakes to be explored by the Europeans since the Iroquois, who occupied the Niagara River area, were in conflict with the French and did not allow explorers or traders to pass through their territory (Casson and deGalinée 1670).

1670

- Charles II of England granted the right to trade, in areas that could be reached by Hudson Bay, to a group of traders. This led to the formation of the Hudson Bay Company. The fur trade financed early exploration in Ontario. Many of the men dispatched to manage posts were amateur naturalists who kept records of native flora and fauna including fish. Trappers also relied on fish as food for themselves and their dogs as well as bait for their traps.
- Casson and deGalinée (1670) report on spawning stocks of lake whitefish in the St. Marys River: "This river forms at this place a rapid so teaming with fish called whitefish, or in Algonkin "*Attikamegue"*, that the Indians could easily catch enough to feed 10,000 men. Each weighs six to seven pounds but it is so big and so delicate that I know of no fish that approaches it."
- An early map of Ontario and the lower Great lakes identified the upper St. Lawrence River as being an important area for eel fishing among Aboriginal people (Casson and deGalinée 1903).

1673

- The settlement of Moose Factory was established by the Hudson Bay Company followed by Fort Albany (1679), Severn House (1680) and York Factory (1684). Considerable exploration of the larger Hudson Bay tributaries, including the Moose and Albany rivers, occurred during this period.
- Fort Frontenac was constructed at the site of present day Kingston. The fort was constructed by the French to protect their fur trading interests from the British.

1674

- Jesuits describe a summertime gathering of local First Nations at the St. Mary's Rapids, Sault Ste. Marie, for the lake whitefish fishery (Thwaites 1898). This fishery can be traced back to at least 1640 when dried fish may have been used as currency (MacDonald 1978).

Figure 2. Ojibwas fishing in the St. Marys rapids near Sault Ste. Marie circa 1900 (National Library of Canada *In* McCullogh 1989)

1679

- Rene-Robert Cavelier, Sieur de La Salle and crew with permission from the King of France sailed the upper Great Lakes in the vessel Griffon. An accompanying missionary Father Louise Hennepin described the eel fishery and salmon in Lake Ontario, lake trout frequenting the mouths of Lake Ontario tributaries in such numbers that they could be killed with sticks, the sturgeon and whitefish fishery in the area of La Salle's fort at Niagara, and setting nets weighted with stones the under the ice in 20-25 fathoms of water in Lake Huron for lake trout (Hennepin 1974).

1688

- Jacques de Noyon was believed to be the first European to reach Lake of the Woods. de Noyon reported a fall fishing expedition in which over 4,000 fish (lake whitefish, lake trout, lake sturgeon, etc.) were caught.

Late 1600s

- Early European explorers reported the importance of American eel fisheries to First Nations people.

1725

- The Michipicoten trading post was established on Lake Superior. The Michipicoten-Missinabie route was one of the most important trading routes connecting Lake Superior with James Bay. Fishing, primarily for lake whitefish and lake trout, was of vital importance to the residents as well as other Lake Superior posts.

1731

- La Verendrye reached Rainy Lake via the Pigeon River in what was the most widely used route for fur traders travelling from Lake Superior to Lake of the Woods. It subsequently became the basis for the international boundary between Canada and the United States.

1762

- Fur trader Alexander Henry's journals record spear fishing through the ice at Sault Ste. Marie (Guillet 1933).

1763

- After years of war, France ceded all of its North American territory, north and east of the Mississippi River, to Britain (Treaty of Paris). King George issued the Royal Proclamation of 1763 which still affects many of the relations and negotiations between Canada and its First Nations. The Royal Proclamation reserved "hunting grounds" for the Indian people but it did not explicitly refer to fishing as an activity which could be undertaken there (Hansen 1986).

1779

- The Northwest Company was formed. Their first post, built at the mouth of the Nipigon River, would later serve as a fishing outpost.

1789

- Explorer Alexander MacKenzie described fish encountered during his westward journey: "Lake Superior abounds in a great variety of fish which are the most excellent of their kind. There are trout of three kinds, weighing from five to fifty pounds, sturgeon, pickerel, pike, red and white carp, black bass, herring and the last and best of all, the "*Ticameg"*, or whitefish which weighs from four to sixteen pounds and is of a superior quality in these waters" (MacKenzie 1801 *In* Goodier 1982).
- Observations of Indians fishing on the St. Lawrence River: "Some Indians were in the river taking fish with harpoons. They made large fires in their canoes which attracted the fish to the surface of the water where they could see by the light of the fire to strike them" (Guillet 1933).

1780s

- Surveys were initiated to determine areas suitable for harbours on the Great Lakes.

1791

- A Constitutional Act of British parliament divided the colony of Canada into two provinces: Lower Canada (including what is now Quebec) and Upper Canada (including what is now Ontario). The first Lieutenant Governor of Upper Canada was Colonel John Graves Simcoe.

1792

- Newark (Niagara on the Lake) became the first capital of Upper Canada. The first sitting of the legislature took place on September 17, 1792. The capital was subsequently moved to York (Toronto) in 1793.

1793

- Records indicate that early settlers speared Atlantic salmon from canoes near the mouths of the Don and Humber Rivers. Many households accumulated their own winter supply of salted/pickled salmon.

1798

- A bill to protect Atlantic salmon in streams of York Township failed to pass in two successive sessions.
- The first locks were constructed at Sault Ste. Marie by the Northwest Company. They were destroyed in 1814.

- A treaty was signed with First Nations which ceded St. Joseph Island in the lower St. Marys River to Great Britain.
- A newspaper advertisement in the May 16 edition of the Gazette of York: "To be sold by public auction on Monday the second of July at John McDougall's hotel in the town of York, a valuable farm situated on Yonge Street on which is a log house and seven or eight acres well improved. It affords an excellent salmon fishery large enough to support several families."

Late 1700s
- Members of First Nations sold and traded lake whitefish to European settlers on the upper Great Lakes.

Early 1800s
- Increasing use of nets and weirs for taking fish. Reports of large numbers of fish being taken in seine nets from Lake Ontario. Lake whitefish were used as fertilizer and small whitefish, lake herring and lake sturgeon were destroyed as "nuisances."

1805
- The Mississauga Nation ceded a large tract of land along the north shore of Lake Ontario to the Crown (Hansen 1986).

1807
- An *Act for the Preservation of Salmon* was passed based on concerns about the decline of Atlantic salmon. The Act prohibited the taking of any salmon by nets or weirs from any creek or river in the Districts of Home and Newcastle. It did not prevent the use of spears or hook and line or the capture of fish from spawning grounds.

1810
- Amendments were made to the *Act for the Preservation of Salmon* which provided for a closed season (October 25 – January 1) and prohibited taking salmon within 100 yards of any mill or dam at any time. Members of First Nations were allowed to follow their traditional fishing practices. Similar Acts for the preservation of salmon were passed in 1821 and 1823. These Acts were repealed when a new Act was passed in 1845.

1817
- William Bell, a pioneer Lanark County pastor, wrote soon after his arrival in Perth: "The Mississippi Lake affords an abundance of fish for the settlers in the neighbourhood who kill them with spears in great numbers in the spring when ascending the river to spawn" (Brown 1984).

1818
- Indian surrender of territories surrounding Lake Simcoe (MacCrimmon and Skobe 1970) and in the Kawartha lakes area (Hansen 1986).

1820s
- The first relatively complete shoreline survey of the Great Lakes was completed.
- Records of commercial fishing with seine nets at Hamilton Beach, Lake Ontario.

1821
- An *Act for the Preservation of Salmon* was repealed to make further provisions respecting fisheries in other parts of the province and to prevent accidents by fire from persons fishing by

torch or firelight. The Act was amended again in 1823 to prohibit any person from buying or receiving salmon in designated areas from any Indian.
- Merger of the Hudson Bay Company and the Northwest Company.
- Some of the earliest angling records in the Sault Ste. Marie area indicate that local British soldiers "took the amusement of trout fishing and found it to be fantastic." (Spears 1913).
- An account (Goodier 1984) of making gill nets for fishing in Lake Superior: "Knitting new nets from imported twine was a major chore during the winter for nets and lines were frequently swept away in the stormy waters of autumn. Gill nets were strung with cedar floats and stones and dipped in boiled larch bark, a strengthening and darking agent."

1822
- The Boundary Commission established the border between Canada and the United States through the St. Lawrence River and the Great Lakes.

1823
- An *Act for the Better Preservation of the Herring (Coregonus spp.) Fishery at the Outlet of Burlington Bay* (Lake Ontario) was passed.
- The first extensive survey of Lake of the Woods was conducted to determine the boundary between the United States and British North America.
- Isinglass returns from the Hudson Bay Company (Lac la Pluie District) indicated that a substantial and sustained Ojibway commercial fishery for lake sturgeon existed in Lake of the Woods between 1823 and 1885. Isinglass is a substance obtained from the dried swim bladders of fish and used for the clarification of wine and beer as well as making specialized glue.

1825
- The Erie Canal opened. The 586 km canal connected the Hudson River with Lake Erie.

1827
- The Dunnville Dam was constructed near the mouth of the Grand River. By 1867 the Grand River Navigational Company had constructed dams at Mount Healey, York, Caledonia and Seneca. None of these dams had fishways and early reports indicated significant fish mortality at the base of the dams.
- Early accounts of angling in the St. Marys River near Sault Ste. Marie indicated that brook trout were taken in great abundance (McKenny 1827).

1830
- Fur companies, including the Hudson Bay Company and the American Fur Company, expanded into commercial fishing in Lake Superior so that native peoples would not be diverted from the fur trade. Gill nets were first used by the Hudson Bay Company in Lake Superior in the 1830s. By 1839, 800 barrels of salted lake whitefish were prepared at the Michipicoten post for shipment to the American market. By 1850, the Hudson Bay Company had expanded its commercial fishery to the point where thousands of barrels of salted fish were shipped annually to market (Goodier 1982).
- Reports of good fishing were increasingly regarded as an important recreational asset (UEL 1984).

1831
- A seine net fishery was established in the area of the Fishing Islands off the west coast of the Bruce Peninsula. The fishery targeted lake herring and lake whitefish which were salted and

sold in the U.S. At the time approximately 3,000 barrels were sold annually. Landon (1944) provided an account of this fishery: "A watchman was stationed in a high tree near the shore from which he had a clear view of the lake. Suddenly there would seem to be a bright silvery cloud moving through the water. The man on watch would quickly notify the fishermen and the boats would set out with their nets which would be dropped so as to encircle the fish. Then began the work of hauling the net to shore. At times the catch was so large that the landing of the fish was extended over three days, so none were lost through inability of the curers to handle so many. At other times, when the supply of barrels or salt was running low, the net was opened to let a portion of the catch escape."

1832

- The Rideau Canal system opened. The 202 km canal system connected the Rideau (Ottawa River) and Cataraqui (Lake Ontario) watersheds.

1833

- Piers were constructed at Port Stanley on Lake Erie. A lighthouse was subsequently built in 1844.
- Laws, including closed seasons and gear limitations, were passed to provide protection for lake whitefish in the Niagara, St. Clair and Detroit rivers.
- An excerpt of a letter from a young pioneer in the Peterborough area to his father in Liverpool: "Our fish are the bass, the maskinonge – a more excellent species of pike, as fat almost as an eel – and the eel itself; the sunfish I believe we have but I have never seen or tasted any; the whitefish abound above and salmon trout below. The bass is our staple commodity and a most excellent one it is. If you are on the lake, tie a line, baited with a piece of red cloth, around your wrist and proceed on your journey and before you have gone a quarter of a mile you will feel your prize. In some parts of the lake if you are short of meat for dinner you may put the potatoes on to boil and before they are done enough you may have ten or twenty bass on the gridiron. Maskinonge and eel are generally speared, a very difficult matter until one has studied the laws of refraction a little. I have bought some seine twine and mean to construct a net this winter which will supply me pretty well with fish next summer. I will go to Lake Kinashgingquash next summer and bring back a barrel of whitefish which, salted, are almost as good as herrings. At any rate I cannot afford salt pork at present prices."

1834

- A commercial gill net fishery, involving small boats and canoes, was started in southern Georgian Bay (MNR undated).

1835

- Declines in Lake Ontario Atlantic salmon stocks were first reported. Between 1846-50 commercial yields of salmon decreased notably with each passing season. By 1865, the Atlantic salmon was considered to be on the verge of extinction. Atlantic salmon were extirpated by the 1890s.
- First reliable report of sea lamprey in Lake Ontario. It is believed that sea lamprey gained access to Lake Ontario via the Erie Canal.
- Report of an exceptionally large lake whitefish netted in Lake Superior near the Little Pic River. The fish was reportedly 27 inches in length and 21 pounds in weight (Goodier 1984).

1836

- The first account of the occurrence and distribution of freshwater fish in Canada was published (Richardson 1836). A total of 32 freshwater species were identified in Ontario waters.

1839

- The Hudson Bay Company escalated their domestic commercial fishery on Lake Superior. By 1850, three major posts (Pic, Michipicoten and Kaministikwia) maintained over thirty fall stations and shipped thousands of barrels of salted fish (Goodier 1984).

1840

- An Act was passed to regulate the inspection of fish. It allowed fish inspectors to be appointed and ensure that barrels contained 200 lb. of salted fish of required quality. This was the first Act to establish government control over the quality of fish caught commercially.
- Lake sturgeon were reportedly so common that farm labourers insisted that their employers should not feed it to them on a daily basis.

1841

- Upper and Lower Canada were united to form the Province of Canada. Upper Canada became known as Canada West.

1843

- Legislation was passed to protect lake trout in Essex and Kent counties on Lake Erie.

1846

- Lighthouses were constructed at Port Dover and Port Maitland on Lake Erie.
- By 1846, ten dams had been constructed across the Grand River and one hundred smaller mill dams had been constructed within the watershed.

1848

- An expedition lead by L. Agassiz to Lake Superior resulted in a publication on physical characteristics, limnology and listing of native fishes (Agassiz 1850).

1849

- Samuel Strickland, an early Peterborough area settler remarked on the excellent fishing at the base of Burleigh Falls: "In October 1849 between breakfast and dinner my two eldest sons and myself caught with our trolling lines thirty-five salmon trout, eight maskinonge and several large lake bass, the total weight of which amounted to 473 pounds" (Guillet 1933).

1840s

- Lake sturgeon, Atlantic salmon, and muskellunge were reportedly all in decline in Toronto Bay, Lake Ontario.
- An early account of American shad in the lower Ottawa River: "Among other things which contributed to render this place one of considerable celebrity was its excellent fishing grounds and many varieties of fish – shad especially - being caught in large numbers. During the decade following 1845, as many as 1,200 fish were sometimes caught in one day and though they rapidly decreased from that time, 400 were often caught in a day during the two or three years which preceded the building of the dams (Carillon, 1872-1874). After construction of the first dam at Carillon, fishing continued to excel especially below the dam where the fish came to spawn and could go no further upstream. The annual run of shad provided local residents with a year's supply of fish"(Ontario Ministry of Natural Resources and Québec Faune et Parcs 1998).

1850

- John McCuaig was appointed the first Superintendent of Fisheries for Upper Canada. He had one assistant.
- Commercial fishermen started using pound nets on Lake Erie (MNR undated). They were the dominant type of net used on Lake Erie by 1890.
- The town of Peterborough established a bylaw which ruled "the pernicious habit of fishing on Sunday an offence."
- Two major treaties were signed at Sault Ste. Marie on September 7, 1850. The *Robinson-Superior Treaty* was signed between Ojibway chiefs and the Crown for a large area of the Lake Superior Region. Similarly, the *Robinson-Huron Treaty* was signed between the Ojibway chiefs and the Crown for an area including the northern and eastern shores of Lake Huron between Sault Ste. Marie and Penetanguishene (Appendix 1).

1851

- Census indicates that the population of Canada West was 952,000; 96 people were employed as fishermen and fish production was 10,251 barrels.

1852

- First records of commercial gill netting on Lake Erie (MNR undated).

1853

- Commercial pound net fisheries were established in the Port Maitland area of Lake Erie. Target species included lake whitefish, yellow perch, blue pickerel, lake sturgeon, and lake herring.

Figure 3. Nipigon brook trout were highly prized by early anglers (Ontario Department of Fisheries photo).

1855

- U.S. Soo locks opened allowing passage between Lake Superior and the lower Great Lakes by bypassing the rapids of the St. Marys River.
- An increasing amount of fish caught commercially in Canadian waters of the Great Lakes were exported to the United States.

1857

- The *Federal Fishery Act* (Province of Canada) was passed providing for leases of commercial fishing locations. It also provided encouragement for the artificial propagation of fish, recognized the danger of pollution and gave government authority to appoint fisheries overseers who had full authority as magistrate to enforce the statutes by search and seizure. Initially, there was widespread hostility toward government by fishermen for attempts to regulate the fishery.
- John McCuaig, superintendent of fisheries for Upper Canada, visited each of the Great Lakes to evaluate the commercial fishing industry. He recommended that fisheries inspectors should be appointed for each major fishing port.
- A fisheries superintendent reported a catch of 47,000 lake whitefish from a single seine net haul in Lake Ontario off Prince Edward County.

- The local fisheries superintendent reported the disappearance of Atlantic salmon from the Moira, Trent and Salmon Rivers (all Lake Ontario tributaries).

1858
- The Hudson Bay Company established a trading post at Rat Portage (Kenora).

1859
- A local game protective club was formed (formally constituted in March 1861) in Carleton Place to protect local fish and game. Rewards ($5) were offered for information leading to convictions. In 1862, the name was changed to the Lanark and Renfrew Game Protection Society. This is believed to have been one of the first such associations in Ontario.
- *The Origin of Species* was published by Charles Darwin. The book introduced the theory that populations evolve over the course of time through the process of natural selection. The book is widely considered to be the foundation of evolutionary ecology.
- Fisheries overseer William Gibbard complained about anglers using brook trout as bait (Lambert and Pross 1967).

1860
- Discharge of sawmill waste into public waters was prohibited.
- The north shore of Lake Superior, from Sault Ste. Marie to as far west as the Kaministiquia River, was surveyed from Sault Ste. Marie.
- Booth Fisheries acquired a Crown land lease for Quebec Harbour on Michipicoten Island, Lake Superior. The strategic site formed a base of fishing operations in northern Lake Superior. During the peak years a crew of approximately forty men and their families were stationed at Quebec Harbour. The rights to the station were subsequently purchased by James Purvis in 1934.

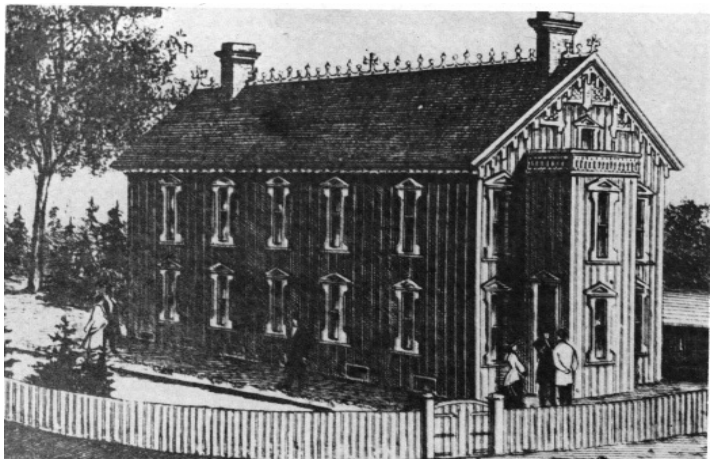


Figure 4. Samuel Wilmot's early fish hatchery near Newcastle (photo from Wilmot 1878).

1861
- Census indicates the population of Canada West was almost 1.4 million with 4,124 people engaged in fisheries.

1863
- Fisheries overseer William Gibbard was murdered over a disputed fishing lease agreement on Manitoulin Island.

1865
- Samuel Wilmot commenced rearing Atlantic salmon at a small facility on Wilmot Creek near Newcastle. This followed several years of experimentation in his home. His original goal was to restore Atlantic salmon in Lake Ontario.
- Discharge of lime, chemicals, drugs, poisonous matter, dead fish or deleterious substances was prohibited in water frequented by fish.

- Gentlemen and non-resident anglers fished brook trout in the Nipigon River with considerable success. Six and seven pound trout were ordinary sizes. This fishery was widely regarded as "the finest trout stream in North America" (Grant undated).
- Robert Roosevelt published the book "Superior fishing or the striped bass, trout and black bass of the northern states" in which he describes wilderness fly fishing for brook trout on the St. Marys, Chippewa, Batchawana, and Agawa rivers (Roosevelt 1865).

1866

- Fisheries staff in Upper Canada consisted of one superintendent, 18 fishery overseers and numerous fisheries guardians.
- It was confirmed that Atlantic salmon were no longer present in the Trent River.

1867

- The *British North America Act (BNA)* created the Dominion of Canada which resulted in Ontario being established as a province. The federal government was given jurisdiction over fisheries while provincial governments were given jurisdiction over natural resources and property rights. This division of responsibility established the framework for the current *Fisheries Act* (federal) which sets rules for the protection and taking of fish while the *Fish and Wildlife Conservation Act* (provincial) establishes rules related to licensing. The British North America Act was incorporated into the *Constitution Act* of 1982.
- Samuel Wilmot commenced efforts to rear lake whitefish.
- American eels were found in Lake Erie – supposedly having gained access through the Welland Canal.
- In terms of weight harvested, the four most predominant species in the Great Lakes commercial fishery were lake whitefish, lake trout, lake herring, and walleye. Lake trout and lake whitefish comprised almost 80% of the Great Lakes commercial catch.

1868

- During the first session of the new federal parliament, the *Fisheries Act* was passed assimilating provincial laws and the Department of Marine and Fisheries was established. The Honourable Peter Mitchell was the first Minister of the Department of Marine and Fisheries.
- The federal government provided funding to Wilmot to construct a permanent culture facility and initiate full scale production. It is believed that this was the first government hatchery in the western hemisphere.

1869

- The first licences for the use of pound nets in Lake Erie were issued by the Dominion government. By 1894, there were 204 pound nets in the Canadian waters of Lake Erie.

1860s

- Significant expansion of commercial fisheries was linked to improved access to railway lines and refrigerated railway cars. The older method of salting was replaced by packing fish on ice in large boxes which were transported to market.

1870

- Commercial fisheries were well established on Lake Erie and Lake Ontario. Target species were predominantly lake herring, lake whitefish, and lake trout. Steam powered tugs replaced smaller boats for commercial fishing. This opened up new fishing grounds further offshore.

Figure 5. Early commercial fishers with their catch from the Bay of Quinte (National Library of Canada *In* McCullough 1989).

- The *American Fish Culturists Association* was established. The name was changed to the *American Fisheries Society (AFS)* in 1885.
- By 1870, fishing destinations for American tourists were well established in the Muskoka lakes, the Kawartha lakes, and the Rideau lakes.

1871

- Permanent buildings were constructed on Michipicoten Island and the Lizard Islands, Lake Superior, for commercial fishing activities. Fishermen often overwintered on Michipicoten Island in order to access the late fall and early spring fisheries in the area (Canada Department of Marine and Fisheries 1871 *In* Goodier 1982).

1873

- Alewife were first recorded in Lake Ontario (Appendix 2). It is believed they accessed Lake Ontario via the Erie Canal.
- Treaty 3 was signed between the Ojibway nation and Queen Victoria. The treaty area covered a large portion (an estimated 55,000 square miles) of northwestern Ontario.

1874

- Chinook salmon were first stocked in the Ontario waters of Lake Ontario. The stocking program was discontinued in 1882.

1876

- First records of muskellunge being propagated in Canada. The initial project occurred at Rice Lake, Ontario.
- Samuel Wilmot was appointed as the Dominion Superintendent of Fish Hatcheries. He supervised nine hatcheries across Canada including two in Ontario.
- The initial planting of rainbow trout into the Au Sable River, Michigan. They appeared shortly thereafter in the St. Marys River.

1877

- Report of an early fishing trip by anglers who sailed from Collingwood, Georgian Bay, to Rossport on Lake Superior. The fishing party reported catching lake trout up to 70 lb. and brook trout up to 7 lb. in weight.
- The Hudson Bay Company post at Red Rock expanded their fishery to provide food for men working on the construction of the Canadian Pacific Railway in the area.

1878

- A game protective society was organized in Campbellford – one of the first in Ontario (Walkinshaw 1967).

1870s

- Resort lands were being developed on Lake Erie, Georgian Bay, Lake Simcoe and lakes in the Kawartha region.
- An early explorer describes Indians fishing for whitefish at the rapids on the St. Mary's River near Sault Ste. Marie: "Indians were catching whitefish at the foot of the rapids. One man holds the canoe with wonderful skill in the swift current and another stands in the bow with a large scoop net sometimes three and a half feet in diameter. This he drops over the noses of the fish as they swim upstream. Drawing the scoop net towards him, the fisherman, by dexterous twist, closes the mouth of the net and hauls his prize aboard. In the spring and the fall large quantities of whitefish are captured in this way."

1880

- First records of carp being imported into Ontario. It is believed that they were intended as a source of food for early settlers but, by 1899, their negative impact was realized and efforts were directed to prevent their spread.

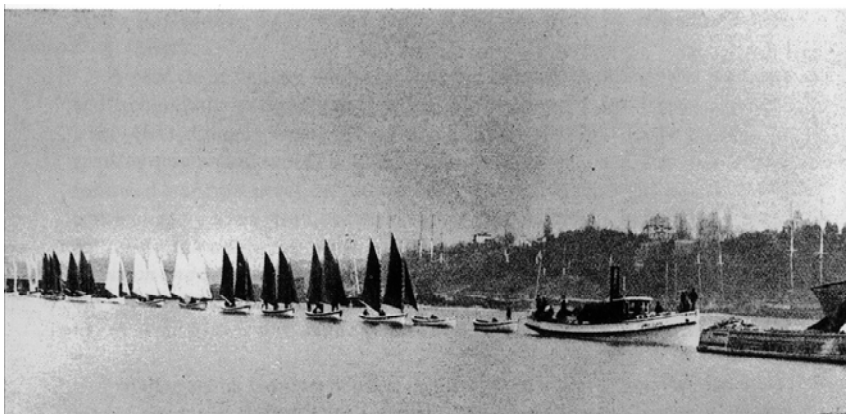


Figure 6. The Goderich (Lake Huron) fishing fleet in 1884 (Ontario Department of Fisheries photo).

1882

- A 150 lb – 8 foot long lake sturgeon was angled from the Niagara River. The dressed weight of the fish was 71 lb. It was sold for $3.90 (5 ½ ¢/lb.) (Kerr 1982).

1883

- First release of rainbow trout into Canadian waters of the Great Lakes. The initial stocking was into Lake Superior where spawning populations were established within ten years. By 1920 they had replaced many brook trout populations which had already been overexploited.
- The Anglers Association of the St. Lawrence River was founded with the goals of preservation, protection and perpetuation of game fish in the St. Lawrence River (Walkinshaw 1967).
- Gill net fishing for lake sturgeon was prohibited in the Canadian waters of Lake Ontario (Kerr 1982).

1884

- Non-native commercial fishing for lake sturgeon and other species began on Lake of the Woods. Fish were barged to the railhead at Rat Portage (Kenora) and shipped by the Canadian Pacific Railway (CPR) to markets in the United States and abroad.

1885

- The *Ontario Fisheries Act* was passed. This provided provincial administration (e.g., fisheries officers, licences, closed seasons and limits) over inland fisheries under the Department of Crown Lands. Federal fisheries responsibilities were confined to the Great Lakes. One of the first regulations passed was a closed season on brook trout, lake trout, and muskellunge. Other regulations included the requirement for constructing fish passes at mill dams and the prohibition of the use of explosives or poison for taking fish.
- The commercial harvest of lake sturgeon from the Great Lakes peaked at 4,901 metric tons. Between 1885 and 1895 the abundance of sturgeon in Lake Erie had declined by 80%.
- A federal Order in Council extended the closed season for lake whitefish and lake trout in Ontario for the entire month of November. In addition, a new regulation closed the walleye season from April 1 – May 15 and the muskellunge season was closed from April 15 – June 15.
- A commercial pound net fishery for lake sturgeon was established on Lake of the Woods and Rainy Lake in northwestern Ontario.
- The Canadian Pacific Railway line across northern Ontario was completed. This railway was eventually used to transfer and distribute smallmouth bass to many northern Ontario waters.

1886

- A paddlefish was reportedly captured in the Spanish River (Nash 1908).
- Extensive catches of lake sturgeon were reported from Lake Erie. The local fisheries overseer reported that it was not unusual to see 900 penned sturgeon (Kerr 1982).

1887

- Forest and Stream magazine named the Nipigon River as the finest trout stream in the world. This article and other reported catches from the area resulted in many anglers travelling to the Nipigon area seeking brook trout. By the early 1900s there were reports that the numbers and average size of brook trout had declined.
- The highest commercial harvest (> 600,000 pounds) of lake sturgeon from Lake Erie was recorded.

1888

- Commission of Crown Lands issued fishery regulations including a $1 non-resident angling licence (20 sold in Kawartha lakes; 375 at Nipigon) and a brook trout season of May 1 – September 15.

1880s

- Increased dissatisfaction by anglers and the provincial government with the federal fisheries administration particularly with regard to inland recreational fisheries. Provincial officials insisted on a higher valuation of sport fishes and did not want to concede sport fish to the commercial fishery.

1889

- Control and management of Ontario fisheries placed under the Crown Lands Department.
- The commercial fishery in the Canadian waters of Lake of the Woods was closed following recommendations from MP Simon Dawson and senior officials in the Department of Indian Affairs indicating that sturgeon stocks were being overexploited and should be protected for the benefit of local settlers and Indians only. It was subsequently reopened in 1892 due to pressures from commercial interests.
- The *Canada Act* (Ontario boundary) was passed establishing the western boundary of the Province of Ontario at its present location.

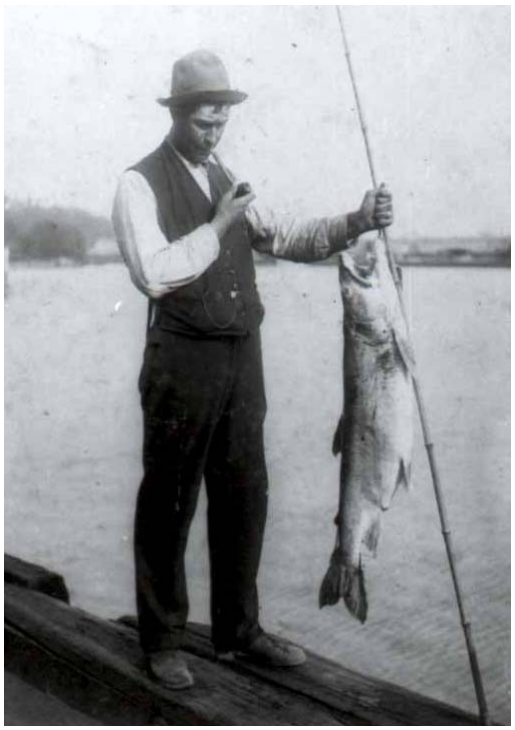


Figure 7. Lake trout have traditionally been a highly valued fish in Ontario (MNR photo).

1890

- Amid increasing concern about declines in fisheries resources, the *Ontario Fish and Game Commission*, chaired by Dr. G. A. MacCallum, was established to determine the status of game and fish in the province of Ontario. Questionnaires were circulated and personal interviews were held with sportsmen throughout the province. A total of 2,873 completed questionnaires were submitted and 283 briefs were presented to the committee.
- The first vessel (the "Petrel") was built for use to enforce fisheries regulations on Lake Erie. This boat was replaced in 1904 by the "Vigilant".
- Closed season for lake sturgeon was extended to May 15 – July 15 in Lake Erie and Lake Ontario.
- Numbers of sportsmen and tourists, travelling by the Canadian Pacific Railway, increased in the Kenora-Lake of the Woods area (Nute 1950).

1892

- The *Ontario Fish and Game Commission* was consolidated into a five member Board of Fish and Game Commissioners by an *Act for the Protection of Provincial Fisheries* which was passed by the provincial legislature.
- The report of the Ontario Fish and Game Commission was released. The report identified the lack of enforcement of existing laws. It included sweeping recommendations to protect resources. It resulted in the institution of creel limits and minimum length limits for bass and brook trout.
- Four full time salaried game wardens were hired in Ontario. In addition, 392 deputy wardens were appointed. Deputy wardens were not paid a standard salary but, instead, received half of the fines they secured. In 1893 the province was officially divided into five warden zones.
- Ontario and Quebec challenged the federal jurisdiction in fisheries.
- Alewife became abundant in Lake Ontario.

- Commercial fishing was initiated on the Ontario portion of Lake of the Woods. An early account: "fish is king here just now and it makes one feel very wealthy to watch the loading of the railway cars with such splendid samples of the finny type and to realize something of the enormous food supplies which are the common heritage of Canada" (Nute 1950).
- The Norman dam was constructed at the western outlet of Lake of the Woods for control of lake levels.

1893
- Over 400 individuals engaged in commercial fishing on Georgian Bay. The fishery consisted of 150 boats, 15 tugs, and 1.5 million yards of gill net.
- Edward Prince, an English fisheries scientist, was appointed Dominion Commissioner of Fisheries.
- Algonquin Provincial Park, Ontario's first provincial park, was established as "a public park and forest reservation, fish and wildlife preserve, health resort and pleasure ground for the people of Ontario." A total of 2,456 lakes are situated in the park. Upon purchase of a park fishing licence, angling, with rod and line only, was permitted. All other means including nets, spears, and night lines were strictly prohibited.

1894
- Federal Order in Council referred questions in the matter of jurisdiction of provincial fisheries to the Supreme Court of Canada. Prior to this there had been several public and legal challenges to the federal fisheries administration.
- Game warden's annual salaries were increased from $120 to $400.
- By 1894, caviar (sturgeon roe) was making Lake of the Woods famous among gourmets (Nute 1950).

1896
- First record of carp in Lake Simcoe (MacCrimmon and Skobe 1970).

1897
- Last record of Atlantic salmon in Lake Ontario.

1898
- The Judicial Committee of the Privy Council in London, England, ruled that the property rights of inland fisheries were vested in the Province. As a result, the Province of Ontario obtained jurisdiction over the fisheries of the province from the federal government. The Ontario Fishery Regulations were extended to cover previous areas of federal responsibility.
- The *Ontario Fisheries Commission*, chaired by F. R. Latchford, was established.
- Some of the earliest records of bass transfers in and around Algonquin Park were recorded.
- The *Biological Board of Canada* was established by the federal government to encourage scientific fisheries research.

1899
- Ontario established a provincial Fisheries Branch, under a Commissioner, which promoted recreational fisheries. From 1899 to 1902 this Branch reported through the Attorney General's Department and later to the Department of Public Works.
- Federal fish commissioner and provincial deputy commissioner in separate reports drew attention to the growing importance of pollution.
- Report from the Deputy Commissioner of Ontario's Fisheries Branch, S. T. Bastedo, stating that "there can be nothing more destructive to fish life than the depositing of sawdust on the

rivers and lakes." He also urged the formation of more clubs and associations to aid the government in "the great work of protection."
- Ichthyological results of an early U.S. expedition to the Muskoka region of Ontario are published (Meek 1899).
- The steamer "Gilphie" was purchased for $3,250 and used for enforcement patrols on Georgian Bay. In the following years several vessels were purchased to patrol the Great Lakes and larger inland waterways.

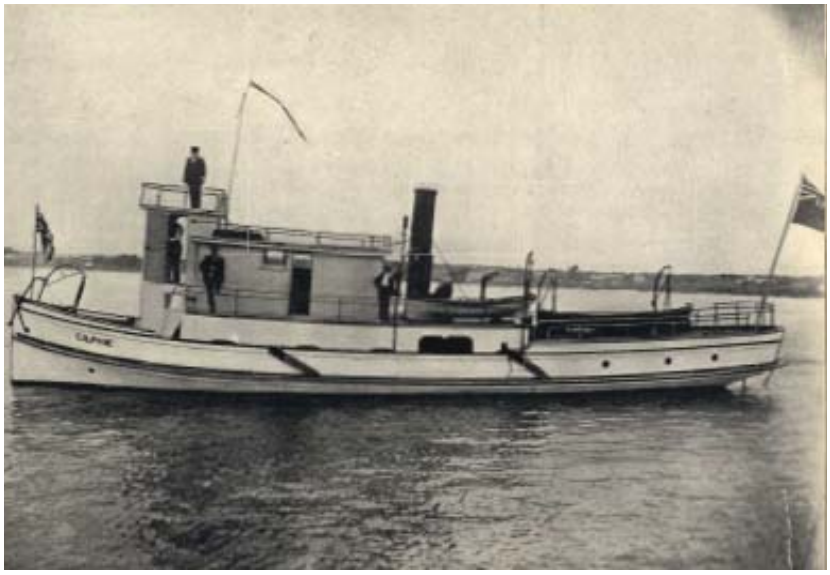


Figure 8. The "Gilphie" was one of the first boats used for patrols on the Great Lakes (Ontario Department of Fisheries photo).

1890s
- Fish sanctuaries established at several spawning/concentration areas on the Great Lakes (Bay of Quinte, eastern Georgian Bay, Lizard Islands on Lake Superior).
- Some of the earliest records of anglers using ice shanties on Lake Erie during the winter (Hatcher 1945).

1900
- The commercial fishery for lake whitefish was reduced in nearshore areas of the Great Lakes as a result of expanding fisheries and habitat degradation.
- Poaching in Lake Superior, by both Canadians and Americans, was rampant. For example, twelve of twenty-eight pound nets fishing in the Thunder Bay area waters of Lake Superior were found to be unlicensed (Goodier 1982).

1901
- A federal fisheries research station was established at Go-Home Bay, Georgian Bay. Annual reports were submitted to the province during the station's period of operation from 1903-1913. The facility was closed in 1914.
- Construction of the Ontario and Rainy River railway (now the Canadian National Railway) between Thunder Bay and Winnipeg was completed.
- The province of Ontario expanded the transfer and distribution of bass. Distribution of bass in northern Ontario was often conducted by rail using specially designed railway cars. In one

instance, 10,000 adult bass were captured from Lake Nipissing and released in eighteen different lakes and rivers in the area.

1902

- A fish removal program was initiated on the Nipigon River with the intent of enhancing brook trout. Between 1902 and 1921, thousands of predatory fish, including walleye, northern pike, suckers, sturgeon, and lake whitefish, were removed.

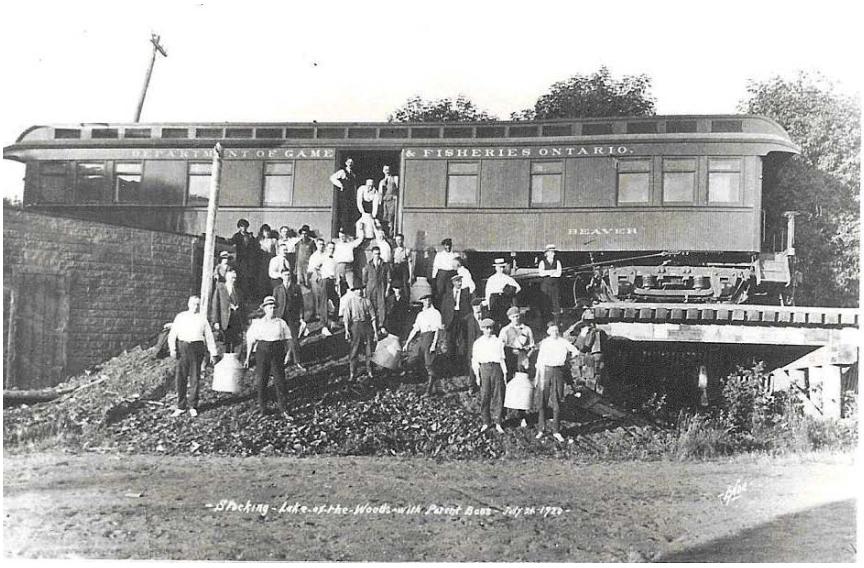


Figure 9. Many bass were distributed across northern Ontario by specially equipped railway cars (Ontario Department of Lands and Forests photo).

- A 1902 article from an Ottawa newspaper (St. John Daily Sun) illustrated the abundance of American eels in the Ottawa River: "A turbine mill wheel which ran a gang of saws at the Chaudier waterfall stopped suddenly. Upon shutting done the mill and unscrewing the upper cap it was discovered that the wheel had become packed full of eels. It looked as though there must have been hundreds of thousands of them."

1903

- The sale of game fish was prohibited in the Province of Ontario. This was particularly important for bass, brook trout, and muskellunge. The same regulation established the brook trout limit at not more than 10 lb. and not greater than 30 fish.
- Records indicate it was common for new commercial fishing licences to be refused based on the "limited entry" concept.
- At the request of local sportsmen, smallmouth bass were obtained from the Department of Game and Fisheries and planted in Lake of the Woods and surrounding lakes.
- Regulations were introduced to close the fishing season for lake sturgeon during their spawning period.

1904

- A non-resident angling permit allowed for the export of a two day limit of fish.
- The commercial harvest from Lake Huron (all species) peaked at 27.4 million pounds.
- First rainbow trout reported from Lake Huron. By 1930 rainbow trout had developed spawning populations in many tributaries.
- Gill nets were introduced to the Rainy Lake and Lake of the Woods commercial fisheries.
- The severe winter of 1903-04 caused many portions of Lake Scugog to freeze to the bottom of the lake whose water level was several feet lower than previous years. This resulted in a massive fish kill.

1905

- The Premier of Ontario dispenses with salaried district fisheries supervisors and increases the number of part-time officers to 156.
- G. W. Bartlett, superintendent of Algonquin Park recollects "the bass introduced some years ago have proved a great success and the lakes in which they were placed and all connected streams now afford splendid bass fishing." (Bartlett 1905).

1906

- Construction of the hydrogenerating station at Kakabeka Falls commenced.

1907

- An *Act Respecting the Game, Fur-Bearing Animals, and Fisheries of Ontario* was passed.
- The Game and Fisheries Commission was abolished and a new Department of Game and Fisheries was created under the control of a provincial cabinet minister. The structure of the new Department consisted of the Minister, the Superintendent of Game and Fisheries, a field staff of paid inspectors and wardens and 215 deputy wardens. Wardens were based at Simcoe, Windsor, Belleville, Beaumaris, North Bay, Sault Ste. Marie, and Kenora. In 1916, the Game and Fish Branch became a Department under the direction of various Ministers in the following years.

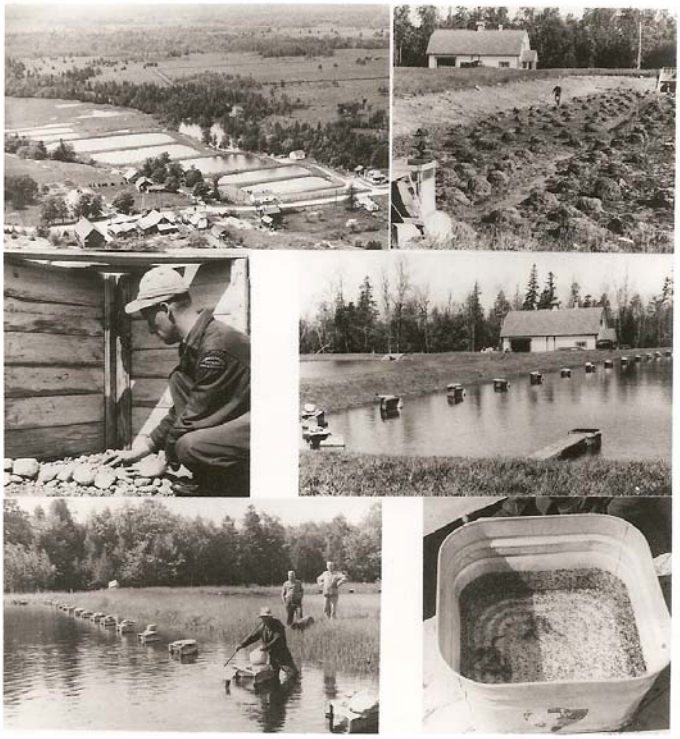


Figure 10. Phases of early bass culture at the Sandfield fish culture station on Manitoulin Island (Photo from the collection of H. R. MacCrimmon)

- Winter spearing licences were issued to take lake trout and lake whitefish on Lake Simcoe. By 1920, as many as 122 licences were issued. Spearing licences were discontinued in 1941.

1908

- The federal government built hatcheries at Sarnia and Wiarton. Both facilities were closed in 1954.
- Walleye were introduced into Mississippi Lake in southeastern Ontario (Brown 1984).

1909

- The provincial government became involved in fish culture with a facility at Mount Pleasant (Appendix 3). This involved experimental rearing of bass. This was Ontario's first provincially directed hatchery.
- The federal fisheries inspector in his report to the Superintendent of Fisheries stated: "whitefish and trout have decreased to a very marked extent and this, when taken into consideration with the greatly improved methods of fishing steam lifts and steam tugs thus enabling the fishermen

to go into waters far from the shore where the sail or rowboats were formerly unable to reach…depletion is going on from year to year at an alarming rate."
- The *Boundary Waters Treaty* was signed between Canada and the United States. Its significance was to identify measures to resolve international disputes over shared resources.
- Dam and powerhouse construction on the outlet of Rainy Lake. Additional dams and hydro facilities were constructed in the area at Namakan Lake (1914), Calm Lake (1926), and on the Seine River system (1928).
- The *Quetico Forest* was established. It was subsequently assigned provincial park status in 1913 and expanded in size in 1931.
- A Royal Commission into the state of Ontario's game and fisheries was initiated by Kelly Evans. After review, he proposed the appointment of wardens paid on commission and an overhaul of existing services including the establishment of a smaller full-time professional staff.

1910
- An International Fisheries Commission recommended a four year moratorium on all fishing for lake sturgeon on Lake of the Woods in order for the stocks to rebuild. The recommendation was accepted by the Canadian legislature but not the Americans.
- The Game and Fish Commission had 13 steam, gas, or sail-powered vessels purchased or under lease for patrolling the Great Lakes and the St. Lawrence River. Additional vessels were also patrolling the Rideau system, the Kawartha lakes, Lake Simcoe, the Muskoka lakes and Lake Nipissing.
- Reports of a decline in lake whitefish abundance in the Michipicoten Island area of Lake Superior (Goodier 1989).

1911
- Annual report of the Department of Game and Fisheries mentions a "widespread system of pollution of our lakes, rivers and streams."
- Fisheries overseer C. J. Kerr recommended the establishment of fish and game preserves (Kerr 1982).

1912
- American smelt were introduced to Lake Michigan and gradually spread to the remaining Great Lakes.
- Formation of the *International Joint Commission (IJC)* under the *Boundary Waters Treat Act* of 1909. The IJC was designed to deal with issues of water quality in the Great Lakes.
- The first commercial fishing licence was issued for Lac Seul.
- The grand prize for a salmon (lake) trout, in the two thousand dollar contest organized by Field and Stream, was awarded for a salmon trout caught in Lake of Two Rivers, Algonquin Park. It measured 30.5 inches (Bartlett 1912).
- Several specimens of fish taken from Delano Lake, Algonquin Park, had the appearance of a brook trout – lake trout hybrid. One specimen was forwarded to Professor Edward Prince, Department of Marine and Fisheries in Ottawa, who concluded that the fish was indeed a natural hybrid. He also indicated an interest in experimenting to determine if the hybrids could be produced artificially.

1913
- The first introduction of brown trout into Ontario waters.
- The federal fisheries department agreed that "the propagation of sporting fish in Ontario will be left with the provincial government."

1914

- The Kenora fish hatchery was constructed to rear walleye, lake whitefish, lake trout and brook trout. The hatchery was closed in 1961.

Figure 11. Brown trout were introduced into Ontario from Europe in 1913 (MNR photo by Ian Rayner).

1915

- A world record brook trout, weighing 6.58 kg (14.5 lb.), was angled from the Nipigon River by Dr. J. W. Cook of Fort William (Appendix 4). The fish is recognized as a world all tackle record (IGFA 2010).
- Commercial harvest from Lake Erie (all species) peaked at 76.3 million pounds.
- Inauguration of the *Canadian Fisheries Association.* The desire was to have all persons engaged in the fisheries industry to be a member. Their name was changed to the *Fisheries Council of Canada* in 1945.

1916

- Prompted by a meat shortage during World War 1, a licence to net lake whitefish and lake trout on Lake Opeongo was issued to a local Whitney butcher (Shaw 1998).

1917

- Lake Nipigon was opened to commercial fishing (Gibson 1968). The commercial harvest peaked at 2.3 million pounds in 1919.
- A regulation was passed whereby the Department of Fisheries reserved the right to purchase 20% of the commercial catch from designated waters (Lake Nipigon, Lake Nipissing, Lake Huron and Georgian Bay) to provide an affordable food source for local residents. Prior to this most commercial catches were exported to the United States because of higher prices.

1918

- During World War 1, the *Fish Sales Branch* was established under the Department of Game and Fisheries. Their mandate was to secure fish and ensure that they were made available at fixed prices to Ontario consumers. The need for this Branch ended shortly after termination of the war and it was discontinued in 1922.
- Algonquin Park superintendent G. W. Bartlett recollects “In the spring of 1918 it was decided to take out a quantity of mullet (suckers) from the lakes near headquarters, where they had become very numerous, much to the detriment of the better fish, and five tons were taken out and shipped bringing $129.20.”

1919

- The Ontario government initiated studies on many of Ontario’s larger waterbodies. Based on these and earlier expeditions, several noteworthy fisheries publications were produced between 1908 and 1939. These included *Fishes of Ontario* (Nash 1908), *Fishes of Georgian Bay* (Bensley 1915), *Fishes of Lake Abitibi* (Dymond and Hart 1927), *Fishes of Lake Erie* (Dymond

1922), *Fishes of Lake Nipigon* (Dymond 1926), *Fishes of Lake Ontario* (Dymond et al. 1929), and *Fishes of the Ottawa Region* (Dymond 1939).
- The *Ontario Fisheries Research Laboratory* in the Department of Zoology, University of Toronto, was formed under the direction of Professor W. A. Clemens.

1920
- The Department of Game and Fisheries was reorganized and enlarged to include 60 full time overseers under seven district superintendents (Skuce 1959).
- The 50th annual meeting of the American Fisheries Society held in Ottawa, Ontario.
- The Trent-Severn waterway opened. The canal system, comprised of 45 individual locks, connected the Bay of Quinte (Lake Ontario) with Georgian Bay. The Trent and Severn River drainages were linked at Kirkfield.
- The first sport fishing resorts in northwestern Ontario were established during the early 1920s in the Nestor Falls-Sioux Narrows area on the east side of Lake of the Woods.

1921
- An article in a July 1921 edition of Rod and Gun magazine encouraged the public to take up fish stocking by detailing the process for capturing, raising and stocking fish into the wild with the only caution that care should be taken that the capture of parent fish does not cause conflict with the closed season.
- Walleye were introduced into several of the Kawartha lakes. This introduction served to establish a number of self-sustaining populations.
- The sea lamprey was first recorded above Niagara Falls in Lake Erie (near Port Alma). Access was associated with the opening of the Welland Canal.
- Commercial harvest from Lake Ontario (all species) peaked at 6.5 million pounds.
- The fee for a non-resident angling licence was increased from $2 to $5. This fee applied to designated areas including Lake Nipigon and the Nipigon River.

Figure 12. The Aurora trout, a colour variant of brook trout (MNR photo).

1922
- A lake sturgeon, weighing 310 lb., was caught by a commercial fisher using a pound net in Batchawana Bay, Lake Superior. This remains the largest authenticated specimen recorded from Ontario waters.
- The Ontario government banned the use of bull nets. Bull nets were deep gill nets which were extremely efficient at catching fish. Bull nets were banned in most American jurisdictions by 1934.

1922-1926

- First efforts in Ontario to propagate lake sturgeon. The project, undertaken by the Ontario Fisheries Research Laboratory at the University of Toronto, occurred on the Gull River, a Lake Nipigon tributary.

1923

- Aurora trout were first discovered in several small lakes north of Sudbury. Originally thought to be a new fish species (Henn and Rickenbach 1925), but they have since been described as a colour variant of brook trout. A 2.22 kg Aurora trout, angled from Carol Lake in 1996, is recognized as the world all tackle record (IGFA 2010).
- The Williams Treaty was signed with the Mississauga and Chippewa First Nations. The treaty covered lands in southcentral Ontario and the northern shore of Lake Ontario.
- Black crappies were first introduced into the U.S. waters of Lake of the Woods.

Figure 13. Some of the earliest lake surveys in Ontario were initiated in the 1920s (MNR photo).

1924

- Commercial harvest of lake whitefish from Lake Ontario peaked at 2.8 million pounds.
- By Order in Council, the special fishery regulations for Ontario were amended to institute a minimum size limit of 15 inches for walleye.

1925

- The first biologist (Dr. H. H. MacKay) was hired for fisheries work which included directing surveys of provincial waters as well as overseeing six provincial fish hatcheries.
- The first lake surveys were conducted on Ontario inland waters.
- The commercial harvest of lake trout from Lake Ontario peaked at 1.1 million pounds.
- American smelt were first reported in Lake Huron. Smelt were not reported in the Canadian waters of Lake Huron until 1931 (Dymond 1944).

1926

- The Ontario Department of Game and Fisheries assumed control of all eight federally operated fish culture stations in the province.
- Inaugural meeting of the *Toronto Anglers Association*. This group would later become the Federation of Anglers. By 1928 their membership had reached two thousand and they had launched a campaign to organize and affiliate with other sportsmen clubs in the province.
- Sabaskong Bay on Lake of the Woods was closed to commercial fishing, except for coarse fish trapping, in response to conflicts with the growing tourist sport fishery for walleye and other target species in the area.

1927

- *Rivers and Streams Act* amended to become the *Lakes and Rivers Improvement Act.* Under this Act approval was now required to construct or alter a dam or to make any modifications to a waterbody which could alter fish habitat.
- The Ontario waters of Lake of the Woods were divided into 58 blocks or lots which were licensed for the exclusive use of individual commercial fishers.

1928

- A *Fish Culture Branch* was established to unify the biological and fish culture activities of Department, to promote the restocking of lakes, and to detect pollution in suspect areas.
- The Ontario government announced the creation of a *Special Committee on the Game Fish Situation in Ontario*. The secretary of the committee was W. J. K. Harkness. This committee toured the province in 1929 and 1930 hearing representations from municipalities and sportsmen. Their report, which included 84 recommendations, was tabled in March 1930.
- Smallmouth bass were introduced into Opeongo Lake, Algonquin Park.

1929

- The first expedition to Algonquin Park, by W. E. Ricker and F. P. Ide, was made to study lake trout ecology in Wolf and Ragged lakes (Shaw 1998).
- An Order in Council amended the special fishery regulations for Ontario so that "no one shall without the approval of the Department of Game and Fisheries import fish for the purpose of restocking public waters of the Province or transfer any fish from one body of water to another within the Province."
- The *Northern Ontario Tourist Outfitters (NOTO)* was officially incorporated. NOTO is a non-profit organization which currently represents 294 member tourist operations (www.noto.net).

Figure 14 Rearing lake whitefish eggs at the Little Current fish culture station (O. C. Jennett photo)

- Superior Shoal in Lake Superior was discovered during a U.S. survey (Landon 1959). It was further surveyed by the Canadian hydrographic ship "Bayfield" in 1930 (Goodier 1982). Once known, the shoal produced many large commercial catches of lake trout (Goodier 1989).

1920s

- Lake herring stocks in Lake Erie collapsed.
- Charter boat fisheries became established on Lake Erie (targeting percids) and Lake Huron (targeting lake trout) (Loftus 1979, Regier et al. 1999). By the 1950s, a charter boat fishery had been established on Lake Superior (targeting lake trout).

1930

- Twenty-two government-operated fish culture stations were present in Ontario.

- A second biologist (W. H. R. Werner) was hired to assist H. H. MacKay in the Biological and Fish Culture Branch of the Department of Game and Fisheries.
- The 60th annual meeting of the American Fisheries Society was held in Toronto, Ontario.
- Game wardens were first issued uniforms.
- Commercial fishers used gill nets made of linen. By 1950, linen nets had been replaced by cotton and later by nylon.
- American smelt were first reported in Lake Superior (Whitefish Bay) (Dymond 1944).
- The 24th annual convention of the International Association of Game, Fish and Conservation Commissioners was held in Toronto.

1931

- The *Federation of Ontario Naturalists (FON)* was formed as a charitable organization of more than 25,000 members to protect wild species and spaces. Their name was recently changed to Ontario Nature (www.ontarionature.org).
- Alewife were first reported in Lake Erie. Their presence was attributed to movements through the Welland Canal.
- Sea lamprey were first observed in Lake Huron.

1932

- An attempt was made to control the spread of noxious species of fish by prohibiting the liberation of minnows and other small fishes except into the water from which they originated.
- Completion of the fourth (present) Welland Canal which served to circumvent Niagara Falls. Previous canals had been constructed in 1829, 1848, and 1887.
- The White Lake fish hatchery property was deeded to the Department of Game and Fisheries.
- The *Grand River Conservation Commission Act* was passed allowing municipalities in the Grand River watershed to address water management issues at a watershed scale.

Figure 15. Fish stocking in Ontario peaked in the late 1930s – early 1940s (Ontario Department of Lands and Forests photo).

1933

- Alewife were first reported in Lake Huron.
- Fort Frances hatchery opened to supply eyed-eggs of walleye and lake whitefish for waters in the Kenora and Fort Frances areas.

1935

- Kamloops trout, an inland strain of rainbow trout imported from British Columbia, were first stocked in Ontario waters. Stocking continued until 1957.
- Original stocking of Atlantic salmon in Trout Lake near North Bay. Of all the inland waters stocked with Atlantic salmon, only Trout Lake developed a small, self-sustaining population which still exists today.
- Lake trout had become non-existent in Hamilton Harbour by the mid 1930s.
- Smallmouth bass were introduced into Shebandowan Lake (Monk 1966).

- First smelt were reported in the Canadian waters of Lake Erie (Port Dover). They had been recorded in Lake St. Clair in 1932 (Dymond 1944). By 1952, smelt had become quite abundant in Lake Erie.
- At the urging of Frank McDougall, Superintendent of Algonquin Park, for more research in Algonquin Park, W. J. K. Harkness selected the location on Opeongo Lake for a permanent fisheries research laboratory.

Figure 16. Coarse fish removal programs, for species such as carp, were very common in Ontario between 1930 and 1960 (MNR photo).

1936

- The *Opeongo Limnological Laboratory* ("the fish lab") in Algonquin Park was established (Harkness and Fry 1942). A formal agreement, between the Ontario Department of Lands and Forests and the University of Toronto, was not signed until 1954. This laboratory became a major center for research and field studies.
- The Opeongo creel survey was initiated by Dr. F. E. J. (Fred) Fry. The survey was subsequently coordinated by N. V. (Nick) Martin (1946-1963), J. M. (Jim) Fraser (1964-1969), D.(Don) Cucin (1970-79), and J. A. (Jim) MacLean (1980). It has continued annually since that time and is believed to be the longest standing uninterrupted source of creel information in the world.
- Last record of American eel in Algonquin Provincial Park. It's extirpation from the Park was attributed to the construction of dams and hydroelectric facilities on the Madawaska and Petawawa rivers.
- Archibald G. Huntsman was elected to a one-year term as president of the American Fisheries Society. He was the first of five Ontario residents to serve in that capacity.
- MacLeans magazine reported that "the Grand River fishery had become a memory with trout and bass replaced by carp and suckers."
- Provision was made to licence tourist outfitters in northern Ontario. Tourist outfitter fees were $10 for residents and $25 for non-residents. In 1937, a total of 498 camps were licenced. This subsequently increased to 642 in 1939 and 1,543 by 1952.

1938

- The province of Ontario stocked more fish than all other provinces and the federal government combined.

1939

- The Nogies Creek fish sanctuary was established near Bobcaygeon, Ontario. This area eventually became the focus of muskellunge research by Dr. E. J. (Ed) Crossman.

1930s

- Sea lamprey invaded the upper Great Lakes. Although first recorded in the upper Great lakes during the 1920s, it took some time to become established until they ultimately spread rapidly into Lake Huron.
- Rainbow smelt were present in all five Great Lakes.
- The first studies of muskellunge biology were initiated in Ontario (MacKay 1931, Dymond 1932, Harkness 1934).
- Coarse fish removal programs became a common fisheries management technique particularly in southern Ontario (Appendix 5). Most programs involved mechanical removal of species, including carp, burbot, and northern pike, in an attempt to enhance the abundance of sport fish species.

Figure 17. The sea lamprey was one of the most destructive species to invade the Great Lakes (MNR photo).

1940

- 70th annual meeting of the American Fisheries Society held in Toronto, Ontario.
- Lake herring were deliberately introduced to Lake Opeongo to provide forage for lake trout. An additional introduction was conducted in 1948.
- Nylon gill nets were first used in the commercial fishery of northwestern Ontario.
- The estimated sport harvest of walleye from the Ontario waters of Lake of the Woods equalled the commercial walleye catch for the first time. At the time, the commercial fishery was regulated to a minimum gill net mesh size of 4½ inch stretched measure and the minimum size of saleable walleye was 15 inches (total length). Anglers were restricted to 8 walleye per day (16 in possession) with a minimum size limit of 13 inches.

1941

- The *Ontario Federation of Anglers and Hunters (OFAH)* was formed as a result of the amalgamation of the Ontario Federation of Anglers and the Ontario Hunters Association.
- Commercial harvest from Lake Superior (all species) peaked at 25.5 million pounds.
- An American expedition to Quetico Provincial Park resulting in a publication listing fishes native to that area (Lindeborg 1941).
- Spear fishing for lake trout and lake whitefish was banned. This had been a traditional activity on Lake Simcoe (Kirk 2001). Between 1907 and 1941, licensed spear fishers reported a winter lake trout harvest of almost 500,000 pounds.

1943

- Waboose dam construction completed on the Ogoki River. This diverted water from the Hudson Bay drainage through the Lake Nipigon system into the Great Lakes drainage. Construction of hydroelectric facilities between 1920-1950 on this system flooded rapids, blocked fish movements, and altered lake morphometry.

1944

- The Junior Forest Ranger program (currently known as Ontario Rangers) was established. The program was initially established as a means of recruiting future staff. Over the years a

considerable amount of fish habitat restoration and enhancement has been completed using Ontario Ranger labour.

- The Research Division of the Department of Game and Fisheries was formed under the direction of Dr. C. H. D. Clark. Prior to this, most fisheries research had been conducted through subsidized university studies. By 1946, research headquarters had been established at Maple, Ontario.
- An experimental Atlantic salmon program was initiated on Duffins Creek, a Lake Ontario tributary. From 1944-46, approximately 40,000 fry were stocked each year (MacCrimmon 1950). Assessment was conducted to determine habitat selection and post-stocking survival. The project was discontinued after poor results.
- Lake Superior Provincial Park was established. The park supports a large number of brook trout and lake trout waters. It was classified as a natural environment park in 1967.

1945-46

- Collapse of the lake trout fishery in Lake Huron.

1946

- The Department of Game and Fisheries was reorganized as the Division of Fish and Wildlife in the Ontario Department of Lands and Forests (it had formerly been under the Ministry of Mines). The Division Chief was Dr. W. J. K. Harkness (Appendix 6). There were four Sections in the new Division: fisheries, enforcement, wildlife, and commercial fisheries. The new division was developed with the objective of managing fish and game on the basis of scientifically proven facts. From a field perspective, there were eight administrative regions and twenty-two districts.
- One hundred and thirty-six full time enforcement staff were employed in the Division of Fish and Wildlife. Conversely, there were only five permanent biologists.
- The monthly catch report and implementation of quotas in some areas were among the first actions taken by the new Commercial Fish Section.
- The *Ontario Council of Commercial Fisheries* was established. It was later to be renamed the Ontario Fish Producers Association and, subsequently, the Ontario Commercial Fisheries Association (www.ocfa.on.ca). The association represents the commercial fishing industry which currently employs approximately 3,500 people in Ontario.

Figure 18. Winter fishing for lake whitefish has been a traditional activity on Lake Simcoe (Photo from the collection of H. R. MacCrimmon)

- Fish and wildlife technical staff were first trained at newly opened Forest Ranger school near Dorset, Ontario. In December, 1946, a two week course was organized for Fish and Wildlife biologists, technicians and overseers on identification and ecology of various species of fish, birds and mammals.
- The *Great Lakes Fishery Treaty* was signed but never ratified.

- Sea lamprey were first reported in Lake Superior.
- The *Conservation Authorities Act* was passed by the provincial government in response to growing concern about the state of natural resources resulting from poor land, water and forestry practices in previous decades. Currently there are 36 Conservation Authorities in Ontario (Appendix 7).
- An Ontario-Quebec waterpower agreement was signed for the Ottawa River.

1947

- The first permanent fisheries research station in Ontario was established at South Bay on Manitoulin Island (Maher 1966). Although one of the original objectives of the station was to investigate the status of lake trout stocks, the program quickly developed studies involving lake whitefish. Research indicated that whitefish year class strengths were determined by factors including amount of northeast wind, winter severity, and spring air temperatures during their first year of life. Other work included gear (e.g., trawl) development and monitoring the effectiveness of sea lamprey control.
- The provincial government made the Laboratory for Experimental Limnology at Maple available for research by the University of Toronto`s Department of Zoology.
- A total of 2,421 commercial fishing licences were issued in Ontario. The commercial fishing industry employed 4,026 persons.
- Hector H. MacKay was elected to a one-year term as president of the American Fisheries Society. He was the second of five Ontario residents to serve in that capacity.

1948

- Lake herring were introduced into Opeongo Lake in an attempt to improve the forage base for lake trout.
- The term “conservation officer” was used to replace the term “game warden” or “overseer.”
- Dr. W. B. (Bev) Scott appointed as Curator of Ichthyology and Herpetology at the Royal Ontario Museum. This was the first museum in Canada to have a full time curator of ichthyology.
- The first Canadian National Sportsmen Show (CNSS) was held. This non-profit corporation is Canada`s largest producer of outdoor events. Over the years, grants from CNS have supported numerous fisheries projects.
- 1,450 ice huts were registered on Lake Simcoe.
- Nylon gill nets were first used by commercial fishermen on Lake Huron. Nylon nets were found to be stronger and less expensive to maintain as well as increasing capture efficiency by a factor of two or three times when compared to linen or cotton.
- The first sea lamprey control efforts were initiated in the Great Lakes.
- Construction of several large scale dams, resulting in fish habitat destruction, commenced on the Ottawa River.

1940s

- Results of fish stocking programs became more closely scrutinized. The provincial fish stocking policy was amended in the 1950s and a number of fish culture stations were subsequently closed.
- Fisheries researchers refined the ability to age fish. This enabled the determination of year class strengths, the assessment of recruitment, and predictions on the health of the fishery.
- Lake trout population in South Bay, Lake Huron, was extirpated.
- General shift in emphasis from protection and conservation to scientific management.

- *Queen's University Biological Station (QUBS)* was established on Lake Opinicon north of Kingston. The site has since been expanded to include a land base of more than 2,000 ha.

1950

- Experimentation with splake (lake trout x brook trout hybrid) was initiated in Ontario. The selective breeding program was intended to develop a top predator to replace lake trout after their collapse in the Great Lakes. Although splake are no longer stocked in the Great Lakes they continue to provide angling opportunities in many inland lakes.

1951

- Twenty-eight provincial fish culture stations were in operation.

1952

- First experimentation with air dropping fish was conducted as a stocking technique for remote lakes in the Algoma district.
- Snagging was declared an unlawful means of capturing lake whitefish in the Ontario Fishery Regulations. Prior to this, it had been a popular activity in waters including Lake Simcoe.

1953

- White perch were first reported in Lake Erie.
- A fisheries research station was established on Lake Erie at Wheatley.
- There were a total of 34 permanent biologists on staff in the Fish and Wildlife Division of the Ontario Department of Lands and Forests (MacKay undated$_b$)

Figure 19. Repairing nets at the Ontario Department of Lands and Forests southern research station at Maple (Ontario Department of Lands and Forests photo).

1954

- The provincial minimum size limit of fifteen inches (38 cm) on walleye was removed. A 14 inch (35.6 cm) minimum size limit was reinstituted in Lanark and Leeds Counties (Division 10) in the early 1960s. That size limit was removed in 2008.
- The first operating year under a federal-provincial agreement for fisheries research and lamprey control on the Great Lakes.
- Alewife were first reported in Lake Superior (Scott and Crossman 1973).
- Surveys were conducted on Goose Creek (near Fort Severn) to evaluate the potential of establishing pink salmon or chum salmon to provide a commercial fishery for the local inhabitants. Chum salmon eggs were obtained from the Samish State hatchery, Washington, and reared at the Port Arthur hatchery. Pink salmon eggs were obtained from the Skeena River, British Columbia. Eggs and fry were subsequently planted but the project was a failure (Reynolds 1964, Nunan 1967).
- Hurricane Hazel, a 100 year storm, flooded much of southern Ontario destroying dams and barriers on many Great Lakes tributaries.

1955

- The *Great Lakes Fishery Convention* was signed and ratified establishing the *Great Lakes Fishery Commission.*
- Winter ice fishing was banned in Algonquin Park.
- The federal government passed the *Fisheries Improvement Loans Act* to facilitate credit to fishermen to purchase vessels, repair gear, etc.

1956

- The *Great Lakes Fishery Commission (GLFC)* was organized and assumed its duties as set forth in the Convention. The Commission had two basic mandates: (i) initiate and coordinate sea lamprey control, and (ii) improve management of fish stocks of common concern.
- Pink salmon were inadvertently introduced into Lake Superior from the Current River fish hatchery at Thunder Bay. Although first maturing at two years of age similar to their Pacific parents they soon adapted to also spawn at ages 1 and 3 thereby producing an annual spawning run. After an initial population explosion in Lake Superior their abundance eventually declined to a low but constant level. Pink salmon eventually spread throughout the Great Lakes from this single release (Kwain and Lawrie 1981).
- The 86th annual meeting of the American Fisheries Society held in Toronto, Ontario.
- Removal of a provincial size limit on bass.
- The Fort Frances walleye and whitefish hatchery was closed.

1957

- The *Fisheries Research Board of Canada* was established from the former Biological Board of Canada.
- Responsibility for pollution control was transferred to the newly established Ontario Water Resources Commission.
- A new experimental fishing permit was introduced to be issued to commercial fishermen wishing to experiment with new forms of gear not otherwise provided for by regulation.
- The lampricide 3-trifluoromethyl-4-nitrophenol (TFM) was developed for sea lamprey control.
- The Glenora fish hatchery near Picton was converted to a fisheries research station. J. W. (Jack) Christie, biologist, was placed in charge of the fisheries research program.
- Four hundred smallmouth bass were successfully transported by air to Sweden.
- Great Lakes Power Corporation (GLPC) commenced construction on the Cat Falls hydro development project at Whitefish Lake on the Michipicoten River system.
- The majority of Lake Erie commercial fishermen withdrew from the Ontario Fisheries Council and formed the *Lake Erie Fisheries Council.*

1958

- River-run strain lake trout from Lake Superior were introduced into three inland lakes (Mishibishu, Mishi and Katzenbach) on the north shore of Lake Superior (Harrison 1970). This served to establish a lake trout population in these waters which was subsequently used as a source of brood stock in the provincial fish culture program.
- Large scale stocking efforts were initiated on Lake Superior to rehabilitate lake trout.
- The federal *Sea Lamprey Control Program*, using the selective lampricide TFM, was initiated on Lake Superior followed by Lake Michigan (1960), Lake Huron (1966) and Lake Ontario (1971).
- The Moses-Saunders Dam hydroelectric construction project was completed on the St. Lawrence River. The impoundment behind the dam is known as Lake St. Lawrence. Several villages were relocated and the Long Sault Rapids, an important spawning area, was flooded.

- The Bayfield-Goderich Commercial Fishermen's Association was formed. The first president was J. McMillan.
- The first experimental efforts were undertaken to use trawls in Lake Erie. In 1960, 6 million pounds of smelt were taken by trawl. By 1962, the Central Lake Erie Trawlers Association had been formed.
- D. E. McAllister was appointed as the first full time curator of fishes at the National Museum of Canada in Ottawa.

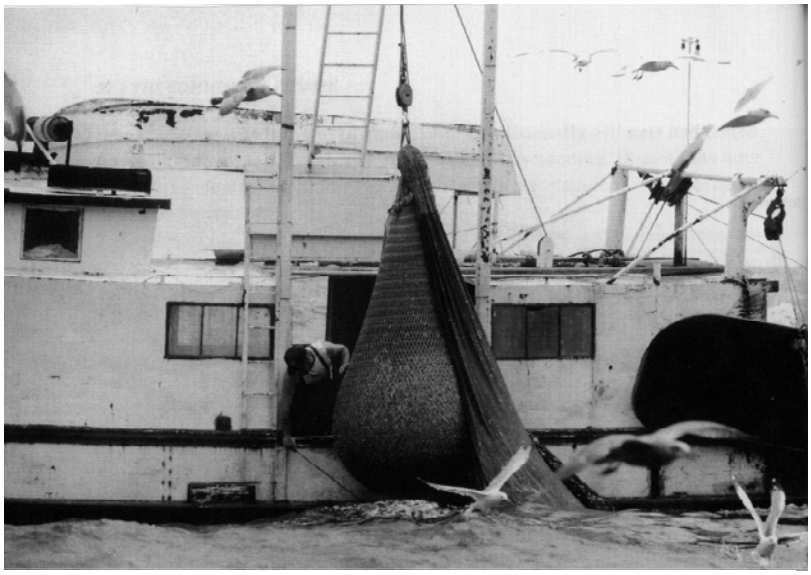


Figure 20. Raising a trawl on a Lake Erie tug (Department of Fisheries and Oceans photo).

1959

- The Patricia fisheries inventory project was initiated to document lake characteristics and fisheries populations in that part of northwestern Ontario. The project concluded in 1965.
- The first concrete fishway in Ontario was constructed at the Mill Dam on the Sydenham River in Owen Sound. Today, there are at more than forty fish passage facilities in Ontario (Appendix 8).
- A federal-provincial agreement was signed to delineate federal-provincial responsibilities with respect to fisheries management. The federal government assumed responsibility for sea lamprey control and general fisheries research on Lake Superior while the provincial government became responsible for general fisheries research and collection of routine fisheries statistics on Lakes Huron, Erie, and Ontario.
- Fish and Wildlife Division was renamed as Fish and Wildlife Branch in the Ontario Department of Lands and Forests.
- The *St. Lawrence Seaway* officially opened. The Seaway facilitated traffic of ocean freighters opening up a shipping route of approximately 3,700 km to Lake Superior at the heart of North America.
- The *Lake Erie Fisheries Research Advisory Committee* was formed to review research programs and improve communications with clients.
- The Ontario legislature passed the *Wilderness Areas Act* under which the government could set aside tracts of land as wilderness reservations in which public entry was strictly prohibited.

1950s

- Lake trout were extirpated in Lakes Michigan, Ontario, and Erie, nearly extirpated in Lake Huron, and present at low levels of abundance in Lake Superior.
- Explosion in numbers of American smelt in Lake Erie. Trawling was initiated as a harvest technique.
- Collapse of lake whitefish in the Bay of Quinte.

1950s-1960s

- Reproductive failures and population declines observed in fish-eating birds (gulls, cormorants, herons, eagles, terns, etc.) in the Great Lakes attributed to pollutants and contaminants.

1960

- Lake Erie, much of Lake Ontario and areas of Lake Huron had become eutrophic with noxious algal growths, fish kills, and anoxia.
- Dr. C. H. D. Clarke was appointed as Chief of Fish and Wildlife Branch succeeding the late Dr. Harkness. H. H. MacKay was the supervisor of Fisheries Section. MacKay's direction included the principle of sustained yield, integrated land use planning, and promotion of public use of natural resources.
- There was a notable decline in walleye abundance in the Bay of Quinte.
- A major fish kill, evident after ice-out, occurred on Lake Scugog in southern Ontario. Almost 50,000 dead fish, of several different species, were recorded. This was believed to have been one of the largest fish kills ever to occur in the province to that point in time (Wainio 1982).
- A seven inch provincial minimum size limit was removed for brook, rainbow, and brown trout.
- The first authenticated occurrence of Arctic char in Ontario was documented based on a specimen captured in the Severn River on August 13, 1960 (Ryder 1961).

1961

- The provincial *Game and Fisheries Act* was rewritten as the *Game and Fish Act*.
- A total of 59 organized fish and game clubs were reported in the Lake Huron District of the Ontario Department of Lands and Forests.
- The baitfish industry continued to expand. In 1961, there were 2,181 harvesters, 510 dealers and 88 licences issued to preserve baitfish.
- Provincial policy was established whereby a waterbody would only be stocked with fish after it had been surveyed and was believed to provide suitable conditions.
- The Nicholston dam fishway was constructed on the Nottawasaga River near Alliston.
- The *Ontario Fish and Wildlife Review*, edited by O. C. (Ott) Devitt, was initiated. The publication of the Ontario Department of Lands and Forests was published four times a year until 1982 when it was replaced by the Ministry of Natural Resources publication Landmarks.
- Lake-wide commercial quotas were implemented for lake trout in Lake Superior.
- In memory of W. J. K. Harkness, the Opeongo fisheries research laboratory was renamed the *Harkness Laboratory of Fisheries Research.*

1962

- The first public fishing area was opened at the former Mount Pleasant fish hatchery. By 1971, there were 12 provincial fishing areas designed to provide angling opportunities close to urban centers (Persal 1963, Johnston 1965, Raine 1969). In 1971, it was estimated that 239,000 angler hours of effort were expended to catch 66,000 trout at these twelve locations.
- American smelt were first reported in Lake Simcoe (MacCrimmon and Skobe 1970).
- Conservation Authorities Branch transferred from the Department of Planning and Development to the Ontario Department of Lands and Forests.
- The provincial brown trout stocking program was terminated for several reasons including poor returns. The program was resumed years later.
- A five year study was initiated on Lake of the Woods to document physical/chemical characteristics of the lake as well as determine the status of resident fish stocks. A biologist was hired and the Lake of the Woods management unit was formed. A similar unit was formed in the Kawartha lakes the same year.

- Sixty-eight professional biologists were employed in the Ontario Department of Lands and Forests. This represented a substantial increase from 18 biologists in 1949.
- Amendments to the provincial *Game and Fish Act* allowed the private sector to culture and sell rainbow trout and brook trout for consumption and stocking, and the culture and sale of largemouth bass and smallmouth bass for stocking only. Prior to this, fish culture had been largely practiced by only the provincial government.

1963

- *Fishes of Ontario* by Dr. H. H. MacKay was published by the Ontario Department of Lands and Forests.
- A three day non-resident angling licence was re-established.
- In an amendment to the *Ontario Farm Products Marketing Act*, "fish" was declared to be a farm product for the purposes of that Act.

Figure 21. Conservation officers with muskellunge seized from poachers on Lake Simcoe (MNR photo).

1964

- Sixty-seven full time biologists and two hundred and fifty-one conservation officers were on staff with the Ontario Department of Lands and Forests. There were also thirty-seven staff in Fisheries Research.
- A report on the feasibility of introducing Kokanee salmon in the Great Lakes to establish a recreational fishery and provide forage for lake trout was released. Kokanee salmon were first stocked into Lake Huron (Maher 1965) but the program was terminated in 1972.
- A book, authored by J. R. Dymond, entitled *Fish and Wildlife: A Memorial to W. J. K. Harkness*, was published (Dymond 1964).
- Lake Simcoe was designated as a separate fisheries management unit with its own biologist and senior technician. At roughly the same time a cooperative fishery research program, funded by the Canadian National Sportsman Show, was initiated with the University of Guelph.
- The Federation of Ontario Cottagers Association (FOCA) was formed (www.foca.on.ca). It currently represents over 550 cottage associations in Ontario.

1965

- The problem of pollution and eutrophication in Lakes Erie and Ontario was referred to the International Joint Commission.
- The last confirmed blue pickerel was taken from Lake Erie.
- Development of the *morphoedaphic index (MEI)* for use as an estimator of fish yields from individual waterbodies (Ryder 1965, 1982, Ryder et al. 1974). This represented a major achievement and ultimately resulted in the production of numerous other papers on the topic of predicting sustainable fish yields.

- A special licence, issued free of charge, was instituted for anglers seeking lake trout on Lake Superior. Anglers were encouraged to complete and submit the creel census portion of the licence in order for biologists to obtain information on the recreational harvest of lake trout.
- The issuance of permits allowing importation of live bait fish was discontinued.
- A U.S. presidential advisory committee panel warns that the greenhouse effect was a matter of "real concern."

Mid 1960s

- Several Ontario researchers were assigned to investigate the potential to introduce species from elsewhere in the world to provide sport fisheries in the degraded Great Lakes environment (Martin 1966, Christie 1970). Fish species which were examined included cherry (masu) salmon, redspot salmon, Ayu, Danube salmon, pikeperch, and hybrid sturgeon.
- American smelt became firmly established in Huronia Lake (east of Atikokan) at the headwaters of the Winnipeg-Nelson River system. They quickly spread downstream to several large lakes in Quetico Provincial Park.

1966

- Seventy-two biologists and 238 enforcement personnel were on staff with the Ontario Department of Lands and Forests.
- A *Provincial Lake Inventory Program* was initiated. A new unit in Fisheries Branch was formed to coordinate the provincial program. In the following 10-15 years, 9,885 lakes were surveyed in the province. By 1989, there were inventory records for 12,880 lakes and streams in Ontario.
- Peak commercial harvest of walleye was recorded from Black Bay, Lake Superior. By 1972 the commercial walleye harvest had declined to zero. Walleye had been extirpated from nearby Nipigon Bay in the 1960s.
- In 1966 and 1967, a total of 6,000 cherry salmon were introduced into Westward Lake in Algonquin Park (Christie 1970). The eggs originated from the Shiribetsu River, Japan. The program did not establish a self-sustaining population and was discontinued.
- F. E. J. Fry was elected to a one-year term as president of the American Fisheries Society. He was the third Ontario resident to serve in that capacity.
- Rusty crayfish, papershell crayfish and northern clearwater crayfish were first reported in Lake of the Woods. It is believed that they were most likely introduced from an angler's bait bucket.
- A Lake Temagami fisheries management unit comprised of a biologist and a technician was established. In 1968, similar management units were also established on Lake St. Clair, Lake Nipigon, and Rainy Lake.

1967

- Aurora trout were considered extirpated from the wild in Ontario. Before this occurred, a small number of trout were collected from the wild and used to establish a brood stock at the Hills Lake Fish Culture Station.
- 97th annual meeting of the American Fisheries Society was held at Toronto, Ontario.

1968

- The *Experimental Lakes Area (ELA)* program commenced in northwestern Ontario. This federal program was designed to provide measurements on responses to various pollutants and stressors on aquatic ecosystems and resident biota using whole lake simulations. One of the first projects involved the artificial acidification of Lake 223 and the experimental eutrophication of Lake 226.

Figure 22. Aerial view of Lake 226, Experimental Lakes Area, during a eutrophication experiment (Department of Fisheries and Oceans photo).

- Due to increasing concerns for introduced fishes, a symposium on introductions of exotic species was held in Ottawa. Symposium proceedings were published as Research Report No. 82, Ontario Department of Lands and Forests (Loftus 1968).
- The *Canada Centre for Inland Waters (CCIW)* was established based on increasing national concern over the status of the Great Lakes.
- The last year that the training center at Dorset was used to graduate forest technicians. It had been the only Ontario source for this training since 1947. It was also in 1968 that Sir Sandford Fleming College in Lindsay began to offer a two year technician course.

1969

- A resident sport fishing licence was instituted for male anglers aged nineteen years of age or older. Prior to this there had only been a resident licence requirement to fish in waters of Algonquin, Quetico, and Lake Superior provincial parks. The licence proved to be unpopular and was discontinued in 1972.
- Coho salmon were stocked in Bronte Creek and the Credit River in an experimental program.
- Conference on coregonids was held in Winnipeg, Manitoba. Conference proceedings, *Biology of Coregonid Fishes,* were published in 1970 (Lindsey and Woods 1970).
- The *Freshwater Fish Marketing Corporation (FFMC)* was established to improve marketing of fish caught in the western provinces and territories (Brubacher 1969). It also included Lake of the Woods and other commercial fisheries in northwestern Ontario. Lake of the Woods dropped out after only one year over complaints of low prices for premium species.
- Implementation of ice hut removal dates (March 31) for Lake Temagami, Lake Nipissing, and all waters south of the French and Mattawa Rivers.

Late 1960s

- The use of helicopters to stock small remote lakes commenced.

1960s-1970s

- Studies conducted in the La Cloche and Wawa areas of northeastern Ontario documented the loss of fish populations as a result of changes to surface water pH associated with acid precipitation. One of the earliest papers documenting the phenomena was published in a 1972 issue of the Journal of the Fisheries Research Board of Canada (Beamish and Harvey 1972).

1970

- The *Lake Huron Fisheries Assessment Unit* was established to monitor and report on commercial fish harvests from Lake Huron and to recommend regulations for those commercial fisheries.
- A survey of recreational angling in Ontario was conducted. Results indicated that 2.4 million people angled to catch more than 29 million fish (Appendix 9). Twenty-one percent of

Ontarians indicated they were anglers. It was estimated that anglers spent over $300 million annually for fishing in Ontario.

- Blue walleye were considered to be extirpated.
- A fishway and sea lamprey barrier was constructed at Denny's Dam on the Saugeen River, a major Lake Huron tributary.
- The commercial and recreational fisheries in Lake St. Clair were closed due to mercury contamination from an upstream source. The sport fishery ban continued for several months while the commercial ban lasted for ten years.
- Cooperative studies involving Ontario Department of Lands and Forests, University of Guelph, and Ontario Water Resources Commission, conclusively prove the deleterious effects of DDT on early life stages of lake trout.
- Mercury contamination from a Dryden paper mill was discovered in the English-Wabigoon river system leading to the closure of the commercial fishery and some tourism-related businesses (Fimreite and Reynolds 1973). The accumulation of mercury in fish caused mercury poisoning in First Nations peoples of Grassy Narrows and Whitedog. In 1986, a mercury disability fund of almost $17 million was created, funded by government and companies (Reed Limited and Great Lakes Forest Limited).
- The booklet *Fisheries of Lake Simcoe* (MacCrimmon and Skobe 1970) was published by the Department of Lands and Forests.

1971

- A departmental reorganization divided Fish and Wildlife Branch into Fisheries Branch and Wildlife Branch. In the Fish and Wildlife Division, Dr. K. K. (Ken) Irizawa was executive director, K. H. (Ken) Loftus was the director of Fisheries Research Branch and J. D. (Doug) Roseborough was the Director of Fisheries Branch.
- *Project Quinte* was initiated. This multi-agency project was designed to implement measures to reduce phosphorus loading in the Bay of Quinte and to monitor improvements in water quality and recovery of aquatic biota (Minns et al. 1986). By the mid 1980s, dramatic changes were evident resulting from the dramatic decreases of phosphorus loading which began in 1977-78.
- An international symposium on *Salmonid Communities in Oligotrophic Lakes (SCOL)* was held at Geneva Park, Ontario. Proceedings were subsequently published in a special issue of the Journal of the Fisheries Research Board of Canada (Loftus and Regier 1972). One of the key principles emerging from the symposium was that similar aquatic communities respond to stressors in similar ways.
- The *Endangered Species Act* was passed by the provincial legislature.
- A cooperative multi-year study, involving MNR, MOE, Ontario Hydro, and Stelco, was initiated at the Nanticoke Generating Station on Lake Erie to determine the effects of thermal discharges on the aquatic environment. Results of the study were published by MNR in 1987 (MacGregor and Witzel 1987).

1972

- Provincial government reorganization in which the Ontario Department of Lands and Forests became the Ontario Ministry of Natural Resources. The Ministry of Natural Resources Act came into effect on April 1, 1972. Forty-nine new administrative districts were created (formerly 21) in eight regions of the province.
- *Trout Unlimited Canada (TU)* was founded with the goal of conserving and protecting Canada's coldwater fisheries and their ecosystems. There are currently 17 TU chapters in Ontario (www.tucanada.org).

- The booklet *Rainbow Trout in the Great Lakes* was published by MNR (MacCrimmon and Gots 1972).
- The *Great Lakes Water Quality Agreement* was signed by Canada and the United States. The agreement committed both countries to initiate programs and measures to reduce pollution entering the Great Lakes. The agreement was subsequently renewed in 1978 and amended in 1987.
- Quotas were established for walleye and northern pike in designated northwestern Ontario inland lake commercial fisheries.
- Arising from increased local environmental concerns, construction of the Inco superstack was completed. At a height of 380 m, the stack dispelled smelter emissions of sulphur dioxide into the jet stream. While the superstack lowered ground level pollution in the Sudbury area, it increased surface water acidification over a larger area. By the late 1980s, it was determined that almost 7,000 lakes were damaged due to acidic precipitation. By 1994, technology was devised to remove approximately 94% of the sulphur dioxide emissions.

1973

- The Great Lakes Fishery Commission published a series of case histories for individual Great Lakes (Berst and Spangler 1973, Christie 1973, Hartman 1973, Lawrie and Rahrer 1973, Wells and McLain 1973).
- *Freshwater Fishes of Canada* was published (Scott and Crossman 1973). This popular reference book was reprinted in 1998.
- A large scale lake trout stocking program was initiated on Lake Huron and Lake Ontario to rehabilitate lake trout.

Figure 23. Top span of the prototype wooden eel ladder at the Moses-Saunders hydroelectric station on the St. Lawrence River. Photo shows willow cuttings in the ladder with a resting pool (bottom left) (Ontario Ministry of Natural Resources photo).

- The *Freshwater Institute* opened in Winnipeg as a federal center for research on freshwater fisheries.
- Fifteen provincial fish culture stations were in operation.
- The *Game and Fish Hearing Board* was established, in an amendment to the Game and Fish Act, to deal with complaints from rejected applicants for commercial licences.
- Surveys conducted in 1973 and 1974 on Lake Erie revealed that more than two-thirds of the bottom waters had no oxygen. This was attributed largely to phosphorus loading.
- An MNR survey indicated that 72% of tributaries of Lake Erie, Ontario and southern Lake Huron, having potential as spawning and rearing habitat for anadromous fishes, were blocked by dams.
- *Federal Environmental Assessment Review Process (EARP)* was introduced.
- Chinese mitten crabs were found in Lake Erie (Nepszy and Leach 1973).

1974

- An eel ladder was constructed at the Moses-Saunders dam on the St. Lawrence River at Cornwall to provide upstream access for American eels. Approximately 4.4 million eels were provided upstream access during the first six years of operation. The original wooden structure was eventually replaced with a permanent structure.
- Canada hosted the 19th meeting of the International Association of Limnology. Proceedings, including a number of Ontario papers, were published as a special issue of the Journal of the Fisheries Research Board of Canada (Stevenson 1974).
- The forest ranger school at Dorset was renamed the *Leslie M. Frost Natural Resources Centre.* The center was used extensively for fish and wildlife staff training as well as serving as a public education center.
- Review of the provincial fish culture program was conducted by an independent consultant who submitted the final report in January 1975.

1974-1979

- *Strategic Planning for Ontario Fisheries (SPOF)* (Loftus et al. 1978). This federal-provincial exercise resulted in the production of four background reports and nine working group reports (Appendix 9). Working group reports included designation of fisheries assessment units, rationalizing the commercial fishery, involving the public in fisheries management, introducing a resident sport fishing licence, and developing defensible fish yield estimates. SPOF established the principles of managing provincial fisheries for the benefits of all society not just those of competing interests (Christie et al. 1999). SPOF was approved by the Ontario cabinet in 1978.

1975

- *CITES, the Convention of International Trade in Endangered Species of Wild Fauna and Flora*, came into effect. As a signatory, Canada was required to ban commercial trade in an agreed list of currently endangered species. Ontario's role in CITES was to ensure that endangered species are not illegally brought into Canada through Ontario.
- The *Journal of Great Lakes Research* was launched as a scientific information tool of the International Association of Great Lakes Research.
- The first national recreational fishing survey was conducted. Based on this household survey, it was estimated that 46.7 million angler days of fishing effort was expended on Ontario waters. The survey continues to be conducted at five year intervals.
- U.S. scientist Wally Broecker puts the term "global warming" into the public domain.

1976

- Booklet entitled *About Bait Fish in Ontario* was published by the Commercial Fish and Fur Branch of MNR (Wallace 1976).
- Sport Fisheries Branch and the fisheries component of Commercial Fish and Fur Branch amalgamated to form Fisheries Branch. The new Fisheries Branch, under the leadership of K. H. (Ken) Loftus had five sections: Environmental Dynamics under D. P. (Doug) Dodge, Fish Culture under G. C. (George) Armstrong, Fisheries Services under J. R. (Charlie) Weir, Policy Development under Frank Maher, and Population Dynamics under C. H. (Charlie) Olver.
- Fish and Wildlife Research Branch, under the direction of J. D. (Doug) Roseborough, was based at Maple, Ontario. The station housed seven fisheries research scientists and nine wildlife researchers. In addition, there were fisheries research stations at Glenora, Harkness, Sault Ste. Marie, South Baymouth, Thunder Bay and Wheatley.

- Despite attempts at their eradication, American smelt became established in Lake Nipigon.
- *Percid International Symposium (PERCIS)* was held in Ontario. The event was attended by 70 scientists with the goal of bringing experts together to address issues of common concern. Proceedings were subsequently published as a special issue of the Journal of the Fisheries Research Board of Canada (Colby and Wigmore 1977).

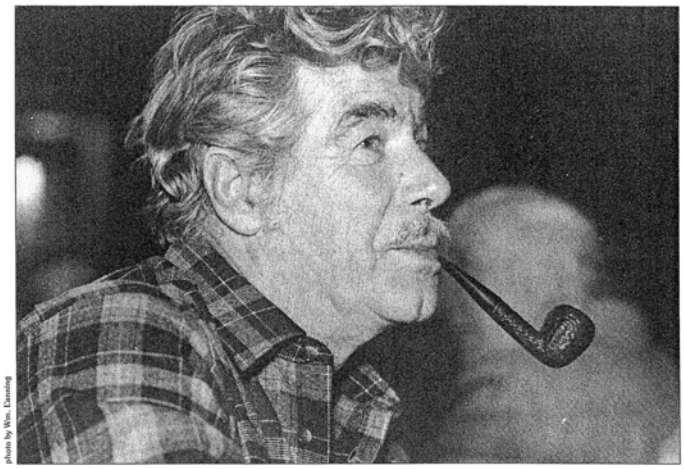


Figure 24. K. H. (Ken) Loftus was one of the principle architects of the Strategic Plan for Ontario Fisheries (SPOF) (MNR photo)

- Booklet *Quetico Fishes* was published by the Royal Ontario Museum (Crossman 1976).
- Implementation of the Sport Fish Contaminant Monitoring Program. This was a cooperative program involving the Ministries of the Environment and Natural Resources. To date, samples have been collected and analyzed for 1,860 locations in Ontario – the largest program of its kind in North America. Updated consumption guidelines ("Guide to Eating Ontario Sport Fish") are printed and distributed on a regular 1-2 year basis.
- *Distribution and Characteristics of Ontario Lake Trout Lakes* was published (Martin and Olver 1976). This was the first fish species atlas completed on a provincial basis which displayed the geographic basis for the distribution of lake trout lakes in Ontario.
- The book *Fish Ontario* was published. This book provided information on 4,582 Ontario lakes and their resident fishes for anglers.
- A special issue of the Journal of the Fisheries Research Board of Canada was published to review physical, chemical, and biological studies which had been carried out on Lake Erie in 1970 and 1971 (Stevenson 1976).

1977

- An annual Fisheries Certificate course was initiated at the Frost Centre, Dorset. The course was intended to provide conservation officers and other fisheries staff training on the principles of fisheries management and development of new management techniques.
- A large natural year class of walleye was produced in the Bay of Quinte in 1977 and 1978. As a result of degraded water quality, walleye had been almost non-existent during the 1960s and 1970s. The sudden resurgence in walleye was attributed to water quality improvement coincident with reductions in alewife and white perch populations.

1978

- Rehabilitative stocking efforts in Georgian Bay and the North Channel were switched from splake to lake trout backcross (a select splake crossed with a lake trout). Lake trout backcross were reared at the Chatsworth Fish Culture Station near Owen Sound.
- *Counts and Measurements of Ontario Lakes* was published by MNR (Cox 1978). It represented the first comprehensive effort to enumerate and document characteristics of Ontario lakes. A total of 226,918 lakes (44,762,966 acres) were identified.

- *Muskies Canada Inc. (MCI)* was founded (www.muskiescanada.ca). It functioned as a single entity until 1987 when geographic chapters were formed. MCI currently has more than 600 members in 14 chapters in three provinces.
- The commercial harvest of American eels from Lake Ontario and the St. Lawrence River peaked at 231,000 kg.
- Research scientist Jim Fraser's paper entitled "The effect of competition with yellow perch on the survival and growth of planted brook trout, splake, and rainbow trout in a small Ontario lake" (Fraser 1978) won the award for the best paper published by the American Fisheries Society in the Transactions of the American Fisheries Society that year.

Figure 25. Administrative districts and regions of the Ontario Ministry of Natural Resources in 1978.

- Rollout of several of the *Fisheries Assessment Units* (FAU) recommended from SPOF was initiated. SPOF recommendations included establishing units on the 5 Canadian Great Lakes and 24 inland assessment units (172 lakes) (Appendix 11). The Fisheries Assessment Unit concept was based on the premise that similar fish communities respond in a similar manner to stresses and management actions. Only 12 inland units were ultimately established. A core data program was subsequently developed to identify key physical, chemical and biological data to be collected on designated FAU waters.
- Henry R. Regier was elected to a one-year term as president of the American Fisheries Society. He was the fourth Ontario resident to serve in that capacity.

1979

- *The Sea Lamprey International Symposium (SLIS)* was held. Proceedings were subsequently published as a special issue of the Canadian Journal of Fisheries and Aquatic Sciences.
- Formation of the *Ontario Conservation Officers Association (OCOA)* (www.ocoa.ca). The Association is a non-profit, and fraternal association of active and retired Ontario Conservation Officers and other natural resources law enforcement officers. The Ontario Conservation Officers Association is dedicated to continued excellence within the Conservation Officers profession, internally fostering fellowship and promoting mutual interests to ensure the maximum protection of Ontario's natural resources.
- The *Cleithrum Project* was initiated by E. J. (Ed) Crossman and J. M. (John) Casselman in an attempt to develop a repository for age and growth information for Ontario esocids (muskellunge and northern pike). There are approximately 5,000 esocid cleithrum currently in the collection.
- The Lake Nipigon Fisheries Assessment Unit (LNFAU) was formed to collect information from which to monitor the status of the fishery.
- A *Manual of Instructions for Aquatic Habitat Inventory Surveys (AHI)* (Dodge et al. 1979) was published and was designated as the official procedural manual for use in conducting inventory

surveys on lake and streams. The eighth edition, which included large river survey techniques, was published in 1987.
- The provincial government issued hunting and fishing guidelines for Treaty Indians which reflected the policy of MNR.

1980
- A survey of Ontario's recreational fishery was conducted. It was estimated that 37.8 million days of angling effort was expended on Ontario waters during 1980.
- Signing of the *Joint Strategic Plan for Management of Great Lakes Fisheries* by all parties with jurisdiction for management.
- First-in-Canada automated fish lock opened at Thornbury on the Beaver River, a Georgian Bay tributary.
- The *Stock Concept International Symposium (STOCS)* was held at Alliston, Ontario. The concepts of identifying and managing individual fish stocks were developed. Proceedings were subsequently published as a special issue of the Canadian Journal of Fisheries and Aquatic Sciences (Green 1981).
- MNR fisheries scientist, Richard A. (Dick) Ryder was elected for a one year term as president of the American Fisheries Society.
- The *North American Eel Conference*, organized by MNR and sponsored by the Great Lakes Fishery Commission, was held in Toronto. The conference consisted of 25 papers which were subsequently published in the Ontario Fisheries Technical Report Series. (Loftus 1982). Initial concern over the status of eels in Ontario was documented at this conference.
- Atlas of brook trout lakes in Ontario was published by MNR. A total of 2,110 lakes were identified (Appendix 12).
- Minimum length limits (114.3 cm) for lake sturgeon were implemented in two northwestern Ontario fishing divisions.

Figure 26. Recreational angling has important social and economic benefits (MNR photo).

- The book *Charrs – Salmonid Fishes of the Genus Salvelinus* was published (E. K. Balon ed.). Several of the chapters were authored by MNR research scientists.
- The Northwestern Ontario Chapter of the American Fisheries Society was formed. It was eventually dissolved when an Ontario Chapter was formed some years later.

1981
- Representatives of the Department of Fisheries and Oceans, MNR, and eight U.S. government agencies signed the *Joint Strategic Plan for Management of Great Lakes Fisheries.* MNR Minister, Alan Pope credited SPOF as an important contribution to the plan.
- Introduction of the *Ontario Fisheries Technical Report Series*. This series was established by MNR to provide for the broad dissemination of internal reports and reviews that were of relevance to provincial problems and issues in fisheries research and management. There were 29 reports published in this series until it was discontinued in 1989 (Appendix 13).

- Increasing concerns over the impacts of acidic precipitation on water quality and fisheries lead to an international symposium on Acidic Rain and Fishery Impacts in Northeastern North America at Cornell University, New York. Several papers were presented from Ontario. Proceedings were subsequently published by the American Fisheries Society (Johnson 1982).
- MNR/MOE initiated an acidification monitoring program. A lab and office space were developed at MOE's facilities in Dorset.
- Minister James Auld announced a committee of industry and MNR staff to recommend improvements in the administration system regulating the commercial fishing industry.
- The Deputy Conservation Officer program was established to increase enforcement capabilities and to facilitate participation by members of the public. Within the first year almost 200 deputies had been appointed and trained.

1982

- Canada enacted the *Constitution Act (1982)* which maintained the federal-provincial relationships established in the British North America Act of 1867. A new provision of the Constitution Act (1982) and the incorporated *Charter of Rights and Freedoms* was the entrenchment of treaty, aboriginal, and Metis rights. This recognition placed these rights as equivalent to the law of Canada.
- The *Community Fisheries Involvement Program (CFIP)* was implemented. The program was designed for interested volunteers to become involved in projects which benefited fisheries and conserved biodiversity. In the first year an estimated 3,000 work days of volunteer effort was expended on 22 different projects.
- Efforts to develop lake whitefish advanced rearing techniques were initiated at Glenora. By 1986 intensive culture techniques had been refined to the point where culture shifted to a production basis at the White Lake Fish Culture Station.
- Spiny water flea was first reported in Lake Ontario. By 1989 it was present in all the Great Lakes and, shortly thereafter, numerous inland lakes.
- A general policy for stocking fish in Ontario was developed. The policy recognized different objectives for stocking, stipulated that a standard aquatic habitat inventory survey must first be conducted to ensure appropriate habitat conditions, required public access, and recommended stocking densities for various species. Pursuant to the policy, guidelines were to be developed and updated on a regular basis.
- The *Report of the Committee on Modernizing the Commercial Fishery in Ontario* was submitted to the Deputy Minister of Natural Resources by co-chairs J. MacDonald and A. (Art) Holder. The report made recommendations for major changes in how Ontario's commercial fisheries were managed.
- MNR employed a total of 4,302 regular and 1,565 unclassifed staff. Over 4,427 of these staff were stationed in the field organization.

Figure 27. The introduction of zebra mussels had major impacts on the Great Lakes ecosystem (MNR photo by Heather Bickle).

- A lake sturgeon, weighing 76.2 kg (168 lb.) was angled from Georgian Bay. This fish holds the world all tackle record (IGFA 2010).

1983

- A long term lake trout rehabilitation plan for Lake Ontario, which included restocking initiatives, was developed.
- *Conference on Lake Trout Research (CLAR),* sponsored by the Great Lakes Fishery Commission, was held at Goderich, Ontario. The conference was designed to develop priorities for lake trout research on the Great Lakes. The conference proceedings were published by the Great Lakes Fishery Commission (Eshenroder et al. 1984).
- The *Lakeshore Capacity Study*, a joint undertaking involving MNR, MOE and Ministry of Municipal Affairs and Housing (MMAH), was initiated. The project was undertaken to develop an understanding of the potential impacts of shoreline cottage development on selected aspects of the environment including fisheries. A total of eight technical reports were produced by the end of the project in 1986.
- The *Canada-Ontario memorandum of agreement for the Experimental Lakes Area (ELA)* was signed. The memorandum was renewed in 1993 and amended in February 2000.
- Last record of bloater (a deepwater ciscoe) in Lake Ontario.
- The number of American eels ascending the ladder at the Moses-Saunders Dam on the St. Lawrence River peaked at 1,313,570 eels.
- The report *Beyond the Rainbow: Alternative Species for Commercial Aquaculture in Ontario* was published (Watson et al. [eds.] 1983). This report was prepared by a private aquaculture development program tasked with evaluating the feasibility of rearing various species of freshwater fish commercially in Ontario.
- The *Canada-Ontario Sea Lamprey Barrier Dam* A*greement* was signed by the Ministers of the Department of Fisheries and Oceans and the Ontario Ministry of Natural Resources.
- Shoal Lake was closed to both commercial and recreational fishing for walleye following a drastic decline in the population believed to have been caused by overfishing.

1984

- A *Non-Salmonid Rehabilitation Workshop* was held at Barrie, Ontario. Workshop proceedings were subsequently published by MNR.
- After consultation with the Ontario Fish Producers Association (initiated in 1982), quotas for commercial fishing activities were implemented (the exercise was known as Modernization of the Commercial Fishery) with considerable resistance from commercial fishers.
- New Lake Ontario Fisheries Unit headquarters were opened in Glenora.
- A record-sized lake whitefish, weighing 6.52 kg, (14 lb. 6 oz.) was angled from Georgian Bay near Meaford. It has been recognized as the world all tackle record (IGFA 2010).
- Provincial policy developed for competitive fishing events in Ontario. Key points included neutrality, no staff involvement at events, promotion of catch-and-release practices, and adherence to the regulations.
- An *Approach to Management and Design for Natural Channel Systems* was published by MNR in conjunction with the Canadian Water Resources Association, Soil and Water Conservation Society and the American Fisheries Society. The document was intended as a guide for those interested in managing or designing stream or riverine channel systems of a natural flow.
- The international symposium *Managing Muskies* was held at LaCrosse Wisconsin. The proceedings were subsequently published (Special Publication 15) by the American Fisheries Society (Hall 1986).

- A *Crown Land Camping Program* was established in northwestern Ontario. It included restrictions and permit requirements for non-resident camping.
- The *Minnesota-Ontario Boundary Waters Fisheries Management Committee* was formed to facilitate development of long term solutions for the management of border waters including Rainy Lake and Lake of the Woods. This Committee subsequently published the first Boundary Waters Fishery Atlas, a Compendium of Fish Stock Status, and a socio-economic evaluation of the fishery.
- A *Sport Fish Symposium*, co-sponsored by OFAH and MNR, was held in Owen Sound. Fourteen papers were presented and a summary of the proceedings was published.
- An experimental cage culture project (involving lake trout) was initiated in the North Channel of Lake Huron. This MNR project was discontinued in 1992.
- A conference *Walleye and Tourism: Future Management Strategies*, sponsored by the Northwestern Ontario Chapter of the American Fisheries Society, was held at the Quetico Center, Ontario. Conference proceedings were subsequently published (Baccante 1985).

1985

- A survey of Ontario's recreational fishery was conducted. It was estimated that there were 34.4 million days of angler effort in Ontario waters during 1985.
- An International Symposium on *Stocking Assessment and Yield Prediction (ASPY)* was held at the Quetico Center, Ontario. The event was sponsored by the Great Lakes Fishery Commission and was published (47 papers) as a special issue of the Canadian Journal of Fisheries and Aquatic Sciences (Christie and Spangler 1987). Some of the highlights of the symposium included recognizing the importance of keystone species and their role in trophic systems and ecosystem structure.
- Forty-three *Areas of Concern (AOC)* in Great Lakes were designated by the International Joint Commission. There were seventeen AOC's identified in Ontario (Appendix 14).
- A protocol for evaluating wetlands was developed jointly by MNR and Environment Canada and published in 1985.
- Introduction of a Daily Angling Validation Tag system on border waters in the Kenora & Fort Frances districts for non-resident day-trip anglers.
- *CREESYS*, a microcomputer software package used to manage creel survey data, was released for use by MNR staff (Orsatti et al. 1991).
- To comply with the Environmental Assessment Act, MNR submitted its "Class Environmental Assessment (EA) for Timber Management on Crown Lands in Ontario." After several years of hearings, the EA Board decision and approval was issued in 1994. The decision required an ecosystem approach for managing the forest and related extraction and regeneration activities. The legal obligation resulting from these hearings, as well as the proclamation of the *Crown Forest Sustainability Act (CFSA)*, had a significant impact on how fish habitat was viewed during forest management activities on Crown land in Ontario. The Class EA and CFSA introduced a new planning process and formalized a series of forest management guides, with one devoted specifically to protecting fish habitat during forest operations. Rather than timber management being viewed as the production of trees to produce pulp and timber, a new era of sustainable forest management addressed the health of the forest ecosystem including aquatic habitats.

Mid 1980s

- A provincial exercise was initiated to develop district fisheries management plans.
- Unauthorized introduction of American smelt into Algonquin Park.
- Decline in American eels first detected in the Great Lakes.
- Northern pike extended their range into Algonquin Park.

- Large sections of two rivers (East Goulais and Upper Garden) were designated for "fly-fishing only". These waters continue to be some of the only waters having this designation in Ontario.

1986

- The *Large River Symposium (LARS)* was organized by MNR and held Honey Harbour, Ontario. Proceedings, which included 42 papers, were published as a Canadian Special Publication of Fisheries and Aquatic Sciences (Dodge 1989).
- First discovery of zebra mussels in Lake St. Clair. They quickly spread throughout the Great Lakes as well as into the Rideau and Trent-Severn waterways.
- A limited recreational fishery was re-opened for Aurora trout on two stocked northeastern Ontario lakes.
- MNR implemented an official policy for electrofishing. Electrofishing guidelines were prepared by G. A. (Gareth) Goodchild and were adopted as standard operating procedures. Mandatory training was initiated for both federal and provincial fisheries staff.
- A workshop on the *Biology and Management of Lake Sturgeon,* organized by MNR, was held at Timmins, Ontario. Workshop consisted of 14 papers which were published in the Ontario Fisheries Technical Report series (Olver 1987).
- The Ontario Council of Commercial Fisheries (OCCF) changed their name to the *Ontario Fish Producers Association* (OFPA).
- A *Walleye Culture Manual*, authored by P. (Peter) Richard and J. (Julian) Hynes, was published by MNR. The manual summarized walleye culture techniques developed over twenty-five years at the White Lake Fish Culture Station.
- A *Federal Policy for the Management of Fish Habitat* was released by the Department of Fisheries and Oceans. The overall long term policy objective was a net gain of fish habitat based on the guiding principle of no net loss of the productive capacity of habitats.
- Ruffe were first reported in the St. Louis River, a Lake Superior tributary.
- Construction of the provincial Harwood Fish Culture Station near the south shore of Rice Lake.
- The first district fisheries management plan (Owen Sound District) was developed and approved. Preparation of district fisheries management plans, as recommended in SPOF, were intended to document characteristics of the resource base and identify longer term goals, targets, and management actions to maintain or enhance the local fisheries resource. Within a 3-4 year period, district fisheries management plans had been developed for every district in the province.

Figure 28. Initial efforts to re-introduce Atlantic salmon to Lake Ontario commenced in 1988 (MNR photo by Amanda Smith).

- A $1.5 million dollar remedial measures dike was constructed in the St. Marys River rapids at Sault Ste. Marie to maintain productive fish habitat during periods of low water flow.

- The first private cage culture operation was established at Lake Wolsey for the production of rainbow trout. There are currently nine private cage culture operations in Lake Huron and Georgian Bay.

1987

- A resident sport fishing licence was introduced for Ontarians between the ages of 18 and 64 (inclusive).
- The *Ontario Fisheries Advisory Council* was established by Order in Council dated June 25, 1987. Their mandate was to advise the Minister of Natural Resources, review programs and policies, and identify new sources of revenue.
- The research component of the Atlantic salmon re-introduction program was initiated on Lake Ontario. The first experimental plantings were conducted in 1988 (Knight 1988).
- Report of the World Commission on Environment and Development (also known as the Brundtland report) was published. The report focused attention on the concept of "sustainable development."
- A splake weighing 9.39 kg (20 lb. 11 oz) was angled from Georgian Bay and recognized as a world all tackle record.
- The publication *The Glass Bottom Boat* was commissioned by Fisheries Branch to document the provincial fisheries management program (Gilmour 1987).
- First record of black crappies in Lake Simcoe.
- Aurora trout and redside dace were designated as endangered species by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).
- *Remedial Action Plans* (RAP) were developed to address Areas of Concern on the Great Lakes. The development of RAPs involved a three stage process: (i) determination of the causes and severity of degradation, (ii) identification of goals and actions for restoration, and (iii) implementation of restoration measures.
- Atlases of smallmouth bass, muskellunge, and walleye lakes in Ontario were published by MNR. A total of 4,038 walleye lakes, 302 muskellunge lakes and 2,421 smallmouth bass lakes were documented during that exercise.
- The Sault Ste. Marie municipal fish hatchery was constructed as part of a community sport fishing initiative. The facility reared Chinook salmon, rainbow trout, and brown trout until it closed in 1995.

1988

- The *Ontario Fisheries Information System* (OFIS) rolled out new software for the standardized entry and analysis of fisheries data from field projects including creel census (CREESYS) and index netting (FISHNET).
- The Southern Ontario Chapter of the American Fisheries Society was formed. The name was changed to the Ontario Chapter in 2004.
- The 118th annual meeting of the American Fisheries Society was held in Toronto, Ontario.
- *Rising to the Challenge* (also known as the Pearse report) was published (Pearse 1988). This report summarized a comprehensive review of freshwater fisheries policy in Canada and provided 62 recommendations.
- A provincial baitfish culture workshop, organized by MNR, was held in February, 1988. A subsequent MNR publication summarized existing information and presentations from the workshop.
- Renovations to the Tarentorus fish culture station in Sault Ste. Marie were completed.
- A muskellunge measuring 58 inches in length and weighing 65 lb. (29.48 kg) was angled in the Blackstone Harbour area of Georgian Bay. This fish is still recognized as the largest authenticated muskellunge angled from Ontario waters.

- The *Canada-Ontario Fisheries Agreement* was signed. The agreement provided for the development of subsidiary agreements on various areas of federal/provincial interests such as science, habitat management, information systems, etc. It also established the *Canada-Ontario Fisheries Advisory Board (CONFAB)* to make recommendations to fisheries ministers.

1988-89

- Increased efforts to protect fish habitat including the development of staff training modules (more than 700 staff trained) by MNR.

1989

- Skamania steelhead, a summer-run strain of steelhead, were first stocked into Lake Huron and Georgian Bay. Between 1989 and 1994 a total of more than 420,000 fish were stocked. The stocking project did not meet expectations and was discontinued in 1995.
- The Supreme Court of Canada ruled that the province has the authority to enact regulations to conserve and protect the resources where fish stocks are clearly the property of the province.
- A brook trout rehabilitation plan was developed for the Nipigon River.
- Timmins was the first city to introduce the *Report-A-Poacher* program in conjunction with Crime Stoppers International.
- A formal review of the lake trout backcross program was conducted which lead to the rehabilitative program being discontinued in the early 1990s.
- Construction of Blue Jay fish culture station on Manitoulin Island was completed.
- Provincial review of the Fisheries Assessment Unit network was initiated. A committee report was published in 1992 (MNR 1992). It was recommended that the FAU program should be continued, strengthened, and given a high priority in the provincial fisheries program.
- The *Interim Referral Process* for fish habitat management was introduced as an interim process until a federal/provincial fish habitat subsidiary agreement was signed. It set out the framework for implementing the policy for the management of fish habitat and how to achieve the goals of SPOF.
- New Lake Ontario Fisheries Unit headquarters were opened at Glenora after extensive renovations to modernize the building. The building was originally constructed in 1872 as an iron foundry. It was purchased by the Ontario government in 1922 for use as a fish hatchery.

1990

- A survey of Ontario's recreational fishery was conducted. It was estimated that > 2 million anglers fished for 31.4 million angler days to harvest 64.4 million fish.
- A review of the commercial fishing industry was initiated to address three issues: resource allocation, royalties, and incidental catch. Eleven public meetings were held across the province. The final report, issued in 1991, had eight recommendations including the implementation of a royalty system.
- The Deer Lake fish culture station, located near Havelock, was closed. This station had been the only provincial facility that reared muskellunge.
- Round goby were first discovered in the St. Clair River.
- Fisheries Branch was reorganized to become Fisheries Policy Branch.
- A zebra mussel coordinating office was established to organize and coordinate education and control efforts.
- Fisheries Policy Branch moved from Whitney Block at Queens Park to temporary accommodations in North York before a permanent move to Peterborough.
- The Supreme Court of Canada ruled on the *Sparrow case*. This landmark ruling affirmed the traditional fishing rights of First Nations people. The case helped to define the concepts established in the Constitution Act and Charter of Rights and Freedoms with regards to

aboriginal and treaty rights specific to fishing. One of the primary rules speaks to the concept of access to the fishery resource. First Nation communities have a right of access to the fishery resource which may not be restricted by arbitrary rules. If restrictions are to be applied they must only occur as a last resort and only where a true conservation concern has been established. At the same time, the Supreme Court decided not to hear the appeal of Agawa who was a treaty Indian convicted in a lower court of commercial fishing on Lake Superior without a licence. This affirmed the right of Ontario to regulate commercial fishing by First Nations people.

- Atlases of largemouth bass and northern pike lakes in Ontario were published by MNR. A total of 6,411 northern pike lakes and 1,275 largemouth bass lakes were identified.
- The Blue Jay Creek fish culture station on Manitoulin Island opened.
- The *Intergovernmental Panel on Climate Change (IPCC)* concluded that temperatures have risen by 0.3 – 0.6 ºC over the last century and that human activities were significantly adding to concentrations of greenhouse gases.
- Fish community objectives (Busiahn 1990) and a state of the lake report (Hansen 1990) for Lake Superior were published by the Great Lakes Fishery Commission. Subsequently, updated fish community objectives were published for Lake Superior in 2003 (Horns et al. 2003). State of the lake reports for Lake Superior were also updated in 1992 (Hansen 1994), and again in 2000 (Ebener 2007).

1991

- Completion of the provincial *Lake Trout Science Synthesis* exercise (Lake Trout Synthesis). Four working group reports were published (Appendix 15).
- *SPOF II*, a revised Strategic Plan for Ontario Fisheries, was adopted as government policy. SPOF II focused on managing aquatic ecosystems rather than single fish species or individual bodies of water.
- The first dog (Shadow) was trained, by Conservation Officer Brian Morrison, to assist in law enforcement. There are presently seven fully trained general service police dogs in MNR's K9 unit.
- Implementation of *Fishways*, a fisheries education program for the public school curriculum, at both junior and intermediate levels. Manuals were released for classroom use in October 1991.
- Spring littoral index netting (SLIN) protocol implemented as a provincial standard.
- The first international *Zebra Mussel Conference* was held in Toronto. This conference eventually evolved into an annual conference on invasive aquatic species (Lucy and Muckle-Jeffs 2010).

Figure 29. Today, dogs are routinely used to assist in fisheries enforcement activities (MNR photo).

- The *Code of Practice for Timber Management Operations in Riparian Areas* was published by MNR. The Code was intended to be used in conjunction with "Timber Management Guidelines for the Protection of Fish Habitat" during forest management activities.
- Zebra mussels were first observed in Lake Simcoe.
- One of the first *State of the Lakes* report was prepared for Lake Ontario and published by the Great Lakes Fishery Commission (Kerr and LeTendre 2007).
- The *Clearwater Bay Restricted Area Order* was enacted to ensure that additional development on private lands would not negatively impact water quality and lake trout habitat in the Clearwater Bay area of Lake of the Woods. It formed part of a unique strategy that included a tag system intended to control lake trout harvest and maintain a trophy fishery in the area.
- MNR's Enforcment Branch developed an interim enforcement policy recognizing the impact of the Sparrow court decision and other judicial decisions and the wish of the Government of Ontario to minimize the number of instances where aboriginal people are in conflict with the Government of Ontario in the application of the *Game and Fish Act*, the *Fisheries Act*, the *Migratory Birds Convention Act*, and the regulations enacted pursuant to those Acts consistent with public safety and conservation objectives.
- *Status of walleye in the Great Lakes: case studies* was prepared for the 1989 workshop was published by the Great Lakes Fishery Commission (Colby et al. 1992).
- American smelt were first recorded in Lake of the Woods.

1992

- Fisheries Policy Branch was reorganized to become Aquatic Ecosystems Branch.
- Corporate strategy *"Directions 90s"* published. Strategy was based on an ecosystem approach to resource management and sustainable development of natural resources.
- MNR in partnership with OFAH established the *Invading Species Awareness Program* which included a hotline for citizen reports.
- 100 year anniversary of fish and wildlife law enforcement in Ontario.
- *SPOF II* received Cabinet approval and was released after extensive internal and external consultation (MNR 2002). It renewed emphasis on protecting native fish communities and managing aquatic resources on an ecosystem basis.
- After a review of the commercial fishing industry, a 2% royalty was implemented on the value of the landed catch.
- The Canadian Aquatic Resource Section (CARS) of the American Fisheries Society was established and held its inaugural meeting in Rapid City, South Dakota.
- *A Checklist of Ontario Freshwater Fishes: Annotated with Distribution Maps* was published by the Royal Ontario Museum (Mandrak and Crossman 1992). A total of 165 fish species were identified.
- The *Symposium on Climate Change and Northern Fish Populations* was held in Victoria, British Columbia. The proceedings were subsequently published as Canadian Special Publication of Fisheries and Aquatic Sciences 121.
- A wetlands policy statement was issued by the Ontario government under the Planning Act. The policy statement was designed to ensure that wetlands were evaluated and adequately protected through land use planning processes. The goal was to achieve no net loss of provincially significant wetlands. A manual of implementation guidelines was subsequently released.
- MNR formally became a member of the Crime Stoppers organization in Ontario. Crime Stoppers is a partnership between the public, the media, and law enforcement which allows members of the public to anonymously provide information to law enforcement agencies. MNR is the only non-police agency to become a full member of Crime Stoppers anywhere in the world.

- Great Lakes Management Units were formed within MNR. The units were comprised of previous Great Lakes Fisheries Assessment Units.
- First contingent of fisheries staff from Toronto moved to new temporary offices in Peterborough.
- The *Ontario Fisheries Advisory Council*, which had been chaired by Dr. E. J. Crossman, was disbanded.
- The 54th Midwest Fish and Wildlife Conference was held in Toronto, Ontario.
- An MNR fisheries research vessel, the K. H. Loftus, was launched at Wheatley, Ontario.

1993

- The Outdoors Card, an identification card for Ontario anglers and hunters, was introduced on January 1, 1993. The Conservation Licence, a cheaper fishing licence having reduced catch limits, was also instituted.
- Ten year (1984-1993) study on walleye stocking in eastern Ontario was completed. Results were published by MNR (Seip 1995).
- Formalization of the watershed planning process prepared by MNR and MOE to support watershed planning including consideration for fish habitat and fisheries management.
- Based on concerns of overstocking on the forage fish community, Ontario and New York agreed to substantial reductions in Chinook salmon and lake trout stocking in Lake Ontario.
- Task team was formed to develop an aquatic habitat training program for field staff. Over a two year period, a series of modules were produced and training sessions were provided to numerous staff across the province.
- The *Border Waters Lake Sturgeon Management Committee* was formed to provide recommendations for improving management of the species in the Minnesota-Ontario boundary waters area.
- Prompted by complaints of deteriorating walleye fisheries in the Kawartha lakes, a third party review was initiated to examine all available fisheries assessment information and determine if a walleye stocking program was warranted. The report, submitted in 2004, concluded that walleye stocking was not a recommended option (Anthony and Schupp 1994).

1994

- International Conference on *Restoration of Lake Trout in the Laurentian Great Lakes (RESTORE)* was held in January, 1994, at Ann Arbor, Michigan. Proceedings were subsequently published as a special issue of the Journal of Great Lakes Research in 1995.
- *Fish Habitat Protection Guidelines for Developing Areas* were published by MNR to provide guidance for consistent application in areas of the province which did not have watershed management plans.
- New regulations were implemented in designated northwestern Ontario waters to restrict angling by non-Canadians. The new regulations permitted non-Canadian anglers to keep Ontario fish if certain conditions were met. New border water conservation tags were also introduced on Lake of the Woods and Rainy Lake.
- *Ontario Guidelines for Aquatic Plant Control* were developed and published as a Canadian Manuscript Report of Fisheries and Aquatic Sciences (MNR and DFO 1994).

Early-Mid 1990s

- Dramatic declines were noted in the abundance of American eels in Lake Ontario and the St. Lawrence River.

1995

- A survey of Ontario's recreational fishery was conducted. It was estimated that 1.9 million anglers fished for 23.4 million angler days to harvest a total of more than 39 million fish.
- The *Ashinabek/Ontario Fisheries Resource Center* (A/OFRC) was established to serve as an independent source of information on fisheries assessment, conservation and management for both fisheries managers and traditional ecological knowledge.
- Progress report on SPOF II was released
- The *Managing Muskies in the 90s* workshop was held in Kemptville Ontario. Workshop proceedings, which included 18 papers, (15 from Ontario) were published by MNR (Kerr and Olver [eds.]1996).
- Ruffe were first reported in central Lake Huron.
- Several multi-year assessment projects were implemented to determine the status of lake sturgeon in Lake Huron.
- Ontario Streams, a non-profit environmental organization, was formed (www.ontariostreams.ca). The group was dedicated to the conservation and rehabilitation of streams and wetlands in Ontario.
- *Family Fishing Weekend* was implemented to promote angling as an activity and encourage non-anglers to participate. Under the program, Canadian residents could fish licence-free during a long weekend in July. The program was expanded to included a winter Family Fishing Weekend in 2007.
- The second *PERCIS Symposium* was held in Vassa, Finland. The symposium expanded on knowledge gained since the first symposium especially with regard to percid culture. The proceedings were published in the Annales Zoologici Fennici (Rask et al. 1995).
- The federal government proclaimed the *Canadian Environmental Assessment Act (CEAA)* and its enabling regulations.
- Fish and Wildlife staff moved into new permanent accommodations at Robinson Place in Peterborough.
- Fish community objectives (DesJardine et al. 1995) and state of the lake report (Ebener 1995) for Lake Huron were published by the Great Lakes Fishery Commission. Updated state of the lake reports were subsequently published for 1999 (Ebener 2005) and 2004 (Bence and Mohr 2008).
- Over 3,500 tonnes of rainbow trout were produced from some 200 licenced private aquaculture facilities in Ontario.
- Amendments to the *Game and Fish Act* allowed for the private culture of 38 different aquatic species.

Figure 30. The provincial Percid Community Synthesis consolidated science and knowledge for improved management of walleye in Ontario (MNR photo by Matt Garvin).

1996

- The *HabCARES Conference* was held at the Kempenfelt Centre in Barrie. This was a workshop on the science and management for habitat conservation and restoration strategies in the Great Lakes.

- A provincial Fish and Wildlife program business review was conducted to establish new directions and clarify core business for the Fish and Wildlife program.
- Reorganization of the Ontario Ministry of Natural Resources. This exercise reduced the number of administrative districts and regions as well as establishing a new Science and Information Division which included regional science and technology units. MNR's head office was officially relocated to Peterborough.
- The Fish and Wildlife program was provided a dedicated source of funding known as the *Special Purpose Account (SPA).* A *Fish and Wildlife Advisory Board* was formed to advise the Minister of Natural Resources on how dedicated funds could best be used.
- Funding for the CFIP and CWIP programs was increased to one million dollars annually.
- A multi-year stocking program was initiated to re-introduce muskellunge to the Spanish River area of the North Channel of Lake Huron. By 2004, a total of 15,962 muskellunge (all life stages combined) had been stocked.

1996-2004

- A second provincial science synthesis exercise was initiated on fish communities dominated by percids (*Percid Community Synthesis*). Five working group reports were published and the Fall Walleye Index Netting (FWIN) protocol was developed (Appendix 16).

1997

- Lead responsibility for fish habitat protection was assumed by the federal Department of Fisheries and Oceans.
- *Lands for Life*, a comprehensive Crown land use planning process, was announced. Some of the basic principles included habitat protection, expanded fishing and hunting opportunities, and an increased parks and protected areas system.
- The workshop *Fish: To Stock or Not to Stock* was held in Thunder Bay. Workshop proceedings (13 presentations) were subsequently published by the Northwest Science and Technology Unit of MNR (MacMahon 1997).
- The *Science for Fish Habitat* workshop was held in Barrie, Ontario. The workshop brought together representatives from Canadian natural resource agencies to share information about current directions in fish habitat management and to set direction for the development of better management tools. The workshop proceedings were published as a Canadian Manuscript Report of Fisheries and Aquatic Sciences (Lester et al. 1997).
- The *Northern Lakes Recovery Study* (NLRS) was initiated. This cooperative study, involving both Canadian and Norwegian scientists, was intended to monitor the biological recovery of acid damaged waters following reductions in acid deposition. The first phase of the project was completed in 2002 with results published in a special issue of Ambio (Gunn et al [eds.] 2003).

Figure 31. The Bait Association of Ontario (BAO) was formed in 1998 to represent the interests of bait dealers and harvesters in Ontario (MNR photo by Brenda Koenig).

1998

- The *Algonquin Provincial Park Management Plan* was released for review. The plan prohibited the introduction of any new species to Park waters, restricted the stocking of interior lakes to the use of native stocks, and limited the stocking of hatchery-reared fish to Development Zones and the heavily fished parkway corridor.
- The *Bait Association of Ontario* (BAO) was formed to represent the bait industry at the provincial level. Ontario's bait industry is the largest in Canada (MNR 2010). A new bait licence fee was approved in conjunction with a new business relationship with the bait industry.
- The CFIP and CWIP programs were amalgamated to become the Community Fisheries and Wildlife Involvement Program (CFWIP).
- The *Grand River Fisheries Management Plan* was published. This detailed watershed-based plan was prepared through the cooperative efforts of the federal and provincial governments, Grand River Conservation Authority and many non-government organizations and interest groups. An implementation committee was struck the following year.
- Fisheries and Oceans Canada expanded the fish habitat management program across their Central and Arctic regions. Formal agreements for fish habitat management were established between DFO and Ontario Conservation Authorities.
- A *Fish Habitat Advisory Group* (DFO/MNR/Conservation Ontario) was formed to oversee implementation of the fish habitat referral process.
- Significant efforts were initiated to develop a national approach to increase participation in recreational fishing by way of a task team established under the Canadian Council of Fisheries and Aquaculture Ministers (CCFAM).
- A *Strategic Fisheries Management Framework for the Ottawa River* was released. This represented the collective efforts of fisheries staff from Ontario and Quebec to identify common objectives and promote efforts to harmonize regulations and become involved in cooperative fisheries management programs on the river.

1999

- The *Fish and Wildlife Conservation Act* became effective on January 1, 1999 replacing the Game and Fish Act (Appendix 17).
- A joint government-NGO task team developed criteria *(Size Limit Regulations for Ontario Muskellunge: A New Approach*) for establishing benchmark minimum size limits for muskellunge in Ontario. Based on growth potential, the following benchmark size limits were established: 36" and 40" for high density fisheries, 44" and 48" for enhanced size fisheries, and 54" for record class fisheries.
- A survey of competitive fishing events in Ontario was conducted. Information on 518 events was recorded in an MNR publication (Kerr 1999a). Similar surveys were also conducted in 2004 and 2008.
- A *Workshop on Competitive Fishing* in Ontario was held at Kemptville, Ontario. Workshop proceedings (12 papers) were published by MNR (Kerr 1999b).
- *Ontario's Living Legacy* provincial land use strategy was released. In addition to an expansion of parks and protected areas, fish stocking was increased.
- Significant changes were made to angling regulations (size and catch limits) for numerous species in northwestern Ontario.
- *Nearshore Community Index Netting* (NSCIN) and *Spring Littoral Index Netting* (SLIN) protocols were accepted as provincial sampling standards (Appendix 18).
- Fish community objectives for Lake Ontario were published by the Great Lakes Fishery Commission (Stewart et al. 1999).

2000

- A survey of Ontario's recreational fishery was conducted. It was estimated that 1.6 million anglers exerted 17.8 million angler days of effort to harvest 26.7 million fish.

Figure 32. Biologically-based minimum size limits for Ontario muskellunge were established in 2001 (MNR photo by Matt Garvin).

- Ontario introduced a bait harvest daily log to increase the accuracy of annual bait returns. In 2002, a bait dealers daily log was introduced to record bait purchases by bait dealers.
- A second international sea lamprey symposium was held in Sault Ste. Marie, Michigan. Proceedings were subsequently published as a special issue of the Journal of Great Lakes Research (Jones et al. 2003).
- First record of bluegill in Lake Simcoe.
- A walleye workshop was held near Parry Sound (MNR 2000). The workshop was designed to discuss walleye management in Georgian Bay and the North Channel of Lake Huron.
- A *Black Bass Symposium* was held in conjunction with the 130th annual meeting of the American Fisheries Society. Symposium proceedings were produced as a special publication of the American Fisheries Society (Philipp and Ridgway 2002).
- A commercial fishing agreement was signed between the Saugeen Ojibway and the Ontario government. Under the agreement, First Nations designated commercial fishers and conducted commercial catch sampling. First Nations agreed not to set nets in Owen Sound or Colpoys Bay nor the outer bays during salmon season. The agreement was renewed for an additional five year period in 2005.
- The Ontario Aquaculture Association (formerly Ontario Trout Farmers) disbanded as the commercial aquaculture industry switched largely from land-based to water-based production facilities. A new organization, the Northern Ontario Aquaculture Association, was formed to represent those interests. In 1999, private aquaculture facilities produced approximately 4,500 tonnes of rainbow trout with a farm gate value of $20 million.
- A *Fish Habitat Referral Process for Ontario*, superceding the former referral process, was implemented.
- The *Border Waters Conservation Tag* was rescinded as the result of a challenge by Minnesota under the North American Free Trade Agreement. The tag had limited U.S. anglers fishing on Rainy Lake and Lake of the Woods to practice catch-and-release only for walleye and sauger.

2001

- The *National Code on Introductions and Transfers of Aquatic Organisms* was developed by federal and provincial governments. The Ontario Introductions and Transfers Committee was subsequently established to review proposals involving the intentional introduction or transfer of aquatic organisms in Ontario.
- An atlas of muskellunge streams and rivers was published by MNR. A total of 105 streams or rivers were identified.

- The symposium *Fisheries Research in Algonquin Park – the 90s* was held. Abstracts from the symposium were subsequently published by the Parks Research Forum of Ontario.
- The first intensively reared captive walleye brood stock (Bay of Quinte strain) was developed at the White Lake Fish Culture Station.

2002

- A comprehensive review of fish stocking science was conducted culminating in the development of updated provincial fish stocking guidelines for inland waters of Ontario (MNR 2002a).
- The "*Adaptive Management of Stream Corridors in Ontario*" manual was published in electronic format. Prepared for working professionals with the task of managing healthy stream corridors and channels for both fish and people.
- A statistical report on Ontario's commercial bait industry published (MNR and BAO 2004). The industry is comprised of approximately 1,400 licencees per year who harvested 35 million dozen baitfish. The Ontario bait industry was valued at approximately $20 million. Annual reports were prepared up to 2005 when a longer reporting time frame was adopted.
- Atlases of black crappie, lake herring, lake sturgeon, sauger (*Sander canadensis*), and brown trout waters in Ontario were published by MNR. A total of 182 brown trout waters, 228 sauger waters, 2,273 lake herring waters, 273 black crappie waters and 229 lake sturgeon waters were documented.
- A fin clipping workshop for CFWIP proponents was held in Owen Sound (MNR 2002b). The workshop was designed to instruct stocking proponents on techniques and rationale for marking salmonids stocked in Lake Huron and Georgian Bay.
- The *Fall Walleye Index Netting* (FWIN) sampling protocol was accepted as a provincial sampling standard.
- A *National Recreational Fishing Symposium (Vision 2002)* was held in Toronto to consider the most effective means to reverse participation. The symposium was hosted by the CCFAM Recreational Fishing Task Group which included non-government agencies and fishing industry representatives.

Figure 33. Competitive fishing is a rapidly expanding activity in Ontario (Photo courtesy of Charlie Ross, Lures and Tours).

2003

- Atlases of channel catfish and lake whitefish waters in Ontario were published by MNR. A total of 2,150 lake whitefish waters and 122 channel catfish waters were documented.
- An *International Eel Symposium* was held at Quebec City to review declining status of eels and cause for the decline in waters including the Great Lakes basin. Symposium proceedings were published by the American Fisheries Society in 2009 (Casselman and Cairns 2009).
- The Supreme Court of Canada ruled on the Powley case. This case served to establish the rules of resource access for Metis people with regard to the entrenched rights established in the Constitution Act of 1982. One of the important considerations of the case involved defining who was a Metis person. The case established that the right is community based, that there must be a history of resource use, and that the individual being considered must be an accepted part of that community.
- The atlas of Ontario brook trout streams and rivers was published by MNR. A total of 1,663 streams and rivers were identified.
- The *Ontario Competitive Fishing Council (OCFC*) was formed as a proactive entity to represent the interests of competitive angling in Ontario (www.ocfc.ca).
- A book entitled *Fishes of Algonquin Provincial Park* was re-published by the Friends of Algonquin Park in cooperation with Ontario Parks (Mandrak and Crossman 2003).
- A paper was published in an American Fisheries Society journal suggesting that fisheries management on an individual waterbody basis was ineffective (Lester 2003). It was argued that fisheries management should be carried out at a larger level of scale (i.e., landscape), consensus should be achieved on biological objectives, and that periodic evaluation should be conducted to embrace an adaptive management approach. This paper formed the basis for the Ecological Framework for Fisheries Management initiative which was announced in 2006.
- Report summarizing regional summaries of walleye life history characteristics was published by MNR (Morgan et al. 2003). Results were based on Fall Walleye Index Netting (FWIN) conducted on 390 Ontario lakes and rivers between 1993 and 2001.
- The *PERCIS III* symposium was held in Madison, Wisconsin. The symposium provided the opportunity to consolidate and expand the knowledge of percids including the darters. Symposium proceedings were subsequently published (Barry and Malison 2003).
- The federal *Species at Risk Act (SARA)* came into force in June 2003. Prohibitions followed in 2004.
- Fish community objectives for Lake Erie were published by the Great Lakes Fishery Commission (Ryan et al. 2003).

2004

- A book entitled *"Boreal Shield Watershed: Lake Trout Ecosystems in a Changing Environment"* was published by Lewis Publishers (Gunn et al. 2004). The book was edited by three MNR staff and includes several papers by Ontario authors.
- First record of quagga mussels in Lake Simcoe.
- A state of the lake report for Lake Erie was published by the Great Lakes Fishery Commission (Tyson et al. 2009).
- A survey of competitive fishing events in Ontario was conducted. Information on 680 events was recorded in an MNR publication (Kerr 2004).
- *End of Spring Trap Netting* (ESTN) sampling protocol accepted as a provincial sampling standard.
- An atlas of walleye streams and rivers in Ontario was published by MNR. A total of 860 waters were documented.
- Commercial quotas for American eel were cancelled and the sport fishery was closed due to concerns of declining eel stocks in the Great Lakes basin.

- The "*Ontario-Minnesota Boundary Water Fisheries Atlas*" was published by MNR and the Minnesota Department of Natural Resources.
- *Fish Stocking Information System (FSIS)* software was developed for the electronic entry, storage, and reporting of fish stocking data.

2005

- Strategic directions document entitled *"Our Sustainable Future"* was published by MNR (MNR 2005). It advocated the approach of sustainable resource development, stronger policy development, and enhanced science, assessment and reporting.
- International muskellunge symposium was held in Indianapolis, Indiana in the memory of E. J. Crossman. Symposium proceedings which included 17 individual papers were published as a special issue of the Environmental Biology of Fishes (Diana and Margenau 2007).
- *Ontario's Biodiversity Strategy* was published by MNR. The report recognized the importance of biodiversity and the need for protection. An interim report on Ontario's biodiversity was subsequently published in 2008.
- The "*Comprehensive Bait Guide for eastern Canada, the Great Lakes region and northeastern United States"* was published jointly by the Bait Association of Ontario and the Ontario Ministry of Natural Resources.
- The *Brook Trout Index netting* (BTIN) sampling protocol was accepted as a provincial sampling standard.
- After their discovery in 2004, a rotenone application to a five km stretch of the Pefferlaw River was conducted in an attempt to eradicate the round goby before they could become established in Lake Simcoe (Dimond et al. 2009). Approximately 10,000 fish (various species) were captured and transported to Lake Simcoe before the treatment. In 2006 gobies were found in both the Pefferlaw River and Lake Simcoe.
- A multi-year stocking program was initiated to re-introduce muskellunge to Lake Simcoe.
- The *Ontario Stream Assessment Protocol (OSAP)* was accepted as a provincial sampling standard.
- Viral hemorrhagic septecemia (VHS) was isolated in several fish species in Lake Ontario and the St. Lawrence River. It was associated with die-offs of freshwater drum, yellow perch, muskellunge, and round gobies. Ontario and other Great Lakes jurisdictions implemented a series of measures designed to prevent the spread of the virus inland.
- A national recreational fishing survey was conducted. For Ontario, it was estimated that almost 1.27 adult (18-65 years of age) anglers actively participated in recreational fishing. It was also estimated that anglers caught 114.2 million fish but kept only 25.1 million fish in 2005.
- The *Kyoto Protocol* came into effect whereby world nations pledged to reduce emissions of greenhouse gases by an average of 5% during the period 2008-2012.
- Enforcement Branch established the TIPS-MNR violation reporting line which operates 24 hours each day of the year. The reporting line allows callers to contact the Provincial Communications Unit in Sault Ste. Marie on a toll-free telephone line. The call is taken and held directly by MNR in contrast to the Crime Stoppers program where calls and information are taken and held by a non-government volunteer organization.. This TIPS line received over 5,000 calls in its first year leading to 1,410 investigations and 86 convictions.
- The *Aquatic Resource Management Advisory Group (ARMAC)* was established by CONFAB to coordinate fisheries and related aquatic interests of federal-provincial agencies in Ontario. This multi-agency Committee replaced the Fish Habitat Advisory Group which had operated since 1998.

2006

- The provincial *Ecological Framework for Fisheries Management* was announced in 2006. The new framework had four basic pillars: (i) Streamlined fisheries regulations (implemented in 2008), (ii) creation of new Fisheries Management Zones (implemented in 2008), (iii) increased public involvement through creation of FMZ Councils (initiated in 2007), and (iv) development and implementation of a new state of the resource monitoring program (initiated in 2008. The new EFFM represented a change in management approach from managing fisheries on an individual waterbody basis to a landscape level of scale.
- The provincial Enforcement Branch was established as a separate organization in the Field Services Division of MNR. Enforcement Branch provides the service of law enforcement to ten different program areas within MNR. Historically, enforcement was a program within the Fish and Wildlife Branch. This reorganization separated Conservation Officers from areas of potential conflict where they may have had influence on the issuing of licences and quota setting.
- Enforcement Branch began the use of risk-based priority setting in conjunction with program areas to focus enforcement attention on highest priority issues provincially, regionally and on a local basis.
- The *"Bass Research and Management in Ontario II"* workshop was held at Sutton, Ontario.

Figure 34. A major fish and wildlife enforcement conference was held in Sault Ste. Marie in 2006 (MNR photo).

Workshop proceedings, which included 13 papers, were published by MNR.

- A provincial conference *"Natural Resources Compliance and Enforcement in the Future"* was held in Sault Ste. Marie. All conservation offices across the province were invited to attend
- The first juvenile American eels were stocked in the St. Lawrence River in an attempt to rehabilitate declining stocks in the Great Lakes basin.
- The Lake Ontario Atlantic Salmon Restoration program was implemented. The project involved several partnerships including Trout Unlimited, MNR, Ontario Federation of Anglers and Hunters and Banrock Station Wines.

- Results of a five year review of the status of lake trout lakes in northeastern Ontario was published by MNR. It was concluded that the overall status of lake trout in northeastern Ontario was poor.
- Record fines were assessed against three Lake Huron commercial fishermen and their company. Evidence revealed that more than 15,454 kg (34,000 lb) of lake whitefish had been taken over quota in 2003 and more than 88,181 kg (194,000 lb) in 2004. The fishermen were ordered to pay $485,000 in fines for deliberately falsifying fishing reports and for taking an over quota of whitefish from Lake Huron.
- A report was released which listed the 2,283 inland Ontario lakes (exclusive of the Great Lakes) that were currently designated for lake trout management. The list includes 2098 lakes that are managed for naturally reproducing populations ('Natural' lakes) and 185 lakes that are managed for put-grow-take stocking ('P-G-T' lakes). It is believed that approximately 20% of all the lake trout lakes in the world lie within Ontario (MNR 2010).

2007

- New provincial Endangered Species legislation was passed (received Royal Assent in May 2007) and came into effect in June, 2008.
- First three pilot Fisheries Management Zone (FMZ) Councils were established in FMZ 6, 10, and 17. Councils were created as part of the Ecological Framework for Fisheries Management to encourage public involvement in fisheries management. Five additional FMZ Councils were established in 2008-09.
- First successful egg collection and hatch of more than two million walleye fry from captive brood stock held in the provincial fish culture system.
- Spiny water flea was first recorded in Rainy Lake and Lake of the Woods. It was believed that the invasive species had spread from waters upstream in the Boundary Waters Canoe area in Minnesota.
- MNR banned the overland transport of crayfish to control the spread of invasive rusty crayfish. Prior to this, commercial harvest and sale had been banned as a condition of licence.
- A major die-off of common carp occurred in the Kawartha lakes. It was estimated that 12-24,000 carp were taken to municipal landfill sites between June and September (Taillon 2008). The die-off was attributed to columnaris and the Koi herpes virus. This represented the first detection of Koi herpes virus in Ontario. In 2008, the die-off continued in Lake Simcoe (>19,000 carp) and Rice Lake (>3,000 carp).
- The updated *"Inter-Jurisdictional Compliance Protocol for Fish Habitat and Associated Water Quality"* was released for staff implementation.
- The landed value of Ontario's commercial fishery was approximately $30 million with an estimated contribution to the Gross National Product of $200-250 million. Ontario has one of the largest freshwater commercial fisheries in the world.

2008

- Series of new provincial regulations, resulting from the *Ecological Framework for Fisheries Management*, came

Figure 35. Lake sturgeon are considered a species at risk in many areas of Ontario (Photo by Michael Brown).

into effect. Thirty-five fishing divisions were replaced by 20 Fisheries Management Zones. Other significant changes included the development of two new categories of fish (specially protected and invasive) and the prohibition of dumping the contents of bait containers within 30 meters of a waterbody.
- Provincial survey of competitive fishing events in Ontario was conducted. Information on 1,039 events was recorded. Results were published by MNR (Kerr 2009).
- The 138th annual meeting of the American Fisheries Society hosted by MNR, DFO and several other partners in Ottawa, Ontario.
- MNR developed a "white list" of 48 fish species which could legally be used as live bait in Ontario.
- A new broadscale monitoring program was implemented in selected FMZs as part of the Ecological Framework for Fisheries Management. Manual of sampling instructions were published by MNR. A total of 189 lakes were monitored in 2008.
- Recreational fishing for lake sturgeon was modified to catch-and-release only (0 quota) where an open season was in place.
- The *Lake Simcoe Protection Act* received royal assent by the Ontario legislature. The purpose of the act was to protect and restore the ecological health of the Lake Simcoe watershed. The Act required the implementation of a Lake Simcoe protection plan to restore the health of the Lake Simcoe watershed. It also provided for the establishment of a Lake Simcoe Science Committee and a Lake Simcoe Coordination Committee.
- The *Ontario Spearing Association* was formed to promote spearing as an activity and to have spearing for northern pike reinstated in southwestern Ontario (www.ontariospearing.com)

2009
- Lake sturgeon was listed at "threatened" in the Winnipeg River and Great lakes drainages by the Committee on the Status of Species at Risk in Ontario (COSSARO). Recreational fishing for sturgeon was changed to a closed season (no fishing) for all populations designated under the *Endangered Species Act.* Commercial quotas for lake sturgeon were reduced to zero by mid 2009. An exemption regulation allowed for the continued sale of lawfully caught sturgeon and sturgeon products until April 2010.
- A "*Field Guide to Freshwater Fishes of Ontario"* was published by the Royal Ontario Museum.
- The Ontario Association of Crime Stoppers partnered with MNR's Enforcement Branch to combat the unlawful sale of angled fish, an issue identified as a provincial priority by Fisheries Section and Great Lakes Branch. The initiative doubled the number of calls coming to Crime Stoppers in a period of eight months.
- A new and revised *Fish Habitat Referral Process* was introduced to replace the 2000 process. A series of nine provincial training sessions were held (attended by a total of 390 staff).
- A *"Strategy for Sustainable Aquaculture Development in Ontario*" was published (Canadian Aquaculture Systems Inc. 1997). It provided a blueprint to guide research, development investment, and policy pertaining to aquaculture.
- Ontario's Green Energy Act (GEA) became law. This involved MNR revising existing site release policies for water and wind power.

2010
- As a result of recommendations from the Fisheries Management Zone 17 council, winter fishing was opened up in the Kawartha Lakes for the first time in approximately eighty years. Open winter seasons were for black crappie, yellow perch, northern pike, bluegill and pumpkinseed.

Figure 36. In 2010 winter fishing for selected species was reopened in the Kawartha lakes (FMZ 17) for the first time in almost eighty years (MNR photo by Matt Garvin).

- Ontario supported efforts by Michigan to seek a legal injunction for a preliminary closure of the Chicago Sanitary and Ship Canal to prevent the spread of Asian carp into the Great Lakes from the Mississippi River watershed.
- MNR reorganizational alignment which resulted in the formation of five new divisions: Policy, Regional Operations, Provincial Services, Sciences and Information Management and Corporate Management. Fisheries Policy Section was situated within Biodiversity Branch of Policy Division.
- There were 203 permanent conservation officers in the field. (Note: This total does include Special Investigations Unit (SIU) staff, canine handlers, district and regional enforcement coordinators, or provincial Enforcement Branch staff).
- Wheatley Harbour, Lake Erie, was delisted as one of the Great Lakes Areas of Concern.

References and Additional Reading Material

Adams, G. F. and D. P. Kolenosky. 1974. Out of the water – Ontario's freshwater fish industry. Commercial Fish and Fur Division. Ontario Ministry of Natural Resources. Toronto, Ontario.

Agassiz, L. 1850. Lake Superior: It's physical character, vegetation and animals compared with those of other and similar regions. Gould, Kendal and Lincoln Publishers. Boston, Massachusetts. 428 p.

Alison, R. M. 1976. Indian geographical names in Ontario. Ontario Fish and Widllife Review 15(1):12-17.

Anthony, D. D. and D. H. Schupp. 1994. Kawartha lakes walleye fishery review. Report prepared for the Walleye Fishery Review Steering Committee. Bobcaygeon, Ontario. 40 p. + appendices.

Armstrong, G. C. 1957. Commercial fishing in Ontario. p. 43-48 *In* Fish and Wildlife Management Report No. 21. Ontario Department of Lands and Forests. Toronto, Ontario.

Armstrong, G. C. 1967. An historical review of the management of the sport fishery in Ontario. Ontario Fish and Wildlife Review. Ontario Department of Lands and Forests 6(1-2):25-34.

Baccante, D. [ed.]. 1985. Walleye and tourism: future management strategies. Proceedings of a Conference held at the Quetico Centre, Ontario. September 18-21, 1984. 172 p.

Bailey, R. M. 1945. Some considerations on the distribution of fishes in Ontario. Copeia 1945:125-126.

Bailey, R. M. and G. R. Smith. 1981. Origin and geography of the fish fauna of the Laurentian Great Lakes. Canadian Journal of Fisheries and Aquatic Sciences 38:1539-1561.

Balon, E. K. [ed.]. 1980. Charrs – Salmonid fishes of the Genus *Salvelinus*. Dr. W. Junk Publishers. The Hague, Netherlands.

Barbetti, F. 2001. History of fisheries in the lower Grand River. p. 35-36 *In* M. Austin [ed.]. Restoration of Healthy Ecosystem Function in the Lower Grand River. Lake Erie LAMP Workshop, August 28-29. Burlington, Ontario.

Bartlett, G. W. 1905. Excerpts from the Algonquin Provincial Park annual report. Department of Fish and Game. Toronto, Ontario.

Bartlett, G. W. 1912. Excepts from the Algonquin Provincial Park annual report. Department of Fish and Game. Toronto, Ontario.

Beamish, R. J. and H. H. Harvey. 1972. Acidification of the La Cloche mountain lakes, Ontario, and resulting fish mortalities. Journal of the Fisheries Research Board of Canada 29:1131-1143.

Beeton, A. M. 1965. Eutrophication of the St. Lawrence Great Lakes. Limnology and Oceanography 10:240-254.

Bence, J. R. and L. C. Mohr. 2008. The state of Lake Huron in 2004. Special Publication 08-1. Great Lakes Fishery Commission. Ann Arbor, Michigan.

Bensley, B. A. 1915. The fishes of Georgian Bay. Contribution of Canadian Biology 1911-14.

Benson, N. G. [ed.]. 1970. A century of fisheries in North America. Special Publication No. 7. American Fisheries Society. Bethesda, Maryland.

Berry, T. P. and J. A. Malison [eds.]. 2003. Proceedings of PERCIS III the third international percid fish symposium. University of Wisconsin. July 20-24, 2003. University of Wisconsin Sea Grant. Madison, Wisconsin.

Berst, A. H. and G. R. Spangler. 1973. Lake Huron: The ecology of the fish community and man's effects on it. Technical Report No. 21. Great Lakes Fishery Commission. Ann Arbor, Michigan. 41 p.

Bocking, S. 1997. Fishing the inland seas: Great Lakes research, fisheries management and environmental policy in Ontario. Environmental History 2:52-73.

Bogue, M. B. 2000. Fishing the Great Lakes: An environmental history, 1783-1933. University of Wisconsin Press. Madison, Wisconsin. 456 p.

Brown, H. M. 1984. Lanark legacy – nineteenth century glimpses of an Ontario county. Corporation of the County of Lanark. K. G. Campbell Corporation Printers. Ottawa, Ontario 290 p.

Brubacher, M. J. 1969. Marketing of freshwater fish. Ontario Fish and Wildlife Review 8(3):13-17.

Busiahn, T. R. 1990. Fish community objectives for Lake Superior. Special Publication 90-1. Great Lakes Fishery Commission. Ann Arbor, Michigan.

Canadian Aquaculture Systems Inc. 1997. Strategy for sustainable aquaculture development in Ontario. Report prepared for Northern Ontario Aquaculture Association. 16 p.

Casselman, J. M. and D. K. Cairns. 2009. Eels at the edge – science, status and conservation concerns. American Fisheries Society Symposium58. American Fisheries Society. Bethesda, Maryland. 449 p.

Casson, D. and B. deGalinée. 1670. Exploration of the Great lakes, 1669-1670. *In* J. H. Coyne [ed.]. Papers and Records . Ontario Historical Society 4(1903).

Christie, W. J. 1970. A review of the Japanese salmons (*Oncorhynchus masou* and *O. rhodurus*) with particular reference to their potential for introduction into Ontario waters. Fisheries Research Report. Ontario Department of Lands and Forests. Maple, Ontario.

Christie, W. J. 1970. Introduction of the cherry salmon (*Oncorhynchus masou*) in Algonquin Park, Ontario. Copeia 2:378-379.

Christie, W. J. 1973. A review of the changes in the fish species composition of Lake Ontario. Technical Report No. 23. Great Lakes Fishery Commission. Ann Arbor, Michigan.

Christie, W. J. undated. Fishing in the Bay of Quinte. Technical brochure. Ontario Department of Lands and Forests. Tweed, Ontario. 12 p.

Christie, W. J. and G. R. Spangler. 1987. International symposium on stocks assessment and yield predictions (ASPY). Canadian Journal of Fisheries and Aquatic Sciences 44:6-499.

Christie, W. J., P. J. Christie, E. A. Christie, and G. C. Christie. 1999. Perspectives on sustainable fisheries – W. J. (Jack) Christie's story. Aquatic Ecosystem Health and Management 2(1999):197-207.

Colby, P. J. and R. H. Wigmore [eds.]. 1977. The Percid International Symposium (PERCIS). Journal of the Fisheries Research Board of Canada 34(10):1447-1999.

Colby, P. J., C. A. Lewis, and R. L Eshenroder. 1992. Status of walleye in the Great Lakes: case studies prepared for the 1989 workshop. Special Publication 91-1. Great Lakes Fishery Commission. Ann Arbor, Michigan.

Colby, P. J., H. Lehtonen, P. Kestemont, and J. A. Malison. 2005. History of PERCIS. Annales Zoologici Fennici 33(3-4):11-12.

Cox, E. T. 1978. Counts and measurements of Ontario lakes. Fisheries Branch. Toronto, Ontario. 113 p.

Cox, E. T. 1992. An indexed chronology of some events in the development and administration of commercial fishing on Lake Erie. Lake Erie Fisheries Assessment Unit Report 1992-8. Ontario Ministry of Natural Resources. Wheatley, Ontario. 335 p.

Crawford, S. S. 2001. Salmonine introductions to the Laurentian Great lakes: an historical review and evaluation of ecological effects. Canada Special Publication of Fisheries and Aquatic Sciences 132. NRC Research Press. Ottawa, Ontario. 205 p.

Crossman, E. J. 1976. Quetico fishes. Royal Ontario Museum. Toronto, Ontario. 86 p.

DesJardine, R. L., T. K. Gorenflo, R. N. Payne, and J. D. Schrouder. 1995. Fish community objectives for Lake Huron. Special Publication 95-1. Great Lakes Fishery Commission. Ann Arbor, Michigan.

Diana, J. S. and T. L. Margenau. 2007. The muskellunge: a memorial tribute to E. J. Crossman. Environmental Biology of Fishes 79(1-2):1-185.

Dimond, P. E., N. E. Mandrak, and B. Brownson. 2009. Summary of the rapid response to round goby (*Neogobius melanostomus*) in Pefferlaw Brook with an evaluation of the NationalRapid Response Framework based on the Pefferlaw Brook experience. Canadian Science Advisory Secretariat Research Document. Department of Fisheries and Oceans. 26 p. + appendices.

Dodge, D. P. [ed.]. 1989. Proceedings of the international large river symposium (LARS). Canadian Special Publication of Fisheries and Aquatic Sciences. 629 p.

Dodge, D. P., J. C. Tilt, G. A. Goodchild, D. Waldriff, and I. MacRitchie. 1979. Manual of instructions – aquatic habitat inventory surveys. Official procedural manual 2.03.01. Fisheries Branch. Ontario Ministry of Natural Resources. Toronto, Ontario. 248 p.

Dymond, J. R. 1922. A provisional list of the fishes of Lake Erie. Biological Series No. 20. University of Toronto Studies. Publication of the Ontario Fisheries Research Laboratory.

Dymond, J. R. 1926. The fishes of Lake Nipigon. Biological Series No. 27. University of Toronto Studies. Publication of the Ontario Fisheries Research Laboratory.

Dymond, J. R. 1932. About the maskinonge. Rod and Gun 34:18.

Dymond, J. R. 1939. The fishes of the Ottawa region. Contribution of the Royal Ontario Museum of Zoology 15:1-43.

Dymond, J. R. 1944. Spread of the smelt (*Omerus mordax*) in the Canadian waters of the Great Lakes. Canadian Field Naturalist 58(1):12-14.

Dymond, J. R. 1964. A history of ichthyology in Canada. Copeia 1:2-33.

Dymond, J. R. [ed.]. 1964. Fish and wildlife: a memorial to W. J. K. Harkness. Longmans Canada Limited. Don Mills, Ontario. 214 p.

Dymond, J. R. and J. L. Hart. 1927. The fishes of Lake Abitibi. Biological Series 29. University of Toronto Studies. Publication of the Ontario Fisheries Research Laboratory 28:1-19.

Dymond, J. R., J. L. Hart and A. L. Pritchard. 1929. The fishes of the Canadian waters of Lake Ontario. Biological Series No. 33. University of Toronto Studies. Publication of the Ontario Fisheries Research Laboratory.

Ebener, M. P. 1995. The state of Lake Huron in 1992. Special Publication 95-2. Great Lakes Fishery Commission. Ann Arbor, Michigan.

Ebener, M. P. 2005. The state of Lake Huron in 1999. Special Publication 05-2. Great Lakes Fishery Commission. Ann Arbor, Michigan.

Ebener, M. P. 2007. The state of Lake Superior in 2000. Special Publication 07-2. Great Lakes Fishery Commission. Ann Arbor, Michigan.

Ebener, M. P., R. E. Kinnunen, P. J. Schneeberger, L. C. Mohr, J. A. Hoyle, and P. Peters. 2008. Management of commercial fisheries for lake whitefish in the Laurentian Great Lakes of North America. American Fisheries Society Symposium 62. Bethesda, Maryland.

Eshenroder, R. L., T. P. Poe and C. H. Olver. 1984. Strategies for rehabilitation of lake trout in the Great Lakes: proceedings of a conference on lake trout research, August 1983. Technical Report No. 40. Great Lakes Fishery Commission. Ann Arbor, Michgan. 63 p.

Evans, D. O. and B. A. Campbell. 1984. An annotated listing of original field data books and diaries of Ontario fisheries research laboratory workers, 1921-1948. Ontario Fisheries Technical Report Series No. 11. Ontario Ministry of Natural Resources. Toronto, Ontario. 37 p.

Fimreite, N. and L. M. Reynolds.. 1973. Mercury contamination of fish in northwestern Ontario. Journal of Wildlife Management 37:62-68.

Fisher, J. 1992. Game wardens: men and women in conservation. Ontario Ministry of Natural Resources. Toronto, Ontario. 157 p.

Fraser, J. M. 1978. The effect of competition with yellow perch on the survival and growth of planted brook trout, splake, and rainbow trout in a small Ontario lake. Transactions of the American Fisheries Society 107:505-517.

Gibson, B. H. 1968. The Lake Nipigon commercial fishery. Ontario Fish and Wildlife Review 7(3-4):11-16.

Gilmour, D. 1987. The glass bottom boat: fish managers at work. NC Press Limited. Toronto, Ontario. 170 p.

Goodchild, G. A. 1986. Electrofishing guidelines and procedures manual of instructions. Official Procedural Manual Policy FI.3.01.01. Fisheries Branch. Ontario Ministry of Natural Resources. Toronto, Ontario.

Goodier, J. L. 1982. The fish and fisheries of Canadian Lake Superior. Institute for Environmental Studies. University of Toronto. Toronto, Ontario. 176 p.

Goodier, J. L. 1984. The nineteenth century fisheries of the Hudson's Bay Company trading posts on Lake Superior: a biogeographical study. Canadian Geographer 28(4):341-357.

Goodier, J. L. 1989. Fishermen and their trade on Canadian Lake Superior: one hundred years. Inland Seas 45(4):284-306.

Gourlay, J. L. 1896. History of the Ottawa Valley: a collection of facts, events, and reminisences for over half a century. 288 p.

Grant, G. M. undated. Picturesque Canada: the country as it was and is. Belden Brothers Publishers. Toronto, Ontario.

Green, R. H. 1981. Stock concept international symposium. Canadian Journal of Fisheries and Aquatic Sciences 38(12):1457-1921.

Greening, W. E. 1961. The Ottawa – The colourful story of the Valley of the Ottawa from days of the voyageurs to the present. McClelland and Steward Limited. Toronto, Ontario. 208 p.

Guillet, E. C. 1933. Early life in Upper Canada. University of Toronto Press. Toronto, Ontario. 782 p.

Gunn, J. M., S. Sandoy, B. Keller, C. Brereton, E. Snucins, and N. Yan. 2003. Biological recovery from acidification: northern lakes recovery study. Ambio 23(3):162-248.

Gunn, J. M., R. J. Steedman, and R. A. Ryder. 2004. Boreal shield watersheds – lake trout ecosystems in a changing environment. Lewis Publishers. New York, New York. 501 p.

Hall, G. E. [ed.].1986. Managing muskies: a treatise on the biology and propagation of muskellunge in North America. Special Publication No. 15. American Fisheries Society. Bethesda, Maryland. 372 p.

Hansen, L. C. 1986. Historical report of Indian fishing in Ontario. Indian Resource Policy. Ontario Ministry of Natural Resources. Toronto, Ontario. 70 p.

Hansen, L. C. 1991. Treaty fishing rights and the development of fisheries legislation in Ontario: a primer. Native Studies Review 7(1):1-22.

Hansen, M. J. 1990. Lake Superior: the state of the lake in 1989. Special Publication 90-3. Great Lakes Fishery Commission. Ann Arbor, Michigan.

Hansen, M. J. 1994. The state of Lake Superior in 1992. Special Publication 94-1. Great Lakes Fishery Commission. Ann Arbor, Michigan.

Harkness, W. J. K. 1934. The maskinonge in Ontario. Rod and Gun 35:17-19, 29-30.

Harkness, W. J. K. 1954. Fish and wildlife management in Ontario. Canadian Geographical Journal. 48:46-63.

Harkness, W. J. K. and F. E. J. Fry. 1942. Game fish management in Algonquin Park lakes. Transactions of the 7th North American Wildlife Conference. April 8-10, 1942. Toronto, Ontario.

Harkness, W. J. K. and J. L. Hart. 1927. The fishes of Long lake, Ontario. Biological Series 29. University of Toronto Studies. Publication of the Ontario Fisheries Research Laboratory 29:1031.

Harkness, W. J. K., J. W. Leonard, and P. R. Needham. 1954. Fisheries research at mid century. Transactions of the American Fisheries Society 83:212-216.

Hartman, W. L. 1973. Effects of exploitation, environmental changes and new species on the fish habitats and resources of Lake Erie. Technical Report No. 22. Great Lakes Fishery Commission. Ann Arbor, Michigan.

Harrison, T. G. 1970. The case of the substitute lake. Ontario Fish and Wildlife Review 9(3-4):2-6.

Hatcher, H. 1945. Lake Erie. The American Lakes Series. Bobs-Merrill Company Publishers. New York, New York. 416 p.

Henn, A. W. and W. H. Rickenbach. 1925. Description of the Aurora trout (*Salvelinus timagamiensus*) a new species from Ontario. Ann. Carnegie Museum 16:131-141.

Hennepin, Father Louis. 1974. A new discovery of a vast country in America. R. G. Thwaites [ed.]. Coles Publishing Company. Toronto, Ontario. 711 p.

Holmes, J. A. and T. H. Whillans. 1984. Historical review of Hamilton Harbour fisheries. Canadian Technical Report of Fisheries and Aquatic Sciences 1257. 117 p.

Horns, W. H., C. R. Bronte, T. R.. Busiahn, M. P. Ebener, R. L. Eshenroder, T. orenflo, N. Kmiecik, W. Mattes, J. W. Peck, M. Petzold, and D. R. Schreiner. 2003. Fish community objectives for Lake Superior. Special Publication 03-1. Great Lakes Fishery Commission. Ann Arbor, Michigan. 78 p.

International Game Fish Association (IGFA). 2010. 2010 world record game fishes. Dania Beach, Florida. 408 p.

Johnson, R. E. 1982. Acid rain and fisheries – proceedings of an international symposium on acidic precipitation and fishery impacts on northeastern North America. August 2-5, 1981. Ithaca New York. American Fisheries Society. Bethesda, Maryland. 357 p.

Johnston, D. R. 1965. Public fishing ponds for trout. Ontario Fish and Wildlife Review 4(1):18-25.

Johnstone, K. 1977. The aquatic explorers: a history of the Fisheries Research Board of Canada. Minister of Supply and Services Canada. 342 p.

Jones, M. L., C. H. Olver, and J. W. Peck. 2003. Sea lamprey international symposium (SLIS II). Journal of Great Lakes Research (Supplement 1):1-807.

Kennedy, W. A. 1965. A history of commercial fishing in inland Canada. Manuscript Series 871. Fisheries Research Board of Canada. Ottawa, Ontario.

Kerr, J. W. 1982. The Kerr diaries – records of an early Fisheries Overseer. Unpublished transcripts. Royal Ontario Museum. Toronto, Ontario.

Kerr, S. J. 1999a. A survey of competitive fishing events in Ontario. Technical Report TR-114. Southcentral Sciences Section. Ontario Ministry of Natural Resources. Kemptville, Ontario. 107 p.

Kerr, S. J. 1999b. Competitive fishing in Ontario workshop proceedings. WP-01. Southcentral Sciences Section. Ontario Ministry of Natural Resources. Kemptville, Ontario. 107 p.

Kerr, S. J. 2004. A 2004 survey of competitive fishing events in Ontario. Fish and Wildlife Branch. Ontario Ministry of Natural Resources. Peterborough, Ontario 14 p. + appendices.

Kerr, S. J. 2006. An historical review of fish culture, stocking and fish transfers in Ontario, 1865-2004. Fish and Wildlife Branch. Ontario Ministry of Natural Resources. Peterborough, Ontario. 154 p. + appendices.

Kerr, S. J. 2009. A survey of 2008 competitive fishing events in Ontario. Fish and Wildlife Branch. Ontario Ministry of Natural Resources. Peterborough, Ontario.

Kerr, S. J. 2010. Fishways in Ontario. Fisheries Policy Section. Biodiversity Branch. Peterborough, Ontario. 34 p.

Kerr, S. J. and G. C. LeTendre. 1991. The state of the Lake Ontario fish community in 1989. Special Publication 91-3. Great Lakes Fishery Commission. Ann Arbor, Michigan.

Kerr, S. J. and C. H. Olver [eds.]. 1996. Managing muskies in the 90s workshop proceedings. WP-007. Southern Region Science and Technology Transfer Unit. Ontario Ministry of Natural Resources. Kemptville, Ontario. 170 p.

Kirk, R. A. 2001. Hook, line and spear – the ice fishing history of Lake Simcoe. And So Forth Press. Orillia, Ontario. 85 p.

Knight, W. 1988. The Atlantic salmon is back. Aski Spring 1988:7.

Knight, W. 2007. Samuel Wilmot, fish culture and recreational fisheries in late 19th century Ontario. Scientia Canadensis 30:75-90.

Kwain, W.-H. and A. H. Lawrie. 1981. Pink salmon in the Great Lakes. Fisheries 6(2):2-6.

Lambert, R. S. and P. Pross. 1967. Renewing nature's wealth: A centennial history of the public management of lands, forests and wildlife in Ontario, 1793-1967. Ontario Department of Lands and Forests. Toronto, Ontario. 630 p.

Landon, F. 1944. Lake Huron. The American Lakes Series. Bobs-Merrill Company Publishers. New York, New York. 398 p.

Landon, F. 1959. The discovery of Superior Shoal. Inland Seas 15(1):50-54.

Lawrie, A. H. 1978. The fish community of Lake Superior. Journal of Great Lakes Research 4:513-549.

Lawrie, A. H. and J. F. Rahrer.1973. Lake Superior: a case history of the lake and its fisheries. Technical Report No. 19. Great Lakes Fishery Commission. Ann Arbor, Michigan. 69 p.

Lester, N. P., K. J. Cornelisse, L. Greig, C. K. Minns, and M. L. Jones. 1997. Proceedings of the 1997 Science for Fish Habitat Management Workshop. Canadian Manuscript Report of Fisheries and Aquatic Sciences.

Lindeborg, R. G. 1941. Records of fishes from Quetico Provincial Park. Copeia 1941:159-161.

Lindsey, C. C. and C. S. Woods [eds.]. 1970. Biology of Coregonid fishes. University of Manitoba Press. Winnipeg, Manitoba. 560 p.

Loftus, D. H. 1979. Charter boat fishery for lake trout in southern Georgian Bay, 1920-1955. LHFAU Report 79-1. Ontario Ministry of Natural Resources. Owen Sound, Ontario. 24 p.

Loftus, K. H. 1968. A symposium on introductions of exotic species. Fisheries Research Report No. 82. Ontario Department of Lands and Forests. Maple, Ontario.

Loftus, K. H. 1976. A new approach to fisheries management and F.E.J. Fry's role in its development. Journal of the Fisheries Research Board of Canada 33:321-325.

Loftus, K. H. [ed.]. 1982. Proceedings of the 1980 North American eel conference. Ontario Fisheries Technical Report Series No. 4. Ontario Ministry of Natural Resources. Toronto, Ontario.

Loftus, K. H. and H. A. Regier [eds.]. 1972. Salmonid communities in oligotrophic lakes (SCOL) international symposium. Journal of the Fisheries Research Board of Canada 29(6):613-986.

Loftus, K. H., M. G. Johnson, and H. A. Regier. 1978. Federal-provincial strategic planning for Ontario fisheries: management strategies for the 1980s. Journal of the Fisheries Research Board of Canada 35:916-927.

Lytwyn, V. P. 1990. Ojibwa and Ottawa fisheries around Manitoulin Island: historical and geographical perspectives on aboriginal and treaty fishing rights. Native Studies Review 6(1):1-30.

Lucy, F. F. and E. Muckle-Jeffs. 2010. History of the zebra mussel/ICAIS conference series. Aquatic Invasions 5(1):1-3.

MacCrimmon, H. R. 1950. The reintroduction of Atlantic salmon into tributary streams of Lake Ontario. Transactions of the American Fisheries Society 78:128-132.

MacCrimmon, H. R. and E. Skobe. 1970. The fisheries of Lake Simcoe. Fish and Wildlife Branch. Ontario Department of Lands and Forests. Toronto, Ontario. 140 p.

MacCrimmon, H. R. and B. L. Gots. 1972. Rainbow trout in the Great Lakes. Sport Fisheries Branch. Ontario Ministry of Natural Resources. Toronto, Ontario. 66 p.

MacCrimmon, H. R., J. E. Stewart, and J. R. Brett. 1974. Aquaculture in Canada: the practice and the promise. Bulletin 188. Bulletin of the Fisheries Research Board of Canada. Ottawa, Ontario. 84 p.

MacDonald, G. A. 1978. The Ojibway fishery at Sault Ste. Marie, 1640-1920. M.Sc. Thesis. University of Waterloo. Waterloo, Ontario.

MacGregor, R. B. and L. D. Witzel. A twelve year study of the fish community in the Nanticoke region of Long Point Bay, Lake Erie, 1971-1983. Lake Erie Fisheries Assessment Unit Report 1987-3. Ontario Ministry of Natural Resources. Port Dover, Ontario. 616 p.

MacKay, H. H. 1931. The maskinonge and its conservation. Bulletin 1. Biological and Fish Culture Branch. Ontario Department of Lands and Forests. Toronto, Ontario.

MacKay, H. H. undated$_a$. Ontario fisheries regulations and why. Manuscript Report. Ontario Department of Lands and Forests. Toronto, Ontario.

MacKay, H. H. undated$_b$. Fisheries management in Ontario with special reference to the role of hatcheries. Technical Report. Ontario Department of Lands and Forests. Toronto, Ontario. 6 p.

MacMahon, P. 1997. Fish: To stock or not to stock. Northwest Region Science and Technology Unit Workshop Proceedings WP-003. Ontario Ministry of Natural Resources. Thunder Bay, Ontario. 25 p.

Maher, F. P. 1965. Kokanee salmon for the Great Lakes. Ontario Fish and Wildlife Review 4(2):2-5.

Maher, F. P. 1966. The South Bay fisheries research station. Ontario Fish and Wildlife Review 5(1):14-20.

Mandrak, N. E. and E. J. Crossman. 1992. Postglacial dispersion of freshwater fishes into Ontario. Canadian Journal of Zoology 70:2247-2259.

Mandrak, N. E. and E. J. Crossman. 1992. A checklist of Ontario freshwater fishes annotated with distribution maps. Royal Ontario Museum. Toronto, Ontario. 176 p.

Mandrak, N. E. and E. J. Crossman. 2003. Fishes of Algonquin Park. Ontario Parks. Ontario Ministry of Natural Resources. 40 p.

Martin, N. V. 1966. Investigation of European fishes for introduction to Ontario waters. Fisheries Research Information Paper No. 32. Ontario Department of Lands and Forests. Maple, Ontario.

Martin, N. V. 1968. The Harkness Laboratory of fisheries research. Research Branch. Ontario Department of Lands and Forests. 50 p.

Martin, N. V. and C. H. Olver. 1976. The distribution and characteristics of Ontario lake trout lakes. Fisheries Research Report 97. Ontario Ministry of Natural Resources. Maple, Ontario. 30 p.

McAllister, D. E. 1961. Fish remains from a 600 year old St. Lawrence River Iroquois site. Natural Museum of Canada Bulletin 172:34-38.

McAllister, D. E. 1962. Fish remains from Ontario Indian sites 700 to 2,500 years old. Natural History Papers. National Museum of Canada 17:1-6.

McCullough, A. B. 1987. Commercial fishing in the Great Lakes: resource management and technological efficiency. Scienta Canadensis 11:3-18.

McCullough, A. B. 1989. The commercial fishery of the Canadian Great Lakes. Queen`s Printer. Ottawa, Ontario.

McKenny, L. 1827. Sketches of a tour to the lakes. Baltimore, Maryland.

Meek, S. E. 1899. Notes on the collection of fishes and amphibians from Muskoka and Gull lakes. Field Columb. Museum Publication 41. Zoological Series 1:307-310.

Mills, E. L., J. H. Leach, J. T. Carlton, and C. L. Secor. 1993. Exotic species in the Great Lakes: a history of biotic crises and anthropogenic introductions. Journal of Great Lakes Research 19:1-54.

Minns, C. K., D. A. Hurley, and K. H. Nicholls [eds.]. 1986. Project Quinte: point source phosphorus control and ecosystem response in the Bay of Quinte, Lake Ontario. Special Publication of Canadian Journal of Fisheries and Aquatic Sciences 86:270 p.

Moccia, R. D., S. Naylor, and G. Reed. 1997. An overview of aquaculture in Ontario. Fact Sheet No. 96-003. University of Guelph. Guelph, Ontario. 4 p.

Monk, C. E. 1966. The Shebandowan lakes. Ontario Fish and Wildlife Review 5(4):2-10.

Morgan, G. E., M. D. Malette, R. S. Kushneriuk, and S. E. Mann. 2003. Regional summaries of walleye life history characteristics based on Ontario's fall walleye index netting (FWIN) program, 1993-2001. Percid Community Synthesis. Ontario Ministry of Natural Resources. Peterborough, Ontario.

Morris, J. L. 1943. Indians of Ontario. Ontario Department of Lands and Forests. Toronto, Ontario. 75 p.

Morrison, B. J. and S. R. LaPan [eds.]. 2007. The state of Lake Ontario in 2003. Special Publication 07-1. Great Lakes Fishery Commission. Ann Arbor, Michigan.

Nash, C. W. 1908. Fishes of Ontario. Department of Education. Warwick Brothers and Rutters Limited Publishers. Toronto, Ontario 122 p.

Nepszy, S. J. and J. H. Leach. 1973. Chinese mitten crabs in Lake Erie. Ontario Fish and Wildlife Review 12(1-2):17-18.

Nielsen, L. A. 1999. History of inland fisheries management in North America. p. 3-30 *In* C. C. Kohler and W. A. Hubert [eds.]. American Fisheries Society. Bethesda, Maryland.

Nunan, P. J. 1967. Pink salmon in Lake Superior. Ontario Fish and Wildlife Review 6(3-4):9-14.

Nute, G. L. 1950. Rainy River country – a brief history of the region bordering Minnesota and Ontario. Minnesota Historical Society. St. Paul, Minnesota.

Ontario Department of Fisheries. 1903. 5th Annual Report. L. K. Cameron Kings Printer. Toronto, Ontario.

Ontario Department of Lands and Forests. 1963. A history of the Kapuskasing forest district. District history series No. 1. 16 p.

Ontario Department of Lands and Forests. 1963. A history of the Geraldton forest district. District history series No. 2. 50 p.

Ontario Department of Lands and Forests. 1963. A history of the Lake Huron forest district. District history series No. 3. 73 p.

Ontario Department of Lands and Forests. 1963. A history of the Port Arthur forest district. District history series No. 4. 20 p.

Ontario Department of Lands and Forests. 1963. A history of the White River forest district. District history series No. 5. 19 p.

Ontario Department of Lands and Forests. 1963. A history of the Sioux Lookout forest district. District history series No. 6. 21 p.

Ontario Department of Lands and Forests. 1963. A history of the Lake Simcoe forest district. District history series No. 7. 139 p.

Ontario Department of Lands and Forests. 1963. A history of the Fort Frances forest district. District history series No. 8. 16 p.

Ontario Department of Lands and Forests. 1963. A history of the Lake Erie forest district. District history series No. 9. 85 p.

Ontario Department of Lands and Forests. 1963. A history of the Kenora forest district. District history series No. 10. 22 p.

Ontario Department of Lands and Forests. 1964. A history of the Gogama forest district. District history series No. 11. 37 p.

Ontario Department of Lands and Forests. 1964. A history of the Parry Sound forest district. District history series No. 12. 58 p.

Ontario Department of Lands and Forests. 1964. A history of the North Bay forest district. District history series No. 13. 8 p.

Ontario Department of Lands and Forests. 1964. A history of the Cochrane forest district. District history series No. 14. 51 p.

Ontario Department of Lands and Forests. 1964. A history of the Swastika forest district. District history series No. 15. 82 p.

Ontario Department of Lands and Forests. 1964. A history of the Chapleau forest district. District history series No. 16. 54 p.

Ontario Department of Lands and Forests. 1964. A history of the Kemptville forest district. District history series No. 17. 112 p.

Ontario Department of Lands and Forests. 1965. A history of the Lindsay forest district. District history series No. 18. 138 p.

Ontario Department of Lands and Forests. 1965. A history of the Tweed forest district. District history series No. 19. 54 p.

Ontario Department of Lands and Forests. 1965. A history of the Sault Ste. Marie forest district. District history series No. 20. 121 p.

Ontario Department of Lands and Forests. 1967. A history of the Sudbury forest district. District history series No. 21. 90 p.

Ontario Department of Lands and Forests. 1967. A history of the Pembroke forest district. District history series No. 22. 42 p.

Ontario Ministry of Natural Resources. undated. Out of the water – Ontario's freshwater fish industry. Fisheries Branch. Toronto, Ontario. 68 p.

Ontario Ministry of Natural Resources. 1992. Strategic plan for Ontario fisheries – SPOF II – An aquatic ecosystem approach. Queen's Printer for Ontario. 22 p.

Ontario Ministry of Natural Resources. 1992. Report of the Fisheries Assessment Unit Review Committee. Fisheries Policy Branch. Toronto, Ontario. 26 p.

Ontario Ministry of Natural Resources. 2000. Walleye workshop 2000. Report 02-2000. Lake Huron Management Unit. Owen Sound, Ontario.

Ontario Ministry of Natural Resources. 2002a. Guidelines for stocking fish in inland waters of Ontario. Fish and Wildlife Branch. Peterborough, Ontario. 44 p.

Ontario Ministry of Natural Resources. 2002b. Lake Huron workshop proceedings: finclipping. Report 03-2002. Lake Huron Management Unit. Owen Sound, Ontario. 66 p.

Ontario Ministry of Natural Resources. 2005. Protecting what sustains us – Ontario's biodiversity strategy. Queen's Printer for Ontario. Toronto, Ontario. 44 p.

Ontario Ministry of Natural Resources. 2010. Fisheries management in Ontario – an overview for MNR staff. Fisheries Policy Section. Biodiversity Branch. Peterborough, Ontario 27 p.

Ontario Ministry of Natural Resources and the Bait Association of Ontario. 2004. The commercial bait industry in Ontario statistical report for 2002. Peterborough, Ontario. 18 p.

Ontario Ministry of Natural Resources and the Department of Fisheries and Oceans. 1994. Ontario guidelines for aquatic plant control. Canadian Manuscript Report of Fisheries and Aquatic Sciences 2236. 25 p.

Ontario Ministry of Natural Resources and Québec Faune et Parcs. 1998. A strategic fisheries management framework for the Ottawa River. Pembroke, Ontario. 72 p.

Ontario Ministry of Natural Resources, Ontario Federation of Anglers and Hunters, Muskies Canada Inc. Royal Ontario Museum and Northern Ontario Tourist Outfitters. 1999. Size limit regulations for Ontario muskellunge: a new approach. Musky Size Limit Committee Report. Peterborough, Ontario. 12 p. + appendices.

Orsatti, S. D., M. E. Daniels and N. P. Lester. 1991. CREESYS: a software application for the management of Ontario creel survey data. American Fisheries Society Symposium 12:285-291.

Payne, N. R. 1967. A century of commercial fishery administration in Ontario. Ontario Fish and Wildlife Review. Ontario Department of Lands and Forests 6(1-2):7-15.

Pearse, P. H. 1988. Rising to the Challenge. Canadian Wildlife Federation. Ottawa, Ontario. 180 p.

Persal, E. E. 1963. Mount Pleasant public fishing area. Ontario Fish and Wildlife Review 2(1):2-5.

Philipp, D. P. and M. S. Ridgway [eds.]. 2002. Black bass ecology, conservation, and management. American Fisheries Society Symposium 31. American Fisheries Society. Bethesda, Maryland. 724 p.

Prince, E. E. 1920. Fifty years of fishing administration in Canada. Transactions of the American Fisheries Society 50:163-186.

Prothero, F. 1973. The good years – a history of the commercial fishing industry in Lake Erie. Mika Publishing. Belleville, Ontario.

Qadri, S. U. and D. E. McAllister. 1967. Fish remains from a 700 year old southern Ontario archaeological site. Natural History Papers. National Museum of Canada 34:1-6.

Quimby, G. I. 1960. Indian life in the upper Great Lakes, 11,000 BC to AD 1800. University of Chicago Press. Chicago, Illinois. 182 p.

Raine, G. E. 1969. Cornwall Recreation Area proves popular. Ontario Fish and Wildlife Review 8(4):13-14.

Rask, M., W. van Densen, H. Lehtonen, and E. Rutherford [eds.]. 1995. Proceedings of the second international Percid symposium PERCIS II. Annales Zoologici Fennici 33(3-4):303-725.

Regier, H. A., T. H. Whillans, W. J. Christie, and S. A. Bocking. 1999. Overfishing in the Great Lakes: the context and history of the controversy. Aquatic Ecosystem Health and Management 2(1999):239-248.

Reynolds, J. K. 1964. Pink salmon in Ontario. Ontario Fish and Wildlife Review 3(3):18-21.

Richardson, A. H. 1974. Conservation by the people: the history of the conservation movement in Ontario to 1970. University of Toronto Press. Toronto, Ontario. 146 p.

Richardson, J. 1836. Fauna Boreali-Americana, or the zoology of the northern parts of British America. Part III The fish. Richard Bentley. London, England. 327 p.

Rogers, E. S. 1972. Ojibwa fisheries in northwestern Ontario. commercial Fish and Fur Branch. Ontario Ministry of Natural Resources. Toronto, Ontario. 49 p.

Roosevelt, R. B. 1865. Superior fishing or the striped bass, trout and black bass of the northern states. Carleton Publishers. New York, New York.

Ryan, P. A., R. Knight, R. MacGregor, G. Towns, R. Hoopes, and W. Culligan. 2003. Fish community goals and objectives for Lake Erie. Special Publication 03-2. Great Lakes Fishery Commission. Ann Arbor, Michigan.

Ryder, R. A. 1961. First Ontario record of the Arctic char (*Salvelinus alpinus*). Copeia 3:359-360.

Ryder, R. A. 1965. A method for estimating the potential fish production of north temperate lakes. Transactions of the American Fisheries Society 94:214-218.

Ryder, R. A. 1982. The morphoedaphic index – use, abuse and fundamental concepts. Transactions of the American Fisheries Society 111:154-164.

Ryder, R. A., S. R. Kerr, K. H. Loftus, and H. A. Regier. 1974. The morphoedaphic index, a fish yield estimator – review and evaluation. Journal of the Fisheries Research Board of Canada 31:663-688.

Scott, W. B. 1965. John Richardson Dymond, 1887-1965. Canadian Field Naturalist 79:219-229.

Scott, W. B. and E. J. Crossman. 1973. Freshwater fishes of Canada. Bulletin 184. Fisheries Research Board of Canada. Ottawa, Ontario. 966 p.

Seip, D. E. 1995. An evaluation of stocking walleye fingerlings in ten eastern Ontario lakes, 1984-93. Technical Report TR-007. Southern Region Science and Technology Transfer Unit. Ontario Ministry of Natural Resources. Kemptville, Ontario. 81 p. + appendices.

Shaw, S. B. 1998. Lake Opeongo – untold stories of Algonquin Park's largest lake. General Store Publishing House. Burnstown, Ontario. 110 p.

Skuce, E. L. 1959. Enforcement of fish and wildlife regulations in Ontario, 1890-1958. p. 18-33 *In* Conservation Officer Projects, Southwestern Region, Volume VI. Ontario Department of Lands and Forests. Toronto, Ontario 51 p.

Smith, S. H. 1995. Early changes in the fish community of Lake Ontario. Technical Report 60. Great Lakes Fishery Commission. Ann Arbor, Michigan. 38 p.

Spears, R. S. 1913. A trip on the Great Lakes. A. R. Harding Publishers. Columbus, Ohio.

Stevenson, J. C. [ed.]. 1974. International Association of Limnology meeting proceedings. Journal of the Fisheries Research Board of Canada 31(5):499-1020.

Stevenson, J. C. [ed.]. 1976. Lake Erie in the early seventies. Journal of the Fisheries Research Board of Canada 33(3):349-643.

Stewart, T. J., R. E. Lange, S. D. Orsatti, C. P. Schneider, A. Mathers and M. Daniels. 1999. Fish community objectives for Lake Ontario. Special Publication 99-1. Great Lakes Fishery Commission. Ann Arbor, Michigan.

Taillon, D. 2008. Kawartha lakes fish die-offs in 2007. Ontario Ministry of Natural Resources. Peterborough, Ontario.

Thompson, P. A. 1967. Fish and game law enforcement in Ontario. Ontario Fish and Wildlife Review. Ontario Department of Lands and Forests 6(1-2):35-40.

Thorns, M. J. 2004. Ojibwa fishing grounds: a history of Ontario's fisheries law, science and the sportsmen's challenge to aboriginal treat rights, 1650-1900. Ph.D. Dissertation. University of British Columbia. Vancouver, British Columbia.

Thwaites, R. G. 1898. The Jesuit relations and allied documents. Burrows Brothers Company. Cleveland, Ohio.

Tyson, J. T., R. A. Stein, and J. M. Dettmers. 2009. The state of Lake Erie in 2004. Special Publication 09-2. Great Lakes Fishery Commission. Ann Arbor, Michigan.

United Empire Loyalists (UEL). 1984. Loyal she remains – a pictorial history of Ontario. Toronto, Ontario. 676 p.

Wainio, A. 1982. 1960 – A bad year for fish. Aski 8(2):17.

Walkinshaw, C. A. 1967. Early organization of hunting, angling and conservation associations in Ontario. Ontario Fish and Wildlife Review 6(3-4):15-19.

Wallace, R. G. 1976. About baitfish in Ontario. Fish and Wildlife Division. Ontario Ministry of Natural Resources. Toronto, Ontario. 55 p.

Watson, G., J. Grant, and A. Wheatley [eds.].1983. Beyond the rainbow: alternative species for commercial aquaculture in Ontario. Aquaculture Development Program. Owen Sound, Ontario. 399 p.

Wells, L. and A. L. McLain. 1973. Lake Michigan: Man's effects on native fish stocks and other biota. Technical Report No. 20. Great Lakes Fishery Commission. Ann Arbor, Michigan.

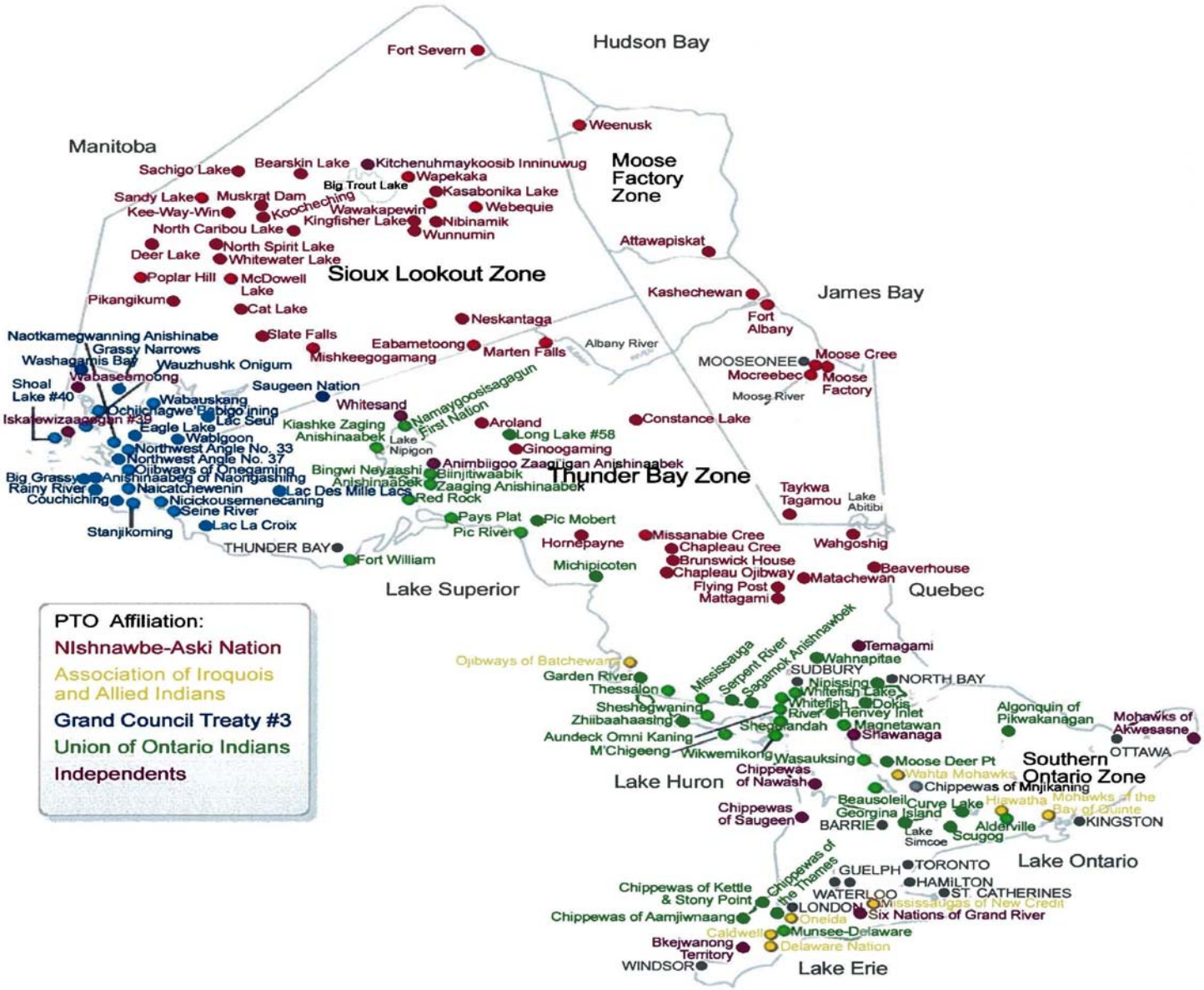
Werner, W. H. R. and M. J. Brubacher. 1960. Fisheries management in Georgian Bay. Technical Bulletin No. 10. Fish and Wildlife Branch. Ontario Department of Lands and Forests. 33 p.

Whillans, T. H. 1979. Historic transformations of fish communities in three Great Lakes bays. Journal of Great Lakes Research 5(2):195-215.

Wilmot, S. 1878. Report of Samuel Wilmot, Esquire, on the several fish breeding establishments and fish culture in Canada during the season of 1877. Tenth Annual Report of the Department of Marine and Fisheries. MacLean and Roger Company. Ottawa, Ontario.

Wilson, L. 1990. Historical literature review of the Nipigon area with emphasis on fisheries from 1654 to 1990. Report No. 8. North Shore of Lake Superior Remedial Action Plan.

Appendix 1. First Nation communities in Ontario.



Appendix 2. A summary of selected introductions of fish and other aquatic organisms into Ontario waters.

Year(s) of Introduction	Species	Waterbody	Means of Introduction	Species Established?
1830s	Sea lamprey	Lake Ontario	Accidental (Erie canal)	Yes
1873	Alewife	Lake Ontario	Accidental (canals)	Yes
1873-78	Coho salmon	Lake Erie	Deliberate (stocking)	No
1874	Chinook salmon	Lake Ontario	Deliberate (stocking)	No
1880	Common carp	Toronto area pond	Deliberate (stocking)	Yes
1882	Rainbow trout	Lake Superior	Deliberate (stocking)	Yes
1895	Bass	Northwestern Ontario lakes	Deliberate (stocking)	Yes
1912	American smelt	Lake Michigan	Accidental (canals, bait bucket)	Yes
1913	Brown trout	Southwestern Ontario streams	Deliberate (stocking)	Yes
~ 1921	Sea lamprey	Lake Erie	Accidental (Welland Canal)	Yes
1935-57	Kamloops trout	27 inland lakes	Deliberate (stocking)	No
1938-62	Atlantic salmon	57 inland lakes	Deliberate (stocking)	Yes (Trout Lake)
1941	Mosquito fish	Southern Ontario	Deliberate (stocking)	No
~ 1950	White perch	Lake Ontario	Accidental (Erie and Welland Canals)	Yes
1950s	Rudd	Eastern Ontario	Accidental (bait bucket)	Yes
1954-55	Chum salmon	James Bay	Deliberate (stocking)	No
1955	Arctic charr	Algonquin Park	Deliberate (stocking)	No
1956	Pink salmon	Lake Superior	Accidental (escapement)	Yes
1959	Arctic grayling	Northwestern Ontario lakes	Deliberate (stocking)	No
1960	Kokanee salmon	Inland lakes	Deliberate (stocking)	Yes (Boulder Lake)
1965	Chinese mitten crab	Detroit River	Accidental (ballast water)	No

Year(s) of Introduction	Species	Waterbody	Means of Introduction	Species Established?
1965-72	Kokanee salmon	Lake Huron	Deliberate (stocking)	No
1966	Cherry salmon	Algonquin Park	Deliberate (stocking)	No
1970s	Rusty crayfish	Kawartha lakes	Accidental (bait bucket)	Yes
1971	Chinook salmon	Lakes Superior and Ontario	Deliberate (stocking)	Yes
1974	European flounder	Lake Erie	Accidental (ballast water)	No
1980s	Fourspine stickleback	Lake Huron and Superior	Accidental (ballast water)	Unknown
1982	Spiny waterflea	Lake Ontario (Lake Huron – 1984)	Accidental (ballast water)	Yes
1985	Grass carp	Lake Erie	Unauthorized (live food fish)	No
1986	Ruffe	Lake Superior	Accidental (ballast water)	Yes
1988	Zebra mussel	Lake St. Clair	Accidental (ballast water)	Yes
1989	Quagga mussel	Lake Ontario	Accidental (ballast water)	Yes
1989-94	Skamania steelhead	Lake Huron-Georgian Bay	Deliberate (stocking)	No
1990	Round goby	Lake St. Clair	Accidental (ballast water)	Yes
	Tubenose goby	Lake St. Clair	Accidental (ballast water)	Yes
1998	Fish hook waterflea	Lake Ontario	Accidental (ballast water)	Yes

Appendix 3. Federal and provincial fish culture stations in the Province of Ontario, 1865-2004 (from Kerr 2006).

Facility	Years of Operation	Agency	Species Propagated
Newcastle	1865-1867	Private	• Atlantic salmon
	1868-1914	Federal	• Lake trout, lake whitefish, brook trout, rainbow trout, walleye, bass, carp
Sandwich	1876-1916	Federal	• Lake whitefish, walleye
Ottawa	1890-1911	Federal	• Atlantic salmon, lake trout, brook trout, rainbow trout, walleye
Belleville	1901-1913	Federal	• Smallmouth bass
Wiarton	1908-1926[1.]	Federal	• Lake trout, brook trout
	1926-1980	Provincial	• Lake trout, rainbow trout, brook trout, Atlantic salmon, Kokanee salmon
Sarnia	1908-1926[1.]	Federal	• Walleye, lake whitefish, lake herring
Port Arthur	1912-1926[1.]	Federal	• Lake trout, lake whitefish, rainbow trout, brook trout, Atlantic salmon, lake herring
	1926-1971	Provincial	• Brook trout, lake trout, lake whitefish
Southampton	1912-1926[1.]	Federal	• Lake trout
Collingwood	1912-1926[1.]	Federal	• Lake whitefish, walleye
Belleville (Thurlow)	1915-1926[1.]	Federal	• Lake whitefish, lake herring, walleye, lake trout
Kenora	1915-1926[1.]	Federal	• Lake whitefish, walleye
	1926-1962	Provincial	• Lake whitefish, walleye
Kingsville	1917-1926[1.]	Federal	• Lake whitefish
	1926-?	Provincial	• Lake whitefish, lake herring, walleye, yellow perch
Mount Pleasant	1909-1965	Provincial	• Brook trout, lake trout, bass
Normandale	1917-Present	Provincial	• Lake whitefish, lake herring, rainbow trout, brook trout, Atlantic salmon
Port Carling	1918-1938	Provincial	• Walleye
Sault Ste. Marie (Huron Street)	1921-1956	Provincial	• Lake whitefish, walleye, brook trout, lake trout
Sault Ste. Marie (Tarentorus)	1932-Present	Provincial	• Lake trout, brook trout, splake, rainbow trout
Glenora	1923-1955	Provincial	• Lake trout, brook trout, lake whitefish, lake herring, walleye, Atlantic salmon, cherry salmon
Omemee	1927-1937	Provincial	• Muskellunge
Codrington	1930-1991[2.]	Provincial	• Brook trout, brown trout, rainbow trout
Pembroke	1930-1994	Provincial	• Brook trout, lake trout
Ingersoll ponds	1931-?	Provincial	• Bass
Dorion	1933-Present	Provincial	• Brook trout, lake trout, rainbow trout, pink salmon, coho salmon, splake
Fort Frances	1933-1956	Provincial	• Lake trout, brook trout, walleye, lake whitefish
Midhurst	1934-1972	Provincial	• Brook trout
White Lake	1934-Present	Provincial	• Brook trout, lake trout, rainbow trout, bass, walleye, Atlantic salmon, brown trout, splake, lake whitefish, muskellunge, smallmouth and largemouth bass
Little Current	1935-?	Provincial	• Lake whitefish, walleye
Chatsworth	1936-Present	Provincial	• Brook trout, lake trout, splake, coho salmon, Chinook salmon, brown trout, rainbow trout, lake trout backcross, Arctic grayling
	1937-Present	Provincial	• Brook trout, bass, lake trout
North Bay	1937-Present	Provincial	• Lake trout, rainbow trout, brook trout, Atlantic salmon, splake, Aurora trout
Skeleton Lake	1938-1991	Provincial	• Brook trout, lake trout, bass, walleye, rainbow trout
Tarentorus	1956-Present	Provincial	• Brook trout, lake trout, splake, rainbow trout
Waring Creek	1938-1955	Provincial	• Brook trout, Atlantic salmon
Hill's Lake	1939-Present	Provincial	• Brook trout, lake trout, Aurora trout, splake, rainbow trout, walleye.
Deer Lake	1940-1991	Provincial	• Brook trout, rainbow trout, lake trout, muskellunge, suckers, minnows
Westport	1950-1991	Provincial	• Brook trout, lake trout, bass, walleye, splake
Swift Current (cage)	1978-1991	Provincial	• Lake trout, splake
Ringwood	1980-Present	Provincial	• Chinook salmon, Atlantic salmon, coho salmon, brown trout, rainbow trout
Harwood	1985-Present	Provincial	• Lake trout, brown trout, brook trout, rainbow trout
Blue Jay Creek	1989-Present	Provincial	• Lake trout, rainbow trout, brown trout

1. Transferred to the provincial government. 2. Recommissioned as a provincial research station in 1996.

Appendix 4. Record fish angled from Ontario waters.

Fish Species	Total Length (Inches)	Round Weight (Pounds)	Waterbody	Source
American eel	38.50	5.10	Ottawa River	OFAH registry
American smelt	10.76	0.33	Lake Simcoe	OFAH registry
Atlantic salmon	35.00	24.30	Lake Ontario	OFAH registry
Aurora trout	22.25	6.64	Carol Lake	OFAH registry
Black crappie	17.00	3.78	Lake Erie	OFAH registry
Bluegill	11.10	1.83	Lake Erie	OFAH registry
Bowfin	31.50	15.10	Dog Lake	OFAH registry
Brook trout	31.50	14.50	Nipigon River	OFAH registry
Brown bullhead	16.38	2.37	401 pond	OFAH registry
Brown trout	38.00	34.38	Lake Ontario	OFAH registry
Burbot	37.50	14.12	Jesse Lake	OFAH registry
Channel catfish	35.00	29.00	Berford Lake	OFAH registry
Chinook salmon	47.00	46.38	Lake Ontario	OFAH registry
Coho salmon	42.00	28.64	Lake Ontario	OFAH registry
Common carp	39.00	38.46	Ganaraska River	OFAH registry
Fallfish	18.50	2.34	Crowe River	OFAH registry
Freshwater drum	31.00	20.60	French River	OFAH registry
Goldeye	14.50	1.19	Redstone River	OFAH registry
Lake herring	23.50	4.33	Corrine Lake	OFAH registry
Lake sturgeon	69.00	168.0	Nottawasaga River	OFAH registry
Lake trout	51.50	63.12	Lake Superior	OFAH registry
Lake whitefish	29.50	14.77	Georgian Bay	OFAH registry
Largemouth bass	22.00	10.43	Preston Lake	OFAH registry
Longnose gar	51.00	15.79	Ottawa River	OFAH registry
Mooneye	15.75	1.43	Rainy River	OFAH registry
Muskellunge	58.00	65.00	Georgian Bay	OFAH registry
Northern pike	N/A	42.12	Delaney Lake	OFAH registry
Pink salmon	N/A	13.06	St. Mary’s River	OFAH registry

Fish Species	Total Length (Inches)	Round Weight (Pounds)	Waterbody	Source
Pumpkinseed	10.00	1.00	Beattie Lake	OFAH registry
Rainbow trout	39.13	40.68	McGregor Bay	OFAH registry
River redhorse	30.50	10.25	Trent River	OFAH registry
Rock bass	N/A	3.0	York River	OFAH registry
Sauger	22.20	4.40	Detroit River	OFAH registry
Saugeye	22.50	4.53	Lake of the Woods	OFAH registry
Shorthead redhorse	N/A	8.75	North River	IFGA registry
Silver redhorse	27.00	8.81	North River	OFAH registry
Smallmouth bass	24.00	9.84	Birch Lake	OFAH registry
Splake	35.00	20.71	Georgian Bay	OFAH registry
Tiger muskellunge	49.00	26.44	Moon River	OFAH registry
Walleye	36.50	22.25	Niagara River	OFAH registry
White bass	N/A	2.87	Georgian Bay	OFAH registry
White crappie	15.39	2.71	Detroit River	OFAH registry
White sucker	22.80	5.39	Lake Joseph	OFAH registry
Yellow perch	15.13	2.42	Lake Erie	OFAH registry

OFAH – Ontario Federation of Anglers and Hunters
IGFA – International Game and Fish Association

Appendix 5. Coarse fish removal projects carried out in Ontario waters.

Waterbody	Year(s)	Target Species	Harvest
Ahmic Lake	1940-1941	Burbot and suckers	• 1,527 burbot and 234 suckers were removed.
Bark Lake	1949	Coarse fish	-
	1950	Coarse fish	-
	1953	Burbot	-
Barker's Creek	1938	Burbot	-
Bass Lake	1938	Burbot	-
	1954	Burbot	-
Bennett Lake	1935	Burbot	-
	1938	Burbot	-
	1952	Burbot	-
	1953	Burbot	-
Beverly Lake	1936	Burbot	-
Beaverton River	1956	Burbot	• 2 burbot removed.
Big Clear Lake	1957	Coarse fish	-
Big Rideau Lake	1931	Burbot	-
	1932	Burbot	• 1,862 burbot captured and removed.
	1935	Burbot	-
	1936	Burbot	-
	1938	Burbot	-
	1951	Burbot	-
	1952	Burbot	-
	1953	Burbot	-
	1954	Burbot	-
Black Lake	1950	Burbot	-
	1953	Burbot	-
Black River	1954	Burbot	-
Bobs Lake	1936	Burbot	-
	1941	Burbot	• 2,109 burbot (8,628 kg) removed.
	1947	Burbot	• 2,589 burbot taken during 101 hoop net lifts.
	1948	Burbot	-
	1953	Burbot	-
Calabogie Lake	1957	Coarse fish	-
Cat (Finger) Lake	1931	Muskellunge, northern pike and turtles	• 19 pike and 10 muskellunge were removed.
	1932	Muskellunge, northern pike and turtles	-
Catchacoma Lake	1958	Coarse fish	-
Charleston Lake	1936	Burbot	-
	1937	Burbot	-
	1938	Burbot	-
	1942	Burbot	• 1,100 burbot removed with hoop nets.
	1952	Burbot	-
	1953	Burbot	-
	1954	Burbot	-
	1955	Burbot	• 3,361 burbot removed.
	1956	Burbot	• 1,000 burbot removed.
	1957	Burbot	• 500 kg of burbot removed by trap net.
	1958	Burbot	• 1,250 burbot removed by hoop net.

Waterbody	Year(s)	Target Species	Harvest
Christie Lake	1935	Burbot	-
	1952	Burbot	-
	1953	Burbot	-
	1960-61 (W)	Burbot	• 715 burbot removed by hoop net.
	1961-62 (W)	Burbot	• 245 burbot removed by hoop net.
	1962-63 (W)	Burbot	• 456 burbot removed by hoop net.
	1968 (W)	Burbot	• 836 burbot removed by hoop net
	1968 (Sp)	Coarse fish	• 1,169 kg bullheads, 331 kg suckers, and 671 kg panfish removed by hoop net.
	1968 (F)	Coarse fish	• 378 kg bullheads, 556 kg bullheads, and 907 kg panfish removed by hoop net.
	1984	Burbot and coarse fish	• CFIP project removed 335 burbot, 34 bullheads and 386 suckers.
	1985	Burbot and coarse fish	• CFIP project removed 193 burbot, 5 bullheads and 62 suckers.
Clear Lake	1947	Burbot	• 29 burbot removed from 5 hoop net lifts.
Connelly Lake	1957	Coarse fish	-
Crosby Lake	1936	Burbot	-
Crow Lake	1935	Burbot	-
	1936	Burbot	-
	1941	Burbot	• 512 burbot (1,862 kg) removed.
	1950	Burbot	-
	1953	Burbot	-
	1954	Burbot	-
Diamond Lake	1952	Burbot	-
	1953	Burbot	-
Dundas Marsh	1951	Carp	-
Eastern Ontario lakes	1903	Burbot and suckers	• “tons”removed.
Elbow Lake	1947	Burbot	• 153 burbot removed from 6 hoop net lifts.
Elephant Lake	1957	Coarse fish	-
Emily Creek	1949	Coarse fish	-
	1950	Coarse fish	-
First Depot Lake	1954	Burbot	-
Fourteen Island Lake	1954	Burbot	-
Gillies Lake	1958	Coarse fish	-
Grippen Lake	1937	Burbot	-
Hamilton Bay	1950	Carp	-
Healy Lake	1984-1987	Sunfish and suckers	• 1,529 kg removed by netting and derbies.
	1996	Sunfish and suckers	-
Heart Lake	1957	Bullheads and pumpkinseed	• Toxicant used to remove 3,227 kg of fish (7 different species).
Holland River	1957	Burbot	• 102 burbot removed by hoop net.
	1958	Burbot	• 102 burbot removed by hoop net.
Huntley Creek (Lake Simcoe)	1953	Burbot	-
Jebbs Creek	1954	Burbot	-
Jersey River	1954	Burbot	-
Kaminiskeg Lake	1949	Coarse fish	-
	1950	Coarse fish	-
	1953	Burbot	-

Waterbody	Year(s)	Target Species	Harvest
Lake Manitou	1935	Burbot	• 1,098 kg burbot removed.
	1937	Burbot	• 2,881 kg burbot removed.
	1950	Burbot	-
	1953	Burbot	-
Lake Simcoe (Atherley Narrows)	1954	Burbot	-
	1956	Burbot	• 125 burbot removed.
Lake Simcoe (Nolan's Shoal)	1956	Burbot	• 569 burbot removed.
Lake Simcoe (Snake Island)	1956	Burbot	• 175 burbot removed.
Leggate Lake	1955	Coarse fish	-
	1957	Coarse fish	-
Long Lake	1947	Burbot	• 107 burbot taken from 6 hoop net lifts.
Loughborough Lake	1942-1943	Bullheads, lake whitefish and lake herring	• Only bullheads were captured and removed.
Lower Rideau Lake	1950	Burbot	-
Madawaska River	1952	Burbot	-
	1953	Burbot	-
	1954	Burbot	-
	1955	Burbot	• 598 burbot removed.
Marie Louise Lake	1946	Northern pike	• Pike removed before bass introduction.
Mazinaw Lake	1953	Coarse fish	-
Mindemoya Lake	1970s-1980s	White sucker	-
	1994	White sucker	• 5,700 kg removed from 42 trap net lifts.
Mississagua Lake	1958	Coarse fish	-
Mississippi Lake	1952	Coarse fish	-
	1953	Burbot	-
	1961	Coarse fish	• 7,160 coarse fish (3,084 kg) removed.
	1962	Coarse fish	• 2,391 kg coarse fish removed.
	1962-63 (W)	Coarse fish	• 2,418 kg coarse fish removed.
	1970	Coarse fish	• 459 kg coarse fish removed.
Mississippi River	1935	Burbot	-
Muskrat Lake	1957	Coarse fish	-
Newboro Lake	1957	Coarse fish	-
	1958	Coarse fish	-
Nipigon River	1902-1921	Northern pike	• In 1905, 7,632 pike, 2,282 suckers, 228 walleye and 145 lake whitefish were removed.
	1931	Northern pike	
	1932	Northern pike	
Nonquon River	1948	Carp and other coarse fish	-
	1949	Carp and other coarse fish	-
	1950	Carp and other coarse fish	-
	1951	Carp and other coarse fish	-
	1952	Carp and other coarse fish	-

Waterbody	Year(s)	Target Species	Harvest
Otonabee River	1952	Carp	-
	1953	Carp	-
Otter Lake	1931	Burbot	• 2,246 burbot were removed by hoop and trap nets.
	1932	Burbot	-
	1937	Burbot	-
	1953	Burbot	-
	1954	Burbot	-
	1955	Burbot	• 640 burbot removed.
Otty Lake	1935	Burbot	-
	1936	Burbot	-
	1937	Burbot	-
	1941	Burbot	• 79 burbot (72 kg) removed.
	1942	Burbot	• 3689 burbot (502 kg) removed.
	1952	Burbot	-
	1953	Burbot	-
	1955	Burbot	• 629 burbot removed.
Palmerston Lake	1953	Coarse fish	-
Papineau Lake	1955	Coarse fish	-
Pasha Lake	1969	American smelt	-
	1970	American smelt	• Toxicant used to destroy ~ 100,000 smelt.
Pefferlaw River	1954	Burbot	-
	1955	Burbot	• 622 burbot removed.
Pike Lake	1935	Burbot	• 727 burbot removed by hoop net.
	1936	Burbot	-
	1937	Burbot	• 385 burbot removed by hoop net.
	1950	Burbot	-
	1951	Burbot	-
	1952	Burbot	-
	1953	Burbot	• 160 burbot removed by hoop net.
	1954	Burbot	-
	1961	Burbot	• 715 burbot removed by hoop net.
	1962	Burbot	• 1,108 burbot removed by hoop net.
	1963	Burbot	• 1,977 burbot removed by hoop net.
Red Horse Lake	1938	Burbot	-
Rice Lake	1957	Coarse fish	-
Round Lake	1945	Coarse fish	-
	1947	Coarse fish	-
	1948	Coarse fish	-
Sand Lake	1936	Burbot	-
	1948	Burbot	-
	1951	Burbot	-
	1953	Burbot	-
	1955	Burbot	• 40 burbot removed.
Scugog Lake	1947	Carp	-
	1948	Carp	-
	1949	Carp	-
	1950	Carp	-
	1951	Carp	-
	1952	Carp	-
	1953	Carp	-
	1955	Carp	-

Waterbody	Year(s)	Target Species	Harvest
Sharbot Lake	1953	Burbot	-
	1958	Coarse fish	-
Spring Valley Mill Pond	1956	Carp and coarse fish	• Toxicant used to remove 227 kg of coarse fish from the pond.
Sturgeon Lake	1950	Carp	-
	1951	Carp	-
	1953	Carp	-
Sunova Lake	1957	Carp	• Toxicant used to remove ~ 2,000 kg of fish (7 species).
Sutton Creek (Lake Simcoe)	1953	Burbot	-
	1954	Burbot	-
	1955	Burbot	• 517 burbot removed.
Talbot River	1954	Burbot	-
	1955	Burbot	• 470 burbot removed.
	1956	Burbot	• 491 burbot removed.
	1957	Burbot	• 154 burbot removed by hoop net.
	1958	Burbot	• 118 burbot removed by hoop net.
Tay River	1936	Burbot	-
	1937	Burbot	-
	1938	Burbot	-
Trent River/Canal	1954	Burbot	-
	1955	Coarse fish	-
Twenty Minute Lake	1949	Coarse fish	-
	1950	Coarse fish	-
Upper Rideau Lake	1942	Lake herring, lake whitefish and coarse fish	• 5,558 kg of fish removed.
Wawa Lake	1951	Burbot	-
	1960	Sunfish	• 8,438 kg removed.
Westport Mill Pond	1948	Sunfish	-
	1969	Sunfish	• 5,894 kg removed.
Whitefish Creek	1954	Burbot	-
	1955	Burbot	• 71 burbot removed.
Wolfe Lake	1931	Burbot	-
	1932	Burbot	• 295 burbot removed.
	1936	Burbot	-
	1937	Burbot	-
	1948	Burbot	-
	1949	Burbot	-
	1950	Burbot	-
	1951	Burbot	-
	1953	Burbot	-
	1955	Burbot	• 397 burbot removed.
	1956	Burbot	• 510 burbot removed.
	1957	Burbot	• 500 kg of burbot removed by hoop net.

Appendix 6. Fisheries/Fish & Wildlife Branch Directors

W. J. K. Harkness – Chief, Fish and Wildlife Division, 1946-1960.

Dr. C. H. D. Clarke – Chief, Fish and Wildlife Branch, 1960-1971

J. D. Roseborough – Director, Sport Fisheries Branch, 1971-1972

Ken Loftus – Director, Sport Fisheries Branch, 1972-1976
Director, Fisheries Branch, 1976-1980.

Art Holder – Director, Fisheries Branch, 1980-1986

George Whitney – Director, Fisheries Branch, 1986-1989

Jim McLean - Director, Fisheries Policy Branch, 1989 - 1991

Gail Beggs – Director, Fisheries Policy Branch , 1991 - 1992
Director, Aquatic Ecosystems Branch, 1992 - 1994

Jim Gosnell – Director, Aquatic Ecosystems Branch, 1994-1996

Andy Houser – Director, Fish and Wildlife Branch, 1996-1998

Bob Beecher - Director, Fish and Wildlife Branch, 1998-2000

Cameron Mack – Director, Fish and Wildlife Branch, 2000- 2010

Eric Boysen – Director, Biodiversity Branch, 2010 -

Appendix 7. Conservation Authorities in Ontario.

Conservation Authority	Date Established	Area of Watershed (km^2)
Ausable-Bayfield	1946	2,440
Cataraqui Region	1964	3,560
Catfish Creek	1950	490
Central Lake Ontario	1958	627
Credit Valley	1954	2,500
Crowe Valley	1958	2,000
Essex	1973	1,680
Ganaraska Region	1946	938
Grand River	1932	7,000
Grey-Sauble[1.]	1957-58	3,146
Halton[2.]	1956	1,000
Hamilton	1958	568
Kawartha Region	1979	2,563
Kettle Creek	1965	520
Lakehead[3.]	1954	2,600
Long Point[4.]	1971	2,782
Lower Thames Valley	1961	3,275
Lower Trent	1968	2,121
Maitland Valley	1951	3,267
Mattagami	1961	11,000
Mississippi Valley	1968	4,450
Niagara	1959	2,424
Nickel District	1973	7,576
North Bay-Mattawa	1972	2,800
Nottawasaga Valley	1960	3,700
Otonabee	1959	1,951
Quinte Region[5.]	1947	6,000
Raisin Region	1963	1,700
Rideau Valley	1966	4,000
Saugeen	1950	4,675
Sault Ste. Marie	1963	2,804
South Nation	1947	3,900
St. Clair	1961	4,100
Toronto Region	1955	3,467
Upper Thames	1947	3,482

1. Formed from the amalgamation of the Grey and Sauble Valley Conservation Authorities.
2. Formed from the amalgamation of the 12 Mile and 16 Mile Conservation Authorities.
3. Originally known as the Neebing Conservation Authority.
4. Formed from the amalgamation of the Big Creek Conservation Authority (1948) and the Otter Creek Conservation Authority (1954).
5. Formed from the amalgamation of the Napanee, Moira, and Prince Edward Conservation Authorities.

Appendix 8. Fishways in Ontario (from Kerr 2010).

Drainage Basin	River/Stream	Location	Type of Fishway	Target Species
Atlantic Ocean	St. Lawrence River	Cornwall	Baffled trough	American eel
Georgian Bay	Beaver River	Thornbury	Channel-pool-weir	Trout and salmon
		Haines Dam	Bypass stream	Trout and salmon
		Clendennan	Stepped pool	Trout and salmon
		Slabtown	Stepped pool	Trout and salmon
	Boyne River	Earl Rowe	Pool and weir	Trout and salmon
	Nottawasaga River	Nicholson Dam	Pool and weir	Trout and salmon
	Pine River	Shelburne	Pool and weir	Trout and salmon
	Sydenham River	Owen Sound	Pool and weir	Trout and salmon
Lake Erie	Big Creek	Quance Dam	Stepped pool	Rainbow trout
	Grand River	Dunnville	Denil	Trout and coolwater species
		Caledonia	Stepped pool	Trout and coolwater species
		Kitchener	-	Trout and coolwater species
	Nith River	New Hamburg	-	Trout, salmon, and coolwater species.
Lake Huron	Maitland River	Bluevale	-	Trout and salmon
	Nine Mile River	Port Albert	Vertical slot	Trout and salmon
	Saugeen River	Denny's Dam	Pool and weir	Trout and salmon
		Walkerton	Pool and weir	Trout and salmon
		Maple Hill	Pool and weir	Trout and salmon
	South Maitland River	-	Pool and weir	Trout and salmon
	Spring Creek	Hepworth	Pool and weir	Trout and salmon
	Trick's Creek	-	Step pool	Trout and salmon
Lake Ontario	Bowmanville Creek	Goodyear Dam	Pool and weir	Trout and salmon
	Credit River	Reid Milling Dam	Pool and weir	Trout and salmon
		Julian Reid Dam	Modified Denil	Trout and salmon
	Don River	Pottery Road	Rocky ramps	-
		Lawrence Avenue	Rocky ramps	-

Drainage Basin	River/Stream	Location	Type of Fishway	Target Species
Lake Ontario (cont'd)	Ganaraska River	Port Hope	Pool and weir	Trout and salmon
	Hamilton Harbour	Cootes Paradise	Electric lift	Rainbow trout
		Grindstone Creek	-	Coolwater species
	Humber River	Raymore Park	Denil	Trout and salmon
		Woodbridge	Rocky ramps	Trout and salmon
		Palgrave	Stepped pool	Trout and salmon
		Bolton	-	Trout and salmon
	Rouge River	Two Good Ponds	Rocky ramp	-
		Milne Fishway	Twin Denil	Trout and salmon
	Sixteen Mile Creek	Milton	Rocky ramps	Trout and salmon
Lake Simcoe	Beaver River	-	Rocky ramps	Coolwater species
	Pefferlaw Brook	Pefferlaw	Circular vertical slot	Coolwater species
Lake Superior	Current River	Thunder Bay	Step pool	Trout and salmon
	McIntyre River	Thunder Bay	-	Trout and salmon
St. Lawrence River	Indian Creek	Spencerville	Bypass channel	Northern pike

Appendix 9. Ontario results from National Recreational Fishing surveys, 1970-2005.

Year	No. Anglers (Angler Days)			Catch (Harvest)		
	Residents	Non-Residents	Total	Residents	Non-Residents	Total
1970*	1,620,000 (35,300,000)	806,000 (5,500,000)	2,426,000 (38,800,000)	- (-)	- (-)	- (-)
1975	1,967,474 (40,550,300)	655,897 (6,209,000)	2,623,371 (46,759,300)	- (79,487,200)	- (23,280,400)	- (102,767,600)
1980	2,130,332 (31,892,906)	810,224 (5,914,339)	2,940,556 (37,807,246)	- (69,667,124)	- (23,894,752)	- (93,561,876)
1985	2,328,192 (29,001,538)	732,403 (5,425,190)	3,060,595 (34,426,728)	101,473,483 (55,891,013)	42,602,835 (18,500,414)	144,076,318 (74,391,427)
1990**	1,436,858 (26,794,871)	578,942 (4,560,739)	2,015,800 (31,355,610)	104,288,726 (49,579,086)	45,179,253 (14,912,293)	149,467,979 (64,491,379)
1995	1,342,567 (19,073,895)	586,001 (4,362,207)	1,928,568 (23,436,102)	74,765,468 (26,902,200)	45,741,020 (12,137,120)	120,506,506 (39,039,320)
2000	979,777 (13,360,477)	619,794 (4,520,606)	1,599,571 (17,881,082)	57,271,081 (15,597,449)	50,239,344 (11,127,205)	107,510,425 (26,724,654)
2005	919,455 (13,142,893)	506,929 (2,676,516)	1,426,384 (16,819,409)	65,093,908 (16,068,801)	49,512,751 (9,325,980)	114,606,751 (25,394,781)

* MNR survey with no DFO involvement.

** Surveys conducted prior to 1990 sampled resident households rather than licencees. Surveys from 1990 to date included licenced resident anglers only (excluding those under 18 and over 65 years of age). As a result, these estimates are expected to be lower than pre-1990 estimates.

Appendix 10. Reports prepared during the Strategic Planning for Ontario Fisheries (SPOF) exercise.

Federal-Provincial Reports

Preliminary Analysis of Goals and Issues.1976. First Report of Federal-Provincial Strategic Planning for Ontario Fisheries. 91 p.

Catalogue of Programs and Legislation. 1976. Second Report of Federal-Provincial Strategic Planning for Ontario Fisheries. 105 p.

Preliminary Analysis of Objectives. 1975. Third Report of Federal-Provincial Strategic Planning for Ontario Fisheries. 21 p.

Management Strategies for the 1980s. 1975. Fourth Report of Federal-Provincial Strategic Planning for Ontario Fisheries. 21 p.

Working Group Reports

Designation of Assessment Units. 1978. Report of SPOF Working Group Number One. Ontario Ministry of Natural Resources. 66 p.

Public Involvement in Ontario Fisheries. 1978. Report of SPOF Working Group Number Two. Ontario Ministry of Natural Resources. 25 p.

Experimental Management. 1978. Report of SPOF Working Group Number Three. Ontario Ministry of Natural Resources. 39 p.

Ontario Fish Yield Estimates. 1979. Report of SPOF Working Group Number Four. Ontario Ministry of Natural Resources. 48 p.

An Allocation Policy for Ontario Fisheries. 1978. Report of SPOF Working Group Number Five. Ontario Ministry of Natural Resources. 39 p.

Toward a More Rational Commercial Fishery in Ontario. 1978. Report of SPOF Working Group Number Six. Ontario Ministry of Natural Resources. 31 p.

A Resident Sport Fishing Licence for Ontario. 1978. Report of SPOF Working Group Number Seven. Ontario Ministry of Natural Resources. 34 p.

Designation of Artificial Fishing Areas and Opportunities. 1978. Report of SPOF Working Group Number Eight. Ontario Ministry of Natural Resources.

Socio-Economic Data Requirements for the Management of Ontario Fisheries. 1979. Report of SPOF Working Group Number Nine. Ontario Ministry of Natural Resources. 58 p.

Guidelines for District Fisheries Management Plans. 1981. Report of SPOF Working Group Number 10. Ontario Ministry of Natural Resources. 99 p.

A Baitfish Harvest Policy for Ontario. 1981. Report of SPOF Working Group No. 11. Ontario Ministry of Natural Resources. 30 p.

Partitioning Yields Estimated from the Morphoedaphic Index into Individual Species Yields. 1982. Report of SPOF Working Group Number Twelve. Ontario Ministry of Natural Resources. 71 p.

Fisheries Assessment Units in Ontario. 1984. Report of SPOF Working Group Number Thirteen. Ontario Ministry of Natural Resources. 19 p.

Artificial Fishing Opportunities.1984. Report of SPOF Working Group Number Fourteen. Ontario Ministry of Natural Resources. 30 p.

The Identification of Overexploitation. 1983. Report of SPOF Working Group Number Fifteen. Ontario Ministry of Natural Resources. 84 p.

Control of Angler Exploitation. 1982. Report of SPOF Working Group Number Sixteen. Ontario Ministry of Natural Resources. 68 p.

Fisheries Enforcement in the 1980s. undated. Report of SPOF Working Group Number Seventeen. Ontario Ministry of Natural Resources. 21 p.

The Transfer, Exchange and Application of Fisheries Assessment Unit Intelligence to District Fisheries Management. 1984. Report of SPOF Working Group Number Eighteen. Ontario Ministry of Natural Resources. 57 p.

SPOF II

Strategic Plan for Ontario Fisheries – SPOF II- An Aquatic Ecosystem Approach to Managing Fisheries.Queen's Printer for Ontario. Toronto, Ontario. 22 p.

Appendix 11. Fisheries Assessment Units (FAU) in Ontario.

FAU	Number of Lakes	Year Established (Closed)	Location
Inland			
Algoma	8	1981 (1989)	Sault Ste. Marie
Algonquin	14	1975	Whitney
Haliburton Highlands	9	1981	Bancroft
Kagami	10	N/A	Hearst
Kawartha Lakes[1.]	6	1978	Lindsay
Keewatin	8	N/A	Kenora
Kinniwabi	8	N/A	Chapleau
Lake Nipigon	1	1979	Nipigon
Lake Nipissing	1	1976 (1994)	North Bay
Lake of the Woods[2.]	1	1978	Kenora
Lake Simcoe[3.]	1	1974	Sutton
Land o' Lakes	12	N/A	Tweed
Magnetewan	10	N/A	Parry Sound
Muskoka Lakes	3	1987	Bracebridge
Northern Frontier	10	N/A	Cochrane
Ojibway	8	N/A	Ignace
Patricia West	10	N/A	Red Lake
Quetico-Milles Lacs	14	1981	Thunder Bay
Rainy Lake	1	N/A	Fort Frances
Rideau Lakes	11	1981 (1994)	Sharbot Lake
Superior North	7	N/A	Geraldton
Timiskaming	8	N/A	Kirkland Lake
Voyageur	10	N/A	North Bay
Great Lakes			
Lake Erie[4.]	1	1992	Wheatley
Lake Huron[5.]	1	1992	Owen Sound

FAU	Number of Lakes	Year Established (Closed)	Location
Lake Ontario[6.]	1	1992	Glenora
Lake St. Clair	1	1968 (amalgamated with Lake Erie Unit in 1992)	Tilbury
Lake Superior[7.]	1	1992	Thunder Bay and Sault Ste. Marie

[1.] Formed from the former Kawartha Lakes Management Unit which was established in 1962.
[2.] Formed from the former Lake of the Woods Management Unit which was established in 1962.
[3.] Formed from the former Lake Simcoe Management Unit.
[4]. Formed from the former Lake Erie Assessment Unit.
[5]. Formed from the former Lake Huron Assessment Unit.
[6.] Formed from the former Lake Ontario Assessment Unit.
[7.] Formed from the former Lake Superior Assessment Unit.

Appendix 12. Distribution of selected sport fish species in Ontario waters.

Fish Species	Number of Lakes*	Number of Streams/Rivers	Total
Atlantic salmon	1	0	1
Black crappie	195	78	273
Brook trout	2,110	1,663	3,773
Brown trout	23	159	182
Channel catfish	62	60	122
Lake herring	2,273	N/A	2,273
Lake sturgeon	128	101	229
Lake trout	2,283	N/A	2,283
Lake whitefish	2,139	11	2,150
Largemouth bass	1,275	Unknown	1,275
Muskellunge	302	105	407
Northern pike	6,411	Unknown	6,411
Sauger	192	36	228
Smallmouth bass	2,421	Unknown	2,421
Walleye	4,038	860	4,898

* Includes individual Great Lakes

Appendix 13. Publications from the Ontario Fisheries Technical Report series.

Parkes, C. C. and C. I. Goddard. 1981. Ontario Fisheries Technical Report Series Guidelines.

No. 1 Gunn, J. M. and W. Keller. 1981. Emergence and survival of lake trout (*Salvelinus namaycush*) and brook trout (*S. fontinalis*) from artificial substrates in an acid lake.

No. 2 Loftus, D. H. 1982. Larval fish sampling in Lake Huron, 1978.

No. 3 Jermolajev, E. and J. M. Fraser. 1982. Zooplankton in brook trout lakes of Algonquin Park, Ontario.

No. 4 Loftus, K. H. [ed.]. 1982. Proceedings of the 1980 North American eel conference.

No. 5 Henderson, B. A. 1982. The population dynamics of lake trout (*Salvelinus namaycush*) in Lake Manitou in relation to the planting and spawn-taking operation.

No. 6 Ihssen, P. E., M. J. Powell, and M. Miller. 1982. Survival and growth of matched plantings of lake trout (*Salvelinus namaycush*), brook trout (*S. fontinalis*) and lake x brook F_1 splake hybrids in northeastern Ontario lakes.

No. 7 Fraser, J. M. 1983. The performance of two wild and two hybrid strains of brook trout planted in an infertile, acidic lake.

No. 8 Sain, P. 1983. Decomposition of wild rice (*Zizania aquatica*) straw and its effect on the depletion of oxygen during winter in natural lakes of northwestern Ontario.

No. 9 Baccante, D. and J. Sandhu. 1983. Annulus formation and growth characteristics of tagged walleye in a lightly exploited lake.

No. 10 Schlesinger, D. A. and A. M. McCombie. 1983. An evaluation of climatic, morphoedaphic, and effort data as predictors of yields from Ontario sports fisheries.

No. 11 Evans, D. O. and B. A. Campbell. 1984. An annotated listing of original field data books and diaries of Ontario fisheries research laboratory workers, 1921-1948.

No. 12 Olver, C. H. and N. V. Martin. 1984. A selective bibliography of the lake trout (*Salvelinus namaycush*), 1784-1982.

No. 13 Sztramko, L. K. and J. R. Paine. 1984. Sport fisheries in the Canadian portion of Lake Erie and connecting waters.

No 14 Haymes, G. T. and D. P. Kolenosky. 1984. Distribution and characteristics of spawning round whitefish in Lake Ontario, 1976-1981.

No. 15 Portt, C. B. 1985. The effects of depth and harvest on bait fish in southern Ontario streams.

No. 16 Cucin, D. and D. J. Faber. 1985. Early life studies of lake whitefish (*Coregonus clupeaformis*) , cisco (*C. artedii*), and yellow perch (*Perca flavescens*) in Lake Opeongo, Ontario.

No. 17 Beggs, G. L., J. M. Gunn and C. H. Olver. 1985. The sensitivity of Ontario lake trout (*Salvelinus namaycush*) and lake trout lakes to acidification.

No. 18 Betteridge, G. Movements of rainbow trout (*Salmo gairdneri*) and splake (*Salvelinus fontinalis* x *S. namaycush*) in a small Ontario lake as revealed by ultrasonic telemetry.

No. 19 McMurtry, M. J. and B. J. Shuter. 1985. The Lake Opeongo creel survey.

No. 20 Wilson, M. L. 1985. Water drawdown and its effects on lake trout (*Salvelinus namaycush*) reproduction in three southcentral Ontario lakes.

No. 21 Cullis, K. I. 1986. Standing stock estimates of benthic fauna for a lake set in northwestern Ontario.

No. 22 Powell, M. J., M.-F. Bernier, S. J. Kerr, G. Leering, M. Miller, W. Samis, and M. Pellegrini. 1986. Returns of hatchery-reared lake trout from eight lakes in northeastern Ontario.

No. 23 Olver, C. H. [ed.]. 1987. Proceedings of a workshop on the lake sturgeon (*Acipenser fulvescens*).

No. 24 Bowlby, J. N., J. G. Imhof, R. M. Biette, and D. P. Dodge. 1987. Long term impacts of highway construction on Mill Creek, Ontario.

No. 25 Sobchuk, M. S. and N. Dawson. 1988. Physiological response of walleye (*Stizostedion vitreum vitreum*) to hooking/playing and hooking/holding stress.

No. 26 Ryder, R. A. and J. Pesendorfer. 1988. Comparative properties of rivers and lakes from an Ontario perspective.

No. 27 Evans, D. O. and P. R. Johannes. 1988. A bridle-less trawl and fine mesh purse seine for sampling pelagic coregonine larvae with observations of spatial distribution and abundance.

No. 28 Fraser, J. M. and D. Rumsey. 1988. Comparative survival and growth of F_1 wild and F_3 generations of the same strain of hatchery-reared brook trout (*Salvelinus fontinalis*) planted in two small lakes.

No. 29 Dechtiar, A. O., J. A. MacLean, and S. J. Nepszy. 1989. Parasites of fishes from Algonquin Park lakes.

Appendix 14. Areas of Concern (AOC) identified on Ontario waters of the Great Lakes.

Area of Concern	Waterbody	Reason(s) for Listing
Thunder Bay	Lake Superior	• Contaminated sediments • Impaired water quality
Nipigon Bay	Lake Superior	• Algal growth. • Degradation of fish and wildlife populations • Water level fluctuations
Jackfish Bay	Lake Superior	• Contaminated sediments (mill effluent) • Degradation of fish and wildlife habitat.
Peninsula Harbour	Lake Superior	• Contaminated fish • Fish habitat destruction • Contaminated sediments
St. Mary's River	St. Mary's River	• Excessive nutrients • Fish deformities and contamination • Poor aesthetics • Unhealthy fish and wildlife populations
Collingwood Harbour	Lake Huron	• Excessive algae • Contaminated sediments *(Note: Site was delisted in 1994)*
Severn Sound	Lake Huron	• Eutrophication and algal problems • Loss of fish and wildlife habitat *(Note: Site was delisted in 2003)*
Spanish Harbour	Lake Huron	• Nutrient enrichment. • Tainted fish flavour • Impaired benthic community *(Note: Designated as an Area in Recovery in 1997)*
St. Clair River	St. Clair River	• Contaminated fish • Poor water quality • Loss of fish and wildlife habitat • Poor aesthetics
Detroit River	Detroit River	• Contaminated sediments • Poor water quality • Contaminated fish • Poor aesthetics
Wheatley Harbour	Lake Erie	• Eutrophication – excessive algae • Contaminated fish • Loss of fish and wildlife habitat *(Note: Site was delisted in 2010)*
Niagara River	Niagara River	• Poor water quality • Eutrophication • Fish deformities and contaminants • Loss of fish and wildlife habitat

Area of Concern	Waterbody	Reason(s) for Listing
Hamilton Harbour	Lake Ontario	• Toxic sediments • Poor aethestics • Poor water quality – bacterial contamination • Loss of fish and wildlife habitat
Toronto Region	Lake Ontario	• Eutrophication – excessive algae • Loss of fish and wildlife habitat • Poor aesthestics • Degraded water quality
Port Hope	Lake Ontario	• Contaminated sediments
Bay of Quinte	Lake Ontario	• Excessive nutrients • Loss of wetlands • Contaminated sediments • Degraded water quality
Cornwall	St. Lawrence River	• Nuisance plant growth • Bacterial contamination • Degraded water quality • Contaminants

Appendix 15. Background reports and final working group reports produced during the Lake Trout Synthesis exercise.

Working Group Reports

Carl, L., M.-F. Bernier, L. Deacon, P. Hulsman, D. Loftus, D. Maraldo, T. Marshall and P. Ryan. 1990. Fish community and environmental effects on lake trout. Ontario Ministry of Natural Resources. Toronto. 56 p.

Evans, D. O., J. Brisbane, J. M. Casselman, K. E. Coleman, C. A. Lewis, P. G. Sly, D. L. Wales and C. C. Willox. 1991. Anthropogenic stressors and diagnosis of their effects on lake trout populations in Ontario lakes. Ontario Ministry of Natural Resources. Toronto. 126 p.

Evans, D. O., J. M. Casselman, and C. C. Willox. 1991. Effects of exploitation, loss of nursery habitat, and stocking on the dynamics and productivity of lake trout populations in Ontario lakes. Ontario Minsitry of Natural Resources. Toronto. 193 p.

Lester, N. P., M. M. Petzold, W. I. Dunlop, B. P. Monroe, S. D. Orsatti, T. Schaner and D. R. Wood. 1991. Sampling Ontario lake trout stocks: issues and standards. Ontario Ministry of Natural Resources. Toronto. 56 p.

MacLean, N. G., J. M. Gunn, F. J. Hicks, P. E. Ihssen, M. Halhiot, T. Mosindy and W. Wilson. 1990. Environmental and genetic factors affecting the physiology and ecology of lake trout. Ontario Ministry of Natural Resources. Toronto. 87 p.

Payne, N. R., R. M. Korver, D. S. MacLennan, S. J. Nepszy, B. J. Shuter, T. J. Stewart and E. R. Thomas. 1990. The harvest potential and dynamics of lake trout populations in Ontario. Ontario Ministry of Natural Resources. Toronto. 72 p.

Background Reports

Lewis, C. A., G. L. Cunningham, and T. Chen. 1990. Analysis of a questionnaire on stresses acting on lake trout lakes. Ontario Ministry of Natural Resources. Toronto.77 p.

Ontario Ministry of Natural Resources. 1990. Lake trout lakes in Ontario. Lake Trout Synthesis. Toronto.67 p.

Appendix 16. Background reports and final working group reports produced during the Percid Community Synthesis exercise.

Working Group Reports

Kerr, S. J., B. W. Corbett, D. D. Flowers, D. Fluri, P. E. Ihssen, B. A. Potter and D. E. Seip. 1996. Walleye stocking as management tool. Ontario Ministry of Natural Resources. Peterborough. 88 p.

Kerr, S. J., B. W. Corbett, D. Kinsman, J. H. Leach, D. Puddister, L. Stanfield, N. Ward and N. J. Hutchinson. 1997. Walleye habitat: a synthesis of current knowledge with guidelines for conservation. Ontario Ministry of Natural Resources. Peterborough. 98 p.

Kerr, S. J., A. J. Dextrase, N. P. Lester, C. A. Lewis and H. J. Rietveld. 2004. Strategies for managing walleye in Ontario. Ontario Ministry of Natural Resources. Peterborough. 24 p. + appendices.

Krishka, B. A., R. F. Cholmondeley, A. J. Dextrase and P. J. Colby. 1996. Impacts of introductions and removals on Ontario percid communities. Ontario Ministry of Natural Resources. Peterborough. 116 p.

Rietveld, H. J., E. W. Armstrong, D. Z. Baccante, R. M. Korver, R. Leith, R. A. S. Mathers, T. E. Mosindy, D. M. Reid, B. J. Ritchie, J. Seyler and R. L. Wepruk. 2000. Regulatory control of walleye sport fisheries in Ontario. Ontario Ministry of Natural Resources. Peterborough. 72 p.

Background Reports

Armstrong, E. W. 1995. Walleye catch and release mortality: an annotated bibliography. Ontario Ministry of Natural Resources. Geraldton. 21 p.

Ball, H. 1999. Literature review on the effectiveness of walleye harvest regulations. Ontario Ministry of Natural Resources. Peterborough. 60 p.

Casselman, J. M. 1995. Otolith techniques for identifying and discriminating between pond cultured and indigenous walleye from the natural environment. Ontario Ministry of Natural Resources. Picton. 18 p.

Dimond, P. E. and B. A. Potter. 1996. Documentation of walleye stocking in Ontario. Ontario Ministry of Natural Resources. Peterborough. 4 p. + diskette.

Dimond, P. E., A. J. Dextrase and N. P. Lester. 1996. Stress histories of selected Ontario walleye waters. Ontario Ministry of Natural Resources. Peterborough. 54 p. + appendices.

Flurie, D. 1998. Does planting walleyes work in northeastern Ontario. Ontario Ministry of Natural Resources. North Bay. 39 p.

Ihssen, P. E. and G. W. Martin. 1995. Biochemical genetic diversity of Ontario walleye populations: implications for stocking. Ontario Ministry of Natural Resources. Maple. 40 p.

Kerr, S. J. 1996. Walleye habitat creation and enhancement: an overview of selected projects. Ontario Ministry of Natural Resources. Kemptville. 40 p.

Kerr, S. J., P. E. Ihssen, and B. Sloan. 1994. An annotated bibliography of selected walleye stocking, genetic and stocking assessment references. Ontario Ministry of Natural Resources. Kemptville. 194 p.

Kerr, S. J. and D. Puddister. 1996. Walleye habitat: a selected bibliography. Ontario Ministry of Natural Resources. Kemptville. 41 p.

Kerr, S. J. and D. E. Seip. 1994. Results from a survey of field staff on historic walleye stocking and assessment activities in Ontario. Ontario Ministry of Natural Resources. Kemptville. 52 p.

Kushneriuk, R. S., N. P. Lester and R. M. Korver. 1996. A compendium of life history characteristics of walleye in Ontario waters. Ontario Ministry of Natural Resources. Peterborough. 27 p. + appendices.

Lester, N. P., B. J. Shuter, R. S. Kushneriuk, and T. R. Marshall. 2000. Life history variation in Ontario walleye populations: implications for safe rates of fishing. Ontario Ministry of Natural Resources. Peterborough.

Lester, N. P., P. A. Ryan, R. S. Kushneriuk, A. J. Dextrase, and M. Rawson. 2002. The effect of water clarity on walleye habitat and yield. Ontario Ministry of Natural Resources. Peterborough.

Morgan, G. E. 2002. Manual of instructions: fall walleye index netting (FWIN). Ontario Ministry of Natural Resources. Peterborough. 34 p.

Morgan, G. E., M. D. Malette, R. S. Kushneriuk and S. E. Mann. 2003. Regional summaries of walleye life history information based on Ontario's fall walleye index netting (FWIN) program, 1993-2001. Ontario Ministry of Natural Resources. Peterborough. 17 p.

Reckahn, J. A., D. A. Baccante, and S. Waters. 1995. Walleye bibliography update, 1987-1992. Ontario Ministry of Natural Resources. Toronto. 52 p. + diskette.

Appendix 17. Legislation related to fish or fisheries management in Ontario (from MNR 2010).

Legislation	Agency	Provisions dealing with fish/fish habitat
Federal Legislation		
National Parks Act	Parks Canada	Allows for park wardens to enforce Fisheries Act provisions on Park lands.
Environmental Assessment Act	Environment Canada	Regulates the process to predict the environmental effects of proposed initiatives before they are carried out.
Fisheries Act	Fisheries and Oceans	Regulates activities affecting fish and fish habitat, deposits of sediment and other deleterious substances.
Navigable Waters Protection Act	Transport Canada	Regulates works built on, over, through or across any navigable water.
Species at Risk Act	Environment Canada	Protects species at risk and the habitats critical for their survival.
Provincial Legislation		
Beds of Navigable Waters Act	OMNR	Regulates the beds of navigable waters on Crown land.
Conservation Authorities Act	Conservation Authorities	Regulates floodplain management on a watershed basis.
Crown Forest Sustainability Act	OMNR	Regulates forest operations in/around water to protect fish habitat.
Drainage Act	OMAFRA	Permits individuals and municipalities to initiate and maintain drainage projects.
Endangered Species Act	OMNR	Protects species at risk and habitat critical to their survival.
Environmental Assessment Act	OMOE	Sets out requirements for the assessment of the effects on the environment of public and private projects.
Environmental Protection Act	OMOE	Regulates the removal of sand and gravel from beaches.
Fish and Wildlife Conservation Act	OMNR	Regulates the capture, sale, and possession of fish and game.
Fish Inspection Act	OMNR	Regulates the standards of fish processing and sale.
Food Safety and Quality Act	OMAFRA	Regulates the standards and quality of fish used for food

Legislation	Agency	Provisions dealing with fish/fish habitat
Lakes and Rivers Improvement Act	OMNR	Regulates activities affecting lakes and rivers including construction of water control structures.
Municipal Act	MMAH	Regulates approvals for construction over municipal lands, including shore and other road allowances whether dry land or flooded.
Nutrient Management Act	OMOE, OMAFRA	Provides for the management of nutrients applied to agricultural lands and enforcement of pollution prevention provisions.
Ontario Fishery Regulations	OMNR	Fisheries management regulations passed pursuant to the Fisheries Act.
Ontario Planning Act	MMAH	Requires planning decisions to have regard to matters or provincial interest such as the conservation and management of natural resources.
Ontario Water Resources Act	OMOE	Regulates discharge into waterbodies as well as withdrawal of water from natural waterbodies.
Public Lands Act	OMNR	Regulates land use and development plans and alteration on shorelands (outside CA jurisdictions).

OMNR – Ontario Ministry of Natural Resources
OMOE – Ontario Ministry of the Environment
OMAFRA – Ontario Ministry of Agriculture and Rural Affairs
OMMAH – Ontario Ministry of Municipal Affairs and Housing

Appendix 18. Ontario fish sampling protocols.

Spring Littoral Index Netting (SLIN) - The methodology for conducting a survey of abundance for lake trout. It is conducted in the spring from after ice-out until water temperatures reach ~ 13º. The SLIN method uses 90 minute gill net sets to sample the littoral zone of a lake during the spring. Nets are set perpendicular to shore at depths ranging from 2.5 m to a maximum of 60 m. The technique is easy to apply and the short net sets serve to minimize mortality. In addition to indices of abundance, biological information can also be collected to determine the status of the lake trout population.

Nearshore Community Index Netting (NSCIN) - Nearshore Community Index Netting (NSCIN) is a standard live release trap netting program designed to evaluate abundance and other attributes of fish species that inhabit the littoral zone of Ontario`s lakes. The protocol involves twenty-four hour sets of six foot trap nets at randomly selected sites. Netting is conducted between August 1 and the point when water temperatures reach 13ºC. A properly conducted NSCIN program will provide fisheries managers with mean catch and fish length data that can be used to make relative comparisons to provincial benchmark values from other Ontario lakes.

End of Spring Trap Netting (ESTN) - End of spring trap netting (ESTN) is a standard live release trap netting program designed to estimate the relative abundance of a fish stock and provide other biological measures to assess the status of walleye populations in Ontario. ESTN is an adaptation of the NSCIN protocol and was designed to be used in situations where mortality is a concern. Netting is conducted during the late spring-early summer.

Fall Walleye Index Netting (FWIN) - Standard method for the collection of biological information to support management of a percid fishery dominated by walleye. The fall walleye index netting (FWIN) uses overnight sets of multi-mesh gillnets and is therefore a method to be used in waterbodies where lethal sampling is acceptable. Netting is carried out in the fall when water temperatures are between 10 and 15ºC. Nets are set perpendicular to the There are two depth strata sampled: 2-5 m and 5-15 m. The number of net sets is based on the surface area of the waterbody being sampled (minimum is eight sites).

Broad Scale Monitoring - The broad-scale method uses a combination of two types of gillnets: "large mesh" gillnet that target fish larger than 20 cm in length, the size range of interest to anglers and "small mesh" gillnet that target smaller fish (size range of interest to large fish). Large mesh gangs are 24.8 m long (8 mesh sizes x 3.1 m panels) by 1.8 m high and have the following stretch mesh sizes; 38mm (1.50"), 51mm (2.00"), 64mm (2.50"), 76mm (3.00"), 89mm
(3.50"), 102mm (4.00"), 114mm (4.50") and 127mm (5.00"). Small mesh gangs are 12.5m long (5 mesh sizes x 2.5m panels) by 1.8 m high with the following mesh sizes; 13mm (0.50"), 19mm (0.75"), 25mm (1.00"), 32mm (1.25") and 38mm (1.50"). All panels in the gang are sewn together and hung on the half (two metres of mesh to one metre of lead line). All mesh sizes use double knotted construction. Mesh panels are non-sequentially arranged in a single series. The separation of the small and large mesh segments into two separate gears offers the advantage of a more flexible design that can be optimized to meet survey objectives.

Brook Trout Index Netting (BTIN) - The standard methods and technical information necessary to conduct the BTIN field program which is designed to provide an unbiased index of brook trout abundance and collect biological information on the target species. The protocol involves the use of short (30 minute) sets of two gangs of gill nets set perpendicular to shore at randomly selected sites in two depth strata. Nets may be set from 0800 until 1700 hours (no overnight sets) from June to early September (during thermal stratification).

Ontario Stream Assessment Protocol (OSAP) - The Ontario Stream Assessment Protocol (OSAP) contains a series of standardized methodologies for identifying sites, evaluating benthic macroinvertebrates, fish communities, physical habitat and water temperatures in wadeable streams. The OSAP provides standardized methods that ensure data repeatability. Use of these standard methodologies allow data to be shared, used for multiple purposes and stored in a common database.

Appendix 19. Physical dimensions of the Laurentian Great Lakes and connecting channels.

Great Lakes

Parameter	Superior	Michigan	Huron	St. Clair	Erie	Ontario
Surface Area (km^2)	82,413	58,200	59,596	1,110	25,700	19,477
Dimensions (length x width in km)	668 x 305	494 x 190	332 x 295	42 x 39	388 x 92	290 x 85
Land Drainage Area (km^2)	145,557	175,760	190,900	16,900	75,000	70,655
Shoreline Length (km)	2,938	2,672	6,157	413	1,400	1,380
Volume (km^3)	12,233	4,870	3,540	3.4	484	1,640
Number of Tributaries	1,525	666	1,992	45	594	780
Maximum Depth (m)	406	281	229	6.4	64	244
Mean Depth (m)	148	84	59	3	19	80
Discharge (m^3/sec)	2,124	1,560	5,036	5,400	5,800	6,800
Water Retention Time (years)	200		22		3	8
Native Fish Species [1, 2].	53 (82)	91 (135)	90 (112)	108 (-)	106 (125)	95 (125)

[1.] From Bailey and Smith (1981). [2.] Number of species including tributaries in parenthesis.

Connecting Channels

Parameter	St. Mary's River	St. Clair River	Detroit River	Niagara River	St. Lawrence River
Length (km)	112	43	51	59	808
Elevation Change (m)	6.7	1.5	1.0	99.3	74.0
Average Flow (m^3/sec)	2,100	5,300	5,400	5,700	6,700
Watershed area (land and water x 10^3)	209.8	579.3	598.2	683.0	766.0

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