

INLAND SEAS[®]



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While this very detailed and comprehensive work will be of special interest to fishery and environmental professionals, it will also interest sport fishermen and women.

FISH SPECIES IN CANADIAN LAKE SUPERIOR

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Seventy-three fish species are known to have inhabited Lake Superior waters, ten of these exotics.¹ For over a century, artificial propagation efforts of various American and Canadian agencies have been directed at replenishing depleted stocks of native species and, for various reasons, establishing new species in the lake. Moreover, a few species such as smelt, alewives and sea lamprey have established themselves without the efforts of man and thrived.

This report draws together information culled from archival records, government reports and correspondence, and fishermen communications. It chronicles those early native fish population losses which motivated many of the hatchery efforts and traces the history of fish stocking related to Lake Superior.

ABOUT THIS STUDY

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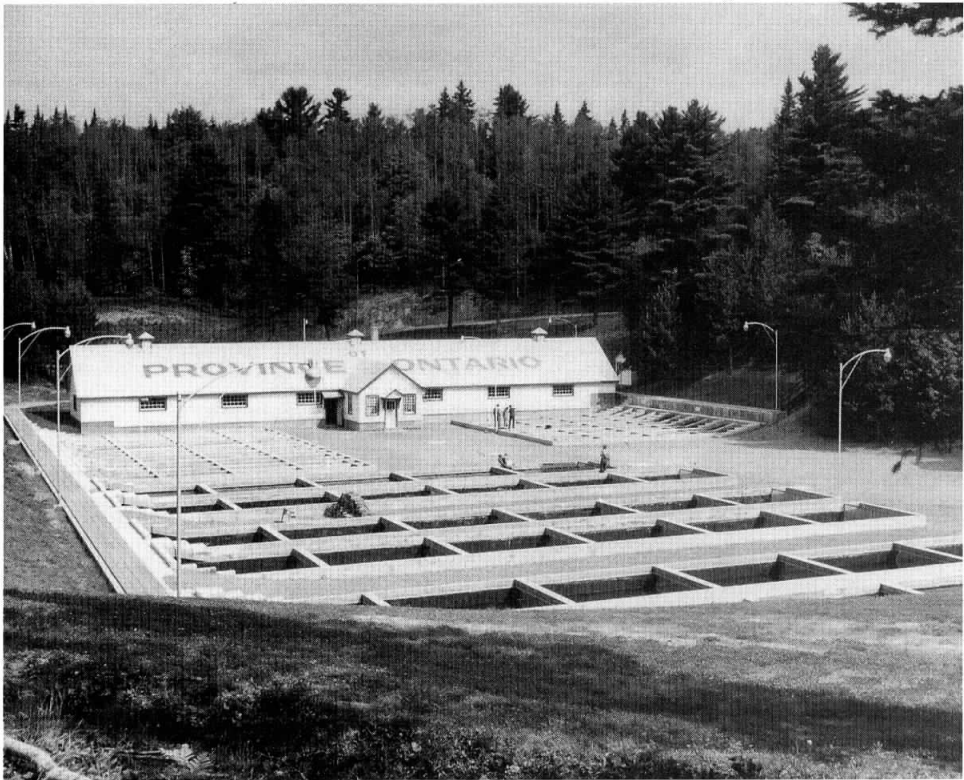
Michigan State fish hatchery, 1890s.⁴

Background of Stocking

In the second half of the last century, the pursuit of commercial fishing in the American waters of Lake Superior was intensive, and after 1880 production losses were reported for various waters along the south shore.² Fearing further declines, the U.S. federal government erected the first fish hatchery on Lake Superior at Duluth and placed it under the direction of Dr. R.O. Sweeney in 1888. The first stock of lake trout eggs arrived from the Northville, Michigan hatchery the following year.³

Encountering difficulties in procuring sufficient whitefish and lake trout spawn along the south shore, the American hatcheries at Duluth, Sault Ste. Marie, and Alpena (photo I)⁴ arranged in 1893 to seek spawn at various Canadian locations, including Rosspoint and Black Bay.⁵ In 1918 U.S. officers were still gathering "considerable quantities" from Batchawana and Whitefish bays. In exchange for this privilege, their hatcheries promised to return some percentage of the fry to the Canadian waters from whence they had originated.

The Dominion of Canada eventually constructed its own hatchery at the mouth of the Current River (Port Arthur), and Manager A. J. McNab



Ontario Dept. of Lands and Forests fish hatchery at Sault Ste. Marie, 1956.⁹

(formerly of the Duluth hatchery) and staff commenced taking whitefish spawn from Lake Superior in 1911. A provincial hatchery was erected at Port Arthur in 1918 and equipped for the rearing of up to 15 million trout and 75 million whitefish, along with brook trout, herring and pickerel.⁶ William Kenefick was its first manager. The province assumed control of the federal establishment at Current River in 1926, but ordered it closed in 1934 after a new brook trout hatchery at Dorion began operations. Efforts at the provincial Port Arthur hatchery were now devoted entirely to whitefish and lake trout, and between 1955 and 1966 white sucker cultivation (the latter fish derived from Sandstone R. stock and were transferred each year to Deer Lake Hatchery). Production of whitefish was suspended in 1957, and the station was finally abandoned.

In 1931 brook trout from eastern hatcheries were first released in the tanks of the Dorion hatchery. The hatchery was reconstructed in 1947 and equipped for the raising of a host of salmonid species, including lake trout, Atlantic salmon (transferred from North Bay Hatchery, 1951) rainbow trout (from Sault Ste. Marie Hatchery, 1952), and grayling (from Prince Albert, Saskatchewan, 1958, stocked in 10 Thunder Bay District lakes).⁷

To serve the east-end Algoma district, the Sault Ste. Marie provincial hatchery (on Huron Street) was opened in 1921. On the outskirts of town the Tarentorus trout-rearing station was erected in 1929, renovated in 1953 and reopened in 1955 with a capacity for 2 to 3 million eggs (including brook trout, lake trout, splake, and rainbow trout).⁸ (photoII).⁹

In the general scramble to fill their egg quota each fall, hatchery staff experimented with a wide variety of methods and sources of procurement. Egg stocks derived from a long list of spawning grounds, both those of Lake Superior and those belonging to various other, often distant inland lakes. It was a tradition of long-standing that hatcheries would place men on the tugs to collect spawn. The Sault Ste. Marie hatchery in 1934 began to pay fishermen to take their own spawn, but the experiment was abandoned after only three years.

Lake Whitefish, *Coregonus clupeaformis*

In the earliest days of settlement and exploration, Lake Superior whitefish were the most highly acclaimed fish of the Great Lakes. The St. Marys River spawning stocks were especially abundant:

"This river forms at this place a rapid so teeming with fish, called white fish, 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."¹⁰

For Anna Jameson¹¹ they were unsurpassed:

"There is no more comparison between the white-fish of the lower

lakes and the white-fish of St. Marys, than between plaice and turbet, or between a clam and a Sandwich oyster... It is really the most luxurious delicacy that swims the waters. It is said by Henry that people never tire of them. Mr. McMurray [the Hudson Bay Co. post factor] tells me that he has eaten them every day of his life for seven years, and that his relish for them is undiminished. The enormous quantity caught here, and in the bays and creeks around Lake Superior, remind me of herrings in the lochs of Scotland..."

Understandably, with such a prize commanding top market prices, fisheries were pursued with vigour. The activities of man soon posed a threat to the bounty of the rapids and diminishing harvests were noted as early as 1870.¹² However, as suggested by McDonald¹³, the construction of the Canadian and American lock systems prior to 1900, plus periodic alterations of water levels in subsequent years, probably destroyed habitat for a major portion of the whitefish population.

The toll of destruction of Lake Superior whitefish first became evident in United States waters, where annual production diminished after the peak year of 1885 (2,074,800 kg). Consequently, much American investment was redirected across the border, and the Canadian industry geared-up to harvest its comparatively healthy whitefish stocks. Canadian production peaked in 1894 at 479,000 kg.¹⁴ In 1902 A. Booth and Co. (the conglomerate dominating commercial fishing on both sides of the border) abandoned operations at the Lozard Islands grounds, purportedly due to the damages wrought by excessive pound net fishing; the islands were subsequently closed to commercial boats. (photo III).¹⁵ By 1910 fishermen were reporting damage to whitefish populations at the Michipicoten Island grounds.¹⁶ Government overseers warned of widespread losses:

"The west end of Lake Superior is about depleted of whitefish and trout, as a result of overfishing with pound and gill nets... In the east end of Lake Superior the whitefish is becoming very scarce, but the trout seems to hold its own."¹⁷

Reports in the popular press were more sensational:

"...That Lake Superior, known as the abode of the finest whitefish in the world, is fast becoming a fishless sea is a startling statement, but that is what fishermen assert. Fishermen have been doing less business each year for some time. Tugs have been going farther and farther out each succeeding season and now nets are set as much as five hours run from shore, but even in these unfrequented waters there are few fish."¹⁸

Until this time Lake Superior had been both a prime source of whitefish spawn and a recipient of hatchery-reared whitefish fry. To supplement eggs from the lake's indigenous stocks, spawn drawn from whitefish at the Mud River site, Lake Nipigon were raised at Port Arthur hatchery in 1912 and



A. Booth and Co.'s station at Quebec Harbour, Michipicoten Is., circa 1900.¹⁵

1913.¹⁹ Supplies of eggs from the waters of Whitefish Lake filled American hatcheries from as early as 1885 and Port Arthur hatchery between 1914 and 1917. By this time yields were falling and spawn-taking operations on Lake Superior were abandoned altogether.²⁰

Dominion hatcheries maintained an active trade in surplus eggs, and during its period of operation Port Arthur hatchery received whitefish eggs from Collingwood, Kingsville, Sandwich, Thurlow, and Wiarton hatcheries, as well as from Pelican Lake (in 1921). In addition to Lake Superior, certain regional inland waters also received fry: in 1920 these included Lake Nipigon, Long Lake, Shebansawan (the three also receiving lake trout), Kashabowie, Wabigoon, Whitefish, and Little Long lakes.²¹

The culture of whitefish continued at the Sault Ste. Marie hatchery until 1952, drawing heavily from Bay of Quinte (L. Ontario) stock. At this time "it was found to be biologically unsound to produce whitefish fingerlings and plant in large numbers."²²

Lake Herring, *Coregonus artedii*

Lake herring are pervasive throughout Lake Superior. When spawning these fish are less site selective than whitefish, and Scott and Crossman²³ note a wide range of acceptable substrates. Traditionally, however, many of the major spawning aggregations have been on grounds also favored by



Herring catch on the docks at Port Arthur, circa 1900.²⁶

whitefish. At various locations this no longer remains the case.

Most of Lake Superior's commercial herring have traditionally come from Thunder Bay and Black Bay:

"Thunder Bay seemed alive with fish, and in some cases as much as twelve tons were taken in one lift."²⁴

As noted by Koelz,²⁵ "most incredible quantities were taken by the virgin fisheries." (photo IV).²⁶

The largest tug operating in 1918 hauled 400 tons of herring between November 15 and December 6:²⁷

"...the number of herring killed at Port Arthur last fall is 3300...tons... killed within three miles square. That is the most herring ever killed in Thunder Bay and it is all due to planting out from 8,000,000 each year. ... there was 500 tons of herring killed last fall more than the market required and the result was they had to be sold this spring to the farmers to be taken out and used as fertilizer for the soil, and many car loads shipped out that was refused at their destination. This has ruined the herring market so that I believe that none of those customers will want herring this fall."²⁸

Between 1915 and 1920 the Port Arthur hatchery annually planted over 8 million herring fry (of Thunder Bay origin) in local waters. Grounds on the lee side of the Welcome Islands were a prime site for spawn collection:

"...According to the number of herring caught last fall in the vicinity of the Welcome Islands, I am of the opinion that the eggs must have reached a depth of at least 14 inches on the bottom of the water... Last fall the total catch of herring reached the 1,986 tons mark; all those were caught in about 1-1/3 square miles."²⁹

McNab's correspondence casts doubt on the accuracy of official harvest statistics. According to government reports, production in the years 1914 and 1918 totalled only 531,600 kg (586 tons) and 1,802,600 kg (1,987 tons), respectively.¹⁴

From 1923 to 1926, 1.5 million or more eggs were shipped annually to Fort Qu'Appelle Hatchery (Lake Winnipeg) and the fish subsequently were distributed in the alkaline waters of Big and Little Quill lakes, Saskatchewan. Prospects for the continued survival of these experimental plants were considered favorable at the time.³⁰

Rainbow (Steelhead) Trout, *Oncorhynchus mykiss*

Rainbow trout joined the lake's aquatic community in 1883 when the Ontario provincial government introduced fish of McCloud River, California to water near Sault Ste. Marie.³¹ The species thrived and by 1912 had grown to a sizable population in the St. Marys River rapids:

"... a specimen of 14 lbs. weight [was] caught by angling in the Canadian waters of the Soo Rapids in 1909, while in the press of 1910 the capture in a net of a monster weighing 35 lbs was recorded as a fact. Doubtless in the course of time it may be expected to spread west into all the streams entering Lake Superior and indeed a small specimen of about 1/2 lb. weight was caught as far west as Steel River in 1910."³²

According to H. R. MacCrimmon,³³ the earliest plants of rainbow trout classed as steelhead (the anadromous form) were made to Isle Royale streams by the Minnesota Fish Commission in 1875, while Canadian efforts began in 1912 (when fry were planted in McVicar Creek, Port Arthur). However, A. J. McNab³⁴ claimed to have personally placed steelhead fry of Columbia River origin into McVicar Creek in June 1894. Two thousand more were planted in 1899.

By 1901 steelhead salmon were being hauled from Canadian pound nets and a year later were reported to be common in American waters.³⁵ An annual harvest of about 900 kg was being drawn from McVicar Creek by 1914. Inspired by such success, the Port Arthur Hatchery experimented with spawn-taking operations at McVicar Creek and the MacKenzie River.³⁶

"... they range now from Port Arthur to Otter Head. Last summer a great number of them were caught in Portage Creek which empties into Black Bay, and in the MacKenzie River. One man caught 12 weighing 2 lbs. one mile from the shore of Thunder Bay. Those were caught about the middle of July."³⁷

Following a hiatus in the provincial stocking program between 1923 and 1934, rainbow trout were introduced into many eastern watercourses, including the Agawa, Montreal, White, and Current Rivers. Progeny of stocks from the Rogue River (near San Francisco) and a privately-owned Montana pond were also utilized. Prior to 1945 the Sault Ste. Marie hatchery deposited fingerlings at points where selected rivers crossed the railway line. In support of these experiments, the Algoma Central Railway would install a special car equipped for the transport of live fish. The Montreal River, for example, gained renown for its trout, and it was a popular fishing excursion to ride the train northward from the Soo, debark, and raft down the river to its mouth.³⁸

Brown Trout, *Salmo trutta*

The state of Michigan introduced brown trout to Lake Superior around 1883.³⁹ Now widely distributed along the American south shore, expansion into Ontario waters has nevertheless been slow, and in the 1970s the species continued to occur only in small isolated groups.¹ In 1955 brown trout were raised at the Port Arthur hatchery and planted at an unknown location.

The first brown trout from Thunder Bay district was captured off McKellar Point on October 20, 1951: this specimen was in spawning condition, measured 52 cm long, weighed 1.8 kg, and was afflicted with a vertebral deformity.⁴⁰ In 1977 a few young-of-the-year and yearlings were found in McKellar Creek. Small populations have also been noted at the Steel, Doré, Magpie, and Michipicoten Rivers and Mink Creek.⁴¹

Brook (Speckled) Trout, *Salvelinus fontinalis*

Brook trout has always been a pervasive native species:

"On Lake Superior there are hundreds of creeks and several large rivers full of Speckled Trout: Current River, MacKenzie River and various creeks in Thunder Bay, near to Fort William. Capt. Dick of the *Rescue* has taken very large Speckled Trout in Current River. On the various lakes (16 in number) on Michipicoten Island, and a creek running into the Quebec Harbour, they are plentiful, and of large size. In a creek near to Michipicoten Fort they are said to be numerous, and in nearly all the streams from Gros Cap to Current River they abound. I have been told by reliable parties - men who have been in the Hudson Bay Company's service for years - that in the rivers entering into Black and Nipigon Bays, they are said to be seen as large as the Salmon Trout, weighing 10 to 13 lbs."⁴²

The species has also been among the most susceptible to degradation of its stream habitat.

At the St. Marys River during the 1840s, Charles Lanman⁴³ reported abundances unsurpassed in his experience. Tourist establishments and

guides prospered as sportsmen dropped money into local coffers. However, an apparent decline in the river's population was noted in 1882 and attributed to the extravagant destruction of small fish during the summer months and to poaching and ice fishing in the winter.⁴⁴ Luard⁴⁵ noted the belief held by many local residents, that propagation of rainbow trout within the St. Marys River was in part responsible for brook trout losses.

Nevertheless, construction of the Canadian and American lock systems prior to 1900, water level fluctuations, and stream modification were probably most detrimental.

The Ontario Game and Fish Commission report of 1913 singled out the Steel River as a superb trout stream. Both Agawa and Michipicoten Rivers also received significant runs.⁴⁶ Periodically during the past century, human activities (including hydroelectric dam construction in recent decades) have had adverse effects:

"For fifteen years now there have been mining operations on the Michipicoten for ten miles up-stream from Lake Superior. The blasting has killed and driven out the trout."⁴⁷

Degradation of aquatic life by lumbering activities has probably been significant at certain localities. Dams were built to facilitate log drives, which disturbed river bottom and deposited large quantities of bark. Large-scale rafting down the St. Marys River developed between 1880 and 1890.⁸ The first drive down the Pic River was in 1891; other major rivers of transport for many years included the Michipicoten, Little Pic, Steele, Aquasoban (Black), Nipigon, Black Sturgeon and Wolf Rivers. Sheltered areas, such as Jackfish, Heron and Terrace Bays, Peninsula Harbour and the inner Slate Islands, served as storage areas for wood prior to its collection in large booms and towing to the mills. Fishermen frequently found cause to complain about the stringy bark and stray logs ("deadheads") which fouled the grounds and damaged their nets.⁴⁸ Certain indirect effects of logging also impinge upon stream communities: increased erosion of shoreline and siltation, loss of shade cover through tree removal, and so on. Extensive deforestation occurred prior to 1900:

"Along the Pic, Pays Plat and Gravel Rivers a considerable quantity of timber has been removed in the past, as evidenced by wood roads and choppings."⁴⁹

The federal hatchery at Port Arthur and the provincial hatcheries at Port Arthur, Dorion, Sault Ste. Marie, and Tarentorous have all participated in the culture of brook trout. In 1912 the Port Arthur dominion hatchery began seeking brook trout eggs at Lake Nipigon's Sturgeon River rapids, Wendigo Bay, and West Bay.⁵⁰ Small number of brook trout were planted into Lake Superior waters at Nipigon River (in 1914), St. Ignace Island (1915), and the Blende River (1917). Other bodies of water stocked during this period included Loon Lake and Lake Helena.⁵¹

Lake Trout, *Salvelinus namaycush*

Prior to 1920 the Port Arthur federal hatchery obtained its lake trout spawn from grounds throughout Superior (Thunder Bay, Rosspport, Port Coldwell, St. Ignace Island, Michipicoten), various inland lakes, and occasionally depended upon additional supplies from the hatchery at Wiarton. Inland sources included Arrow, Allen, Kashabevia, Long and Nipigon Lakes. Of the Sturgeon Rapids spawning run on Lake Nipigon McNab (Oct. 4, 1913)⁵² wrote:

"The rapids in that river were so crowded with salmon trout that their fins were almost worn, just the same as the salmon running up the rivers."

Between 1918 and 1926 approximately 200,000 eggs were shipped annually to the Banff federal hatchery.⁵³

Following the devastation of Lake Superior's lake trout populations by the parasitic sea lamprey in the 1950s, the Ministry of Natural Resources energetically sought egg supplies for restocking from a host of provincial lakes (summarized for the period 1950-1970 in Table 1).⁵⁴ Certain of these were especially important.

Lake Manitou on Manitoulin Island (Lake Huron), for example, was a prime source of lake trout eggs for many years. Beginning in 1959 the Ontario Ministry of Natural Resources annually returned to the lake yearlings (of predominantly native stock) to guard against depletion. Federal involvement with Lake Manitou predates that of the provinces. In 1904 the Department erected a hatchery, and in the course of the following 3 years 150 million young whitefish (from Lake Erie) and 10 million lake trout were planted. In 1905 fisherman S. Fraser leased the lake from the department for 20 years:

"... In 1910 fishing in the lake was [again] started. It was then five years since the first whitefish was put in, but they did not average over one pound weight, although they were increasing fast in numbers, so fishing was stopped... There were plenty of whitefish but... the food is not in the lake for the fish to grow on, as there are more suckers than whitefish and they eat the whitefish food. ... I am now asking your help to enable us to realize something out of this venture, by passing an order-in-council allowing whitefish one pound and over to be taken out of Lake Manitou... I also think I can repair the Hatchery, which has not been in use for some time... ." ⁵⁵

In 1958 4,000 lake trout of Lake Superior Dog River spawning stock were planted in Lake Mishibishu of the Dog River system. In 1963 a further 5,500 fish, mainly of Montreal River brood stock, were planted in Mishibishu and nearby Mishi and Katzenback Lakes. At the time their fish communities were comprised solely of white suckers and minnows, a condition which may linger for some time:

"... It is remarkable that Michi-Biju Lake, Michi Lake, and Katzenback Lake contain no fish, although that are all good-sized bodies of fine clear water. The absence of fish is said by Indians to be due to the presence of certain sulphur springs, but I could find no visible evidence to support this hypothesis."¹⁶

Mysterious sulphur springs notwithstanding, the original plants survived and spawning occurred for the first time in 1961. However, in an effort to counteract slow growth rates and the emaciated condition of many specimens (appropriately named "racers" or "razorbacks" and also noted among trout stocks at Superior Shoal and in Lake Nipigon earlier in this century:⁵⁶) in 1965 and 1966 the Ministry of Natural Resources successfully introduced Lake Superior herring as a forage base.

Fish in Katzenback Lake were larger than those of the other two lakes. Also, during the course of spawn-taking operations in 1972, four groups of trout visibly distinct in body form and coloration were noted: the so-called silver grey, yellowfin, redfin, and dark brown shoal-spawner types.⁵⁷ The reason for this variation from the original river-spawning type is not known. Interestingly, these types correspond to native shoal and river-spawning stocks which were once distinguished by fishermen of Lake Superior.⁵⁶

The planted trout of Killala Lake (Geraldton District) were raised in the hatcheries of Dorion and Port Arthur. Fish deriving from this introduced stock tend to be silvery cast with reddish fins, and are easily distinguished from the smaller and darker natives. The introduced stock are located in the southern basin and commence annual spring spawning at a somewhat later date.⁵⁸

Atlantic Salmon, *Salmo salar*

In 1912 Atlantic salmon eggs from the Miramachi hatchery were transferred to Port Arthur. Loon Lake received 20,000 fry, while a total of 304,000 fry were released in Nipigon River, Rossport area streams, and rivers tributary to Thunder Bay.⁵⁹ For a time they thrived, and after only two years specimens weighing 1.0 kg were captured in Thunder Bay. In 1915 salmon ran 19 km up the Nipigon River to complete their spawning at Camp Alexander on June 20; two specimens weighed 1.1 and 1.4 kg. By 1920 there were reports of spawning in the Blend and MacKenzie Rivers of Thunder Bay.⁶⁰

Stocking was discontinued after 1923, and extinction seems to have beset the various Atlantic salmon runs during the 1920s or 1930s. The state of Wisconsin planted salmon in 1972 and 1973, but few were captured and the experiment was deemed a failure.¹

The Pacific Salmons

Events surrounding the accidental introduction of pink salmon

(*Oncorhynchus gorbuscha*) to Thunder Bay in 1956 and the startling viability and dispersal of the species throughout Lake Superior and ultimately the other Great Lakes, have been outlined in various papers.⁶¹

Initial introductions of coho salmon (*Oncorhynchus kisutch*) were made in 1966 by the state of Michigan. Minnesota followed suit in 1969, and in its turn Ontario planted 78,000 yearlings in the Jackpine and Gravel Rivers of Nipigon Bay between 1969 and 1971.¹ Coho were subsequently reported at many places along the Canadian shore. In 1979 schools of 5 to 7 cm fish, identified as coho salmon parr and reportedly numbering in the "tens of thousands," were observed feeding on insects along the shoreline of Michipicoten Bay in July.⁶²

Chinook salmon (*Oncorhynchus tshawytscha*) have been planted in Lake Superior by Michigan since 1967 and Minnesota since 1974.¹ On October 30, 1974, an 11 kg Chinook was caught at the mouth of the Dead River, Nipigon Bay. Ontario Ministry of Natural Resources employees subsequently identified specimens near Red Rock in 1977 and below Scott Falls on the Nipigon River in 1979.⁶³

Walleye (Pickerel), *Stizostedion vitreum* and
Northern Pike, *Esox lucius*

Around 1868 Sault Ste. Marie's commercial fishermen would set pound nets near the town in May to catch pike and pickerel of the upper St. Marys River and its southern reaches: Mud, George, Echo, and Hay Lakes.⁶⁴ The western pickerel fisheries of Black and Thunder Bays began in 1878:

"Pickerel were caught in large quantities. When pickled, these fish can only be disposed of in United States markets, and at a time when the navigation is closed. Owing, however, to the spirit of enterprise and energy of some of the fishermen, a market for fresh pickerel was found this year and a good business done in that line."⁶⁵

Despite a growing popularity, pike and pickerel were not infrequently condemned as destructive to spawn. In certain rivers serious efforts were made to reduce their numbers (*Sault Star*, Sept. 24, 1908):

"A gentleman who revisited the [Nipigon] river... is pleased to report that war waged against the pike (which were fast taking control of certain portions of the river) has been a decided success. Some thousands of pike which would average 10 lbs each have been destroyed, as well as large numbers of pickerel (equally destructive of the trout) and suckers. ...there are still large quantities left, and the more that are taken out the better will be the fishing."⁶⁶

In 1913 the Ontario Department of Game and Fisheries even recruited men to continue the "war" using hoop nets.

Cultural modification of stream drainage may have adversely affected some stocks.

"... in early days when the country was well wooded pike and pickerel might go up to spawn in the Neebing River. Pike may go a short distance yet but Pickerel will not leave the pure water of Lake Superior. They spawn on the banks."⁶⁷

Some Thunder Bay fish stocks may also have been stressed by the practice of dumping grain screenings into the Kaministikwia and other rivers. At 500,000 bushels dumped each fall, this pollutant was once regarded as a serious problem afflicting the western fisheries:

"... the screenings sometimes comes up in lumps when the nets are lifted and it has been known whitefish and trout being caught with swelling of the gills with seeds stuck in their gills and also the herring."⁶⁸

Screenings were known to drift far beyond Thunder Bay.

Decline in the numbers of pike and pickerel were reported prior to 1900.⁶⁹ One overseer attributed an apparent decline of pickerel (and sturgeon) in Batchawana and Goulais Bays to overfishing with pound nets.⁷⁰ Nevertheless, the Ontario pickerel fisheries as a whole prospered until the collapse of the Nipigon and Black Bay populations in the 1960s.

Black Bay supported a walleye fishery from the 1880s until the late 1960s. According to Department of Marine and Fisheries reports, annual production between 1885 and 1890 averaged almost 30,000 kg. The walleye fishery of Nipigon Bay was established many years after that of Black Bay and it grew to significant dimensions following World War I. Ryder⁷¹ concluded that industrial pollution from Red Rock, rather than overfishing or sea lamprey predation, dispatched the bay's walleye. An electrical lamprey weir erected along the Jackfish River (east of Red Rock) may have hastened the demise of that spawning stock.¹ As a source of both walleye and pike, the Jackfish River was long renowned, as attested by both its present name and original French name, *Rivière la Pique*.⁷² Believing recent efforts at water quality control have been successful, the Ontario Ministry of Natural Resources began 10 years ago to plant walleye eggs in the Jackfish River. Their source was a stock spawning in the Current River of Thunder Bay.⁷³

As the Nipigon Bay walleye population failed, fishermen escalated the pressure being placed on the Black Bay population. Fishing was heavy between 1962 and 1966, and soon catches started to decline.

During the 1930s pickerel were propagated at both Port Arthur federal hatchery and Sault Ste. Marie provincial hatchery. Stock at the latter location was from Echo lake but none was allocated to Lake Superior.⁷⁴

Conclusion

Fishermen, through long experience with Lake Superior from which they derived their livelihood, came to recognize intraspecific varieties of lake

trout, whitefish, herring and chub, differing in time of spawning, appearance and abundance, and movements. Strategies of fishing were gauged to the habits of the different varieties; grounds were essentially visited throughout the season, mesh sizes were altered, depth of net sets changed. Some stocks were stressed unduly, notably those in the Thunder Bay area and in southeastern Lake Superior. Hardest hit were certain river-spawning stocks including lake trout, migratory trout, sturgeon, pickerel and pike. They were most susceptible to the agents of environmental change: severe storms, dredging, deforestation, log rafting, and pollution. These, along with factors of overfishing, the parasitic sea lamprey, and interspecific competition drove certain stocks to a precarious state of survival and even to extinction.

To alleviate the damage, government agencies embarked on vigorous programs of fish stocking. However, as noted by J. Christie,⁷⁵ the philosophy of "glorious optimism" which fish culture inspired during the late 1800s, gave way finally to wide-spread reassessment and scepticism after the 1930s, and in its wake many hatcheries were dismantled.⁷⁶ True, the hatchery programs had their success stories; rainbow trout and the salmon, for where these species had not existed they developed to flourishing populations. Assessing the success and justifying costs of introducing already established species is of course more difficult. Fishermen for decades held the belief that constant inputs of walleye or whitefish to the Great Lakes rejuvenated existing stocks and were so strong advocates of the hatchery program. Nevertheless, the 1943 International Board of Inquiry for the Great Lakes Fisheries was moved to comment:

"There is some divergence of opinion among those in the fishing industry and among these that have been particularly concerned with the subject either as administrators or investigators as to the value of this work maintaining the stock of fish. As yet no proof has been furnished that there is actual increase in the stock of fish from such planting of the young. To determine whatever effectiveness their plantings may have is a difficult matter."

Regier *et al.*⁷⁷ also summarized historical assessments of plantings to the Lower Great Lakes and remarked that the programs may have even acted as destabilizing red herrings by shifting attention away from overfishing and allowing the need for regulations to be downplayed. In this way they in fact hastened the decline of certain stocks.

Efforts at restoring lake trout to Lake Superior have met with some success, although the reestablishment of a strong breeding population proceeded more slowly than was first hoped. The planting of either non-native strains or the progeny of trout repeatedly inbred in hatcheries are reasons which have been forwarded for failure to adapt to natural habitats. However, in recent years increasing attention has been paid to returning genetic strains to the same general area from which they derived.

TABLE I. Sources of lake trout spawn raised at provincial hatcheries on Lake Superior, 1958 to 1970.⁵⁴

Source	Years
Port Arthur Hatchery, and Dorion Hatchery (after 1966)	
Lake Simcoe	1958-1959
Lake Manitou	1958-1960
Loch Lomand	1959-1963, 1972
Crowe Lake	1959-1962
Big Trout Lake	1959-1960
Manitoba (Clear, Whiteshell Atikameg Lakes)	1960-1966, 1969-1970
Lake Innis	1960
Dryberry Lake	1962-1963
Baril Lake	1965, 1969-1970
Hill's Lake (hatchery)	1965, 1969-1970
Tarentorus Hatchery	
Lake Simcoe	1959, 1961-1966
Lake Manitou	1959, 1961-1966 1969-1970, 1972
Lavielle Lake	1959-1962
Lake Opeongo	1961-1962
Ranger Lake	1961-1963
Elliot Lake	1962-1963
Mishibishu Lake	1962-1966, 1969-1970
Lake Superior Brood Stock (Tarentorus Trout Rearing Stn.)	1962-1966, 1969-1970
Charlevoix Hatchery	1963
Lake Superior Brood Stock (Hill Lake Trout Rearing Stn.)	1963
Chiplow Lake	1964-1965

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The *Asia*, continued from page 19

Although later disproved, the loss of the *Asia* prompted the government to further chart these deceptive waters.

The story of the *Asia* and its two brave survivors is perhaps Georgian Bay's best known tale. Many hours have been spent poring over maps, navigational charts, and news clippings, and exploring the Bay's waters in an effort to locate the wreck. It is rumored that one man even waited for the same weather and wind conditions, then set himself afloat in a lifeboat, hoping to get an indication from that of the location of the elusive ship. As for Christy Ann and Dunkan, they did meet once later in life, and it is reported that neither spoke a word about the tragic events of that September of 1882.