THE FISH AND FISHERIES

OF

CANADIAN LAKE SUPERIOR

John L. Goodier

Institute for Environmental Studies
University of Toronto

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ABSTRACT

The story of the American commercial fisheries on Lake Superior has been told in some detail. Historical summaries of Canada's industry are few and of limited scope, however.

The first part of this report outlines the history of the Canadian Lake Superior fisheries from their inception until the present day. Industry growth was rapid after 1880, largely under the impetus of American investment and monopolization. Stages of development are examined and information concerning the fishing ports and stations, and major companies and fishermen is summarized. Production figures are drawn largely from government reports: these are critically assessed for validity.

In a second section, biological and ecological features of the lake's individual fish species are examined. Spawning grounds are summarized with texts, tables, and maps, and species' movements and interactions noted. In the context of this body of information attention is given to the existence of discrete stocks. Through time there have occurred changes in fish habits, habitats, and abundances: these are reviewed along with their possible causes.

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The fishermen and other residents of the Lake Superior region were, of course, most instrumental in making this report possible. Sadly, more than a few have passed away since 1978, the year I first visited the Superior North Shore. It is especially to the memory of these people that I dedicate this report.

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1. INTRODUCTION

Lake Superior, deepest and largest of the Great Lakes, rests almost entirely within the rocks of the Canadian Shield. Its shoreline is imposing, precipitous cliffs falling to narrow shore banks which slip away to depths as great as 405 m. Apart from certain southern bays, waters are perennially cold and oligotrophic. The lake's calm is torn by frequent storms and gales, and for those people whose employment depends upon these waters, life is not without its dangers and discomforts.

The sheltered bays and coves which punctuate the great sweep of shoreline were the earliest sites of habitation. At Cloud, Jarvis, Sturgeon, Black, Thunder, Nipigon, Pays Plat, and Heron bays, the Montreal River, Leach and Lizard islands and the St. Mary's River Indian peoples established camps and pursued subsistence fisheries (W. Ross, T. Conway, pers. comm. 1978). Arriving in the 17th century, Europeans studied Indian ways of survival. Ancient hunting and fishing grounds soon provided white men with a source of subsistence and, with the establishment of the trading posts in the 18th century and the fishing firms in the 19th century, a means of livelihood and prosperity.

The purposes of the present study are two-fold. Section 2 chronicles the history of Lake Superior's commercial fishing industry: the companies, the fishermen, their stations, gear, and fishing territories, their ambitions and tribulations.

The orientation of section 3 is biological, reviewing the habits and habitats of the fish species themselves. Emphasis centres upon:

1) the physical appearance of the fish species,

2) spawning locations and times,

3) spatial-seasonal distribution,

4) species interactions, and

5) evidence for the existence of stocks.

The term stock is here used in the sense of Marr's (1957) "group":

> "A group is a fraction of a population with distinctive characteristics, the nature of which (phenotypic or genotypic) has not yet been determined."

Loss of stocks means a loss of genetic diversity and a consequent reduction in species resilience and stability. The process of loss is often insidious: the presence of a stock is frequently hidden and changes in its status are not easily monitored. When exploited stocks have reached some level of depletion, resource users shift their efforts to others, thereby maintaining overall production but disturbing species integrity (Lawrie and Rahrer 1973). Improved methods of identifying stocks are required. Cataloguing of stocks is essential.

1.1 METHODOLOGY

The following report is based upon information gathered during the years 1977 to 1981. It springs primarily from work complementary to a MSc thesis for the University of Toronto (Goodier 1981) and secondarily from a study initiated by the Ontario Council of Commercial Fishermen (Goodier and Spangler 1981). Much has been drawn from manuscripts and texts housed in libraries and archives scattered throughout Ontario (see Appendix I). Nevertheless, the search has not been exhaustive (if any ever can be), and additional

material of relevance rests in unconsulted log books, diaries, newspapers, correspondence, and government records and reports. Most valuable of all were conversations with those people personally involved with Lake Superior's fisheries. Regrettably, only a small portion of the valuable knowledge they have shared is here committed to writing. The scope of my concerns was narrow: most people spoke of far more than I have had wit or opportunity to record properly. So many fascinating tales, an historical treasure trove, fade from memory. It can only be hoped that other researchers will seek out these "old-timers" before they are no longer with us.

Source materials and investigative procedures are reviewed in detail elsewhere (Goodier 1981). Discussion there focusses upon:

1) personal communication,
2) the spawning ground maps, and
3) written material.

The present study makes proportionately greater use of government-published harvest statistics. In 1948 the government of Ontario first required that fishermen complete monthly-catch-effort forms (C.F.-1's). Certain problems inherent in the use of these data are reviewed elsewhere (Goodier and Spangler 1981). In Section 1.2 the validity of pre-1925 statistics is assessed.

1.2 PRE-1925 PUBLISHED HARVEST STATISTICS

For the period 1867 to 1907, official statistics for the Canadian fisheries of the lake were published in the annual reports of the federal Department of Marine and Fisheries (or Department of Fisheries). In 1907 the Ontario Department of Game and Fisheries

began publishing annual catch returns.

Data for the years 1871 to 1917 are recorded by station of landing and so permit examination of regional fishing intensities. After 1917 there was a tendency to group stations into progressively larger units of area, until 1926 when the practise of recording individual stations was discontinued (until 1948 when C.F.-1's again permitted detailed data collection).

Confusion is introduced by the periodic abandonment of old stations or the creation of new ones. As the industry expanded, grounds were located at greater distances from the home stations. Furthermore, fish from a single ground were often landed at more than one station.

A number of other researchers have cast doubt upon the reliability of early official statistics (Tomkins 1951; Moenig 1977). It is obvious that reported and actual harvests often differed significantly. The lamentations of one overseer, T.A. Keefer, illustrates the problems inherent in compiling returns:

> "[Mr. Keefer] experienced great difficulties in obtaining reliable data for the statistical statements. Fishermen were unable to give their individual catches: this information was sought from sub-officers, buyers, shippers of fish, &c. Interested parties appear to apprehend a curtailment of their privileges or an increase of the license fees, should their catch appear too large--others, who had been fishing more nets than they were licensed for, were also unwilling to give correct returns." (Canada. Dept. of Marine and Fisheries 1891).

Poaching by both Americans and Canadians was rampant and difficult to control. Around 1900, for example, illegal pound net fishing was judged a serious problem for Thunder Bay. Dunn (1895), captain of

the federal patrol boat, discovered 12 of the 28 pound nets fished in Port Arthur division to have been unlicensed. Complaints also came from overseers in eastern Lake Superior:

> "...All the tugs in my Division fish from two to four times more net than they get license for and have been doing so for the last three or four years and the Ontario Fish Officers are aware of this fact." (Duncan 1906)

In the early years of this century, officers of the provincial government (which had assumed control of law enforcement in 1899) were ill-equipped with patrol boats adequate for preventing violations (Elliott 1910).

Near the mouths of the eastern rivers, poachers would scoop or snag for lake trout and whitefish which swam upstream to spawn. According to Duncan (1909), one man took 86 kegs of salt fish and a ton of fresh fish in the course of six days at the Dog River. The Montreal River was also a famous poaching site.

The fast tug or gas boat was favoured by those Americans poaching Canadian waters about Caribou Island, Parisienne Island, and Gros Cap. Three tugs of the Buckeye Co. of Grand Maraise, Michigan harvested a total of 210 tons of fish in the season of 1906; according to Canadian fishermen employed on these boats, 150 tons were hauled from Canada's waters north of Caribou Island (Duncan 1907).

Near the American border and 65 km from the nearest point of land, Superior Shoal comprises a number of banks rising like pinnacle mountains from the lake bottom. The shallowest point is six metres below the surface, and ditches between the banks are, in places, over 180 m deep. When Superior Shoal was surveyed by the Canadian hydro-

graphic ship "Bayfield" in 1930, American nets were discovered around the banks (Landon 1959). More recently, Canadian fishermen have occasionally been forced to remove as much as forty km of American hook and lines from the vicinity of their grounds. (Hooks were usually strung 2.7 m apart).

Some fishermen made a practise of landing fish on the American side, thereby avoiding both Canadian inspectors and American duty. To these unrecorded catches must be added the culls and sublegal-sized fish (which often found their way to market):

> "There is no inspection of fish caught between here and Mamainse a distance of 60 miles and small undersized fish are caught and sold here by the Dominion Fish Co. and others." (Elliott Aug. 10, 1911).

In summary, early government statistics can be most useful when catch data from individual stations are aggregated and used to illustrate long-term production trends. Individual yearly statistics, however, are liable to significantly underestimate actual harvests: the degree of error may also vary widely from year to year. Nevertheless, in the absence of anything better, these official statistics are worthy of examination, but "with caution".

FIG. 1

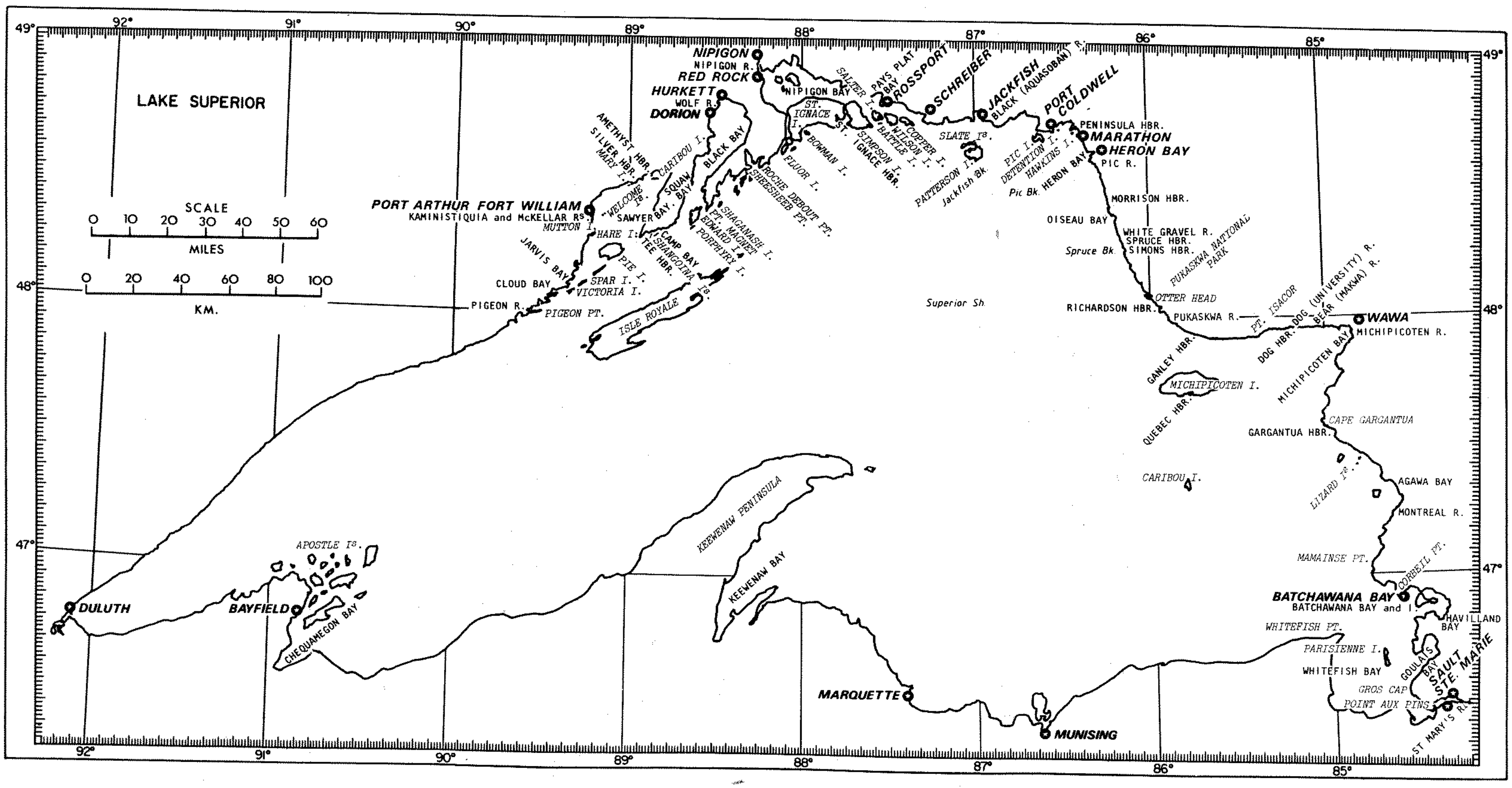
2. HISTORY OF THE COMMERCIAL FISHERIES OF LAKE SUPERIOR

Etienne Brulé is credited as the first white man to penetrate the Indian territories of the Lake Superior region. Aided by Brulé's description, Samuel de Champlain was able to sketch this "Great North Sea" onto his map of 1632 (Nute 1944). In the wake of the early expeditions came the Catholic Jesuits, dedicated explorers in their own right, as well as men of letters who carefully recorded their thoughts and experiences. The Jesuit Relations describe not only a bounty of Indian souls for redemption but also a more tangible wealth of minerals and wildlife:

> "At the point of Saint Esprit, Chagaoumigong [Chequamegon Bay], where the Outaouaks and the Hurons live, there are caught at all times of the year great numbers of whitefish, Trout, and Herring...These Herring are found in every part of the Lake on the South side, from Spring down to the end of the month of August; and a full list of all its fisheries would require a complete enumeration of all the coves and all the Rivers of this Lake." (Jesuit Relations 1669-70).

The quest for fur trading profits accelerated the pace of exploration in the second half of the 18th century. Posts were established at the Kaministikwia River, Chequamagon Bay, and the St. Croix River. The numbing isolation of their wilderness home forced employees of the French, British, and American posts to develop a high degree of self-sufficiency and dependence upon local resources. Fish formed a staple of one's daily diet. Although lake trout and whitefish were most highly prized, other species were exploited,

FIG. 1. LAKE SUPERIOR


LAKE SUPERIOR
SCALE
0 10 20 30 40 50 60
MILES
0 20 40 60 80 100
KM.
NIPIGON
NIPIGON R.
RED ROCK
HURKETT
WOLF R.
DORION
NIPIGON BAY
ST. IGNACE I.
SALTER I.
PAYS PLAT BAY
ROSSPORT
SCHREIBER
JACKFISH
BLACK (AQUASOBAN) R.
PORT COLDWELL
PENINSULA HBR.
MARATHON
HERON BAY
PIC R.
HERON BAY
PIC I.
DETENTION I.
HAWKINS I.
Pic Bk.
SLATE Is.
PATTERSON I.
Jackfish Bk.
COPPER I.
WILSON I.
BATTLE I.
SIMPSON I.
ST. IGNACE HBR.
BOWMAN I.
FLUOR I.
ROCHE DEBOUT PT.
SHEESHEEB PT.
SHAGANASH I.
PT. MAGNET
EDWARD I.
PORPHYRY I.
BLACK BAY
SQUAW BAY
CARIBOU I.
AMETHYST HBR.
SILVER HBR.
MARY I.
WELCOME Is.
SAWYER BAY
CAMP BAY
SHANGOINA
TEE HBR.
HARE I.
PIE I.
SPAR I.
VICTORIA I.
PORT ARTHUR FORT WILLIAM
KAMINISTIQUIA and McKELLAR Rs.
MUTTON I.
JARVIS BAY
CLOUD BAY
PIGEON R.
PIGEON PT.
ISLE ROYALE
MORRISON HBR.
OISEAU BAY
WHITE GRAVEL R.
SPRUCE HBR.
SIMONS HBR.
Spruce Bk
PUKASKWA NATIONAL PARK
OTTER HEAD
RICHARDSON HBR.
PUKASKWA R.
PT. ISACOR
DOG (UNIVERSITY) R.
BEAR (MAKWA) R.
DOG HBR.
WAWA
MICHIPICOTEN R.
MICHIPICOTEN BAY
Superior Sh
GANLEY HBR.
MICHIPICOTEN I.
QUEBEC HBR.
CARIBOU I.
GARGANTUA HBR.
CAPE GARGANTUA
LIZARD Is.
AGAWA BAY
MONTREAL R.
MAMAINSE PT.
CORBEIL PT.
BATCHAWANA BAY
BATCHAWANA BAY and I.
HAVILLAND BAY
WHITEFISH PT.
PARISIENNE I.
WHITEFISH BAY
GOULAIS BAY
GROS CAP
POINT AUX PINS
SAULT STE. MARIE
ST MARY'S R.
KEEWENAW PENINSULA
KEEWENAW BAY
MARQUETTE
MUNISING
APOSTLE Is.
DULUTH
BAYFIELD
CHEQUAMEGON BAY
49°
48°
47°
92°
91°
90°
89°
88°
87°
86°
85°

and numerous reports (such as that penned by Alexander Mackenzie (1801) as he paddled westward in 1789) attest to the piscine diversity, quality, and size:

> "Lake Superior [abounds] in a great variety of fish, which are the most excellent of their kind. There are trouts of three kinds, weighing from five to fifty pounds, sturgeon, pickerel, pike, red and white carp, black bass, herrings, & c. & c. and the last and the best of all, the Ticameg, or white fish, which weighs from four to sixteen pounds, and is of a superior quality in these waters."

Additional testimonials to the lake's aquatic delights have been compiled by Whitaker (1893).

Fish harvests of the eighteenth century provided a means of local subsistence and occasional items of barter between fur traders and natives. In the 19th century the explorer and pioneer were joined by another sort of visionary, the businessman, who foresaw the true value of the water's resources.

2.1 THE COMMERCIAL FISHERIES OF THE UNITED STATES

The potential profits resting with the fish resources of Lake Superior dawned upon American entrepreneurs long before their Canadian counterparts. Local fish vendors undoubtedly existed prior to 1800. The first large-scale venture may be that identified by both Lucius Lyon and Nile's National Register in 1822; in the course of its operation one seine alone took 1600 barrels of whitefish (Thayer 1897; Anon. 1954).

In 1830 Samuel Ashman and Ecstache Roussin (Roussain), former employees of the American Fur Company, erected camp at Whitefish

Point and pursued a fishery from Shelldrake River to Grand Marais (a distance of 87 km.):

> "...[the nets] are tended by fishermen employed for the purpose, two of whom can tend and manage, in fair weather, ten nets; which will yield, every morning, from one to six barrels of fish.... Messrs. Ashman and Roussin have put up at Whitefish point, within the last two years, 559 barrels; others, in the same time, and at the same place, have put up 313 barrels; making the whole proceeds for the above time, 872 barrels, worth in Detroit six dollars per barrel, or 5,234 dollars." (Allen 1832).

Between 1835 and 1841 the American Fur Company vigorously sought new stations along the American shore. La Pointe, situated among the Apostle Islands, became the central depot. The fortunes and misfortunes of the fisheries, the market reverses after 1840, and the ultimate dissolution of the company in 1842 have been chronicled by Nute (1926).

The demise of the American Fur Company was only a temporary set-back for the fishing industry, and fishermen and their families continued to cling tenaciously to their settlements and trade. The opening of the Sault Ste. Marie canal in 1855, the increase in market demands during the Civil War, and the introduction of steam tugs to the lake about 1871 carried the industry into its boom period. Various researchers have pursued the subject of its early growth (Koelz 1926; Van Oosten 1940; Nute 1944; Hessen 1948; Halverson 1955; Rakestraw 1968; Kaups 1978). Nineteenth-century government reports are also sources of valuable information (Goode 1884; United States Commission of Fish and Fisheries 1887; United States House of Representatives 1897).

The history of the commercial fisheries of Lake Superior is a tale of the increasingly opportunistic pursuit of new species and new grounds. Periodic technological innovations have raised the efficiency of capture manyfold over that characterizing the infant industry. Pound nets were introduced in 1864, steam tugs around 1871, motor boats in 1899, baited hooks and lines in the 1890's, automatic gill net lifters around 1900, cotton gill nets about 1930, and nylon gill nets in the late 1940's.

The precocious and dedicated pursuit of the American fisheries was marred by the depletion of certain fish stocks. Kumlien (1887) and Smiley (1882) report losses at Ashland (Chequamegon) Bay, Keewenaw Bay, Marquette, and Whitefish Point. Apparent declines of Apostle Islands and Isle Royale lake trout are noted by the United States House of Representatives (1897). According to R.O. Sweeney (President of the Minnesota Game and Fish Commission) fishing along the American North Shore improved considerably as one approached the Canadian border:

> "...The difference in fishing now from what it was a few years ago, say 20 or 25 years ago, is very marked. We used to get whitefish all the way up to Duluth; all along the Minnesota shore and the Wisconsin shore, it was all good white fishing, but now there are scarcely any whitefish taken until you get towards Bayfield. Very few are taken on the Wisconsin shore, none along Minnesota point; and this season, for the first time in fifteen years, or a little less than that, the fishermen are beginning to make pretty good catches along the north shore of small whitefish, which they attribute to the planting of fish at the head of the lake." (Canada. Department of Marine and Fisheries 1893).

Between 1885 and 1920 there occurred an average annual decrease of six percent in the total whitefish production of Lake Superior (Lawrie and Rahrer 1973). Although lake trout stocks remained in comparative health, local depletions forced American hatcheries to begin seeking Canadian supplies of spawn in 1893 (Elliott 1897).

PHOTO 1

Both production losses and a glut of south shore fishermen encouraged expansion into Canadian territory in the late 1800's. Foreign investment was the overriding catalyst to the growth of the Canadian industry. However, in a pattern which has been repeated in other sectors of the economy, the price of rapid development for Canada involved a reduction in the country's power to control its own resources.

2.2 THE COMMERCIAL FISHERIES OF CANADA

Accepting the challenge presented by the American Fur Company in 1839, the Hudson's Bay Company escalated their domestic fisheries into the commercial realm. By 1850 the three major posts at the Pic, Michipicoten, and Kaministikwia rivers maintained over 30 fall stations and annually shipped thousands of barrels of salt fish to market (Goodier 1981). Other authors also discuss the Hudson's Bay Company fishing activities (Weiler 1973; Campbell 1976; Marsh 1976). During the late 1850's the Company's commercial involvement declined, but the Canadian industry flourished independently.

2.2.1 SAULT STE. MARIE AND EASTERN LAKE SUPERIOR

Steaming between Collingwood and Fort William in 1858, the "Rescue" was one of the first tugs on Lake Superior. Captain James

Dick, pilot Alexander Clarke, and Mr. McMurrich were soon energetic participants in both the east end and west end fisheries (Anon. 1923). A federal overseer wrote:

> "I have been informed that Strowger this last season on Captain Dick's ground, at Michipicoten Island, with 8 men in 6 weeks took 700 barrels; these fish would be worth, at least, $8 per barrel, being chiefly large red Trout". (Gibbard 1860).

Traditional Indian fisheries existed at Batchawana Bay, Goulais Bay, Gros Cap, and the St. Mary's Rapids. The skill and aplomb with which the native scoop net fishermen guided their canoes through the dangerous rapids was a source of fascination for many early travellers. Henry R. Schoolcraft, Indian agent at Sault Ste. Marie, Michigan, possessed ample time to study and observe:

PHOTO 2

> "The fishing canoe is of small size and is steered by the man in the stern. The fisherman takes his stand in the bow, sometimes bestriding the vessel, having a scap net in his hand. This net is made of strong twine, open at the top like an entomologist's. When the canoe has been run into the uppermost rapids and a school of fish is seen below, he dextrously puts down his net and having scooped up a number of fish instantly reverses it in the water, whips it up, and discharges its contents into the canoe." (Whitaker 1893).

In one day the men of a single canoe might harvest "fourteen hundred whitefish, making when salted forty half-barrels of 100 pounds each": a barrel of whitefish was worth almost ten dollars (United States Commission of Fish and Fisheries 1887). White men soon were making a happy living from former Indian grounds. Native and European names mingle in Knight's (n.d) summaries of the earliest census records (Table 1).

PHOTO 3

TABLE 1

TABLE 1. Select list of fishermen in the region of Sault Ste. Marie, 1860 to 1885. (Extracted from Knight n.d.)

Fisherman	Born
Abequash, George	1821
-- , George	1845
Belleau, Michael	1831
Boyer, Michael	1841
Contain, John B.	1801
Gordon, John	1811
Grant, William	1816
Greig, John M.	1837
-- , Edward	1831
Jollineau, Pierre	1816
Kogeosh, John	1808
McKay, Daniel	1832
Mayville, Joseph	1801
-- , Paul	1854
Mizia, Frank	1857
Neveau, Michell	1824
O'Donnel, Owen	1849
Robinson, Alexander	1841
-- , William	1821

In 1871 permanent buildings were erected at both the Lizard Islands (by Messrs. Sharman and Roussain) and Michipicoten Island (by Mr. Griffiths). To avail themselves of the late fall and early spring seasons, the fishermen wintered at Michipicoten Island (Canada. Department of Marine and Fisheries 1871). The following summer Grant (1873) encountered a dozen Collingwood fishermen established at Gargantua for the purposes of fishing whitefish and lake trout; among them was Alex Clarke, well-known on both Lake Huron and Lake Superior (and mentioned above). Cape Gargantua station was also maintained in 1876 (Canada. Department of Marine and Fisheries 1876).

American involvement in the Canadian industry assumed a higher profile in the 1880's. In 1882 businessmen from Sackett's Harbour, New York settled in Sault Ste. Marie, Michigan and outfitted Canadian fishermen to work the shore northward for 120 km. Other interests soon followed, hiring many of their employees from the Georgian Bay area. Fifteen pound nets were maintained in Goulais and Batchawana bays in 1885:

> "The catch, which is large, is made up chiefly of sturgeon, wall-eyed pike, here called "pickerel", whitefish, and a few pickerel, locally known as "pike". Three collecting steamers, two of them belonging in Lake Erie, bring the fish from the gill-nets and pounds to the village [Sault Ste. Marie] and two others, one of them from Detroit, together with upwards of twenty-five gill-net crews, engaged exclusively in fishing. The fish are brought to the village packed in ice and shipped chiefly to Chicago and Detroit". (United States Commission of Fish and Fisheries 1887).

Eventually the Chicago-based A. Booth Packing Co. (known as A. Booth and Co. after 1889) rose to a position of economic dominance,

and for about sixty years its fortunes were intimately bound to the growth of the Canadian Lake Superior fishing industry. Established in 1848 by Alfred Booth, the company acquired a lease to land on the south side of Quebec Harbour, Michipicoten Island around 1860 (in consequence of a title dispute, the Booth site was moved to the north side of the harbour in 1905; Mr. I. Purvis, pers. comm. 1979). Virtually landlocked, Quebec Harbour was strategically located as a base of operations for north shore fishing:

PHOTO 4

> "Michipicoten Island (the Island of Knobs or Hills) may be called the gem of Lake Superior, presenting a most beautiful appearance as approached from the southward, where a few picturesque islands may be seen near the harbour, which can be entered during all winds. Nature seems to have adopted this island as a place of resort for the seekers of health and pleasure..." (Disturnell 1863)

Although Booth may have been associated with Captain Dick's venture, it is possible that its station remained idle for a time. Booth's first verified operations in Canada began on Lake Winnipeg in 1871 (Anon. 1955).

One buyer of prominence, Mr. Ainsworth, reported that 396,900 kg. (875,000 lb.) and 377,400 kg. (832,000 lb.) of Canadian-caught fish were handled by American dealers in the years 1884 and 1885 respectively (United States Commission of Fish and Fisheries 1887). Owners of the Dominion Transportation line, Ainsworth and Joseph Ganley's involvement in the Lake Superior and Lake Huron fishing and coasting trades predated 1880. Eventually they sold their interests to A. Booth, but retained positions as managers of the Buffalo Fish Co. (Duncan 1903).

Enthusiastic fish buyers in Sault Ste. Marie, Michigan included both commercial firms (which had been established prior to 1860) and local tourist lodgings (such as the Chippewa House; Gibbard 1860). With the improvement of lake travel, fresh fish were loaded on steamers and transported to markets in Cleveland, Detroit, and Toronto. By the late 1860's the "Algoma" and the "Chicora" sailed regularly (Devine 1864).

North of the Indian grounds, Charles Rousseau (or Roussain) began a fishing business at Mamainse in the late 1850's. The Quebec and Lake Superior Mining Company here constructed a village dock and initiated tug service. Although the mines closed in the 1880's, John Roussain remained and continued to fish between Mamainse Point and the Lizard Islands (Ontario Bureau of Mines 1893; Collins n.d.). The last commercial fishermen of the family died accidentally in 1960 when their tug caught fire and disappeared near Ganley Harbour.

The initial success of a few men proved a strong lure for others, and stations mushroomed along the eastern shores. In 1869 Mr. Post was conducting a "large business" at Parisienne Island, shipping his fish to Point aux Pins station for packing in ice (Canada. Department of Marine and Fisheries 1869; Drew and Littlejohn 1975). Point aux Pins boasted a dock and for many years had supported ship-building facilities. (The first shipyard was begun by Alexander Henry in 1770, and for a time the place was known as Fort Gloucester; Sault Star Feb. 22, 1938).

Through a series of market manipulations and business aquisitions in the late 1890's, the A. Booth Packing Co. grew into the strong arm of a "fish trust" and assumed virtual control of the fisheries of Manitoba and the Upper Great Lakes. The Georgian Bay Fish Company of Collingwood became an early subsidiary. (Its original founders, John and Charles Noble, obtained interests on Lake Superior as early as 1885; see section 2.2.3). Soon Booth purchased the Wiarton-based Dominion Fish Co., placed it under the management of the Nobles, and extended that company's operations throughout Lake Superior. Thus was Booth able to orchestrate the future of the lake's fisheries under the guise of a company incorporated in Canada (in 1899; Anon. 1917).

By 1905 Booth similarly controlled the Norman Fish Co., of Norman, Reid and Tait Fish Co. (Detroit), the Transfer and Cold-storage Fish Co. (Detroit?), D. McLeod (Southampton), the Selgerson Bros. and Manitoba Fish Co. (Selkirk, Manitoba), and the Buffalo Fish Co. (Goderich), representing, all told, a capital of 5.5 million dollars and annual sale of 100 million lbs. of fish (Sault Star. March 16, 1905). Small companies were a poor match for the combine. Securing support from the state of Michigan in 1904, the Wolverine Fish Co. of Detroit invoked anti-trust laws in both state and federal courts in an effort to curtail A. Booth and Co.'s operations. Failing in its bid, the Wolverine Fish Co. was itself incorporated by Booth two years later (Anon. 1917, 1929). It should be noted, however, that even Booth itself was not immune to the vagaries of the economic climate:

> "The fish and oyster firm of A. Booth and Co. was placed in the hands of a receiver Thursday afternoon. The petition asserts that the liabilities are $5,500,000 and the assets $8,000,000. The troubles of the company are alleged to be due in large measure to the inadequacy of the capital, coupled with the financial depression last fall. Concident with the receivership proceedings an attachment for the funds of the company was secured Thursday by an attorney representing the Girard National Bank of Philadelphia, on claims of $35,000". (Sault Star Sept. 17, 1908).

The embarrassment passed, A. Booth and Co. was reincorporated as the Booth Fisheries Co. on May 11, 1909, and the predation of smaller firms continued. (Table 2 reproduces Anon.'s (1917) list of the company's holdings).

TABLE 2

Few eastern Lake Superior fishermen survived independently of A. Booth and Co. and its subsidiaries. Such opportunistic pursuit of the industry extended stations beyond Michipicoten Bay and northward along the coast-line of present-day Pukaskwa National Park. In addition to its Quebec Harbour base, Booth maintained a major encampment at Gargantua Harbour (under the name of the Dominion Fish Co.). Coleman (1899) writes:

> "...[it] affords good shelter for fishing boats and the small steamers used in the fishing trade, including the Telegram, and could accommodate vessels of a much larger class."

Dog Harbour also boasted a small pier and storehouse, and a few shanties flanking the shore.

Around 1893 William Richardson established a base camp at Richardson Harbour and began fishing both pound nets in Michipicoten Bay and gill nets about Otter Head (Canada. Department of Marine and Fisheries 1894-1898b). Richardson station supported thirteen men and five small

Table 2. Companies whose entire capital stock was owned by Booth Fisheries Co. in 1917.

Company	Where Incorporated	Date of Incorporation	Duration	Capital Authorized	Capital Issued
Booth Cold Storage Co.	Illinois	Mar. 6, 1912	99 years	200,000	200,000
Booth Fisheries Co.	Massachusetts	June 14, 1909	Perpetual	15,000	15,000
Booth Fisheries Co.	Michigan	June 19, 1909	30 years	20,000	20,000
Merchants Cold Storage Co.	Michigan	Mar. 1, 1906	30 years	300,000	150,000
The Wolverine Fish Co.	Michigan	Apr. 7, 1906	30 years	30,000	30,000
Booth Cold Storage Co.	Minnesota	May 4, 1914	30 years	15,000	15,000
Midland Cold Storage Co.	Minnesota	May 18, 1905	30 years	400,000	400,000
Twin Cities Cold Storage Co.	Minnesota	Sept. 2, 1911	30 years	15,000	15,000
U.S. & Dominion Transportation Co.	Minnesota	Sept. 9, 1909	30 years	15,000	15,000
Central Fish Co.	New York	- - - - - -	Perpetual	100,000	100,000
The Booth Fisheries Co.	Ohio	Sept. 7, 1912	Perpetual	200,000	200,000
Booth Fisheries Co.	Tennessee	June 22, 1909	Perpetual	15,000	15,000
Booth Fisheries Co.	Utah	June 14, 1909	100 years	15,000	15,000
Anacortes Fisheries Co.	Washington	Apr. 15, 1915	50 years	1,000,000	1,000,000
The Chlopeck Fish Co., Inc.	Washington	Dec. 22, 1913	50 years	1,000	1,000
Northwestern Fisheries Co.	Washington	Mar. 29, 1905	50 years	1,000,000	1,000,000
Armstrong Trading Co., Ltd.	Manitoba, Canada	July 21, 1908	Perpetual	300,000	300,000
Dominion Fish Co., Ltd.	Dominion of Canada	July 21, 1899	Perpetual	200,000	100,000
Dominion Transportation Co.	Ontario, Canada	Oct. 26, 1909	Perpetual	15,000	15,000
M. Doyle Fish Co.	Ontario, Canada	Jan. 31, 1905	Perpetual	20,000	5,000
Winnipeg Fish Co.	Manitoba, Canada	Oct. 19, 1909	Perpetual	40,000	40,000
Booth Cold Storage Co.	Missouri	Dec. 30, 1915	50 years	500,000	250,000
Booth Fisheries Co. of Canada, Ltd.	Dominion of Canada	July 4, 1916	- - - - -	1,000,000	1,000,000

(From Anon. 1917).

boats in 1893, although Coleman (referring to the site as Killarney or Kilkenney Harbour) found it deserted (Canada. Department of Marine and Fisheries 1893; Coleman 1899). Soon business resumed, and between 1900 and 1915 one or two tugs would land an annual average of 5970 kg (13,160 lb) of whitefish and 90,810 kg (200,200 lb) of lake trout (as calculated from data available in the Department of Marine and Fisheries reports).

In the established tradition of centuries, the Pukaskwa River and flats were a gathering place for Indian fishermen during the fall months (Coleman 1899; Bell 1905). Commercial fishermen also prospered here, and in 1892 twelve men with four boats and 14,600 m (16,000 yd) of gill net procured 32,700 kg (72,000 lb) of lake trout. The ease with which the large yellowfin lake trout were snagged and netted in the shallow pools of the river proved an unavoidable temptation for many poachers (Goodier 1981).

Seasonal fishermen stationed at Michipicoten Island would occasionally erect temporary shelters on the isolated and windswept shores of Caribou Island (Coleman 1899). Here Canadian gill nets frequently became entangled with the hooks and lines of those American poachers attracted to the trout-rich banks situated so conveniently close to the international border.

The Whitefish Bay area supported numerous small-time fishermen equipped solely with sailboats and a few boxes of net. At the turn of the century, several houses stood on South Lizard Island (known for a time as Fishing Island), while three km. north

of Corbeil Point was the steamboat landing and fishing station of Batchawana:

> "The village is not a savory one, since the offal of fish is dumped not far off, forming a perpetual attraction to gulls and crows; and the idle horses of the lumbermen roam the point at will." (Coleman 1899).

In 1904 there were employed at Batchawana 25 men with two tugs, at Gargantua sixteen men with one tug and two sailboats, at each of Richardson and Michipicoten harbours fourteen men with one tug and and one sailboat, and at the Lizard Islands fifteen men (Duncan 1899).

With a population in 1893 of 150 people, Goulais Bay boasted its own fish dealer, William Scott (Might Directories 1893). Ten Indian boats fishing 12,800 m (14,000 yd) of gill net, supplied both local concerns and Booth with fish from Goulais Bay. The fish company in turn paid for the one dollar licenses and supplied all gill nets, a practise promoting frustration among many non-native fishermen who were forced to pay a ten dollar boat license (Duncan 1902; Ainsworth 1902). With the decline of the fur trade, Indians along the entire shore of Lake Superior turned to employment in the seasonal fisheries. Between the distracting activities of these two commercial enterprises, many native families lost their traditional lifestyles forever (Borron 1895; Bell 1905).

Despite the impetus Booth, as chief buyer, gave to fisheries development, its presence often frustrated the free enterprise of Canadian citizens. Allegations against the company were voiced by government officials and fishermen alike but seldom forced any action:

> "Mr. Duncan deplores the fact that most of the fisheries of his large district are controlled by a powerful syndicate of United States citizens, who keep the earning rates of our Canadians at a minimum... The supplying of nets by this rich and obnoxious syndicate to our fishermen seldom turns to their advantage, as the cut rates in fish leaves a very small balance to the individual fishermen at the end of the season. The result is that, in order to live, they fish many more nets than licensed for. He regrets to see the perilous toil of our fishermen wasted for the benefit of foreign capitalists." (Canada. Department of Marine and Fisheries 1901).

Other areas of contention arose. Despite the active trade, citizens of Sault Ste. Marie, Ontario were ill-supplied fresh fish. Exports of Canadian-caught fish from eastern Lake Superior totalled 95 percent in 1899, and reportedly only fish of inferior quality found their way back to the town's consumers. On each pound there was levied a total duty of 1 1/4 cent (Ontario Department of Lands and Forests 1899; Sault Star July 14, 1910). Local discontent, petitions from the Board of Trade, and fears that Canadian waters of southeastern Lake Superior could face depletion (as had American waters) led in 1905 to the cancellation of the Dominion Fish Company's tug licenses south of Mamainse, thereby limiting the use of these waters to local fishermen. In addition, the Lizard Islands grounds were set aside as a preserve; when reopened to gill nets in 1911, there had apparently occurred a resurgence of stocks which previously had been described as dwindling (Ontario Department of Game and Fisheries 1911).

Prior to 1910 Leo Hussey established a company in the Soo, and in the late 1920's John Hussey maintained two tugs and a large gas

boat at Gargantua under the name of the Soo Fish and Trading Company (Ontario Department of Lands and Forests 1925-1934; Mr. G. Agawa, pers. comm. 1978). In 1910 Frank Sullivan also submitted a $12,000 proposal to establish a fishing plant in town. Although his promise to supply the local populous with fish was applauded by the Board of Trade, the fate of his venture is not known (Sault Star Sept 29, 1910). Yet another firm, the Algoma Fish and Oysters Trading Company, entered the trade under management of Mr. Clarke. While maintaining his Lizard Island Station, Clarke and the Ganleys fished actively at Gargantua after 1911 and in 1918 constructed an ice house at Agawa Rocks (Bay); the company was probably disbanded during the 1920's (Bussineau 1915-1927; Macdonald 1979).

About 1890 J. Lapointe moved to Spanish from Bay City to pursue his avocation on Lake Huron. Some of his five sons carried the family name to Lake Superior. Prior to obtaining his own Havilland Bay license, Frank Lapointe worked for the Algoma Fish Company at Agawa. During the 1920's he and his brother Joseph represented the major pound net interests of the east end. Twelve licenses (held in 1930) permitted pound nets to be erected at Gros Cap, Parisienne Island, Agawa Bay, Michipicoten Bay, Point Isacor, and the Bear, Dog, and Pukaskwa rivers (Ontario Department of Game and Fisheries 1925-1934). The catch was sold in part to the Booth Fisheries Co. Around 1924 Booth maintained a 600 ton-capacity ice house (with shed) at Batchawana Bay, as well as houses at Gargantua (450 tons) and Michipicoten Island (360 tons; Booth Fisheries Company 1923-1933).

PHOTO 5

The 1930's were increasingly difficult years for Lake Huron fishermen caught in the crunch of too many people in competition for declining resources. The lure of Lake Superior was strong, and many chose to shift their operations to these northern waters. An important addition was James Purvis and Son, Ltd. Established in the North Channel fisheries since 1879, the Purvises eventually settled at Gore Bay on Manitoulin Island. James Purvis's first introduction to Lake Superior was in 1933, when he obtained a license to fish herring and chub in Thunder Bay: 117 tons were taken that summer. Twelve boxcar loads were frozen and shipped from Port Arthur to Buffalo (Mr. I. Purvis, pers. comm. 1979).

James Purvis purchased the Booth Fisheries Company tug "Flagship", one of the largest on the Great Lakes with its 90 foot length and 18 foot beam. In 1934 he obtained rights to Booth's station at Quebec Harbour, and the "Flagship" joined the "Captain Jim" in the Lake Superior trade. Booth had not actively engaged in the east end fisheries since 1932; inadequate management and depressed market prices have been variously blamed for its failure. Bankruptcy resulted, but a New York bank supported all assets, and the corporation flourishes today as a major purveyor of ocean fish (Mr. I. Purvis, pers. comm. 1981).

The lean years prior to World War II passed, and soon Ivan Purvis built a successful operation by exploiting new grounds and opening new markets. Two gas boats were employed (one of which caught fire near Ganley Harbour in 1936), along with four tugs

licensed for a total of 220,000 m (240,000 yd) of gill net. Each of three tugs would fish up to seven gangs (9.3 km.) of 11.4 to 14.0 cm mesh net, and one tug would act as freight boat. During the peak years, a crew of almost forty hands and their families were stationed at Quebec Harbour.

In the 1930's Purvis's tugs began to make the 110 km run from Quebec Harbour to Superior Shoal in search of lake trout. The largest single lift was obtained in July, 1946 when two gangs of net (with 4,390 m to a gang) yielded 3,440 kg (7,580 lb) of trout (James Purvis and Sons Ltd. 1934-1955).

A high proportion of offshore shoal fish were siscowets or fat lake trout (*Salvelinus namaycush siscowet*). Pioneering new markets in Chicago, Brooklyn, and Philadelphia, Mr. I. Purvis (pers. comm. 1979) shipped fat trout in fresh (for later smoking in the United States) or pre-prepared form:

> "They were so fat that if you were to hang a dressed trout up on a tar-papered building it would render out to skin & bones in the sun. You couldn't cook them because you ended up with fat oil - fish oil. That's why they were smoked in a high building so they wouldn't render out."

The smoke-house described by Mr. Purvis was a four-story building where salted fish were suspended on poles at least two stories above the fire. When ready the fish were taken down and:

> "...sliced up in a slicer that would cut them off into pieces about 1/8th of an inch thick; they were put into [square] tin cans...with a loose lid, for the Jewish fish companies. And they would put them between a couple of slices of bread and butter and that was their sandwich."

For a number of years during World War II, fat trout oil served as a valuable and heat resistant lubricant in the steel-making process (Mr. L. Morden, pers. comm. 1978).

In the 1930's Alexander Mitchell retired from his position as lighthouse keeper at Parisienne Island, moved to Goulais Bay, and began a family fishing business (which his grandson today continues in Sault Ste. Marie). Gino Nori established a fishery at the Lizard Islands in 1936 with a 21,950 m (24,000 yd) gill net license, soon expanded to Mamainse, and opened the City Meat Market of Sault Ste. Marie. During World War II, amenities at the Lizard Island station included a church and a poolroom (Mr. G.A. Jones, pers. comm. 1981).

The war-time boost in market prices drew new fishermen into the industry. In 1944 Daniel and Jack McKay obtained licenses for 54,860 m (60,000 yd) of net in the Gargantua Harbour area, and Carmine Talarico purchased a 21,950 m (24,000 yd) license for Richardson Harbour (Ontario Department of Lands and Forests 1935-1944). After the war, Talarico's camp at Old Dave's Harbour (Otter Head) supported 20 people, including the crew and their families. Twice weekly his two fish tugs would travel as far as Montreal River (Wicks 1951).

Harold Lund acquired the Noris' fishery in the early 1950's. Ralph Gauthier bought Talarico's outfit in 1959 and so began the Mamainse Harbour Fisheries, Ltd. In 1967, eight years after purchasing the licenses of James Purvis and Son, Ltd., Ferroclad

Fisheries also became owners of Gauthier's plant at Mamainse. This company continues to operate from Mamainse Harbour and remains one of the largest Canadian companies on Lake Superior.

2.2.2 PORT COLDWELL (COLDWELL)

Like so many small northern Ontario towns, Port Coldwell sprang up as a station along the newly completed C.P.R. line. Although the village's "raison d'être" lay in its valuable position as a railway supply depot, it became evident that the snug harbour was also ideal for sheltering fishing boats.

The pursuit of the fisheries began around 1880 when Ben Almos entered into partnership with a Frenchman named LeSarge. (Almos subsequently moved to Jackfish and became one of the first fishermen in that village; see section 2.2.3). Around 1887 T.B. VanEvery brought his entrepreneurial talents to Port Coldwell and in 1889 erected a large ice house (with freezer), employing six boats and crews to fill it (Fort William Journal and Thunder Bay Mining News June 15, 1889). Catch records from these early years are, unfortunately, not recorded. The Algoma Miner and Weekly Herald (Oct. 20, 1888) anticipated, somewhat over-optimistically, that the success of VanEvery's enterprise would double the north shore fish trade inside of two years. Nevertheless, it is apparent that grounds in the immediate vicinity of Port Coldwell yielded VanEvery abundant produce, which he "shipped all over" by rail. A fleet of 11 or 12 boats docked at the harbour, and a small station was maintained on nearby Detention Island (Anderson 1889).

Six men (possibly residents of Port Coldwell) employed three small boats at Peninsula Harbour in 1887 (Canada. Department of Marine and Fisheries 1887). The population of Peninsula had already risen to 200, when fisherman D.B. Hawkins relocated from Port Coldwell in 1892; Hawkins Island still preserves his name. The Department of Marine and Fisheries reported the station's total production for 1896 as approximately 18,140 kg. (40,000 lb.) of whitefish, lake trout, pickerel, and sturgeon.

The northeastern portion of the lake seems to have been especially attractive to fishermen each fall. Without a steam tug, overseer Joseph Wilson was powerless to prevent the numerous unlicensed fishermen working the waters about Port Coldwell and Peninsula (Canada. Department of Marine and Fisheries 1889).

South of Peninsula and the traditional Indian grounds at Heron Bay and the Pic River, the coast becomes so rugged and exposed that early fishermen tended to avoid the area. In 1892 no one fished between Otter Head and Peninsula Harbour (Canada. Department of Marine and Fisheries 1892). Coleman (1899) still found a deserted shore between Ganley Harbour and Heron Bay, and at Spruce Harbour there was:

> "...a well sheltered bay, once a fishing station, but the frame houses, pier, and storehouse are now abandoned."

By the 1890's Port Coldwell had become a regular port of call for the Beatty and Collingwood line of steamers. The village population was growing, but it is difficult to uncover details concerning new arrivals; some must remain anonymous. Directories for 1892 list

eight resident fishermen and the firm of "VanEvery and Co." (Case and Co. 1892; Might Directories 1893). Fishing in the vicinity of the village in 1894 were M. McInnes and A.B. Sutherland with their tug "Ida", and Robert Jackson and A. and John Morrison with the tug "Orcadia" and a hired crew of five men. These fishermen also introduced pound nets to the area and, along with John Kerr (formerly of Port Coldwell), fished seven nets east of the village in 1896 (Canada. Department of Marine and Fisheries 1894-1898a; Duncan 1899). Federal government reports indicate that the average annual catch from two tugs and two boats between 1895 and 1897 was 13,060 kg (28,800 lb) of whitefish, 100,470 kg (221,500 lb) of lake trout, and 2040 kg (4500 lb) of sturgeon.

The pace of settlement accelerated after 1900, and by 1904 the fisheries employed 14 men (Duncan 1904). From Port Burwell (Lake Erie) came Captains Foster and E.D.M. Titus, soon to become the first owners of an ice-making machine on Lake Superior (Cron 1978). One of Captain Titus's earliest employees was A.W. Nuttall, subsequently a pioneer of the Black Bay fisheries, and eventually fisheries overseer for northern Lake Superior (Mrs. N. Thrower, pers. comm. 1978; see section 2.2.5). The pre-World War I years also brought William Dampier (fishing from Heron Bay and Port Coldwell around 1900), Charles Miller, Allan and Donald Murray, and Charles "Tink" Winterton (Mountain 1976). In the year 1911 only, many Rossport fishermen also chose to fish from Port Coldwell; George Gerow, for example, maintained a camp at Morrison Harbour

(Mr. F. Legault pers. comm. 1978; see section 2.2.4). Prior to the organization of the Nicoll Brothers Fish Company in 1915, fishermen sold their catch to the Dominion Fish Company and the Nipigon Bay Fish Company (Rossport). The arrival of the Nicoll brothers (Thomas, Charlie, Fred, Jack, and Frank) from Collingwood, galvanized the Port Coldwell industry into a new period of growth.

PHOTO 6

Mountain's (1976) study of Port Coldwell constitutes a chapter in The Inhospitable Shore, a component part of a natural and cultural history study of Neys Provincial Park. Based primarily upon interviews with three old-time residents of the town, it assembles details concerning the operations of the Nicoll Brothers Fish Company. For the purposes of the present report, therefore, it will be sufficient to summarize briefly and to introduce a few salient additions and modifications.

The company was the life force of the town until the late 1950's and the arrival of the sea lamprey. The Nicolls proved to be shrewd businessmen. By employing new fishing innovations and actively seeking new grounds, they increased production. By offering fair prices and opening up new markets, they elicited the support of other local fishermen.

In the early 1920's, the brothers directly held licenses for 46,600 m (51,000 yd) of gill net, increasing this number to 76,810 m (84,000 yd) in 1929. In addition to a number of pound net licenses (fished between Port Coldwell and the Otter Head), they also held special licenses for hooks and hoop nets; rare

equipment for the Canadian waters of Lake Superior (Ontario Department of Lands and Forests 1925-1934).

The "Bessie M" was the first Nicoll tug, the "Coldwell" the second; both were vessels of 75 tons. After the "Bessie M" sank it was replaced by the "Strathbelle" (formerly the "LaSalle"), and the smaller "Nigig" was acquired somewhat later to replace the "Coldwell" (Mr. F. Legault, pers. comm. 1979). The "Iris" belonged to Harry England (and not to the Nicoll brothers as stated by Mountain 1976), who may have begun fishing before 1920. He held a license for 21,950 m. (24,000 yd.) of net and sold his fish to the Nicoll Bros. Fish Co.

In the 1920's gill net licenses restricted fishing to the general vicinity of Port Coldwell. By the 1930's the burgeoning industry was finding the home grounds incapable of always filling the nets, and a sort of "pioneering spirit" developed as tugs sought more distant waters. In quest of lake trout, the Nicolls dispatched their tugs southward toward the Otter Head, stopping to set nets at Morrison Harbour, White Gravel River, Simons Harbour, and Oiseau Bay. Names such as Nicoll Cove and Gid's Harbour (near Oiseau Bay) preserve the memory of the company's presence. Occasionally a Nicoll tug would journey as far as Michipicoten Harbour, although the usual range was eighty km (a distance which still necessitated that one or two nights be spent sleeping on the cold deck of the Strathbelle). To the west, Port Coldwell fishermen met those from Jackfish when setting nets along the Slate Islands in the fall of the year.

During World War I the Nicoll Bros. established a number of markets for siscowet lake trout, and Coldwell's trade in this breed became, for awhile, quite lucrative (Nicoll 1917). From the Pic, Jackfish, and Spruce Banks, siscowets were brought ashore to be filleted and smoked for the Jewish trade.

Among the first tugs to visit Superior Shoal after its "official" discovery in 1929 were the Iris and Strathbelle. Despite some colossal lifts of fish (almost 4400 kg on one occasion), the shoal was visited infrequently after it became apparent the resident siscowets were fatter than those preferred by the markets. By the 1940's the 88 km trips had been discontinued (Mr. I. Johnson, pers. comm. 1979). Previously, the Nicoll tugs had participated in transporting tons of dynamite, a scheme designed to demolish the top of the shoal and so reduce the hazards to shipping. Reportedly, the result was equivalent to attempting to destroy a brick wall with a shotgun; feasible perhaps but not worth the price of the bullets.

Mrs. M. Cress (pers. comm. 1978) recalls that catches remained excellent until 1952; the production losses in the following years were dramatic, however. The death of Gideon Nicoll (Thomas Nicoll's son) in 1954 led to the sale of the company to Moffat and Maclean in 1956, and subsequently to the Penti family, who operated it under the name of Coldwell Fisheries. Neither group of owners found it to be a profitable venture, and the Port Coldwell fisheries ceased entirely in the 1960's. Today six houses

are left standing in the town, but only one family remains on a permanent basis. One or two fishermen continue to dock their boats in the harbour.

2.2.3 JACKFISH

The Department of Marine and Fisheries records a fishing station at Jackfish as early as 1876, and fishermen were already well established when Ben Almos and his brothers John and Fred arrived in the 1880's (Mr. A. Almos pers. comm. 1979). The "large" fishing industry of Jackfish, noted by the Algoma Miner and Weekly Herald (Oct. 20, 1888), grew even larger in 1889 when the ambitious Alex Clarke of Collingwood "built a set of fishing houses" (Fort William Journal and Thunder Bay Mining News June 15, 1889). A. Alexander, John Kerr, Ben Almos, Paul Almos, Alex Olsen and Co., and H. Anderson and Co. were pound and gill net fishermen in 1894, their numbers augmented by Jacob Hendricks in 1897 and Peter Dahl, Sr. in 1900 (Canada. Department of Marine and Fisheries 1894-1898a; Dahl 1921). However, according to Dominion Fisheries Commissioner, Prince (1896):

> "...the fishing has never been very extensively carried on upon this part of Superior, partly because the coast is very rocky and stormy and partly because in former years very destructive and wasteful fishing was pursued by U.S. poachers and the supply was seriously depleted."

Tugs were not a feature of the Jackfish fishery, which was conducted mostly from rowboats and later gasboats. A single rowboat fishermen equiped with 7,320 m (8,000 yd) of net harvested, on the average, 5,900 kg (13,000 lb) of lake trout annually (Mr. A. Almos, pers. comm. 1979).

By 1900 a brisk commerce in fish had developed with the crews of the steamboats which landed regularly at the C.P.R. coal loading docks. Ben Almos's sales book for the year 1905 records rail shipments to Toronto and the Leonard Brothers Fisheries of Montreal, as well as local sales (to the Boarding House commissary, which fed the boat crews, Harris's abattoir, which ran a catering firm, and Crowley and McCracken's restaurant; Mr. A. Almos, pers. comm. 1979). Other buyers of Lake Superior fish included the Waldman, Main, and White Fish Companies of Toronto and Montreal, and the Matheson Fish Co. of Sault Ste. Marie, Michigan. Between 1895 and 1898 an annual average of 14,500 kg (32,000 lb) of lake trout and 6,030 kg (13,300 lb) of whitefish were landed from the Jackfish Bay area (Canada. Department of Marine and Fisheries 1895, 1896, 1897, 1898).

The Slate Island grounds enjoyed an early and well-deserved reputation for excellence. Geologist Selwyn (1885) found an old abandoned (fishing?) wharf on the east end of Patterson Island. In 1884 and 1885 John and Charles Noble, managers of the Georgian Bay Fish Company (see section 2.2.1), obtained gill net licenses for the islands and proved themselves to be most extravagant and wasteful in their fishing methods:

> "The fishing on these islands was formerly leased to Messrs. Noble who grossly abused it, and for many years it was practically worthless. The Department has applications from C.W. Gauthier [manager of the Detroit Fish Co.] and others but as there is ground for believing that these applicants would simply destroy the fisheries in the same way that the Nobles did it was decided not to grant any license in the future." (Prince 1897; also see Kerr 1860-1898: Feb. 13, 1886).

Barlow (1886) makes special reference to the enormous quantities of trout removed from the islands and environs.

Originally, the Slate Islands were privately leased to Lieutenant Governor Patterson of Manitoba (Prince 1897). Arriving in Jackfish in 1938, David Hendrickson shared the island grounds with Peter Dahl, Jr., fishing the western side and establishing his camp on McColl Island. Realizing the value of the shoal waters as spawning grounds for whitefish and lake trout, the Ontario Department of Lands and Forests imposed a surrounding one mile closed area in 1969.

During the peak years of the 1900's, approximately forty families lived in Jackfish. After 1915 gasboats only were employed in the fisheries. Throughout the 1930's and 1940's three gill net fishermen, sons of original settlers, were permanent residents of Jackfish, while a number of Port Coldwell and Rossport fishermen also held trolling licenses for Jackfish area waters. Mr. A. Almos (pers. comm. 1979) recalls the years 1940 to 1948 as most profitable. The Jackfish trout derby was a popular event during this period, drawing sportsmen from many parts of Ontario and the United States.

The conversion of the C.P.R. trains from coal to oil, in conjunction with the decline of the fisheries through sea lamprey predation, dealt a death blow to Jackfish. Today only building foundations mark the townsite. Additional historical details are to be found in Mercier et al. (1973) and Poole (1976).

2.2.4 ROSSPORT

During the infancy of the north shore fishing industry, inhabitants maintained a tenuous contact with the outside world and must often have endured a profound sense of loneliness. Although the fishery at Pays Plat Bay was still controlled by the Hudson's Bay Company in the 1870's (Kerr 1860-1898: Nov. 21, 1871), other fishermen arrived from the south and established scattered and meagre camps on the islands south of Nipigon Bay. Osler (1868) encountered fishermen at St. Ignace Island (and here also found the lighthouse keeper's wife suffering in the later stages of consumption). Their fish may have been transported by the steamer "Algoma", which periodically stopped at St. Ignace Harbour (Devine 1864). Prior to the construction of the C.P.R. railway, it was not unusual for steamers to call only twice a year at remote stations; salt, sugar and empty barrels were brought each spring, and barrels full of pickled fish removed each fall (Mr. G. Gerow, pers. comm. 1981).

Fluor Island was attractive to both miners and fishermen:

> "...a good storehouse for provisions and a good sized cabin have been built on the premises at the extremity of an excellent harbour which constitutes a valuable fishery." (Anon. 1873)

During the 1870's the island was frequented by fishermen of at least two different Indian bands, totalling 38 men and 19 small boats in 1880 (Canada. Department of Marine and Fisheries 1880).

Four months of each year, nearby Bowman Island was the home of William Boon of Barrie, Ontario:

> "Mr. Boon...has built and is this winter [1877] filling a large ice-house on the small island for his own use and that of any visitors who may fish in the neighbourhood next summer. Mr. Boon took five hundred half barrels [2,270 kg.] of choice fish on these grounds last season..." (Thomson 1883)

Also engaged in north shore fishing was Andrew Dick. In 1877 Mr. Dick was required to tend the new Battle Island light prior to the arrival of Charles McKay, its permanent keeper and pioneer resident of McKay's Landing (renamed Rossport in 1885).

PHOTO 7

PHOTO 8

Quitting Toronto in 1881, George Gerow moved his family to the Bowman Island station and sold fish to the John Leckie Co. of Toronto (Todesco 1967). Although most fishermen broke camp each fall and returned to less isolated settlements, Gerow spent winters on the island and here raised a large family. Around this time Atanos "Harry" Legault, accompanied by three other fishermen native of the Montreal area, established an island base at a place later to be called Frenchmens Harbour (south of St. Ignace Harbour?; Mr. F. Legault, pers. comm. 1981).

Mineral explorations led to the erection of an early settlement at Chummy Harbour (Salter Island):

> "...a wharf was built at Harrison's Landing out into sufficient depth of water for schooners and steamboats to come alongside with freedom and safety. Two dwelling houses, a store-house, blacksmith's shop and large baker's oven were substantially built, in order to afford necessary facilities for future operations." (Anon. 1873)

Fish production for the years 1867 to 1887 is recorded by the Department of Marine and Fisheries reports; five to eight men employed two and three boats in the average annual harvest of

15,200 kg (33,500 lb) of whitefish and 37,100 kg (81,800 lb) of lake trout. The reports also indicate stations at Wilson Island (1877), Copper Island (1884 to 1886), Simpson Island (1877, 1883), and Fluor Island (1876 to 1881).

The village of Nipigon bustled with activity as it entertained scores of sportsmen seeking the reknowned brook trout of the Nipigon River. Commercial fishermen also found the settlement well located as a base for bay fishing, and in 1877 the O'Malley Brothers (an American concern of the south shore) exported nearly 68,000 kg (1,500 half barrels) of fish on their schooner the "Mary Ann Hurlbert" (Thunder Bay Sentinel Dec. 6, 1877). The Thunder Bay Sentinel (Nov. 1, 1877) also notes:

> "...that a Company is being organized in...[London, Ont.]...with liberal capital to commence the capturing and curing of fish somewhere near Nipigon, Isle Royale, or Thunder Bay, next season. The nets, boats, etc. will be arranged for in due time, and reliable men employed to prosecute the work with vigour. Capt. Singleton has been applied to for advice and may, possibly, be engaged in that calling next season."

The shoals at the Black River (now dammed to create the Aquasoban River) were also popular among the fishermen of the Nipigon Bay area. Over 100 years ago, a provincial geologist praised the site:

> "The mouth of the Black River affords one of the most esteemed fisheries upon the lake, and has long been the resort of neighbouring Indians during the proper season. Our own little net, scarcely twenty yards in length, supplied us abundantly, and a little surplus. The fish here taken are the speckled and salmon trout, white fish, siscowit, pike and herring. The labour of one or two men, during the first run, would supply a large settlement with most excellent fish...." (Anon. 1872).

With the completion of the C.P.R., more settlers arrived to make Rossport station their permanent home. William Mallot, for example, established a small fish company and store, and after his death by drowning in 1887 his family continued the business. The 1893 population of Rossport was 100 people, and by 1895 there were twelve fishing licenses held at Rossport, one at St. Ignace Harbour (by B. Woolard), and five at Nipigon (Might Directories 1893; Canada Department of Marine and Fisheries 1894-1898a).

By 1889 the Port Arthur Fish Company had erected a fish house at Rossport (see section 2.2.5; Port Arthur Illustrated 1889). Its parent company, the A. Booth Packing Co., engaged in tactics designed to force inroads further into the Rossport industry. A letter to its Port Arthur representative expressed Booth's desire to raise the price of fish at the expense of the recently established Rossport Fish Company, adding that this was "liable to stir up a great deal of strife" (Turner 1894).

The establishment of several small independent firms in the 1890's provided local fishermen with alternate places of sale and in part thwarted Booth's attempts at monopolization. R.J. Smith took charge of the Rossport Fish Co. in 1900, but it survived only a short period of time and is absent from Henderson'Directory Co.'s (1907) business listings (Daily Times Journal May 4, 1900). Obtaining a license to fish outside the Rossport islands in 1894, John Bowman also acted as a buyer of fish. Shortly after 1900 he expanded his business to Port Arthur and in 1918 entered the fish trade on Lake

Nipigon. Similarly, Thomas Craigie began fishing at Nipigon in 1895, moved to Rossport the following year, opened a fish store in Fort William in 1910, and in 1916 finally formed the Fort William Fish Company, which also supported a boat on Lake Nipigon (see section 2.2.5; Ontario Department of Game and Fisheries 1910; King n.d.). At the turn of the century there resided eighteen fishermen at Rossport and nine at Nipigon.

J.A. Nicol, formerly employed by the Canadian Pacific Railway at Heron Bay, assumed the post of Rossport station master in 1896. Excited by the profit potential of shipping fresh fish eastward by rail, he erected a small ice house and entered the industry as a buyer. Not content to remain a mere middleman, around 1908 he built two large waterfront buildings, 1600 m and 320 m square (Daily Times Journal Aug. 19, 1958). Gradually Nicol acquired the license rights of many of the thirteen members of the Rossport fishermen's cooperative. Thus, from a modest start, his Nipigon Bay Fish Company grew to be one of the major enterprises along the north shore and actively competed with A. Booth and Co. By 1940 the company was able to ship a boxcar load of fish daily, drawing on the produce of stations as far away as Magnet Point (Mr. C. MacMillan, pers. comm. 1978).

PHOTOS 9 to 12

PHOTOS 13 to 22

In 1916 there were at least 22 fishermen at Rossport equipped with seven steam tugs (McNab Nov. 24, 1916). A cooperative spirit tended to exist among the Rossport fishermen, and, on the whole, J.A. Nicol was a well-respected employer. Problems and disagree-

ments were usually resolved by the same equitable treatment displayed during the fishermen's strike of September, 1922 (Nicol 1922). A few men chose to fish independently, however. In 1915 John Paulmart and his three sons constructed a packing house and began shipping fish under the name of the Independent Fish Co.; it survived into the 1940's.

The town's sawmill provided fish boxes not only for Rossport, but also for other north shore towns and Macdiarmid. The mill begun by Atanos Legault on Salter Island in 1910 was subsequently owned by the Molinski brothers, who endured two fires before they shifted operations to the main shore. The mill's crumbling ruins may still be seen on the eastern edge of town (Mr. F. Legault, pers. comm. 1981).

After J.A. Nicol's death, his son Maurice continued to manage the Nipigon Bay Fish Company until its closure in 1953. In 1958 its two large buildings (which had been leased to the Fisheries Research Board of Canada) were leveled by fire.

PHOTOS 23 to 24

The 1960's saw the loss of another mainstay of Rossport's economy. Begun in 1938, the Rossport Derby still attracted 1,228 boats during the period of lake trout collapse 20 years later. The record catch was made during the first derby: an 18.8 kg (41.5 lb) lake trout (Lowe 1957).

2.2.5 THE LAKEHEAD AND WESTERN LAKE SUPERIOR

Despite the deterioration of the fur trade, Fort William's fisheries continued to be lucrative and sent 733 barrels of fish to

Detroit in 1857 (Gibbard 1860). In 1866 Fountain (1904) found it to be:

> "...a great fish-curing depot, and this trade seems to give it all its importance."

Fountain describes the local curing process, whereby whitefish and trout were split, salted, and left in the sun to dry.

The stations utilized by the Hudson's Bay Company (including Caribou, Hare, Pie, Shangoina, and Welcome islands, and Thunder Cape) remained popular during the 1860's and 1870's (Goodier 1981). Each fall, fisheries were extended as far afield as Victoria and Spar Islands to the south, and Shaganash Island and Roche Debout Point on the Black Bay Peninsula (Canada. Department of Marine and Fisheries 1875). Porphyry Island was also an appealing site:

> "We found Sir George [Simpson, governor of the Hudson's Bay Co.]'s camping ground on a small island prettily situated off [Porphyry] Point. There were alot of old empty fish barrels there, and the remains of wigwams, lodges, canoes and sweat house." (Stevenson 1865).

In western Lake Superior, as in the east, the development of fast efficient steam traffic acted as a catalyst for the fresh fish trade. As previously noted in section 2.2.1, the "Rescue" was an early transport vessel of the late 1850's

> "...Black Thunder, Neepigon Bay, and Pie Island bay, and neighbourhood, abound in whitefish and trout - 10 fish frequently fill a barrel - 20 as a general rule: nets should be 5 1/2 to 7 1/2 inch mesh. Our pilot [Alex Clarke], two years ago, in five weeks, with two men filled 175 barrels. He was furnished by merchants at the Saut with barrels and salt and $5.00 when returned full- the rate this year being about $4.00. Thirty barrels of whitefish were taken at one haul of a seine near Fort William." (Anon. 1923).

By 1870 two steamers were conveying fish from Fort William to Collingwood as part of their regular cargo. The development of eastern markets was a welcome relief in the face of the discouraging American tariffs levied on pickled fish (Canada. Department of Marine and Fisheries 1870).

Fishing stations managed by Fort William yielded an impressive 2040 barrels (185,100 kg) of whitefish and trout in 1873 and 2276 barrels (206,500 kg) in 1874. Then, in the following year, the fisheries failed completely, reportedly due to the effects of dredging and steamboat operations (Canada. Department of Marine and Fisheries 1873, 1874, 1875). This is one of the earliest Canadian incidents of the cultural disturbance of Lake Superior fisheries, a problem generally rare until recent decades. After 1875 local Indians were the sole fishermen of Fort William, and in 1881 the Hudson's Bay Company Post closed completely.

The decline of the fishing industry at Fort William was paralleled by its growth in neighbouring Prince Arthur's Landing (which became Port Arthur in 1884). Overseer Dickson reports:

> "Most fishermen in this district intend putting up ice houses during the winter, so as to open in Canada and with the United States, a market for fresh fish." (Canada. Department of Marine and Fisheries 1879).

In 1879 the first private enterprise was established, changed hands several times, and finally came to be owned by C.H. Wetmore and Fred Jones. The Lake Superior Fish Company began on a modest scale, with only a few boats travelling short distances into the bay. A

wharf was built, the business developed rapidly, and by 1883 it employed thirty men, six large fishing smacks (each equipped with "120 lb. gill nets, or about 40 nets"), and two tugs. Reportedly, the tugs ran virtually day and night bringing fish to the warehouses to be packed in ice cases holding 135 to 180 kg each (Weekly Herald and Lake Superior Mining Journal June 8, 1882; Anon. 1883). Daily points of call included Sawyer Bay, Silver Harbour, and Welcome Island. In the winter of 1883 the company laid down 180 cu m (50 cords) of ice at Point Porphyry, in addition to 360 cu m (100 cords) stored in town. Consulting Department of Marine and Fisheries reports (1883 to 1890), one discovers an average annual yield of 53,340 kg (117,600 lb) of whitefish and trout: the Porphyry Island grounds remained among the region's most productive until the 1950's. It should also be noted that a station of unknown proprietorship existed at Black's Dock (Sheesheeb Point) prior to 1883 (Canada. Department of Marine and Fisheries 1875; Selwyn 1883).

Most of the Lake Superior Fish Company's produce was sold to American firms in Duluth, Detroit (the U.S. Fish Freezing Company), and Minneapolis (Rich and Co., R.F. Jones). Exports in 1883 totalled about 181,600 kg (400,000 lb ; Anon. 1883). A single firm held a monopoly over the Duluth fish trade in 1880. Five years later two businesses, Cooley, LaVaque and Co. and the Duluth Fish Co., each ran a steamer along the north and south shores, including "one or two little Canadian harbours" among their stops (United States Commission of Fish and Fisheries 1887).

The growth of the Lake Superior industry during the 1880's, and its success in obtaining fish from waters which must have seemed to possess unlimited supplies, attracted many newcomers. It was anticipated in 1882, for example, that 28 fishermen from Lake Huron would be trying their luck on Lake Superior (Weekly Herald and Lake Superior Mining Journal July 22, 1882). Summer brought residents of Isle Royale to fish Thunder Bay waters under the sanction of the Canadian government. This courtesy was reciprocated each fall when Canadian fishermen resorted to the island in order to avoid the restrictions of a closed season (Canada. Department of Marine and Fisheries 1885).

Despite large exports to the American states, the Port Arthur fish markets belonging to the Maloney Brothers and Walker and Trembley (both established circa 1883) seldom reported shortages. (John Maloney had begun fishing in Thunder Bay in 1876; McNab Oct. 4, 1919). Large quantities of whitefish and lake trout were also sold locally to the C.P.R. construction crews, whose 10,000 workers were strung out along the shore between the Lakehead and Michipicoten (Weekly Herald and Algoma Miner Feb. 28, 1884).

The Lake Superior Fish Company survived at least until 1900 (Daily Times Journal Feb. 23, 1900), but may eventually have succumbed to the growing conglomerate of A. Booth and Co. The steamer "A. Booth" began running regularly between Duluth and Port Arthur in 1885 (and was replaced by the "Dixon" a few years later). It's cargo was supplied by the newly established Port Arthur Fish Company, which developed extensive control of the fisheries from

from Thunder Bay to Jackfish. Large buildings were constructed at Port Arthur and at Rossport (see section 2.2.4), and the packing operations at these two depots (plus a few other stations) consumed 2000 tons of ice in 1888:

> "...of whitefish 500,000 pounds were caught with 360,000 pounds of trout, 48,000 pounds of sturgeon 91,000 pounds of pickerel and 30,000 pounds of other fish, or a total weight of over one million pounds, which sold for over thirty-three thousand dollars". (The Port Arthur Illustrated 1889).

New York markets absorbed most pickerel; whitefish and lake trout were sent as far away as Calgary (Fort William Journal and Thunder Bay Mining News Oct. 12, 1889).

By 1891 seven tugs and numerous sailing vessels were docked at the Lakehead. The Dixon was making biweekly trips to Duluth, and Booth had assumed control of the Port Arthur Fish Company and placed it under management of Joseph Brimson (also agent for the Dominion Express Co.).

The complaints leveled against A. Booth and Co. by eastern interests were echoed in the west. Prince (1898) was characteristically outspoken:

> "The Department has for many years felt that the Port Arthur Fish Co. was really monopolizing the valuable fisheries of Lake Superior especially the western part. My own opinion is that our fishermen are poor because such companies as this have them in their power, pay only their own prices and practically though foreigners run our valuable fisheries...The correspondence on file re. Brimson and the Port Arthur Company reflects very little credit on these parties as the Minister may recall. The whole matter was discussed before and the Dept. formed a very unfavourable opinion respecting them".

Accused of unduly favouring the company and turning a blind eye on their illegal practises, one overseer lost his appointment in 1897 (Costigan 1895).

Despite the dominance of the corporation in the 1890's, the small-scale entrepreneur was not to be discouraged. A factory for the production of fish oil and fertilizer was put into operation by M. Nicholson (Weekly Herald and Algoma Miner Oct. 10, 1891). The Union Fish Company, established in 1891 by Harry Servais, eventually depended upon the harvests of five tugs operating in Thunder Bay (Mr. H. Servais, pers. comm. 1978). W.A. Beebe managed the American Fish Co., although his was probably a short-lived venture (Case and Co. 1892; Weekly Herald and Algoma Miner Jan. 23, 1892). Toward the end of the decade the Gagne Bros. made Port Arthur their home base.

East of Thunder Bay new fishing camps were developing. Robert, Allen, and Alonzo (A.W.) Nuttall, three brothers living in Port Arthur, built an ice house at Wolf River and pursued a pound net trade on Black Bay for many years. Their grounds at Cranberry Bay or Chief's Bay (Hurkett) were the site of a former Indian fishery (Peacock 1901-1932). In 1919 Alonso Nuttall employed 16 men for the winter fisheries of Black Bay, and to this day family members continue to fish from Hurkett (Mrs. N. Thrower, pers. comm. 1978). Other fishermen of the early 1900's included Joe Collins and Kate Morrow, and prior to the 1920's the Nipigon Bay Fish Company maintained interests in the Hurkett fisheries (Nicol 1921).

Other fishermen of the period are worthy of note. John Arvelin established a camp at Mary Island in Thunder Bay, and today a third generation fisherman still pursues the trade. Frank Dampier and George Dick resided at Bowman Island and Black's Dock. respectively. In 1905 Mat Miller began fishing on grounds near Amethyst Harbour, while John Bowman, formerly of Rossport, opened a business in Port Arthur. Along with the Dominion Fish Company and the Nipigon Bay Fish Co., Bowman became one of the main procurers of fat lake trout for American markets (Canada. Department of Marine and Fisheries 1910). Some time after 1910, the Exclusive Fish Market was begun by Douglas Williams. The Fort William Fish Company was established in 1916 by Thomas Craigie (see section 2.2.4).

The grounds licensed for the Fort William Indian Band have traditionally extended:

> "From the west mouth of McKellar River to one half mile outside of Mutton Island, thence southeast to Pie Island, thence southwest to Keefer Point [Pie I.], thence to Sister Island, and thence to the northwest point of Jarvis Bay, opposite of Beaver Island." (Ontario Department of Lands and Forests 1925-1934)

Grounds to the south have been periodically exploited for over 100 years. As early as 1873, Americans operated a seine fishery for whitefish along the north shore of Pigeon Point, close to the international border (United States Commission of Fish and Fisheries 1887): since then poachers in Canadian waters have been a familiar sight. According to the Department of Marine and Fisheries reports, stations existed at Victoria Island in 1875 and 1881 and at Pigeon

River in 1886. Fishing camps were maintained at Cloud Bay from the early 1920's until the waters south of Jarvis Bay were closed to commercial fishing in the 1960's. Among the resident fishermen (whose numbers usually did not exceed five) were Joseph Brewer and Fred Dehart, veterans of the area for over fifteen years (Ontario Department of Lands and Forests 1925-1934; 1935-1944).

In 1902 the Port Arthur Fish Company and A. Booth and Company operated two freezers in Port Arthur of 45,400 kg and 68,000 kg capacities (Canada. Department of Marine and Fisheries 1902). The prosperity which these companies enjoyed during the 1920's was sustained by the war-time escalation of the Thunder Bay herring fisheries (which had begun about 1895). The two herring tugs of 1912 grew in number to nine in 1915 (harvesting 4500 to 14,500 kg per day), and to over twenty by 1918, when 500 people were employed fishing, cleaning, salting, or packing the fish (McNab Nov. 27, 1915, Sept. 23, 1919; Chronicle Nov. 23, 1918). At the end of World War I, even the Nicoll Brothers of Coldwell entered the trade (Nicoll 1918). Annual harvests, predominantly from the Thunder Bay area, averaged over 680,000 kg (1,500,000 lb) between 1915 and 1922. Often herring were laid out by the millions on the Port Arthur dock, left to freeze in the cold weather of late autumn, and then packed in 35 kg bags for market. Capabilities for rapid collection of the fresh fish improved significantly with the completion of the road from Dorion to Port Arthur in 1922. The harvest potential of the tugs also increased apace, as explained in a brief summary by Sameluk (1980):

PHOTOS
25 to 27

> "In the 1930's and 1940's steam and gas tugs started the heavy fishing for herring at the C.P.R. dock in Port Arthur at the foot of Arthur St.
>
> There were 3 tugs from Rossport; the "F. Gerow", "C. Gerow" and the "O. Anderson". Each tug had 15-20 men on board. Each man choked a ton of herring in an 8 hour-day. In 3 weeks each tug averaged 12-ton of herring a day, and they produced 720 ton a season.
>
> Booth Fisheries had 2 tugs, "Red-fox" and "McLeod", which produced 400 ton a season.
>
> Craigie Fish Company [The Fort William Fish Co.] fished 2 tugs which produced 400 ton of herring. Bill Garrick had 1 tug, "Garrick", which fished 200 ton of herring ...Paul Bougie, with a 40' foot diesal tug, the "Sarge", produced 100 ton each season...
>
> ...In those days we used 1 7/8" - 2" mesh nets and the herring were 3 fish to a pound."

In addition to the tugs, Sameluk identifies approximately thirty gas boats capable of harvesting over 1300 tons in a fall season.

Facing bankruptcy, the Booth Fisheries Company abandoned its interests in the western Lake Superior fisheries in 1933. These holdings were acquired in part by the Royal Fish Company (Port Arthur) and the Nipigon Bay Fish Company, while Wolmsley, former manager of Booth's firm, pursued his own business for a few years (Mr. V. Bergman pers. comm. 1980). In this sequence of takeovers, Cecil Humby acquired the Royal Fish Company in the 1930's. A. Kemp Fisheries of Duluth, also conducting business on a small scale in Port Arthur in the 1930's, eventually purchased the Royal, and grew to its present status as the dominant force in the western Lake Superior industry.

Finlandic fishermen settled at Tee Harbour in 1934. Fluctuating water levels made life uncomfortable, and the entire camp was transported to Camp Bay in 1943. Meanwhile, Roy McKee and Frank Dampier, operating from Camp No. 5 in Squaw Bay, are credited with inaugurating the Black Bay herring fishery in 1939. Difficulties in freezing and efficiently delivering the fish proved discouraging, and the project was abandoned for a time (Mr. V. Bergman, pers. comm. 1980).

The end of World War II brought a number of younger fishermen home to the fishing industry. Their arrival, along with the completion of a road to Squaw Bay in 1948, motivated the southern Black Bay industry. Trawling for herring was introduced in 1962 and escalated after 1967. The danger of resource overexploitation inspired a fishermen's agreement to limit the number of trawls to five. (Trawling was a part of the Thunder Bay fishery in the late 1960's and early 1970's but is absent today.) Since 1960 Black Bay has supplied over fifty percent of Canadian-caught Lake Superior herring.

PHOTO 28

3. FISH SPECIES IN THE CANADIAN WATERS OF LAKE SUPERIOR, PAST AND PRESENT

Lawrie (1978) lists 73 fish species which have been present in Lake Superior, ten of these exotics. The species now supporting the commercial fishing industry are lake herring, lake whitefish, deepwater cisco (chub), lake trout, smelt, sucker (mullet), yellow perch, and round whitefish (menominee). Sportsmen direct their efforts towards yellow perch, walleye, and the salmoninae species of salmon and trout.

Today the angling and commercial fisheries are no longer free to evolve in accordance with their past opportunism and expansionism. An age of restrictive quotas and tougher government controls has arrived. International agreement brought lake-wide lake trout quotas in 1961, imposed in the belief that sea lamprey control measures and active stocking programs would restore *S. namaycush* to health within the Great Lakes. In 1972 the Ontario government first imposed a quota on Black Bay herring. Whitefish, deepwater chub, and yellow perch have joined the list of controlled species within the past year.

Thus has it become a time for reassessment and forward planning. Fish communities are being more closely monitored, past processes of transformation reexamined. Fishermen have admitted former fishing excesses; government officials have admitted past errors of judgement and management. At times the agents of piscatorial change have been obvious (exotics, pollution, overexploitation, and so on). Often, however, as research continues and analytical techniques

improve, there emerge complex patterns of cause and effect. Abiotic and biotic components of the aquatic environment are found to be intricately interwoven. As discussed in the introduction (section 1), a single fish species within a single lake may show a wide spectrum of habit, habitat, and appearance at the level of its individual stocks. Stock management is an essential goal of future government policy, but it is generally hampered by lack of information. In order to fill a few of these information gaps, this chapter addresses the subject of intra-species diversity and change within Canadian Lake Superior.

3.1 WHITEFISH, *Coregonus clupeaformis*

Since the earliest days of settlement and exploration, Lake Superior whitefish have been the most highly acclaimed fish of the Great Lakes. For Anna Jameson (1838) they were a delicacy unsurpassed:

> "There is no more comparison between the white-fish of the lower lakes and the white-fish of St. Mary's, 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 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, the whitefish fisheries were pursued with vigour. As described in section 2.1, the toll of destruction first became evident in

the United States, 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 (Baldwin and Saalfeld 1962).

It has been suggested by Lawrie and Rahrer (1973) that:

> "The initial decline is tentatively equated with the sequential fishing-up of one quasi-discrete stock after another at rates exceeding those providing maximum sustained yield."

(In a similar process, various lake trout stocks may also have been brought slowly and selectively to the point of commercial extinction.) After 1900 there appeared to be cause for widespread concern. In 1902, for example, A. Booth and Co. abandoned operations at the Lizard Islands grounds, purportedly due to the damages wrought by excessive pound net fishing; the islands were subsequently closed to commercial boats (see section 2.2.1). By 1910 fishermen were reporting damage to the whitefish populations of the Michipicoten Island grounds (Duncan 1910). Government overseers noted widespread declines:

> "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." (Canada. Department of Marine and Fisheries 1911).

Reports in the popular press were even more sensational and disturbing:

> "...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." (Sault Express Nov. 25, 1910)

Although certain stocks undoubtedly were lost forever, the decline in Canadian production ceased around 1920 and remained fairly constant until the sea lamprey era. Be aware, however, that this apparent stability could be deceptive; increasing efficiency of capture and exploitation of new grounds may be masking very real abundance decreases.

During the past fifteen years, whitefish stocks have improved in vitality. Their current status in Canadian Lake Superior has been reviewed by MacCallum (1980) for east end waters, and by Hamilton (1978a) and Goodier and Spangler (1981) for west end waters.

Lake Superior has a long history as both a source of whitefish spawn and a recipient of hatchery-reared whitefish fry. The first fish hatchery on Lake Superior was constructed at Duluth in 1888. Encountering difficulties in procuring both whitefish and lake trout spawn along the south shore, the hatcheries at Duluth, Sault Ste. Marie, and Alpena arranged in 1893 to seek spawn at various Canadian locations (Elliott 1897). In 1918 U.S. officers were still gathering "considerable quantities" from Batchawana and Whitefish bays. In exchange for this privilege, their hatcheries

would return some percentage of the stocks of fry to the Canadian waters from whence they originated.

The Dominion of Canada constructed a hatchery at the mouth of the Current River (Port Arthur) and began taking whitefish spawn from Lake Superior in 1911. The following year, operations were extended to Mud River, Lake Nipigon (a source of 23 million eggs; McNab Oct. 21, 1912). Whitefish fry were replanted in Thunder Bay and Black Bay. Dominion hatcheries also maintained an active trade in surplus egg supplies, and during its period of operation the Port Arthur hatchery received whitefish eggs from Collingwood, Kingsville, Thurlow, and Wiarton hatcheries, as well as from Pelican Lake (in 1921).

The first provincial hatchery on Lake Superior was constructed at Port Arthur in 1918 and:

> "...fully equipped for the hatching of both speckled and lake trout, whitefish, herring and pickerel... having a capacity for 75,000,000 whitefish and 15,000,000 trout." (Ontario Department of Game and Fisheries 1918)

The provincial government also assumed control of the federal establishment at Current River in 1926 (although it was closed down in 1934). With the completion of the brook trout hatchery at Dorion in 1932, facilities at the Port Arthur hatchery were devoted to the cultivation of whitefish and lake trout. Whitefish production was discontinued in 1957, and eventually the station was abandoned.

A provincial hatchery at Sault Ste. Marie (Huron Street) opened in 1921 and immediately engaged in the raising of whitefish

for the Algoma district waters of Lake Superior. (The Tarentorus trout rearing station was constructed in 1929, renovated in 1953, and reopened in 1955; Anon. 1965).

3.1.1 SAULT STE MARIE TO MICHIPICOTEN ISLAND

FIG. 2

The shore banks between Gros Cap and the St. Mary's River remain today, as they have for centuries, among the most intensely fished whitefish grounds of Canadian Lake Superior (MacCallum 1980). Around November 1 of each year, number one class whitefish (each averaging between 0.7 kg (1.5 lb) and 1.1 kg (2.5 lb)) commence spawning in four m of water or less. Reaching a peak about November 10 and lasting until November 20, this period is consistent with that reported by Van Oosten (1927) for the American waters of Whitefish Bay(also see Purvis 1977). No interviewed fisherman reported spawning dates earlier than November, although pre-spawning movements sometimes begin in October:

> "...Looked over the fish coming into the Soo from the Lizzards, Goulais Bay, Gros Cap, and Batchewana. There is not whitefish coming in as yet but the fishermen say that about the 10th or 15th of October they expect whitefish to start to run (Robinson 1919).

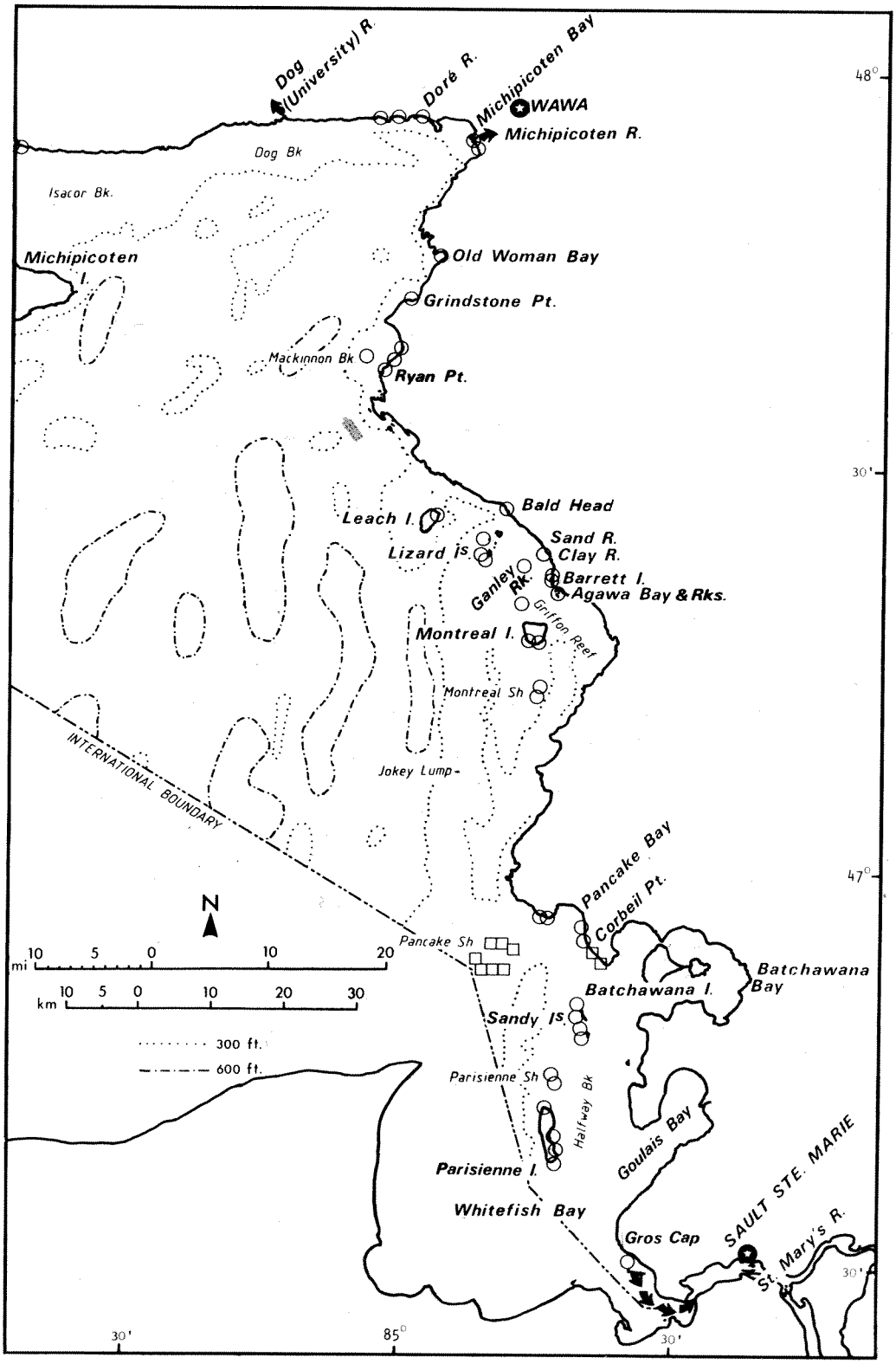
According to Organ et al. (1978), spawning near Taquamenon Island (Michigan) occurred from late October through mid-December.

Reference has already been made to the singular population abundances of the St. Mary's River spawning stocks (section 2.2.1):

> "This river forms at this place a rapid so teaming 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." (Casson and Galinée 1670).

FIG. 2. SPAWNING GROUNDS OF LAKE WHITEFISH (*Coregonus clupeaformis*), SAULT STE. MARIE TO MICHIPICOTEN ISLAND.

Spawning locations ○ Major
□ Minor
River


Dog (University) R.
Doré R.
Michipicoten Bay
WAWA
Michipicoten R.
Dog Bk
Isacor Bk.
Michipicoten I.
Old Woman Bay
Grindstone Pt.
Mackinnon Bk
Ryan Pt.
Bald Head
Leach I.
Sand R.
Lizard Is.
Clay R.
Ganley Rk.
Barrett I.
Agawa Bay & Rks.
Griffon Reef
Montreal I.
Montreal Sh
Jokey Lump
INTERNATIONAL BOUNDARY
Pancake Bay
Corbeil Pt.
Pancake Sh
Batchawana Bay
Batchawana I.
Sandy Is.
Parisienne Sh
Halfway Bk
Goulais Bay
Parisienne I.
Whitefish Bay
Gros Cap
SAULT STE. MARIE
St. Mary's R.
N
mi 10 5 0 10 20
km 10 5 0 10 20 30
300 ft.
600 ft.
48°
30'
47°
30'
85°
30'
30'

According to McKenney (1827), individual weights ranged from 1.8 kg (4 lb) to 4.5 kg (10 lb) and sometimes 6.4 kg (14 lb). The Michigan State Fish Commission (1874) reports an average weight of 1.8 kg (4 lb).

Yet the activities of man soon posed a threat to the bounty of the rapids. The commercial fisheries may have exacted a toll:

> "The whitefish of the St. Mary's River Rapids are decreasing annually, while on the American side they continue to be as numerous as ever." (Canada. Department of Marine and Fisheries 1871).

However, as suggested by MacDonald (1979), 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 proportion of the whitefish population. Today whitefish, reduced both in size and number, continue to visit the rapids above the sixteen control gates. Macdonald notes, "the whitefish are said to have migrated to the tailrace of a local carbide plant".

Different spawning grounds receive different size classes of fish. The small number one fish so common about Gros Cap are relatively scarce on the western shoals of the Sandy Islands and along the north end of Parisienne Island. On these grounds medium-sized whitefish of 1.8 kg (4 lb) to 3.6 kg (8 lb) commence spawning around November 25. Traditionally, larger and larger fish would arrive as the run progressed, and it was not unusual to find 9.1 kg (20 lb) fish among the late spawners. In past years large jumbos would spawn along the shore bank drop-off near the Clay and

Sand rivers and Montreal Island, and about Pancake Shoal at 18 to to 25 m (Mr. C. Cook, pers. comm. 1981). Such giants have become rare in recent decades.

The Lizard Islands have been much admired as the haunts of whitefish. They were, in the words of one provincial game warden, "one of the best breeding grounds for whitefish and lake trout in the Province" (Ontario Department of Game and Fisheries 1910). The area's heaviest spawning occurred at Ganley Rock and Griffon Reef and might continue into the second week of December. According to Mr. O. Bjornaa (pers. comm. 1981), during the past five years unprecedented increases in spawning lake herring have apparently displaced significant numbers of whitefish from these shoals. It is not known if the Barrett Island (Blueberry Island) ground remains the superlative site it once was; here number one whitefish commence spawning around November 10, somewhat later than those of the Gros Cap (Mr. G.A. Jones, pers. comm. 1981). Purvis (1977) also notes the presence of number ones at Agawa Rocks and Bald Head.

Local fishermen of the last century claimed the existence of whitefish peculiar to Batchawana Bay (Ontario Game and Fish Commission 1892). Barnston (1874), once factor of the Hudson's Bay Company's Michipicoten Post, was moved to comment:

> "...in spring we sometimes had sent to us from a small outpost at Bachewaino Bay a fish or two, longer than our own and much thicker and heavier...I never had an opportunity of submitting these white-fish to a close comparison with the large specimens taken at the Sault Ste. Marie, below the rapids, but I conjecture they might be the same species."

Reaching a maximum depth of 45 m, the eastern half of the bay is effectively separated from the main lake by Batchawana Island and its shoal zones. Partial geographic isolation of resident deep-water species would tend to promote stock formation. Lake trout, as well as whitefish, may have been affected by this isolating mechanism; the commercial closure of Batchawana Bay precludes recent observations (Goodier 1981).

Each year certain large rivers would attract spawning stocks of whitefish. The Michipicoten River run was heavy in the 1800's and supplied valuable winter provisions for the inhabitants of the local Hudson's Bay Company post. Possessing an unusually early spawning period and small body size (0.7 kg or 1.5 lb), these whitefish may have been at least partially discrete from those spawning in the main lake (Goodier 1981). A less important run also occurred at the Dog River (University River), and, despite severe reductions in abundance, both streams continue to receive whitefish each fall.

Movements of whitefish to shallow waters also supported spring fisheries. In May the tugs of James Purvis and Son, Ltd. (1934-1955) would commence searching the Dog and Isacor banks for both number one and large jumbo whitefish (also known as "slams"). Until July nets were set at progressively shallower depths on the banks (Mr. L. Morden pers. comm. 1978).

At spring ice-out, whitefish move into Goulais Bay for approximately two weeks (Mr. W. Mitchell, pers. comm. 1981). Each summer whitefish congregate along Halfway Bank, situated east of Parisienne Island and extending northward toward the Sandy Islands.

3.1.2 MICHIPICOTEN ISLAND TO SCHREIBER

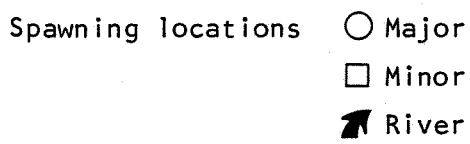
FIG. 3

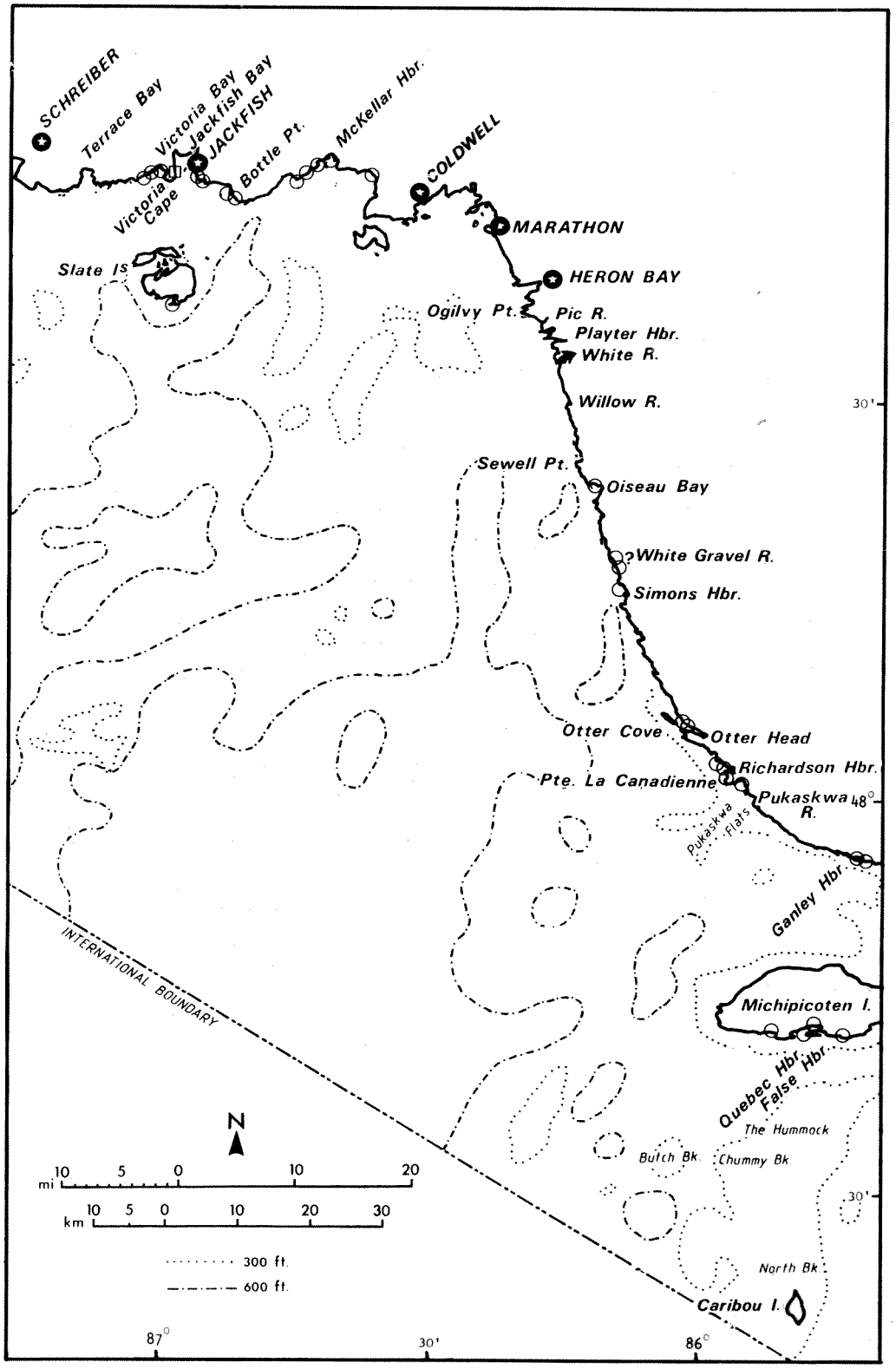
Both late July and November would bring jumbo whitefish into the shallows of Quebec Harbour and the shore banks east of False Harbour. South of Michipicoten Island, spawning grounds existed along southwest Caribou Island prior to 1955 (Mr. W. Sanders, pers. comm. 1981). Whitefish were also found on Butch, Chummy, Hummock and North banks each summer. Although the present status of the Caribou Island whitefish was not ascertained, it is likely that they have been at no time as plentiful as lake trout on these grounds.

The shore between Ganley Harbour and Richardson Harbour borders many favoured grounds. Especially large whitefish concentrations can be found about Pte. La Canadienne. Whitefish continue to frequent the gravelly entrance to Otter Cove, where in the 1930's Mr. F. Legault (pers. comm. 1979) knew large jumbo whitefish to spawn for approximately one week of early December. McNab (Dec. 8, 1914) likewise attests to the large size of Otter Head whitefish: "[the eggs of] less than two fish would fill a jar."

Between Simons Harbour and White Gravel River, there are located many suitable spawning shoals. The White River receives upstream migrants each year (Mr. W. Mitchell, pers. comm. 1981). Oiseau Bay swarms with whitefish both in summer and in fall (although the recent closure of the bay prohibits commercial harvest), and each spring the species is also to be found at the entrance of Playter Harbour and off Sewell Point and the Willow River. South of the

FIG. 3. SPAWNING GROUNDS OF LAKE WHITEFISH (*Coregonus clupeaformis*), MICHIPICOTEN ISLAND TO SCHREIBER.




SCHREIBER
Terrace Bay
Victoria Bay
Jackfish Bay
JACKFISH
Victoria Cape
Bottle Pt.
McKellar Hbr.
COLDWELL
MARATHON
Slate Is.
HERON BAY
Ogilvy Pt.
Pic R.
Playter Hbr.
White R.
Willow R.
30'
Sewell Pt.
Oiseau Bay
White Gravel R.
Simons Hbr.
Otter Cove
Otter Head
Richardson Hbr.
Pte. La Canadienne
Pukaskwa R.
48°
Pukaskwa Flats
Ganley Hbr.
INTERNATIONAL BOUNDARY
Michipicoten I.
Quebec Hbr.
False Hbr.
The Hummock
Butch Bk.
Chummy Bk.
30'
North Bk.
Caribou I.
N
10 5 0 10 20
mi
10 5 0 10 20 30
km
300 ft.
600 ft.
87°
30'
86°

Pukaskwa River, number one whitefish continue to draw fishermen to the Pukaskwa Flats each June and July (Mr. M. Leblance, pers. comm. 1981).

Traditional grounds exist in the area of McKellar Harbour, between Bottle Point and Jackfish Bay, and along a number of sandy beaches west of Victoria Cape. At Victoria Bay nets were set in June, fished more intensively as jumbos became abundant in late August and September, and moved into thirty m of water and less as whitefish began to approach the shores in later September. Few whitefish fishermen are employed in this region today, although opportunities obviously exist for redeveloping certain of the old grounds. Jackfish Bay and the waters about the Slate Islands have never been highly esteemed.

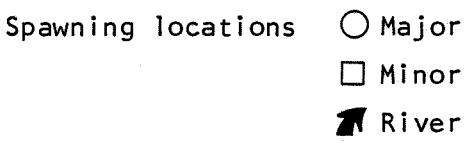
From July until the end of August, whitefish invade Terrace Bay and congregate near the Hydro Company tailrace on the bay's northeastern shore (Mr. I. Johnson, pers. comm. 1981).

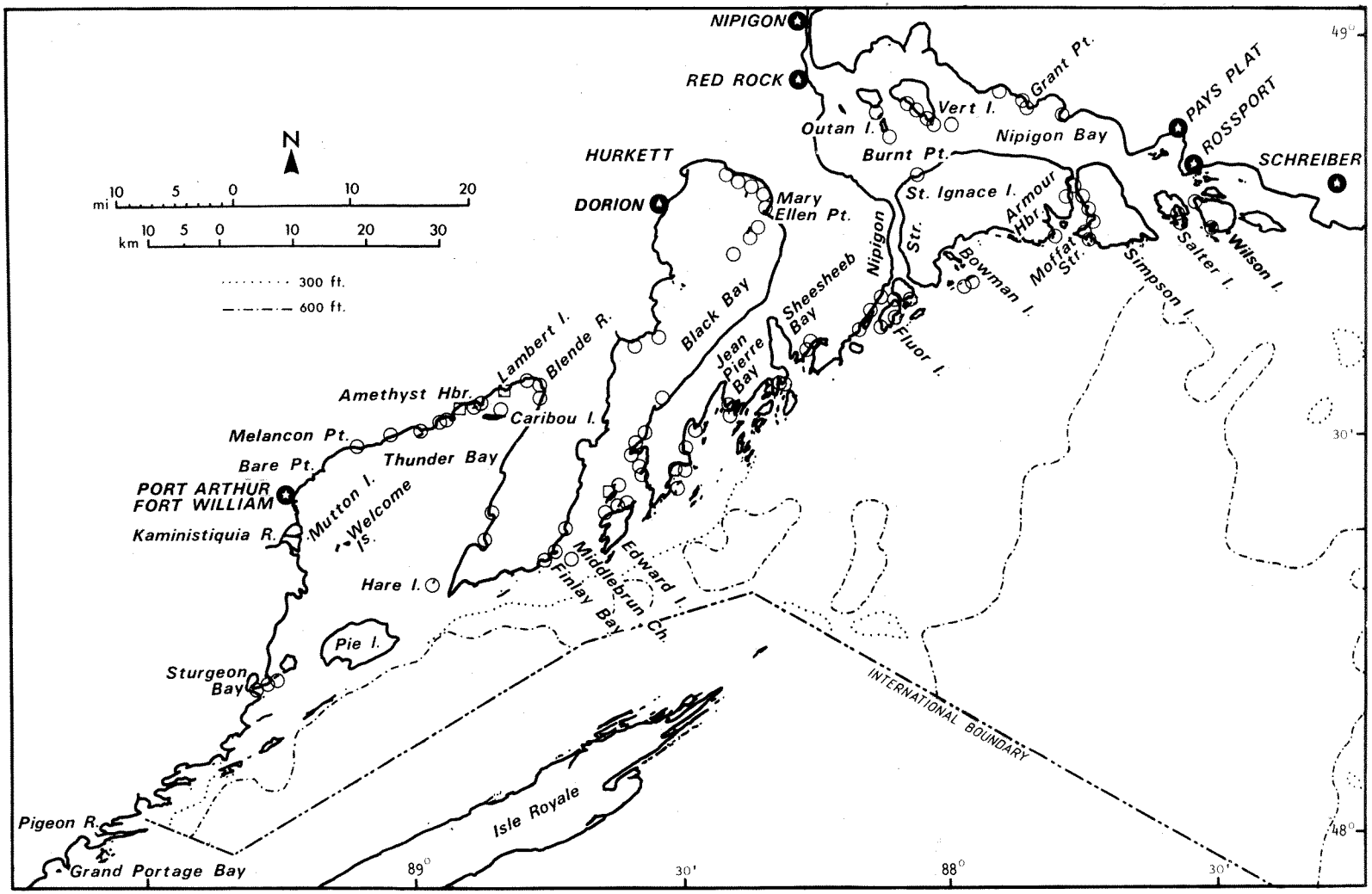
3.1.3 SCHREIBER TO PIGEON RIVER

FIG. 4

In the last century, whitefish of the Saint Ignace Island area weighed as much as 7.7 kg (17 lb; Thomson 1883). Such specimens are rare today, although in recent years increases in the numbers of large fish have been noted at certain localities. Whitefish about Fluor Island presently average 1.1 kg (2.5 lb), whereas those caught in spring at Armour Harbour are 4.5 kg (10 lb) to 5.4 kg (12 lb; Mr. P. Hamilton, pers. comm. 1980).

FIG. 4. SPAWNING GROUNDS OF LAKE WHITEFISH (*Coregonus clupeaformis*), SCHREIBER TO PIGEON RIVER.




NIPIGON
RED ROCK
HURKETT
DORION
Outan I.
Vert I.
Grant Pt.
Burnt Pt.
Nipigon Bay
PAYS PLAT
ROSSPORT
SCHREIBER
St. Ignace I.
Armour Hbr.
Bowman I.
Moffat Str.
Simpson I.
Salter I.
Wilson I.
Nipigon Str.
Fluor I.
Mary Ellen Pt.
Black Bay
Sheesheeb Bay
Jean Pierre Bay
Lambert I.
Blende R.
Amethyst Hbr.
Caribou I.
Melancon Pt.
Bare Pt.
Thunder Bay
PORT ARTHUR
FORT WILLIAM
Mutton I.
Welcome Is.
Kaministiquia R.
Hare I.
Middlebrun Ch.
Finlay Bay
Edward I.
Pie I.
Sturgeon Bay
INTERNATIONAL BOUNDARY
Isle Royale
Pigeon R.
Grand Portage Bay
N
10 5 0 10 20
mi
10 5 0 10 20 30
km
300 ft.
600 ft.
49°
30'
48°
89°
30'
88°
30'

Many fishermen contend that certain bays contain their own distinctive "breeds", and supporting evidence from western Lake Superior has been reviewed by Goodier and Spangler (1981). A number of examples are here cited.

Whitefish of Nipigon Bay, as compared with those of the main lake, tend to weigh less (averaging 1.4 kg or 3 lb during the 1950's) and to possess shorter but deeper bodies. Samples collected by the Ontario Ministry of Natural Resources between 1975 and 1978, revealed some of the oldest mean age but smallest mean length distributions found in western waters. Fishermen have always been of the opinion that the bay fish avoid the main lake and make only occasional forays into Moffat Strait or Nipigon Strait (as far as Moss Island; Mr. W. Schelling, pers. comm. 1980). Starting between October 27 and November 5, fish spawn widely throughout the bay for three or four weeks. Among the prized traditional grounds are Piledriver Shoal (south of Outan Island), Craigie's Harbour (southwestern Vert Island), and north Grant Point.

Certain main lake whitefish were evidently transients to the bay. In August (but rarely during the spawning months), fish of high fat content would appear on the north shore flats west of Burnt Point (St. Ignace Island). Similarly, fat white fish would drift through the 45 m deep waters extending northward from Nipigon Strait; Mr. F. Legault (pers. comm. 1980) knew these as "red-nosed whitefish", so-called because of a slight tinge of colour on their snouts. In the experience of Mr. G. Gerow (pers. comm. 1981), a

fisherman for many years prior to 1955, large whitefish were rare in Nipigon Bay at spawning time, but could be captured up to 10 kg (22 lb) during other months.

Consider another location. Samples taken inside Sheesheeb Bay in 1975 and 1976 (by O.M.N.R.) were of younger mean age and shorter mean length than those taken outside (Goodier and Spangler 1981). Growth rate differences were also apparent. Somewhat ambiguous, and perhaps related to differential fishing pressures, such evidence may also reveal stock diversity. Sheesheeb Bay is an important and traditional spawning ground. In 1924 the Port Arthur Hatchery began to plant major quantities of whitefish in the bay (Craig 1926).

Whitefish from northern and southern Black Bay are said to differ in appearance and taste. In addition to influxes of fish from the main lake, fishermen recognize a resident population whose members tend to be shorter but somewhat fatter. Koelz (1929) elaborates:

> "The Black Bay whitefish appear to be notably deeper bodied, on the whole, than those from the open lake. The meager data on hand also indicate that the bay fish tend to have fewer lateral-line scales, as in the case of the Lake Erie race, which is also deeper bodied...The *artedi* of Black Bay are known also to be deep bodied, and both the whitefish and the herring show the same general characters that these species exhibit in Lake Erie. It is probable that in each case the peculiar characteristics are a response to the environment. While there are no data to indicate exactly what the environmental conditions are, it is known that Black Bay is conspicuously shallower and warmer than Lake Superior and even than other much smaller but more open bays near it...It is noteworthy also in this connection that the whitefish and herring of Lake Winnipeg and certain other shallow lakes, which must become fairly warm in summer, show the same peculiar features."

Koelz also remarks that the whitefish of Black Bay were "notably small, according to the fishermen, not often exceeding 4 pounds in weight." Mr. J. Nuttall (pers. comm. 1980) knew the bay whitefish to average between 1.0 kg (2 lb) and 1.4 kg (3 lb), whereas springtime immigrants (arriving early May) were 1.4 kg (3 lb) or more.

Thunder Bay has, through time, undoubtedly supported a number of different stocks. In the 1800's whitefish, often in numbers totalling in the tens of thousands, would enter the Kaministikwia River during the first week of October and spawn at the foot of the rapids eighteen km upstream. These fish were a small breed, averaging a little under 0.5 kg (1 lb) each (Goodier 1981). The stock met its demise prior to 1920, possibly a victim of the combined effects of dredging and dumping of grain screenings into the river (McNab Sept. 18, 1920; Oct. 4, 1921). At an input rate of 500,000 bushels 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." (McNab Dec. 10, 1923).

Screenings were known to drift far beyond Thunder Bay.

The north end-Caribou Island grounds have been traditionally the most productive of Thunder Bay:

> "The catch of whitefish taken from the waters in the vicinity of Caribou Island beats all records... nearly 32 tons...[one fisherman] with a gas boat from Oct. 15th to Dec. 15th killed over 10,000 lbs. of whitefish.

> The estimate of Whitefish peddled all over the city over and above what went through the Booth fish house is 40,000 lb. The above catch does not include the spring fishing by three tugs, 30 days fishing in Thunder Bay. Each Tug kills whitefish and trout 24,000 lb. Nearly all the fish were killed at the lower end of the Bay." (McNab Dec. 31, 1920).

One fisherman, Mr. G. Tyska (pers. comm. 1980), has identified four phenotypically distinct whitefish groups on these grounds. Near Kent Island (Amethyst Harbour) and south of Lambert Island, there spawns a hump-backed form of variable colouration. At Amethyst Harbour the whitefish of late fall are rounder-bodied, with smaller head, and (frequently) orange-coloured fins. A third, smaller variant, dark of body and fin, with more pointed tail, is found on the shoals north of Caribou Island between October 20 and November 1. Finally, whitefish averaging 1.4 kg (3 lb) with long thin bodies spawn over shoals south of Blende River; this form passes through 11 cm mesh net more easily than other whitefish of comparable size. From 1913 to 1920 the Port Arthur hatchery sought whitefish eggs at the Blende River grounds:

> "...these fish are of a small run and it takes five of those to fill a jar. The Dept. need not expect more than 150 jars of whitefish eggs from this locality... the whitefish were always through spawning about the 1st of Nov. " (McNab Nov. 15, 1914).

> "... it is the only place on Lake Superior that 2,630,000 white fish eggs ever were collected either South or North Shore of the lake, that is Lake Superior's record. Blend River may some time hand over a nice lot of eggs along with Bare Point near the hatchery." (McNab Dec. 31, 1919).

According to McNab (Nov. 3, 1917), whitefish at Blende River averaged 1.0 kg (2.3 lb) each. Their spawning period is comparable to that of whitefish spawning on the Mt. McKay Indian Reserve's grounds (Mr. H. Charlie, pers. comm. 1980).

Fishermen are not in accord concerning the question of pre-spawning movements of Thunder Bay whitefish. In July whitefish collect near Mutton Island (near the Kaministikwia River) and there many become tainted with industrial phenol pollutants. Nicknamed "diesals", these fish are again found at Melancon Point in September, although it is the experience of certain fishermen that they form no part of the spawning runs. Purvis (1977) suggests:

> "...This might indicate then, that the run comes from possibly a mid-water source and that the tainted fish or 'phenols', as they are often called, are a discrete stock and spawn in an, as yet, undiscovered location".

Diesals may rove as far as Grand Portage Bay, 56 km to the south, where tainted fish periodically are captured (Neil 1970).

Wintering at the north end of Thunder Bay, whitefish gather each May in the 35 m deep basin north of Caribou Island. From here they disperse westward and eventually move to the shallow waters of the shore banks (Mr. G. Tyska, pers. comm. 1980; Purvis 1977). In the 1800's men of the Hudson's Bay Company exploited two inshore runs each summer, the first occurring in late June or early July, and the second in mid-August (Goodier 1981). According to Purvis (1977) the first run generally occurs in mid-July and lasts approximately one week. Similar patterns of pelagic and inshore movements probably occur widely throughout the lake. Along the Minnesota shore:

> "...[Whitefish] come in certain areas. In spring they're usually out deeper and then it starts warming up, then there's a trout and whitefish run that

> comes in real shallow. That come right in next to the beach. Then later on in the summer, you'll get them all along, but not as good. Then in August they get sluggish. They don't move. The fish are there but they don't move fast enough to gill even. ...a lot of them go out on the surface." (Ogberg 1977).

3.2 HERRING, *Coregonus artedii*

Lake herring are pervasive throughout Lake Superior. When spawning these fish are less site selective than whitefish, and Scott and Crossman (1973) note a wide range of acceptable substrates. Traditionally, however, many of the major spawning aggregations have been on grounds also favoured by whitefish. At various locales this no longer remains the case.

The processes and patterns of transformation experienced by the lake's herring populations have been reviewed by Rahrer and Elsey (1972), Lawrie and Rahrer (1973), and Lawrie (1978). The western fisheries have been given special attention in papers by Hamilton (1978 b, c, d) and Goodier and Spangler (1981).

Until the mid-1960's, almost all of Ontario's production came from the waters of Black Bay and Thunder Bay. Eastern harvests (predominately from south of Cape Gargantua) increased from 8,240 kg (18,161 lb) in 1964 to a record 329,440 kg (726,287 lb) in 1970. Subsequent years have been marked by production losses. Significant abundance declines became obvious in the western fisheries after 1965, although recent evidence suggests a returning vigour (Goodier and Spangler 1981). As noted by Lawrie (1978), these production failures probably occurred during a fishing-up process of semi-discrete stocks, a process which may have begun long

before annual production statistics gave cause for concern.

One should be aware that fishermen have a tendency to classify as herring breeds those chub species or phenotypes captured in shallow herring nets. Terminology can be confusing. Many stocks and certain species have become rare, and retrospective identification is sometimes difficult. In the fishermen's words, "Herring and chub are not the same as they were 30 years ago."

3.2.1 SAULT STE. MARIE TO MICHIPICOTEN ISLAND

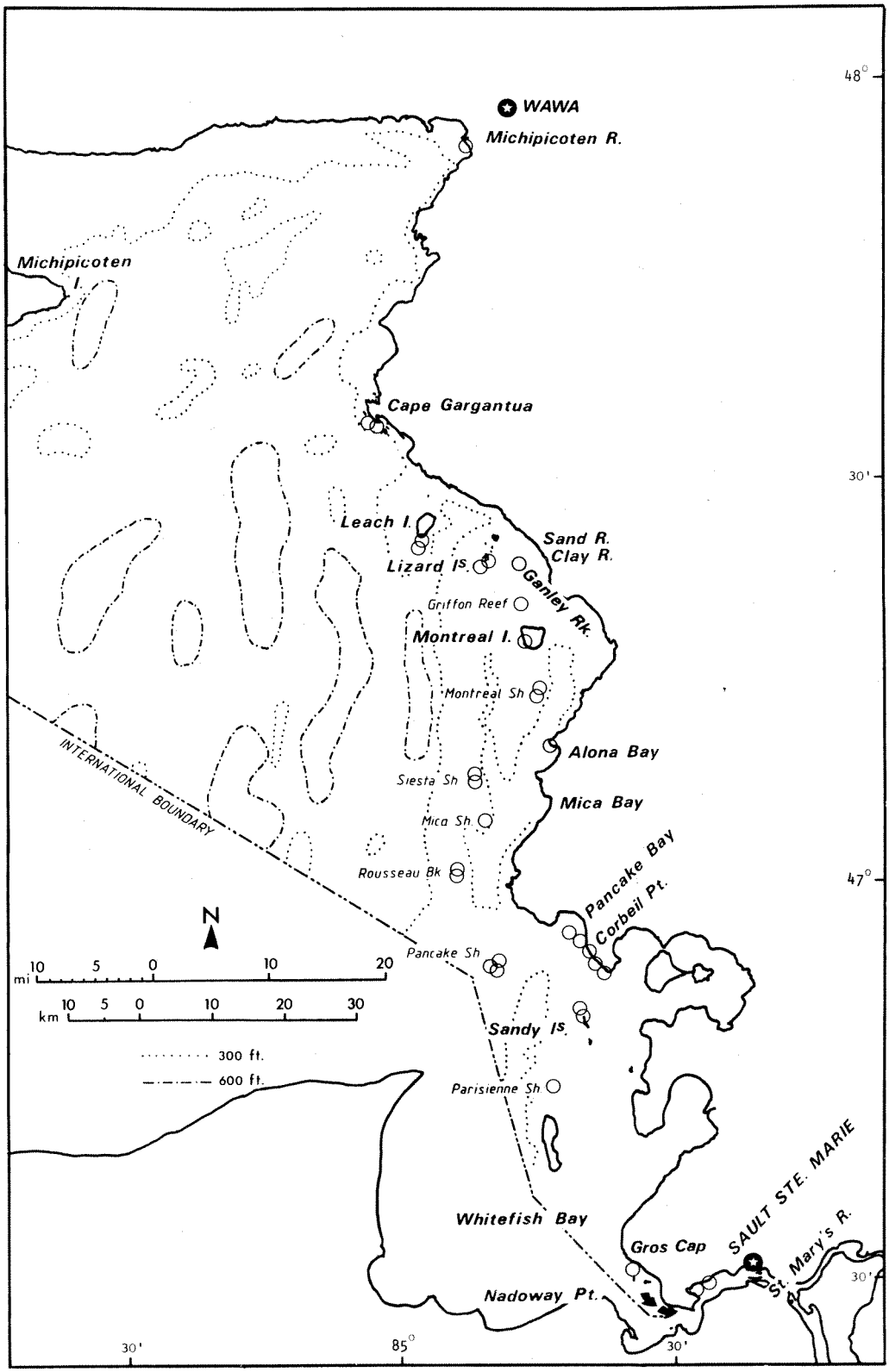
FIG. 5

Each fall, herring move to southeastern Whitefish Bay and the Gros Cap area. Traditional grounds also include Parisienne Shoal, Montreal Shoal and Island, Siesta Shoal, Ganley Rock, Griffon Reef and the Lizard Islands. Until recent times Parisienne Shoal (Big Shoal) was especially popular among American paochers. Herring of these grounds generally begin spawning in early November, peaking about November 25, but continuing into December at many locations; thus runs of jumbo whitefish (where they occur) may be preceded by large influxes of herring. Across the border, former stocks of herring would spawn over rock and gravel bottom between Nadoway Point and the Gros Cap Reefs during October and November (Organ et al. 1978).

Lake herring move close to the Michipicoten River each fall. As described in the journals of the Hudson's Bay Company, herring schools would converge upon the shore banks after mid-May and there remain plentiful throughout June and sometimes into mid-July. Frequently, large numbers of fish would

FIG. 5. SPAWNING GROUNDS OF LAKE HERRING (*Coregonus artedii*), SAULT STE. MARIE TO MICHIPICOTEN ISLAND.

Spawning locations ○


48°
WAWA
Michipicoten R.
Michipicoten I.
Cape Gargantua
30'
Leach I.
Sand R.
Clay R.
Lizard Is.
Ganley Rk.
Griffon Reef
Montreal I.
Montreal Sh
Alona Bay
INTERNATIONAL BOUNDARY
Siesta Sh
Mica Bay
Mica Sh
Rousseau Bk
Pancake Bay
Corbeil Pt.
47°
N
Pancake Sh
10 5 0 10 20
mi
10 5 0 10 20 30
km
300 ft.
600 ft.
Sandy Is.
Parisienne Sh
Whitefish Bay
SAULT STE. MARIE
Gros Cap
St. Mary's R.
Nadoway Pt.
30'
85°
30'
30'

invade the river itself, an unusual habit for the species (Goodier 1981). Inshore migrations continue to be an annual spring event, although they no longer seem to include upstream movements.

Both Alona Bay and the waters south of Pancake Bay support herring schools from spring until fall. Mica Shoal and Jokey Lump also permit summer fishing (but attract no spawners).

Fishermen report localized depletions of the herring stocks. The superabundances of the Gros Cap area are now things of the past:

> "For more than a decade their presence has been minimal on the St. Mary's River. The most strongly supported reason for the decline has been a changing environment caused by the dumping of wastes from the Algoma Steel Corporation in the upper river, near Gros Cap." (Purvis 1977).

Once spring herring were plentiful on the grounds northwest of Corbeil Point, but have declined in recent years. On the other hand, fishing has improved at Griffon Reef (Mr. O. Bjornaa, pers. comm. 1981).

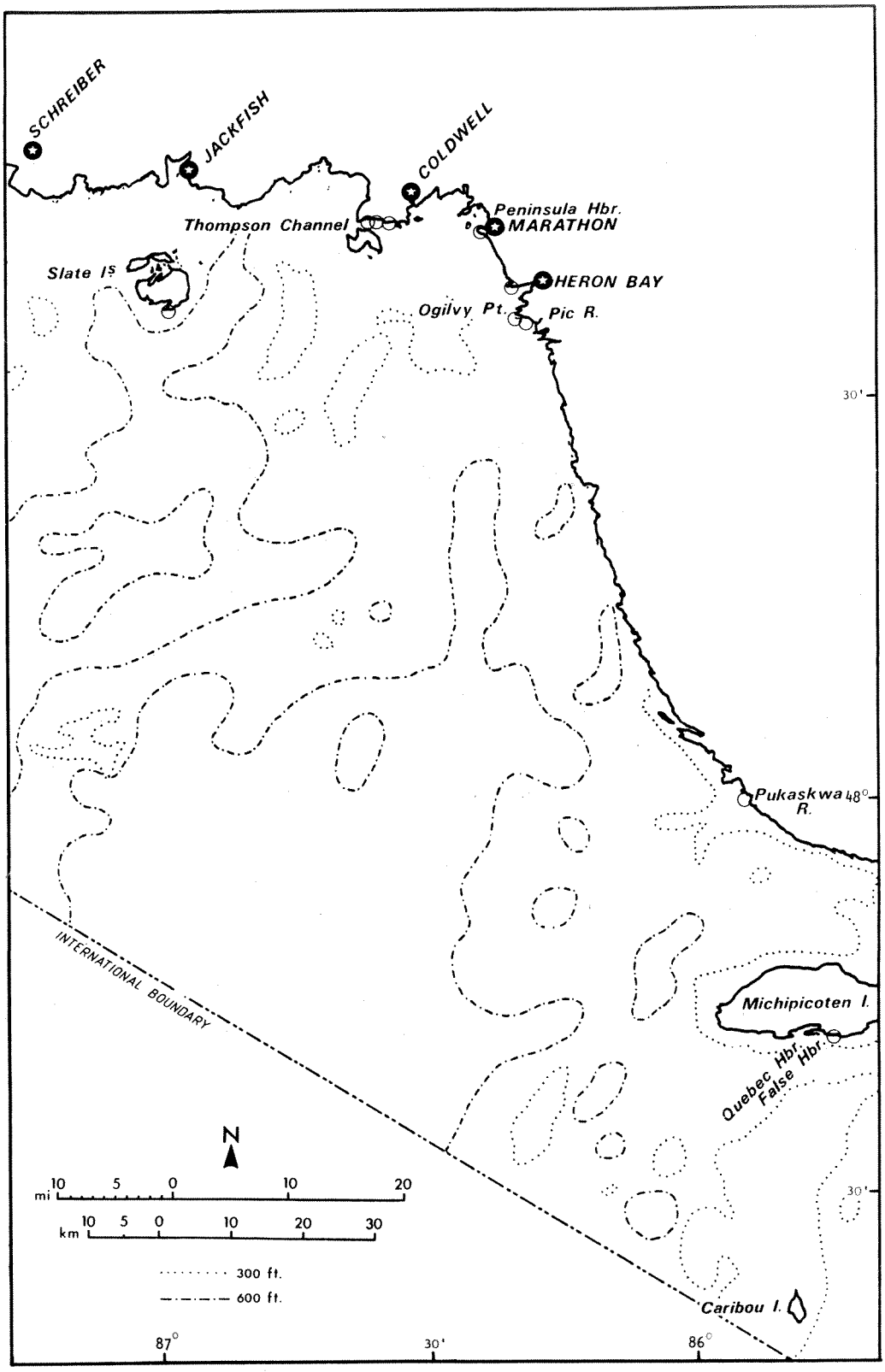
3.2.2 MICHIPICOTEN ISLAND TO SCHREIBER

FIG. 6

A number of traditional spawning schools existed about Michipicoten Island. Each summer, fishermen would also float gill nets and capture numerous herring as they moved into Quebec and False Harbours; interviewees believe these populations have now failed in strength. To the south at Caribou Island, the fisheries were usually successful in August and September, but were discontinued prior to the spawning period.

FIG. 6. SPAWNING GROUNDS OF LAKE HERRING (*Coregonus artedii*), MICHIPICOTEN ISLAND TO SCHREIBER.

Spawning locations ○


SCHREIBER
JACKFISH
COLDWELL
Peninsula Hbr.
MARATHON
Thompson Channel
Slate Is
HERON BAY
Ogilvy Pt.
Pic R.
30'
Pukaskwa R.
48°
INTERNATIONAL BOUNDARY
Michipicoten I.
Quebec Hbr.
False Hbr.
N
10 5 0 10 20
mi
10 5 0 10 20 30
km
300 ft.
600 ft.
Caribou I.
87°
30'
86°

The northeastern shores of Lake Superior do not support commercial herring fisheries. Peninsula Harbour continues to receive herring in November, although effluent and debris from the American Can paper mill is undoubtedly deleterious. During the era of the Hudson's Bay Company, Heron Bay and the Pic River mouth were popular seining sites for the herring available (at least in small numbers) from mid May until late July (Goodier 1981). A casual fishery is still maintained by the Indians of the Heron Bay Reserve; Ogilvy Point is a favoured location.

According to MacMillan (1951), herring would crowd the Pukaskwa River in mid-July:

> "The river from Anchorage pool out to the sand bar was just alive with Herring. You could look over the side of the boat and down as far as you could see in the water was layer after layer of Herring."

It was once popular to winter fish for herring at Schreiber Beach and near Rossport, along the mainshore north of Nicol Island (Mr. F. Legault, pers. comm. 1980).

3.2.3 SCHREIBER TO PIGEON RIVER

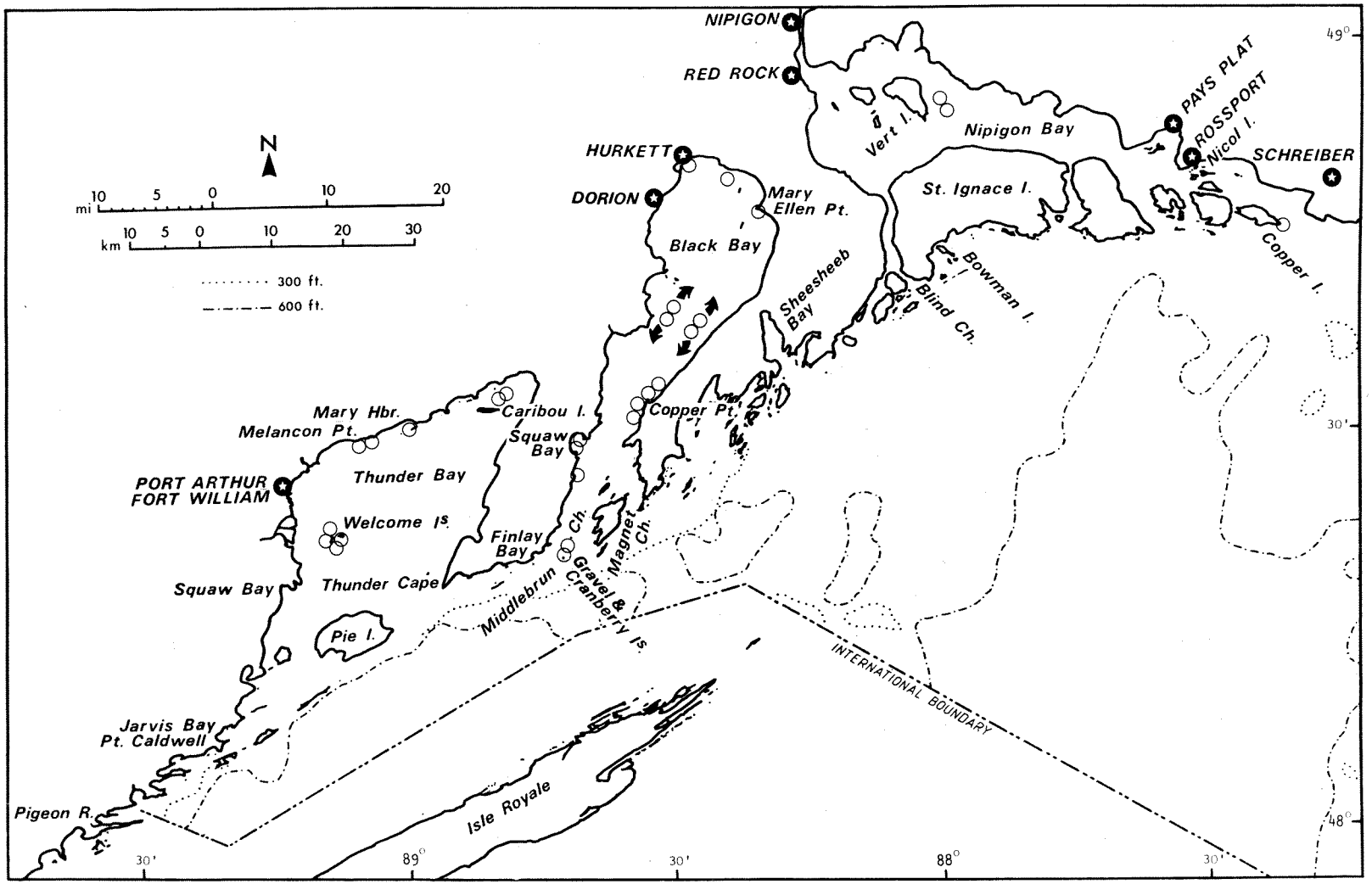
FIG. 7

In response to the food demands generated by World War I, a herring fishery was established in the Nipigon Bay and Rossport area. Production in 1914 totalled over 136,000 kg (a figure including some percentage of chubs; Canada. Department of Marine and Fisheries 1914). In recent decades, however, there have been no commercial fisheries, and most herring are caught incidentally in large mesh nets.

Without a fishery, the current status of stocks in the Nipigon Bay area is difficult to assess. Once waters near the town of

FIG. 7. SPAWNING GROUNDS OF LAKE HERRING (*Coregonus artedii*), SCHREIBER TO PIGEON RIVER.

Spawning locations ○


NIPIGON
RED ROCK
HURKETT
DORION
PAYS PLAT
ROSSPORT
Nicol I.
SCHREIBER
Vert I.
Nipigon Bay
St. Ignace I.
Mary Ellen Pt.
Black Bay
Sheesheeb Bay
Bowman I.
Blind Ch.
Copper I.
Mary Hbr.
Melancon Pt.
Caribou I.
Squaw Bay
Copper Pt.
PORT ARTHUR
FORT WILLIAM
Thunder Bay
Welcome Is.
Finlay Bay
Middlebrun Ch.
Gravel & Cranberry Is.
Magnet Ch.
Squaw Bay
Thunder Cape
Pie I.
INTERNATIONAL BOUNDARY
Jarvis Bay
Pt. Caldwell
Pigeon R.
Isle Royale
N
mi 10 5 0 10 20
km 10 5 0 10 20 30
300 ft.
600 ft.
49°
30'
48°
89°
30'
88°
30'

Rossport were a "mass of herring" in the fall, and local citizens would snag fish from the point or the dock. It was in the 1920's that Mr. F. Legault (pers. comm. 1978) here perceived the species to be failing.

During autumn months of the 1940's, setting 11 cm mesh nets off southeastern Copper Island would yield large herring weighing up to 1.4 kg (3 lb) each. Small herring (of approximately 0.1 kg or 0.25 lb) fell victim to pound nets set east of Vert Island in Nipigon Bay (Mr. F. Legault pers. comm., 1980). Since the early 1960's, herring have grown larger and now average approximately 0.5 kg (1 lb) each. Fishermen of Black Bay and Thunder Bay have progressively increased the mesh sizes of their gill nets from 6.4 to 8.2 cm. According to Mr. W. Schelling (pers. comm. 1980), higher percentages of large herring are to be found in the Port Coldwell region than in the Rossport region.

Early in September, herring begin to advance through Middlebrun and Magnet channels and spread through the pelagic waters of Black Bay. Floated nets are abandoned when the herring "hit bottom" at 18 to 23 m and move to the spawning shoals a short time later.

As noted in section 3.1.3, Koelz (1929) credited the distinctiveness of Black Bay herring, having found them deeper-bodied and more compressed than those of the main lake. Black Bay fishermen confirm this statement and recall more than one breed. For example, the "blue back" or "black back" herring was a fish possessing dark dorsal colouration and average individual weight of

approximately 0.14 kg (0.3 lb; Mr. A. Nuttall, pers. comm. 1980). It may have disappeared from Black Bay in the 1950's.

Black Bay fishermen were also once familiar with the "bluefin", a fish distinguished by its dark fins, green-blue back, dearth of fat, and an abundance of parasitic worms. The breed is called a herring by some fishermen and a chub by others. (Koelz (1929) draws attention to the close similarity of Lake Superior *C. artedii* and the chub, *C. nigriprinnis*). These fish were once part of the early summer fisheries and might remain in Black Bay for 1 1/2 months. Fall spawning occurred in four metres of water or less in bay and shoal areas as far north as Mary Ellen Point. In the 1940's a large bluefin run would gather in Squaw Bay (Mr. A. Ronquist, pers. comm. 1980). These fish are a rarity today, although Mr. O. Nordlander (pers. comm. 1980) fishes south of Finlay Bay and still finds the occasional specimen. Green-backed fish have also been captured in Sheesheeb Bay, Blind Channel, and about Bowman Island harbour in recent years, but it is not known if these are herring or a species of chub (Mr. P. Hamilton, pers. comm. 1980). At the last location they move into 12 to 18 m of water for two weeks each spring. (According to McNab (Sept. 1923) the Duluth hatchery on several occasions planted "bluefin whitefish" as an experiment).

During the past two decades there has occurred not only an increase in the average size of herring, but also an increase in their relative fat content. Herring of deeper waters are

visibly fatter. At certain depths they undoubtedly mix freely with chub species, and it is a general opinion of fishermen that certain forms are the result of interbreeding.

Two weeks may elapse between the start of spawning in Black Bay and the start of spawning in Thunder Bay; by this time Black Bay fishermen may already have stored their nets for the season. The shallow waters of Black Bay cool rapidly and so trigger earlier spawning. Local fishermen claim that the two bodies of water harbour different and discrete stocks.

Various large-scale schooling movements typify the Thunder Bay herring stocks as they converge upon the spawning shoals. Moving northward toward Pie Island, herring enter pound nets first at Point Caldwell and then at Jarvis Bay (Mr. V. Bergman, pers. comm. 1980):

> "In Thunder Bay, out of Port Arthur and Fort William, Ontario, the schools begin moving in from the west between Pie Island and the mainland about the middle of November and spread northward and eastward. They remain until early December and depart then rather suddenly over the same course. While in the bay they are taken at depths of 6 to 25 fathoms on mud and clay bottom...almost incredible quantities were taken by the virgin fisheries." (Koelz 1929)

The true picture is somewhat more complicated than that painted by Koelz. In eastern Thunder Bay herring are first captured about Thunder Cape, from whence they disperse toward the major grounds of the north end and the Welcome Islands. Variations in the spawning periods at these locations may stem from a diversity of stocks. About Pie Island spawning begins November 20, whereas north of Caribou Island spawning continues from November 25 to

December 15, peaking around December 1. At the Welcome Islands herring first appear at 36 m in the second week of November, soon commence to spawn, and so continue to a later date than in the north end of the bay.

The virgin fisheries discovered Thunder Bay to be a valuable reservoir of herring:

> "Thunder Bay seemed alive with fish, and in some cases as much as twelve tons were taken in one lift." (Ontario Department of Game and Fisheries 1911).

The largest tug operating in 1918 hauled 400 tons of herring between November 15 and December 6 (McNab Dec. 31, 1918):

> "...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 belive that none of those customers will want herring this fall." (McNab Sept. 23, 1919).

Between 1915 and 1920 the Port Arthur hatchery annually planted over seven million herring fry (of Thunder Bay origin) in the vicinity of the hatchery. 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 2 1/2 square miles." (McNab June 30, 1915)

McNab's correspondence casts doubt on the validity 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 (Baldwin and Saalfield 1962).

Spring weather brings herring into nearshore zones. Much favoured are the waters north of Caribou Island and south of Finlay Bay, where herring move into shallows at the beginning of May. Patterns of wind and weather strongly influence the availability of the schools; these may remain offshore during cold weather. Herring of southern Black Bay tend to move against the currents, a northeast wind driving the fish farther into the bay. Interestingly, whitefish seem to behave quite differently, displaying a tendency to follow the currents toward the main lake (Mr. O. Kukko, pers. comm. 1980).

3.3 CHUB, *Coregonus* spp.

Ciscoe stock identification and assessment presents the fisheries investigator with a rather tangled Gordian knot. Prior to 1955 Canadian production failed to exceed 43,000 kg, and, on a large-scale, the fishery has developed only during the 1970's (Baldwin and Saalfield 1962). Catches are not reported by species, and biological sampling programs have been limited in scope (Goodier and Spangler 1981).

Under the umbrella classification "chub", five species once constituted the Lake Superior fishery: bloater, *Coregonus hoyi*; kiyi, *C. kiyi*; blackfin, *C. nigripinis;* shortnose, *C. reighardi;* and shortjaw, *C. zenithicus*. All have undergone profound population

changes. The larger and more economically important species were successively cropped, and the blackfin was actually driven to extinction in American waters. Bloaters have come to dominate the catch in many areas (Smith 1968; Lawrie 1978).

3.3.1 SAULT STE. MARIE TO MICHIPICOTEN ISLAND

FIG. 8

In southeastern Lake Superior various fishermen have noted the vicissitudes of chub stocks on certain grounds. Thirty years ago "mooneyes" (*C. kiyi* or perhaps an *artedii* form) could be snagged in trout nets set at about 35 m in Havilland Bay. According to Mr. G.A. Jones (pers. comm. 1981), "hookjaw" chub (possibly *C. reighardi*), fat fish weighing up to 0.9 kg (2 lb), were once prevalent off Mica Bay, Alona Bay, and Montreal Shoal, but have been scarce since about 1970. Formerly, chub would move into Alona Bay in summer; here, as on a number of other grounds, they now seem to have been displaced by banker lake trout (Mr. W. Mitchell pers. comm. 1981). Those chub haunting shallow waters in summer months differed in both colour and body shape from the deep-water "varieties" common at depths greater than sixty metres.

3.3.2 MICHIPICOTEN ISLAND TO SCHREIBER

FIG. 9

The major chub fishing grounds of northeastern Lake Superior presently exist south of Port Coldwell, west of the Pic River, and generally among the extensive series of shoals known as the Pic Bank. Recent catch per unit effort estimates suggest high abundance levels, perhaps among the highest in Lake Superior (Goodier and Spangler 1981).

Fishing along the Pic Bank is conducted from early May until

FIG. 8. FISHING GROUNDS FOR CHUB SPECIES (*Coregonus* spp.), SAULT STE. MARIE TO MICHIPICOTEN ISLAND.

Fishing locations □

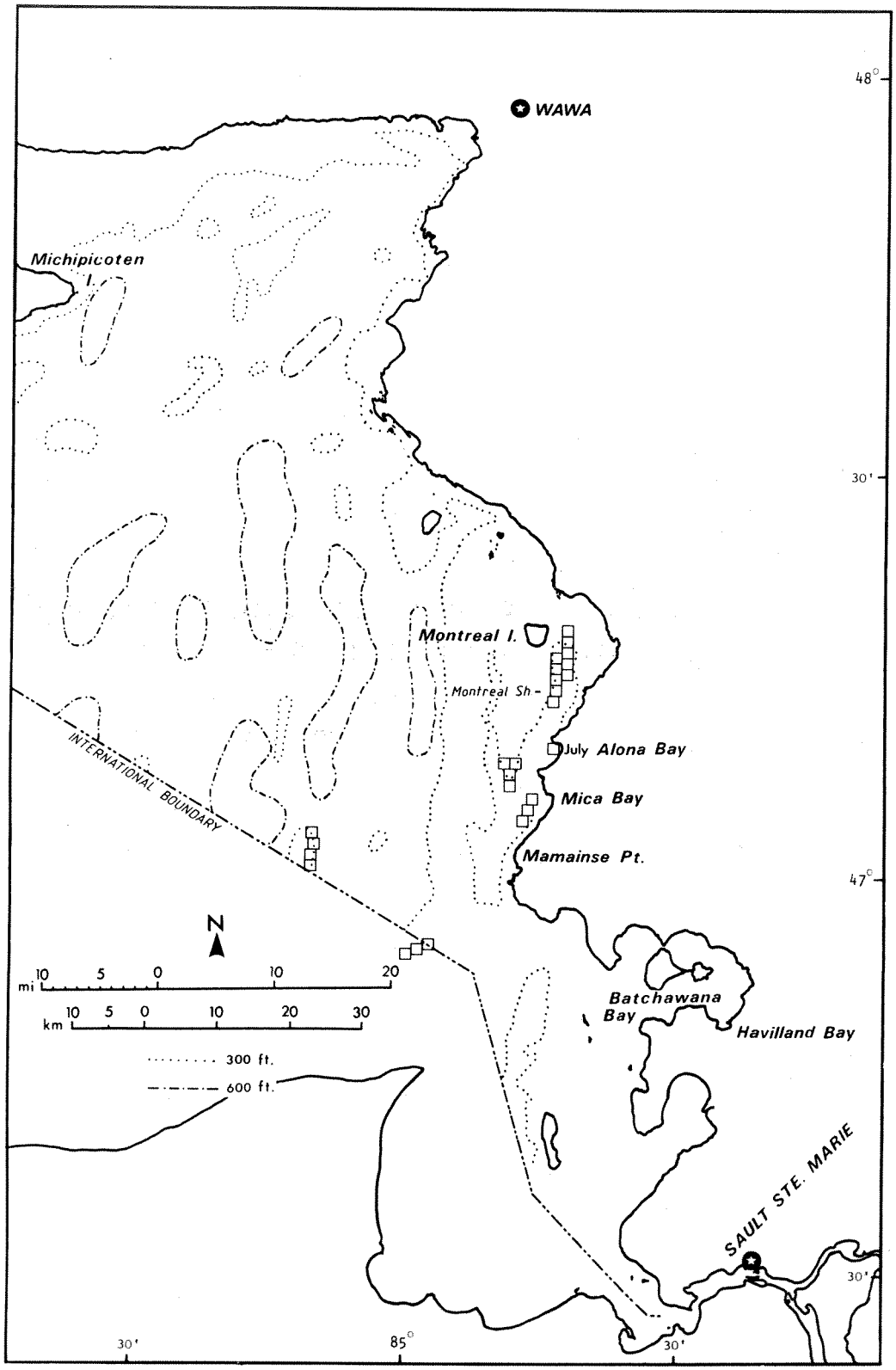
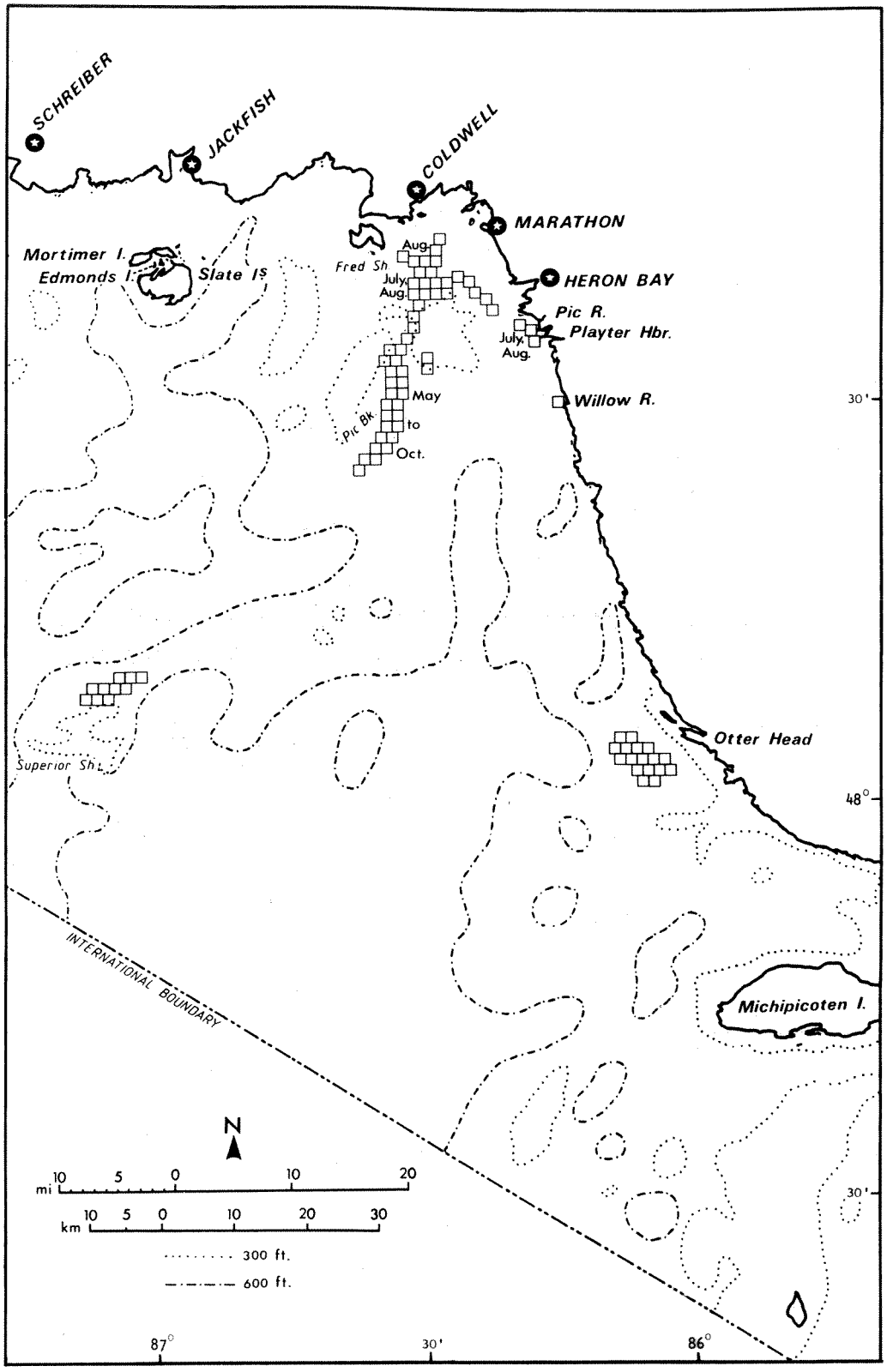

48°
WAWA
Michipicoten I.
30'
Montreal I.
Montreal Sh.
July
Alona Bay
Mica Bay
Mamainse Pt.
INTERNATIONAL BOUNDARY
47°
N
10 5 0 10 20
mi
10 5 0 10 20 30
km
300 ft.
600 ft.
Batchawana Bay
Havilland Bay
SAULT STE. MARIE
30'
30'
85°
30'

FIG. 9. FISHING GROUNDS FOR CHUB SPECIES (*Coregonus* spp.), MICHIPICOTEN ISLAND TO SCHREIBER.

Fishing locations □


SCHREIBER
JACKFISH
COLDWELL
MARATHON
HERON BAY
Pic R.
Playter Hbr.
Willow R.
Mortimer I.
Edmonds I.
Slate Is
Fred Sh
Aug.
July
Aug.
July
Aug.
May
to
Oct.
Pic Bk
Otter Head
Superior Sh.
INTERNATIONAL BOUNDARY
Michipicoten I.
N
10 5 0 10 20
mi
10 5 0 10 20 30
km
300 ft.
600 ft.
87°
30'
86°
30'
48°
30'

the end of October. In summer chub move progressively higher onto Fred Shoal, reaching their shallowest depth at thirty metres in August. Similarly, chub are located off the Pic River, Playter Harbour, and Willow River for one or two weeks in mid-summer. According to Mr. W. Mitchell (pers. comm. 1981), the basin west and southwest of the Pic River yields a brown-coloured chub (possibly *C. reighardi*) highly prized by markets. In his experience, chub from the Mamainse Point area are generally of poorer market quality and include a higher percentage of bloaters.

September months during the 1940's found small "brown-backed" chub in the Slate Island waters around Edmonds Island and westward through the channel south of Mortimer Island (Mr. F. Legault, pers comm. 1980). Spawning habits are not known.

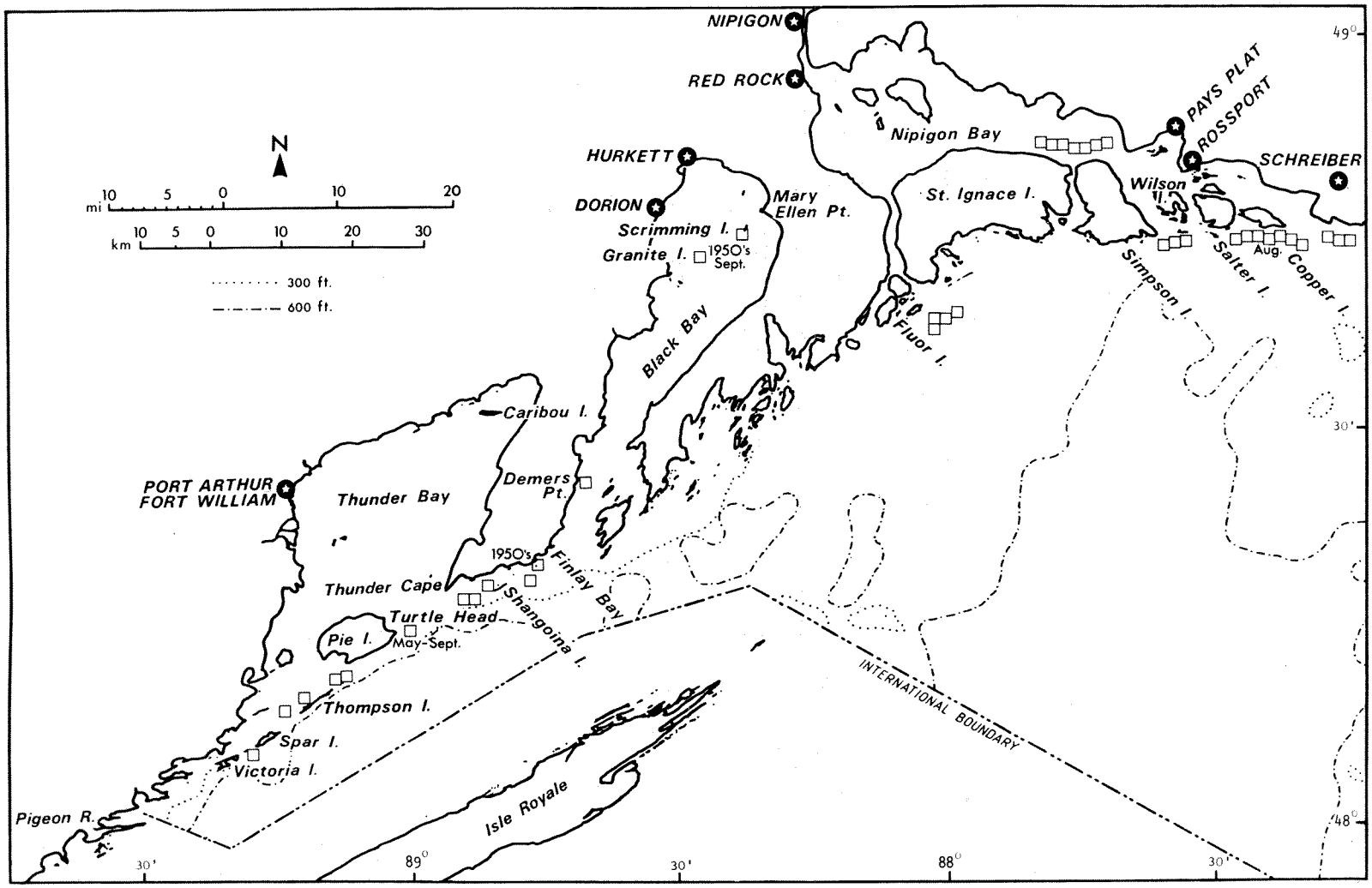
3.3.3 SCHREIBER TO PIGEON RIVER

FIG. 10

Once a component of the Black Bay fisheries, the "brown-back" chub are said to have weighed no more than 0.7 kg (1.5 lb) and to have possessed heads proportionately broader, but shorter, than other ciscoes (Mr. H. Goulet, Mr. A. Ronquist, pers. comm. 1980). Prior to 1960, July movements occurred off Demers Point or in the vicinity of Finlay Bay. Perhaps as a consequence of unusual wind and current patterns, brown-backed chub were driven almost to the north end of Black Bay during two September seasons of the 1950's From the shallows about Scrimming and Granite Islands, it was possible (for a short time) to haul 900 kg of fish a day with only six nets (Mr. W. Pawluk, Mr. J. Nuttall, pers. comm. 1980). These

FIG. 10. FISHING GROUNDS FOR CHUB SPECIES (*Coregonus* spp.), SCHREIBER TO PIGEON RIVER.

Fishing locations □


NIPIGON
RED ROCK
HURKETT
DORION
PAYS PLAT
ROSSPORT
SCHREIBER
Nipigon Bay
Wilson
St. Ignace I.
Mary Ellen Pt.
Scrimming I.
Granite I.
1950's Sept.
Simpson I.
Salter I.
Aug.
Copper I.
Fluor I.
Black Bay
Caribou I.
PORT ARTHUR
FORT WILLIAM
Thunder Bay
Demers Pt.
1950's
Finlay Bay
Thunder Cape
Shangoina I.
Turtle Head
May-Sept.
Pie I.
Thompson I.
Spar I.
Victoria I.
Pigeon R.
Isle Royale
INTERNATIONAL BOUNDARY
N
10 5 0 10 20
mi
10 5 0 10 20 30
km
300 ft.
600 ft.
49°
30'
48°
89°
30'
88°
30'

extraordinary movements were not repeated. The brown-back chub is now seldom pulled from Black Bay nets.

Twenty years ago, Mr. G. Tyska (pers. comm. 1980) set nets at about 35 m for the chub congregating around Caribou Island. Chub fishing begins in June in the Thunder Bay region and is now limited by permit to waters greater than ninety metres. Popular grounds exist in the vicinity of Shangoina Island, Thunder Cape, and northeast Pie Island, but recently the fisheries have expanded to include grounds west of Thompson and Spar Islands (Mr. K. Maki, pers. comm. 1980). Off Turtle Head (Pie Island) chub are known to spawn in August and September; in spring they attain their greatest concentrations between 110 and 130 m (Mr. J. Sameluk, pers. comm. 1980).

Experimental permits recently have been issued by the Ontario Ministry of Natural Resources for those eastern Nipigon Bay waters of less than ninety metres where chub were traditional visitors. Among the region's best grounds are those in the Fluor Island area, south of Simpson Island, and southwest of Copper Island (Goodier and Spangler 1981).

3.4 WALLEYE (PICKEREL), *Stizostedion vitreum* AND NORTHERN PIKE, *Esox lucius*

Around 1868 commercial fishermen would set pound nets in May for pike and pickerel of the St. Mary's River and its southern reaches, Mud, George, Echo, and Hay lakes (Canada. Department of Marine and Fisheries 1872; United States Commission of Fish and

Fisheries 1887). 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." (Canada. Department of Marine and Fisheries 1880).

Despite a growing popularity, pike and pickerel were not infrequently condemned as destructive of more valued species' spawn: in certain rivers serious efforts were made to reduce their numbers (Sault Star Sept. 24, 1908; see section 3.4.3).

Some abundance losses occurred prior to 1900 (United States House of Representatives 1897). One overseer attributed an apparent decline of pickerel (and sturgeon) in Batchawana and Goulais bays to overfishing with pound nets (Canada. Department of Marine and Fisheries 1894). Nevertheless, no long-term trends are evident, and the Ontario pickerel fisheries prospered until the collapse of the Nipigon and Black bay populations.

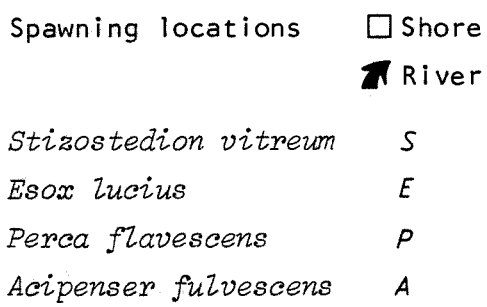
One source of confusion inherent in the use of historical documents should be noted. Early authors often employed the terms pickerel and pike interchangeably: it is sometimes difficult to know if reference is being made to *Stizostedion* spp. or the northern pike.

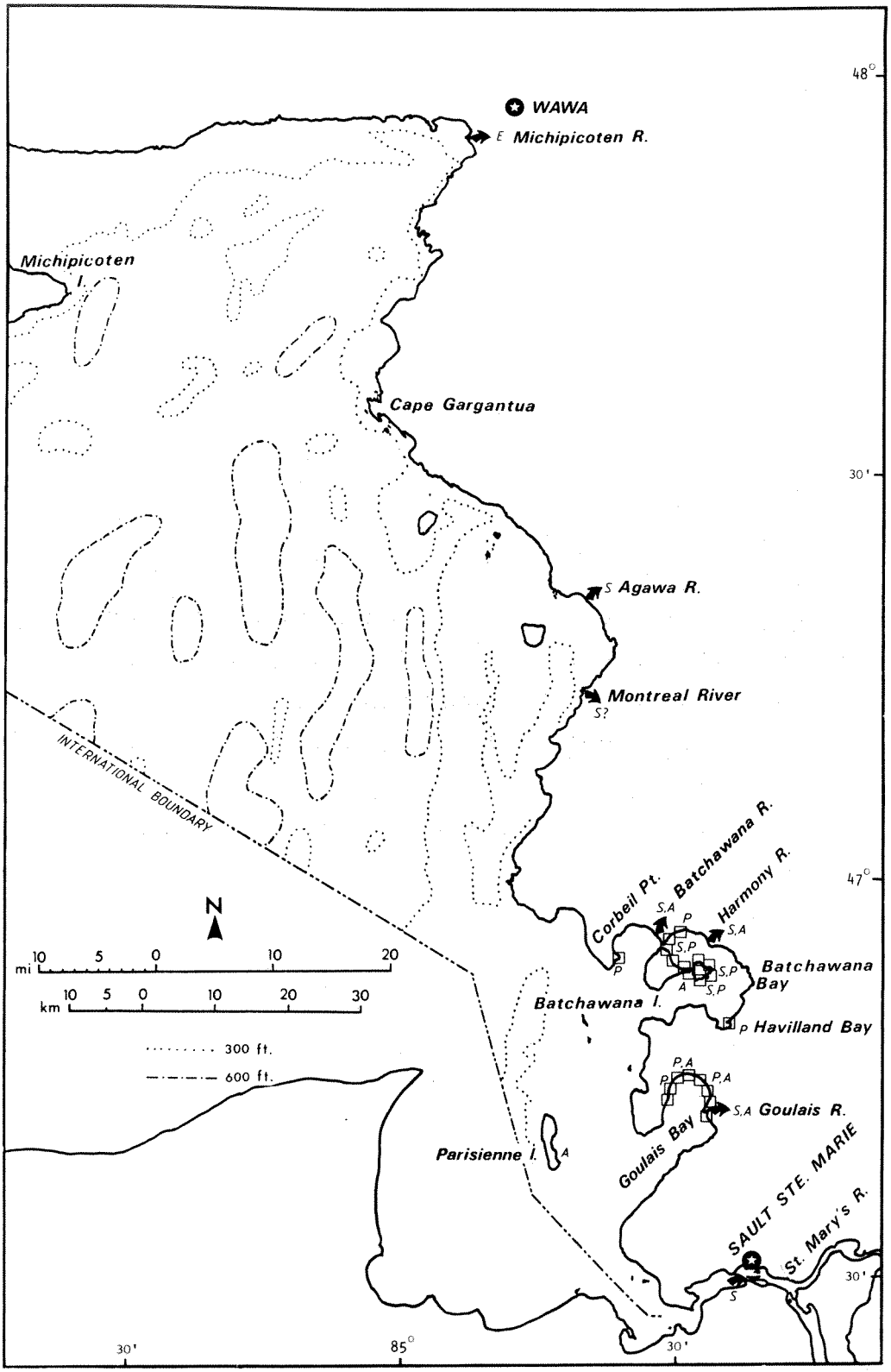
FIG. 11

3.4.1 SAULT STE. MARIE TO MICHIPICOTEN ISLAND

Below the rapids of the St. Mary's River, anglers still seek the walleye which Heriot (1807) once noted as abundant.

FIG. 11. SPAWNING GROUNDS OF WALLEYE (*Stizostedion vitreum*), NORTHERN PIKE (*Esox lucius*), YELLOW PERCH (*Perca flavescens*), AND LAKE STURGEON (*Acipenser fulvescens*), SAULT STE. MARIE TO MICHIPICOTEN ISLAND.




48°
WAWA
E Michipicoten R.
Michipicoten I.
Cape Gargantua
30'
S Agawa R.
Montreal River
S?
INTERNATIONAL BOUNDARY
47°
Batchawana R.
Corbeil Pt.
Harmony R.
S,A
P
S,P
S,A
P
S,P
A
S,P
Batchawana Bay
Batchawana I.
P Havilland Bay
P,A
P
P,A
S,A Goulais R.
Goulais Bay
Parisienne I.
A
SAULT STE. MARIE
St. Mary's R.
S
30'
N
mi 10 5 0 10 20
km 10 5 0 10 20 30
300 ft.
600 ft.
30'
85°
30'

Walleye are found throughout inner Batchawana Bay, and major spawning grounds are located along the northern shores of Batchawana Island, and in the Batchawana and Chippewa (Harmony) rivers. Major concentrations are also found in the vicinity of the Goulais River, where a spawning run occurs from May until June 15 (Mr. G. A. Jones, pers. comm. 1981).

The improved walleye catches reported by some anglers may mark the reversal of a decline noted during the 1960's, especially in the Batchawana Bay area (Anon. 1965; 1968b). During the past two or three years, the species has appeared in the Agawa River for the first time (Mr. O. Bjornaa, pers. comm. 1981). Catches have been reported in the Montreal River, also an unusual occurrence. During the course of a 1977 survey of the Michipicoten River, Ontario Ministry of Natural Resources personnel captured walleye eight km above the mouth (Mr. W.-H. Kwain, pers. comm. 1981).

3.4.2 MICHIPICOTEN ISLAND TO SCHREIBER

FIG. 12

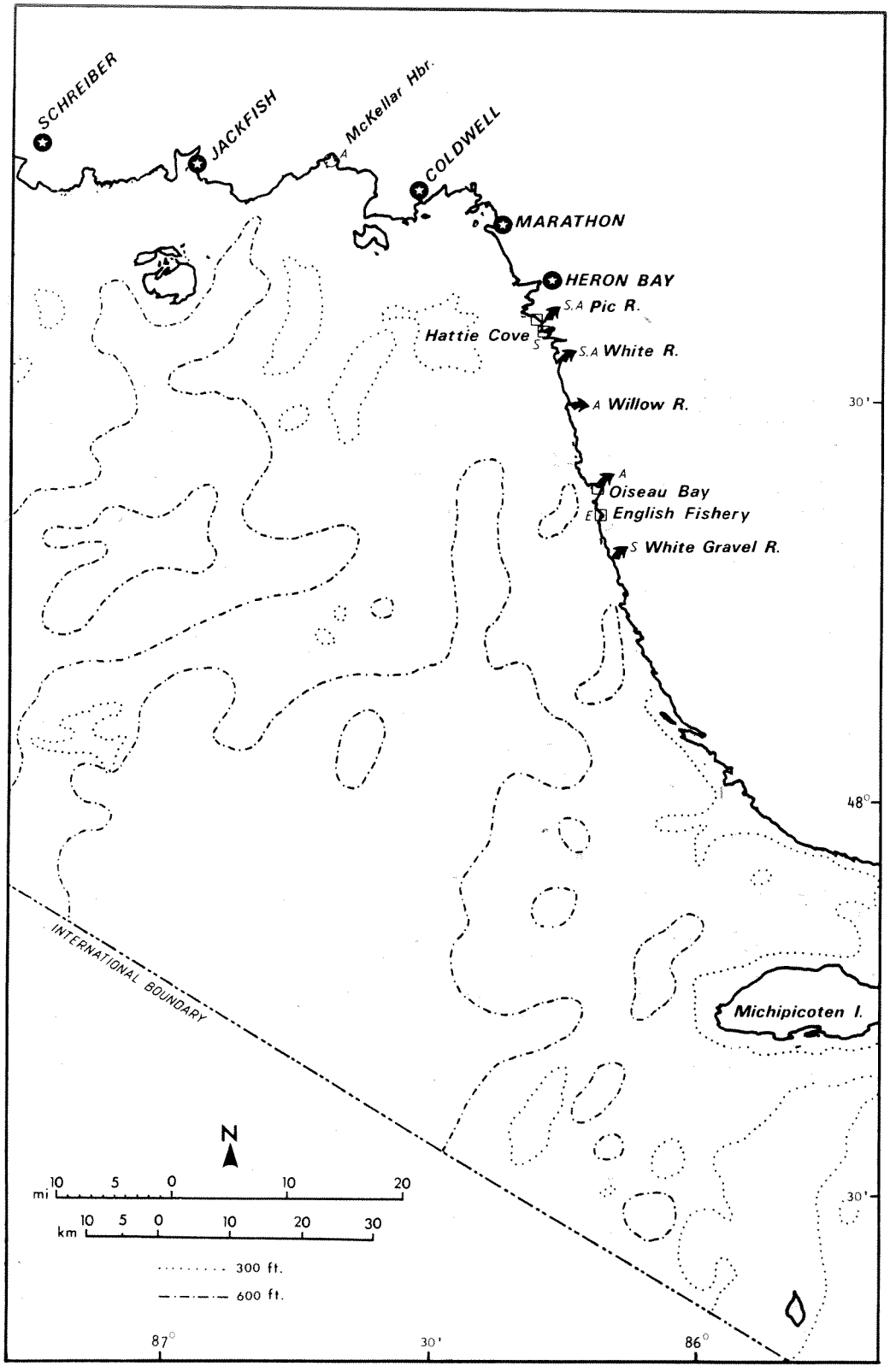
The large numbers of walleye noted in the journals of the Hudson's Bay company are still to be found in Hattie Cove, and the Pic, Black, and White Gravel rivers. Collecting near the mouths of the Pic and White rivers each September, walleye swim near the surface and sometimes move upstream. Spawning occurs in spring.

For many years English Fishery has been known to sportsmen as a prime source of pike (MacMillan 1951).

FIG. 12. SPAWNING GROUNDS OF WALLEYE (*Stizostedion vitreum*), NORTHERN PIKE (*Esox lucius*), YELLOW PERCH (*Perca flavescens*), AND LAKE STURGEON (*Acipenser fulvescens*), MICHIPICOTEN ISLAND TO SCHREIBER.

Spawning locations ☐ Shore
◤ River

Stizostedion vitreum	*S*
Esox lucius	*E*
Perca flavescens	*P*
Acipenser fulvescens	*A*


SCHREIBER
JACKFISH
McKellar Hbr.
COLDWELL
MARATHON
HERON BAY
S,A Pic R.
Hattie Cove
S
S,A White R.
A Willow R.
30'
A
Oiseau Bay
E
English Fishery
S White Gravel R.
48°
INTERNATIONAL BOUNDARY
Michipicoten I.
N
mi 10 5 0 10 20
km 10 5 0 10 20 30
300 ft.
600 ft.
87°
30'
86°
30'

3.4.3 SCHREIBER TO PIGEON POINT

FIG. 13

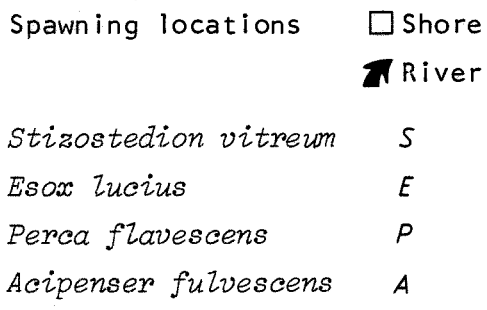
Although the walleye fishery of Nipigon Bay was established many years after that of Black Bay, it grew to significant dimensions following World War I. Ryder (1968) has demonstrated that the stocks of these two bays are discrete. After spawning in the lower reaches of the Nipigon River early in May, walleye would disperse southward to be intercepted by fishermen in the vicinity of Five Mile Point and the Clay Banks. Lost now are the great populations of the past:

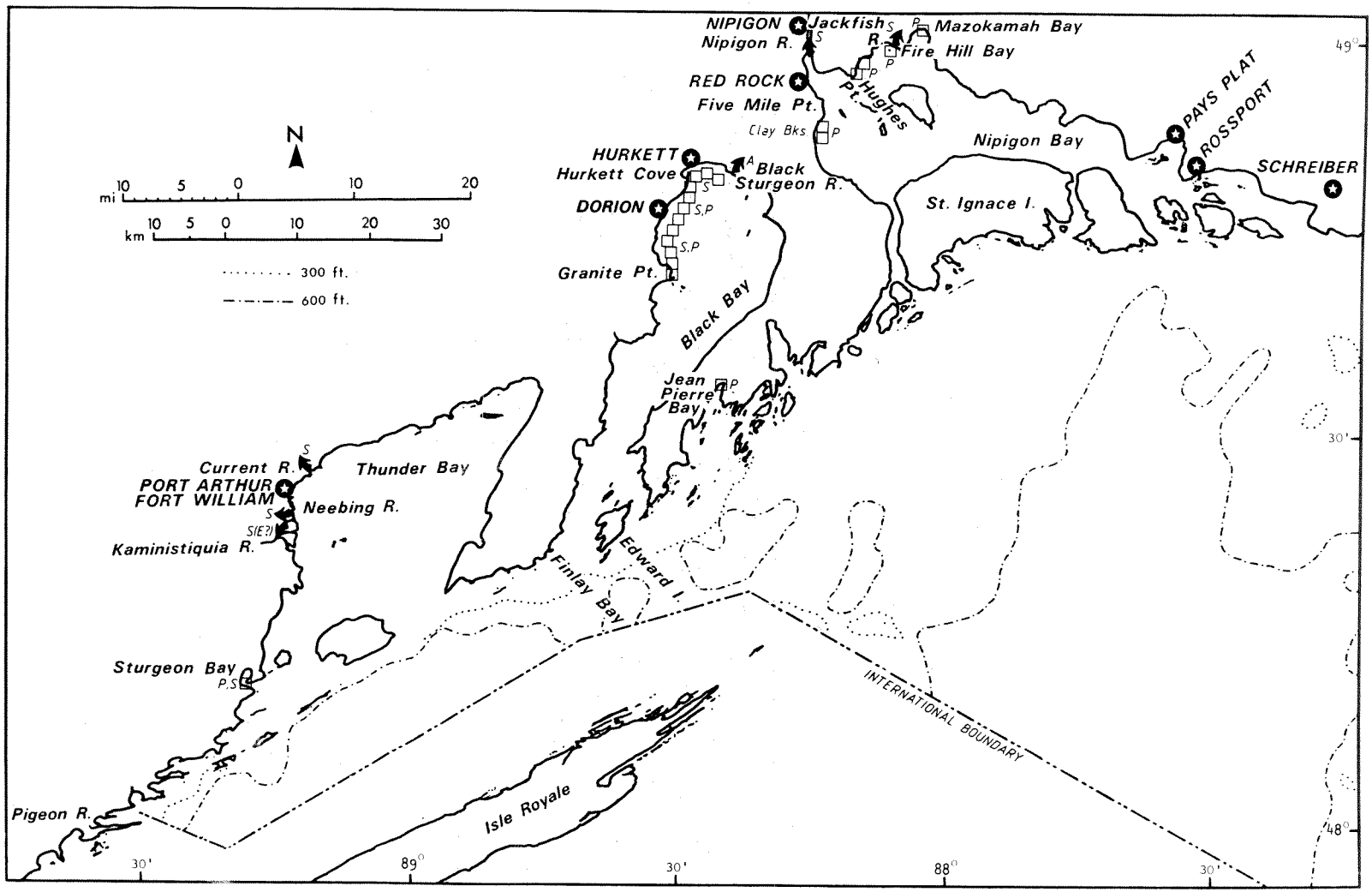
> "A gentleman who revisited the river...is pleased to report that war waged against the pike (which were fast taking control of certain portions of the river) has been a decided success. Some thousands of pike which would average 10 lbs each have been destroyed, as well as large numbers of pickerel (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." (Ontario Department of Game and Fisheries 1902).

In 1913 the Ontario Department of Game and Fisheries (1914) even recruited men to continue waging the "war" with hoop nets.

Beginning in 1958 the walleye fishery began to slump, and in the late 1960's numerous deformed fish were appearing in the nets (German 1970). Ryder (1968) concluded that industrial pollution from Red Rock, rather than overfishing or sea lamprey predation, dispatched the walleye. An electrical lamprey weir erected along the Jackfish River may also have hastened the demise of that spawning stock (Lawrie 1978). As a source of both walleye and pike,

FIG. 13. SPAWNING GROUNDS OF WALLEYE (*Stizostedion vitreum*), NORTHERN PIKE (*Esox lucius*), YELLOW PERCH (*Perca flavescens*), AND LAKE STURGEON (*Acipenser fulvescens*), SCHREIBER TO PIGEON RIVER.




NIPIGON
Nipigon R.
Jackfish R.
Mazokamah Bay
Fire Hill Bay
RED ROCK
Five Mile Pt.
Pt. Hughes
Clay Bks
HURKETT
Hurkett Cove
Black Sturgeon R.
DORION
Granite Pt.
Black Bay
Jean Pierre Bay
Nipigon Bay
PAYS PLAT
ROSSPORT
SCHREIBER
St. Ignace I.
Current R.
PORT ARTHUR
FORT WILLIAM
Neebing R.
Kaministiquia R.
Thunder Bay
Finlay Bay
Edward I.
Sturgeon Bay
Pigeon R.
Isle Royale
INTERNATIONAL BOUNDARY
N
mi 10 5 0 10 20
km 10 5 0 10 20 30
300 ft.
600 ft.
49°
48°
89°
88°
30'

the Jackfish River was long reknowned, as its present name and original French name, Rivière la Pique, attest (Long 1791).

Believing recent efforts at water quality control to have been successful, the Ontario Ministry of Natural Resources has begun planting walleye eggs in the Jackfish River. Their source is a stock from the Current River of Thunder Bay, "where a substantial spawning population still exists" (Koistinen 1980).

As previously noted, Black Bay has supported a walleye fishery since the 1880's. According to Department of Marine and Fisheries reports, annual production between 1885 and 1890 averaged almost 30,000 kg (66,100 lb). Even in the 1920's, when walleye brought only 3/4 cents per lb, the pound net boats would land in Hurkett "loaded to their gunwales" (Mrs. N. Thrower, pers. comm. 1978). Walleye spawned at the north end of Black Bay, both east and south of Hurkett Cove. Ryder (1968) also located a minor run in the Black Sturgeon River. In the course of their movements, walleye were captured in pound nets set on the northeast point of Edward Island and were abundant in Finlay Bay in early September (Mr. M. Gerow, Mr. O. Nordlander, pers. comm. 1980).

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 by 1967 a decline was underway. In 1968 Mr. J. Nuttall (pers. comm. 1981) began to discover deformed fish (interestingly, about the same time they were first noted in Nipigon Bay), and in subsequent years walleye

eggs appeared "yellow and hard". The downfall of *S. vitreum* seems to have been paralleled by the loss of the emerald shiner (*Notropis atherinoides*), once abundant in Black Bay. Fishermen also turned their attentions to the sauger (*Stizostedion canadense*), now no longer a viable commercial species in Black Bay. The bay has been closed to pickerel fishing.

The Thunder Bay fishery began shortly after 1890. Government statistics (available for the years 1871 to 1922) reveal drastic production losses (for reasons unknown) after the peak years of 1907 to 1911, when an average of 50,000 kg (110,200 lb) of pike and walleye were harvested each year.

Cultural modification of stream drainage may have affected a few spawning 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." (McNab March 8, 1915)

The Weekly Herald and Lake Superior Mining Journal (July 22, 1888) notes that pickerel (pike?), like whitefish, were plentiful in the Kaministikwia River . South of Thunder Bay, the pickerel which formerly flourished in Sturgeon Bay have now been reduced to a remnant stock; some people blame the effects of angling and cottage development for the stock losses.

3.5 YELLOW PERCH, *Perca flavescens*

FIG. 11

3.5.1 SAULT STE. MARIE TO MICHIPICOTEN ISLAND

In eastern Lake Superior yellow perch are generally limited to Goulais, Havilland, and Batchawana bays, where they are the dominant

species of the angler's creel. Average annual production south of Cape Gargantua totalled 2030 kg (4480 lb) between the years 1971 and 1975 (Ridgley 1976). Spawning occurs in early June.

FIG. 13

3.5.2 SCHREIBER TO PIGEON RIVER

Since its origins in 1974, the Nipigon Bay perch fishery has annually landed an average of 6380 kg (14,060 lb); the year 1977 showed a peak production of 10,110 kg (22,300 lb). Red Rock's sports-fishing industry, which had collapsed with the loss of the walleye, was resurrected as perch fishing became increasingly popular. (Predictably, conflicts of interest have arisen between anglers and net fishermen). Fishing currently centres about Hughes Point, where perch move inshore in June to spawn. In addition, the species spawns four km south of Five-mile Point and is to be found in Fire Hill and Mazokamah bays.

Far from being detrimental, log rafting in Nipigon Bay seemed to attract perch, and good catches were often made near the boom edges. Mr. W. Schelling (pers. comm. 1980) noted an apparent decline subsequent to the abandonment of rafting. Similar behaviour has been noted among walleye of Black Bay.

Black Bay spawning occurs in May and is concentrated in that part of the bay north of Granite Point. The demise of the walleye, a major predator, has permitted perch encroachment onto former walleye grounds. Former pickerel fishermen have shifted effort to

perch, and the fishery has developed rapidly during the past decade:

YEARS	AVERAGE PRODUCTION	SOURCE
1961-65	7,940 kg	Ontario Ministry of Natural Resources (1972a)
1966-70	3,190 kg	Ibid (1972b)
1971-75	25,500 kg	Hamilton (1978e)
1976-79	46,725 kg	Hamilton (1978e)

Hamilton (1978e) documents its development and assesses the current status of the perch populations. Despite increasing exploitation, catch per unit effort estimates and age distributions reveal a population on the rise.

3.6 LAKE STURGEON, *Acipenser fulvescens*

Once reviled by fishermen as a coarse fish and destroyer of nets, lake sturgeon in the late 1800's assumed a position of esteem and high market demand. Scott and Crossman (1973) chronicle its rise to favour and outline its diverse market uses. According to one old-time Lake Superior fisherman, there are seven different kinds of sturgeon meat, each delicious. At one time, sturgeon gristle was even employed in the manufacture of ping-pong balls (Mr. H. Servais, pers. comm. 1978).

Few people survive who recall sturgeon populations in their prime. Lawrie and Rahrer (1973) note a nine percent average annual rate of decline after 1885. Although overexploitation was probably the major cause, detrimental effects of river drives and log rafting are also considered by these authors.

3.6.1 SAULT STE. MARIE TO SCHREIBER

FIG. 11 and FIG. 12

A small but self-sustaining sturgeon population continues to exist in Goulais Bay, concentrated in the Goulais River and along the shore north of the river's mouth. Once among the most famous of the region, grounds along the southern shores of Batchawana Island continue to support a remnant stock, as also do the Batchawana and Chippewa (Harmony) rivers (Mr. G.A. Jones, pers. comm. 1981). The largest lake sturgeon ever recorded, 140 kg (310 lb), was hauled in 1922 from a pound net set in Havilland Bay by F. Lapointe. Pounds ranged along Parisienne Island shore also entrapped sturgeon, but the present viability of the species on these grounds is not known.

Sturgeon still inhabit Oiseau Bay, and the Willow, White, and Pic rivers. Spawners were formerly abundant at Camp 19 rapids on the Pic River (Mr. C. MacMillan, pers. comm. 1978).

3.6.2 SCHREIBER TO PIGEON RIVER

FIG. 13

Black Bay once contained the most productive sturgeon grounds of Lake Superior. Reports of the Department of Marine and Fisheries show average annual production to have been 25,000 kg (55,000 lb) between the years 1886 and 1890. Prior to 1962 the bay still yielded over 1,360 kg (3,000 lb) of sturgeon each year (Ontario Ministry of Natural Resources 1972a; Ridgley 1975). Mr. J. Nuttall (pers. comm. 1981) perceived the loss of the sturgeon to have been accompanied by a decline in "crayfish" abundance; in the last few years both species seem to have been making a comeback. Sturgeon are in the Black Sturgeon River.

During the 1800's rapids of the Kaministikwia River attracted numerous spawning sturgeon in mid-July (Goodier 1981). Nipigon Bay once also contained important sturgeon grounds (Mr. W. Schelling, pers. comm. 1978).

3.7 SUCKERS, *Catostomus* spp.

Canadian commercial landings of suckers totalled almost 100,600 kg (221,750 lb) in 1975 (Ridgley 1976). It is a general consensus among fishermen that suckers are on the increase.

3.7.1 SAULT STE. MARIE TO MICHIPICOTEN ISLAND

At Parisienne Island, the Sandy Islands, and south of Gros Cap, the sucker stocks grow thicker year by year. In eastern Lake Superior, white suckers (*C. commersoni*) tend to frequent bay areas; including Gargantua, Indian, and Michipicoten harbours, and Batchawana and Goulais bays. Less abundant are the suckers inhabiting the shore zones of the Lizard Islands. Westerman and Van Oosten (1937) noted an ample supply in the St. Mary's River.

Longnose suckers (*C. catostomus*) are not common in Batchawana Bay, preferring instead open areas of shore (Mr. G.A. Jones pers. comm. 1981). At Steamboat Island (North Sandy Island) they are especially prolific. Sucker spawning commences late April and usually continues until at least mid-May. Both species will spawn in streams, although the longnose sucker tends to arrive earlier but remain for a shorter period of time (Scott and Crossman 1973). Also present within the lake are the silver redhorse (*Moxostoma anisurum*) and shorthead redhorse (*M. macrolepidotum*), both fish

liable to be confounded with the sucker. Redhorses spawn in streams, usually somewhat later than suckers.

3.7.2 MICHIPICOTEN ISLAND TO SCHREIBER

The famous biologist, Agassiz (1850) procured most of his samples of longnose sucker at the Pic River. Somewhat east of Port Coldwell is Red Sucker Cove (a name alluding to *C. catostomus*). Suckers also crowd the waters of Quebec Harbour (Michipicoten Island) and between July and September collect in the vicinity of the hydro-electric tailrace emptying into Terrace Bay. Traditionally, suckers have been abundant in Victoria and Jackfish bays, but rare about the Slate Islands (Mr. P. Dahl, pers. comm. 1978).

3.7.3 SCHREIBER TO PIGEON RIVER

According to Haas (1974a), suckers usually spawn in and about the rivers of the Rossport area around June 1. During the first week of June, suckers also invade the southern shores of St. Ignace Island, push through Nipigon Strait, and disperse into Nipigon Bay itself. The bay's fishermen pull their nets during the month of July and avoid entangling mesh with these coarse fish (Mr. R. Dampier, pers. comm. 1980).

Wolf River and Portage Creek of Black Bay receive significant sucker runs in the later part of April (Bougie 1973). Suckers are found along many stretches of Thunder Bay shoreline in water of twenty m or less, but are most common in bays (such as Amethyst and Mackenzie bays). Many whitefish fishermen are forced to suspend

operations in June (Purvis 1977). Traditionally, suckers throng in and about the Kaministikwia River from early May until July, and for a time supplied the Port Arthur hatchery with a ready source of fish food (McNab Aug. 10, 1920).

3.8 BURBOT, *Lota lota*

The burbot is a pervasive species, and fishermen of eastern Lake Superior have noted significant population expansion during the past ten years, accompanied by increasing size of fish (Lawrie 1978; Mr. E. LaBlance pers. comm. 1981). Burbot are common along the western shores of Parisienne Island and the shallows of Batchawana Bay, where it is their habit to spawn in February. According to Organ et al. (1978) spawning also occurs in the rapids of the St. Mary's River.

The burbot of Black Bay are large, frequently exceeding 4.5 kg (10 lb), but averaging 1.4 kg (3 lb). During the 1950's Mr. J. Nuttall (pers. comm. 1981) discovered the value of burbot as a mink food, and managed to capture large quantities in a pound net erected at Bent Island. Mr. P. Dahl (pers. comm. 1978) would also catch burbot near Jackfish.

3.9 THE HERRING FAMILY, CLUPEIDAE

The alewife (*Alosa pseudoharengus*), native of Canada's eastern coast, was first reported in Lake Superior in 1954 (Scott and Crossman 1973). It has become firmly established in southeastern Lake Superior, and its populations occasionally reach significant

proportions. In 1965(?), for example, local residents reported thousands of fish running in the Michipicoten River, although no subsequent sightings are recorded (Holder 1972). Since that time the species has gained a foothold in western Lake Superior. First captures were made in Black Bay in 1963 and the Pigeon River in 1964 (Affleck 1972). It is possible, however, that alewives were established in the area of Jackfish prior to 1963 (Mr. P. Dahl, pers. comm. 1978). Five alewives were procured at the mouth of the Jackpine River (east of Mazokamah Bay) in 1970, and today a July run exists in the Black Sturgeon River of Black Bay (Fullerton 1976; Mr. J. Nuttall, pers. comm. 1981).

In the past two years fishermen of southern Lake Superior have noticed an increase in the number of alewives caught in chub nets (Mr. E. LaBlance, pers. comm. 1981). On the other hand Mr. G. Primeau (pers. comm. 1981) has discerned a decrease in the size of schools frequenting inshore areas and the St. Mary's River, coincident with increases in salmon abundance.

The first documented Lake Superior gizzard shad was a 0.7 kg (1.5 lb) specimen obtained by Mr. G.A. Jones in Batchawana Bay during 1961 (Scott and Crossman 1973). Burger (1972) reports:

> "...One of the Sault Fishermen said he was 15 years old when he first saw 'them flat fish'...this would be about 1937??"

3.10 SMELT, *Osmerus mordax*

TABLE 3

The inexorable advance of smelt throughout Lake Superior following their initial 1930 appearance in Whitefish Bay has been

Table 3. Spawning rivers of selected Lake Superior fish species.*

Location	Species				
	Rainbow Trout	Brown Trout	Pink Salmon	Chinook and Coho Salmon	Smelt
St. Mary's R.	1		1	1	
Garden R.	1				
Root R.	1				
Davignon Cr.	1				
Bennett Cr.	1				
Roundwood Cr.	1				
Carp R.	1				
Prince Cr.	1				
Unnamed Cr. (6.0 km (N.E. of Prince Cr.)	1				
Unnamed Cr. (1.8 km S. of Cranberry Cr.)	1				
Cranberry Cr.	1				
Goulais R.	1				
Little Goulais R.	1				
Havilland Cr.	1				
Stokely Cr.	1			1	
Harmony R.	1				
Government Cr.	1				
Sawmill Cr.	1				
Jones Cr.	1				
Downey Cr.	1				
Chippewa R.	1			1	
Batchawana R.	1				
Carp R.	1				
Pancake R.	1			1	
Unnamed Cr. (W. Pancake Bay)	1				
Mamainse Cr.	1				
Mica Bay Cr.	1				
Dobson's Cr.	1				
Alona Bay Cr.	1				
Metheany Cr.	1				
Montreal R.	1			1	
Laughing Br.	1				
Speckled Trout Cr.	1		1		
Agawa R.	1		1	1	1
Unnamed Cr. (at Agawa Pt.)	1				
Barrett R.	1				
Sand R.	1		1		1
Coldwater R.	1			1	
Baldhead R.	1		1		
Unnamed Cr. (1.5 km S. of Buckshot Cr.)					
Buckshot Cr.	1				

Table 3. continued

Location	Species				
	Rainbow Trout	Brown Trout	Pink Salmon	Chinook and Coho Salmon	Smelt
Unnamed Cr. (at Gargantua Bay)	1				
Unnamed Cr. (at Gargantua Hbr.)	1				
Gargantua R.	1				
Unnamed Cr. (1.5 km N. of Indian Hbr.)	1				
Unnamed Cr. (N. of Ryan Pt.)	1				
Red Rock R.	1				
Unnamed Cr. (N. of Bushy Bay)	1				
Old Woman R.	1		1		1
Unnamed Cr. (at Brulé Hbr.)	1				
Unnamed Cr. (at Brulé Hbr.)	1				
Unnamed Cr. (at Beauvier Pt.)	1				
Noisy Cr.	1				
Unnamed Cr. (2.5 km N. of Smoky Pt.)	1				
Fort Cr.	1				
Michipicoten R.	1	1	1		1
Magpie R.	1	1	1	1	
Unnamed Cr. (at Michipicoten Hbr., E. of Clergue I.)	1				
Doré R.	1	1		1	
Little Makua R.	1				
Makua R.	1				
Little Bear R.	1				
Mountain Ash R.	1				
University (Dog) R.	1		1		
Feather R.	1				
Unnamed Cr. (0.8 km E. of Tamarock Bay (Creek))	1				
Eagle R.	1				
Ghost R.	1				
Unnamed Cr. (2.4 km W. of Ghost R.)	1				
Unnamed Cr. (2.2 km E. of Floating Heart R.)	1				
Floating Heart R.	1				
Campbell Cr.	1				

Table 3. continued

Location	Species				
	Rainbow Trout	Brown Trout	Pink Salmon	Chinook and Coho Salmon	Smelt
Pipe R.	1				
Unnamed Cr. (5.6 km W. of Pipe R.)	1				
Unnamed Cr. (8.8 km W. of Pipe R.)	1				
Unnamed Cr. (at N.E. end of Quebec Hbr., Michipicoten I.)	1				
Julia R.	1				
Imogen R.	1				
Holly Cr.	1				
Swallow R.	1				
White Gravel R.	1				
White R.	1				
Pic R.	1		1		1
Angler Cr.	1		1		1
Red Sucker Cr. (at Port Munro)	1		1		1
Craddock Cr.	1		1		1
Little Red Sucker Cr.	1		1		1
Mink Cr.	1	1	1		1
Neys Cr. (2.5 km S. of Little Pic R.)	1		1		1
Little Pic R.	1		1		1
Dead Horse Cr.	1		1		1
Ripple Cr.	1		1		
McKellar Cr.	1	1	1		1
Prairie R.	1		1		1
Camp 91 Cr. (3.4 km W. of Prairie R.)	1		1		1
Unnamed Cr. (at Bottle Pt.)	1		1		1
Steel R.	1	1	1		1
Jackfish Cr. (from Jackfish L.)	1		1		1
Aguasoban R.	1		1		1
McCausland Pond	1		1		1
Aguasoban Dam (Terrace Bay)	1		1		1
Lost Cr. (at Les Petits Eorits)	1		1		1
Worthington Cr.	1		1		1
Schreiber Cr.	1		1		
Cooks Cr. (at Schreiber Beach, Collingwood Bay)	1		1		1

Table 3. continued

Location	Species				
	Rainbow Trout	Brown Trout	Pink Salmon	Chinook and Coho Salmon	Smelt
Blind Cr.	1		1		1
Hewitson R.	1		1		1
McLeans Cr.	1		1		1
McKellar Cr.	1		1		
Pays Plat R.	1		1		1
Tedesco Cr.	1				
Brook R.	1				
Gravel R.	1	1	1		1
Little Gravel R.	1				
Gurney R. (0.5 km E. Little Cypress R.)					1
Little Cypress R.	1				
Cypress R.	1		1		
McInnes Cr.	1				
Dublin Cr.	1		1		
Jackpine R.	1		1	1	1
Ozone Cr.	1				1
Jackfish R.	1				1
Firehill Cr.	1				1
Cash Cr.	1				
Nipigon R.	1		1		1
Stillwater Cr.	1		1		
Big Trout Cr.	1				
Little Trout Cr.	1				
Unnamed Cr. (at Moss Hbr.)	1				
Unnamed Cr. (Otter Cove from Moss L.)	1				
Black Sturgeon R.	1		1		1
Little Squaw Cr.	1				
Wolf Cr.	1		1		1
Coldwater Cr.	1		1		
Welch Cr.	1		1		
Pearl R.	1		1		
D'Arcy Cr.	1		1		
Portage Cr.	1		1		
Joeboy R.	1				
Blende R.	1		1		
Mackenzie R.	1		1		
Blind R.	1		1		
Wildgoose Cr.	1				
Current R.	1		1		1
McVicar Cr.	1				
McIntyre R.	1		1		
Neebing R.	1		1		
Kaministiquia R.	1		1		

Table 3. continued

Location	Species				
	Rainbow Trout	Brown Trout	Pink Salmon	Chinook and Coho Salmon	Smelt
Whiskeyjack Cr.	1				
Lomond R.	1		1		
Jarvis R.	1		1		
Cloud R.	1		1		
Pine R.	1		1		
Little Pine R.	1		1		
Pigeon R.	1		1		

1 - known

1 - suspected

*Information has been drawn from Anon. (1976) and Ontario Ministry of Natural Resources reports, correspondence, and personnel.

detailed by Dymond (1944). Now widely distributed, smelt will run into streams a mere one or two metres wide.

Around Whitefish and Batchawana bays spawning immediately follows ice-out in the second half of April. Farther north, movements in the Old Woman and Michipicoten Rivers commence between April 25 and May 2 (Thomas 1977-79). In 1959 it was found that:

> "...the smelt, noticeably absent from our shores in former years, as a spawning population, ran in good numbers this spring in streams adjacent to the mouth of the Michipicoten River. There has been some suggestion that the run may also have existed prior to 1951, but for some unaccountable reason was non-existant during the intervening years." (Anon. 1959)

In the Jackfish and Port Coldwell areas, smelt commence spawning the first week of May and continue for one to three weeks. Mid-June they may be found at 27 to 55 m in the Terrace Bay area and for approximately one week are preyed upon heavily by lake trout (Mr. I. Johnson, pers. comm. 1981). Similar movements characterize stocks in Thunder Bay.

At certain times of the year, smelt constitute an important food item for lake trout. It is the opinion of many fishermen that lake trout have altered their habits in accordance with those of the smelt and are now available at places and at times alien to their behaviour decades ago.

3.11 MIGRATORY TROUT

3.11.1 BROOK (SPECKLED) TROUT, *Salvelinus fontinalis*

A native species, brook trout occur widely throughout Lake Superior. Gibbard (1860) reported:

> "On Lake Superior there are hundreds of creeks and several large Rivers full of Speckled Trout; Current River, McKenzie 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's Bay Company's service for years - that in the Rivers entering into Black and Nipigon Bays, they are to be seen as large as the Salmon Trout, weighing 10 to 13 lbs."

The St. Mary's River well deserved its reputation as a trout stream. Author and sportsman Lanman (1847) reported abundances unsurpassed in his experience. Tourist establishments and guides reaped the benefits of the brook trout's palatability as American sportsmen dropped money into local coffers. 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 (Canada. Department of Marine and Fisheries 1882). Poaching and ice fishing (by bobbing or spearing) were detrimental factors:

> "It is much to be regretted that nothing has been done by the Provincial Government for the protection of speckled trout in the rivers of the north shore of Lake Superior. Several of those streams were netted and poached during the past season, and large quantities of fine trout were exported to United States markets." (Canada. Department of Marine and Fisheries 1890)

Luard (1950) records a belief which was held by many local residents: the propagation of rainbow trout within the St. Mary's River was in part responsible for brook trout losses (see section 3.11.2; Ontario Game and Fisheries Commission 1912). Nevertheless, stream

modification and lock construction probably had the earliest and most significant negative effects upon brook trout viability (see section 3.1.1).

The Ontario Game and Fish Commission (1912) drew special attention to the trout of the Steel River. Both the Agawa and Michipicoten rivers also received significant runs (Herrick 1863). Despite long-standing popularity among anglers, the Michipicoten River continues to attract feeding brook trout to its mouth each spring and upstream spawners each fall. Periodically during the past century, human activities (including hydroelectric dam construction in recent decades; MacCallum 1977) have had adverse effects on its trout and other riverine fish:

> "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." (Alexander 1911)

The Michipicoten is also susceptible to storm damage (including, no doubt, siltation and disruption of spawning beds):

> "...The flood swept down the Michipicoten River like a tidal wave. All the lowlying land was covered with several feet of water, thousands of cords of pulpwood stacked along the river banks were swept on with the flood. The large boom at the Mission was torn from its moorings and 11,000 cords pulpwood swept out into Lake Superior." (Sault Star July 2, 1920)

The degradations of aquatic life through lumbering activities are difficult to assess, but probably have been significant at certain localities. Dams were built to facilitate log drives, which disturb river bottom and deposit large quantities of bark. Large-scale rafting down the St. Mary's River developed between 1880 and

1890 (Anon. 1965). The first drive down the Pic River was in 1891; subsequently, other major rivers of transport for many years included the Michipicoten, Little Pic, Steele, Aquasoban, 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 (Eastern Lake Superior Association of Commercial Fishermen 1954).

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." (Collins 1906)

Tourist and sporting guides published the world over have praised the brook trout of the Nipigon River. Here in 1915 the world's largest brook trout was captured: 6.6 kg (14.5 lb; Scott and Crossman 1973). Excessive poaching and wasteful exploitation forced the federal government to appoint a special guardian in 1874 and institute a policy of issuing permits to foreigners; 66 permits were issued that year (Canada. Department of Marine and Fisheries 1874).

Each spring in northeastern Lake Superior, large open water brook trout (known as "coasters") would move inshore at ice break-up. Many anglers actually fished along the very edges of the retreating ice. Again, for approximately two weeks in mid-August, coasters would move to shallow waters in the general area of Heron Bay (Mr. F. LeCoeur, pers. comm. 1981).

During the past twenty years noticable abundance fluctuations have occurred among certain stocks. Concerning the Port Coldwell to Rossport region:

> "In conversations with local "coaster" fishermen, particularly with Willie Heinrich, an ardent and long time enthusiast, it appears that this condition started approximately five years ago and has become progressively worse. "Hot spots" for coasters such as McKellar Harbour and Bead Island are just not producing anymore. A few speckled trout are taken in early summer at outlets of tributary streams but as the summer progresses the catch becomes insignificant." (Anon. 1968a)

Mr. H. Bussineau (pers. comm. 1978) reports that the once abundant populations of Indian Harbour have now disappeared.

The federal hatchery at Port Arthur and the provincial hatcheries at Port Arthur, Dorion, Sault Ste. Marie, and Tarentorus 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 (Lesprence 1915). Small numbers of brook trout were planted into Lake Superior waters at Nipigon River (in 1914), St. Ignace Island (1915), and the Blende River (1917).

The provincial hatchery at Port Arthur instituted a stocking program for western waters in 1921. (The earliest brook trout were of Nipigon River origin.) Stocking of southeastern Lake Superior was begun in 1923 by the Sault Ste. Marie hatchery (Ontario Department of Game and Fisheries 1921, 1923).

3.11.2 RAINBOW (STEELHEAD) TROUT, *Salmo gairdneri*

TABLE 3

According to Huxtable (1936), rainbow trout first became a feature of Lake Superior's fish community in 1883, when they were introduced near Sault Ste. Marie by the Ontario provincial government. These trout were of McCloud River, California origin. By 1912 they were "getting to be numerous in the Sault rapids" (Canada. Department of Marine and Fisheries 1913):

> "...in the St Mary's River...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." (Ontario Game and Fisheries Commission 1912)

The stocking history of *S. gairdneri* is reviewed by MacKay (1963) and MacCrimmon (1971). A few additions are necessary. According to MacCrimmon, the earliest plants of trout classed as steelhead were made to Isle Royale streams by the Minnesota Fish Commission in 1895, whereas the Canadian government did not follow suit until 1912 (when fry were planted in McVicar Creek, Port Arthur). However, McNab (July 24, 1917) claims to

have personally placed steelhead fry (of Columbia River origin) in McVicar Creek in June 1894. Two thousand more were planted in 1899, and by 1901 steelhead were appearing in Canadian pound nets and a year later were reportedly common in American waters (Canada. Department of Marine and Fisheries 1902; MacCrimmon and Gots 1972). By 1914 sportsmen were taking approximately 910 kg (2000 lb) of steelhead from McVicar Creek each year. Impressed by such success, the Port Arthur hatchery experimented with spawn-taking operations at McVicar Creek and the MacKenzie River (McNab Nov. 15, 1914; June 6, 1915). An additional Current River plant failed to establish a spawning run. However, by 1915 steelhead were widely distributed along the Canadian Shore, and during the spring of that year Rossport fishermen made incidental catches totalling 90 kg (200 lb):

> "...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 lb. one mile from the shore of Thunder Bay. those were caught about the middle of July." (McNab June 6, 1915).

During the 1920's, sources of rainbow trout eggs exploited by the provincial hatchery at Sault Ste. Marie included a Rogue River stock (near San Francisco) and trout raised in a privately owned Montana pond. Exchanges with California of lake trout eggs for rainbow trout eggs were not uncommon (Mr. W. Sanders, pers. comm. 1981).

As noted by McCrimmon and Gots (1972), a hiatus in Ontario's stocking program occurred after 1923 and lasted until 1934, when

fish were introduced into the Agawa, Montreal, White, and Current rivers. Prior to 1945 the Sault Ste. Marie hatchery deposited fingerlings at points where selected rivers crossed the railway line. The Algoma Central railway, supporting these ventures, would install a special car equipped for the transport of young fish. The Montreal River was a famous rainbow river, for example, and it became a popular excursion for anglers to ride the train northward from the Soo, debark, and raft down the river to its mouth (Mr. C. Cook, pers. comm. 1981).

Rainbow trout spawn in the St. Mary's Rapids from May 15 to early June, but remain in the river throughout July (Mr. W. Sanders, pers. comm. 1981). In the Wawa district:

> "...the peak rainbow trout run occurs during the first one or two weeks in May coincident with peak spring runoff and stream temperatures ranging from 10-15°C". (Thomas 1981a).

Runs of rainbow trout tend to succeed and overlap those of smelt, although it is not unusual for trout to avoid streams until peak densities of *O. mordax* have abated. Stream spawning in the Heron Bay and Marathon areas begins late April and continues until about May 15.

3.11.3 BROWN TROUT, *Salmo trutta*

TABLE 3

The state of Michigan brought brown trout to Lake Superior around 1883 (MacCrimmon, Marshall, and Gots 1970). Now widely distributed along the American south shore (especially in the west end), the species still occurs only in small isolated groups in Ontario waters (Lawrie 1978).

The first brown trout from Thunder Bay district was captured off McKellar Point on October 20, 1951: this specimen was in spawning condition, measured 52.1 cm (20.5 in) long and weighed 1.8 kg (3.9 lb), and was afflicted with a vertebral deformity (Anon. n.d.). Continued expansion of the species has been slow. In 1977 a few young-of-the-year and yearlings were found in McKellar Creek. Small populations have also been noted at Steel River, Mink Creek, Doré River, Magpie River, and Michipicoten River (Gots 1979a, 1979c; O'Grady 1980). Incidental catches have been made at Otter Cove, Morrison Harbour, Neys Park, and Holly Creek; the last two sites yielded specimens of 5.9 kg (13 lb) and 7.7 kg (17 lb; McCulloch 1977; Gots 1979b).

3.12 SALMON

3.12.1 ATLANTIC SALMON, *Salmo Salar*

In 1912 Atlantic salmon eggs from the Mirimachi hatchery were transferred to Port Arthur. Loon Lake received 20,000 fry, while a total of 304,000 fry were placed in the Nipigon River, Rossport area streams, and rivers tributary to Thunder Bay (McNab May 4, 1912). For a time the salmon thrived; after two years specimens captured in Thunder Bay weighed 0.9 kg (2 lb) to 1.1 kg (2.5 lb); McNab Nov. 15, 1914). In 1915 salmon journeyed nineteen km up the Nipigon River, completing their spawning at Camp Alexander by June 20; two samples weighed 1.1 kg (2.5 lb) and 1.4 kg (3 lb; MacNab June 30, 1915). By 1920 salmon were said to be running in the Blend and Mackenzie rivers (McNab Feb. 23, 1920).

Extinction seems to have overcome the various Atlantic salmon runs in the 1920's or 1930's, and the original stocking attempts are not described by recent authors. The state of Wisconsin planted salmon in 1972 and 1973, but few were recaptured and the experiment was deemed a failure (Lawrie 1978).

TABLE 3

3.12.2 PINK SALMON, *Oncorhynchus gorbuscha*

Events surrounding the accidental introduction of pink salmon 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 other papers (Nunan 1967; Kwain 1978; Kwain and Lawrie 1981; Emery 1981). Collins (1975) observes that the successful establishment of pink salmon in lakes Superior and Huron occurred during:

> "...a period when climax predators and lake herring [were] not abundant and alewife numbers (another possible competitor) [had] declined relative to the 1960 decade."

Spawning periods of the various stocks may show considerable seasonal and geographical variation. South of Michipicoten Bay, salmon tend to occur in rivers throughout September, reaching a peak during the second week (Kwain and Lawrie 1981; Thomas 1981b). Within the Ontario Ministry of Natural Resources' Terrace Bay district, river runs occur progressively later from west to east (Johnston 1976). The heaviest spawning of both 1975 and 1977 occurred in the Jackpine River around September 20 (Townes 1976; Swanson 1978). In 1979 the Steel River run continued from early September to mid-October, peaking about October 3 (Kwain and Lawrie 1981).

Although pink salmon normally mature in two years (spawning in odd numbered years), since 1976 certain Lake Superior stocks have also shown even-year habits (Kwain and Chappel 1978).

3.12.3 COHO SALMON, *Oncorhynchus kisutch*

TABLE 3

Initial introductions of coho salmon were made in 1966 by the state of Michigan. Minnesota followed suit in 1969, and between 1969 and 1971 Ontario planted 78,000 yearlings in the Jackpine and Gravel rivers of Nipigon Bay (Lawrie 1978). Subsequently, coho have been reported at many places along the Canadian shore. In 1979 schools of five to seven cm fish, numbering in the "tens of thousands", were observed feeding on insects along the shoreline of Michipicoten Bay in July: samples identified these as coho salmon parr (Orr 1979).

3.12.4 CHINOOK SALMON, *Oncorhynchus tshawytscha*

TABLE 3

Chinook salmon have been planted by the states of Michigan since 1967 and Minnesota since 1974 (Lawrie 1978). On October 30, 1974, an 11 kg (24 lb) chinook was caught at the mouth of the Dead River, Nipigon Bay (Haas 1974b). Ontario Ministry of Natural Resources employees have since identified specimens near Red Rock in 1977 and below Scott Falls on the Michipicoten River in 1979 (Mr. L. Townes, pers. comm. 1981). Mr. G. Primeau (pers. comm. 1981) reports chinooks in the St. Mary's River.

3.13 MISCELLANEOUS SPECIES

Round whitefish or menominee (*Prosopium cylindraceum*) occur widely throughout the lake, although only a small number of

fishermen actively seek this species; commercial production was a record 17,020 kg (37,524 lb) in 1975 (Ridgley 1976). According to Koelz (1929), the fish ran into creeks around Gargantua and Michipicoten Island in the fall. In the 1950's menomenee by the thousands would foul seine nets and hamper lake trout spawn-taking operations at the Dog (University) River (Mr. W. Sanders, pers. comm. 1978). The Michipicoten River still receives a spawning run in mid-November. Menomenee will also enter this river in May, coincident with upstream movements of rainbow trout and smelt. Other heavy concentrations have been reported about the Lizard Islands, Parisienne Island, and southern Black Bay (especially about northern Edward Island).

Bass species are most prevalent in the warmer waters of south-eastern Lake Superior. It was noted by the Ontario Game and Fish Commission (1912): "Bass is on the increase in the St. Mary's River". Smallmouth bass (*Micropterous dolomieui*) and rock bass (*Ambloplites rupestris*) are caught by anglers in Goulais and Batchawana bays, at points including the Chippewa and Batchawana rivers, and southeast Batchawana Island (Vozeh 1969; Mr. W. Mitchell, pers comm. 1981). Pumpkinseed (*Lepomis gibbosus*) are occasionally found in these areas.

As noted by Lawrie (1978), the sculpin species are "literally everywhere". Myriads occur at Superior Shoal and "Cockatouch Bank" (27 km due south of Schreiber Point) and are drawn from Black Bay during the fall trawling season.

Approximately thirty years ago, Mr. G.A. Jones (pers. comm. 1981) first captured a specimen of "Mississippi carp", a fish possessing:

> "...a mouth more similar to the bass than the carp, and a dorsal fin like that of a pickerel."

Subsequent captures have been made. Such a description conforms with that of the freshwater drum or sheepshead (*Aplodinotus grunniens*), although Scott and Crossman (1973) report its absence in Lake Superior. However, a single reference to the drum is made in a journal of the Hudson's Bay Company post at Michipicoten:

> "[June 22, 1978]...got a sort of Fish in the [Michipicoten] river which I believe called a Sheepshead and is generally caught in Saltwater at home. it weighed about 5 pds had a very round back, and sharp prickly fins from the shoulders to the Tail. It tastes something between a Trout & a Sturgeon. They are very rare here about but are often caught as I am informed about Michilimackinac". (Goodier 1981)

TABLES 4, 5

FIG. 14-16

3.14 LAKE TROUT, *Salvelinus namaycush*

Since the late 1950's, and the advent of the sea lamprey, government agencies have devoted much effort to establishing a firm data base for *S. namaycush*. Thus much can and has been written concerning the current status of lake trout stocks within Lake Superior; one should refer to Lawrie and Rahrer (1973), Lawrie (1978), annual reports of the district offices of the Ontario Ministry of Natural Resources, and annual reports of the Great Lakes Fishery Commission.

Tables 4 and 5 and figures 14 to 16, reproduced from Goodier (1981), summarize lake trout stocks, spawning grounds, and fishing grounds existing prior to 1955.

FIG. 14. SPAWNING AND FISHING GROUNDS FOR LAKE TROUT (*Salvelinus namaycush*), SAULT STE. MARIE TO MICHIPICOTEN ISLAND. (From Goodier 1981).

LEGEND FOR FIGURES 14 TO 16 AND TABLES 4 AND 5.

Varieties of Native Lake Trout (Names are those employed by fishermen)

Leans	RG	Regular
	B	Black
	RF	Redfin
	RD	Red
	Y	Yellowfin
	G	Grey
	ST	Salmon trout
	A	Sand trout
		Spawning grounds for lean lake trout
		1. Shore or shoal
	☆	Major
	○	Average (or of unknown importance)
	ms	"Moss" (weedy) areas
		2. Rivers
	★	Major
		Minor (or of unknown importance)
Non-leans	S	Siscowet (or fat)
	H	Halfbreed
	P	Paperbelly (or humper)
	□	Fishing grounds for non-lean lake trout
	●	Spawning reported for non-leans

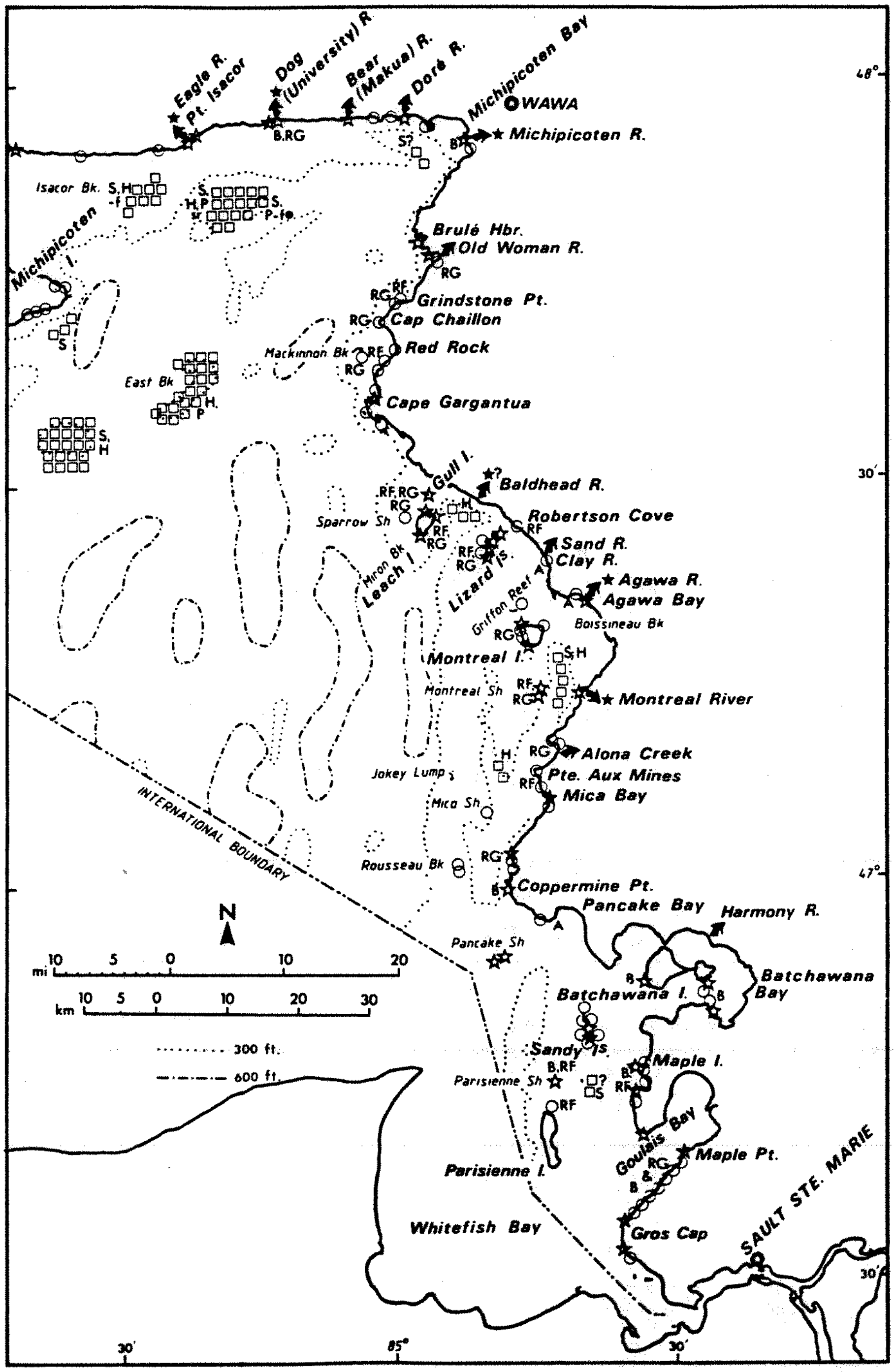
Spawning location or variety uncertain -

Fishing Season

sp	Spring (April-June)
sr	Summer (July-Aug)
f	Fall (Sept-Nov)

Fishing Gear

gn	Gill nets
tr	Trolling
pn	Pound nets



Eagle R.
Pt. Isacor
Dog (University) R.
Bear (Makwa) R.
Doré R.
Michipicoten Bay
WAWA
Michipicoten R.
Isacor Bk.
Michipicoten I.
Brulé Hbr.
Old Woman R.
Grindstone Pt.
Cap Chaillon
Red Rock
Mackinnon Bk
East Bk
Cape Gargantua
Gull I.
Baldhead R.
Robertson Cove
Sparrow Sh
Sand R.
Clay R.
Miron Bk
Leach I.
Lizard Is.
Agawa R.
Agawa Bay
Griffon Reef
Boissineau Bk
Montreal I.
Montreal Sh
Montreal River
Alona Creek
Pte. Aux Mines
Jokey Lump
Mica Bay
Mica Sh
Rousseau Bk
INTERNATIONAL BOUNDARY
Coppermine Pt.
Pancake Bay
Harmony R.
Pancake Sh
Batchawana I.
Batchawana Bay
Sandy Is.
Maple I.
Parisienne Sh
Goulais Bay
Maple Pt.
Parisienne I.
Whitefish Bay
Gros Cap
SAULT STE. MARIE
48°
30'
47°
30'
85°
30'
N
mi 10 5 0 10 20
km 10 5 0 10 20 30
300 ft.
600 ft.

FIG. 15. SPAWNING AND FISHING GROUNDS FOR LAKE TROUT (*Salvelinus namaycush*), MICHIPICOTEN ISLAND TO SCHREIBER.
(From Goodier 1981).

See Fig. 14.

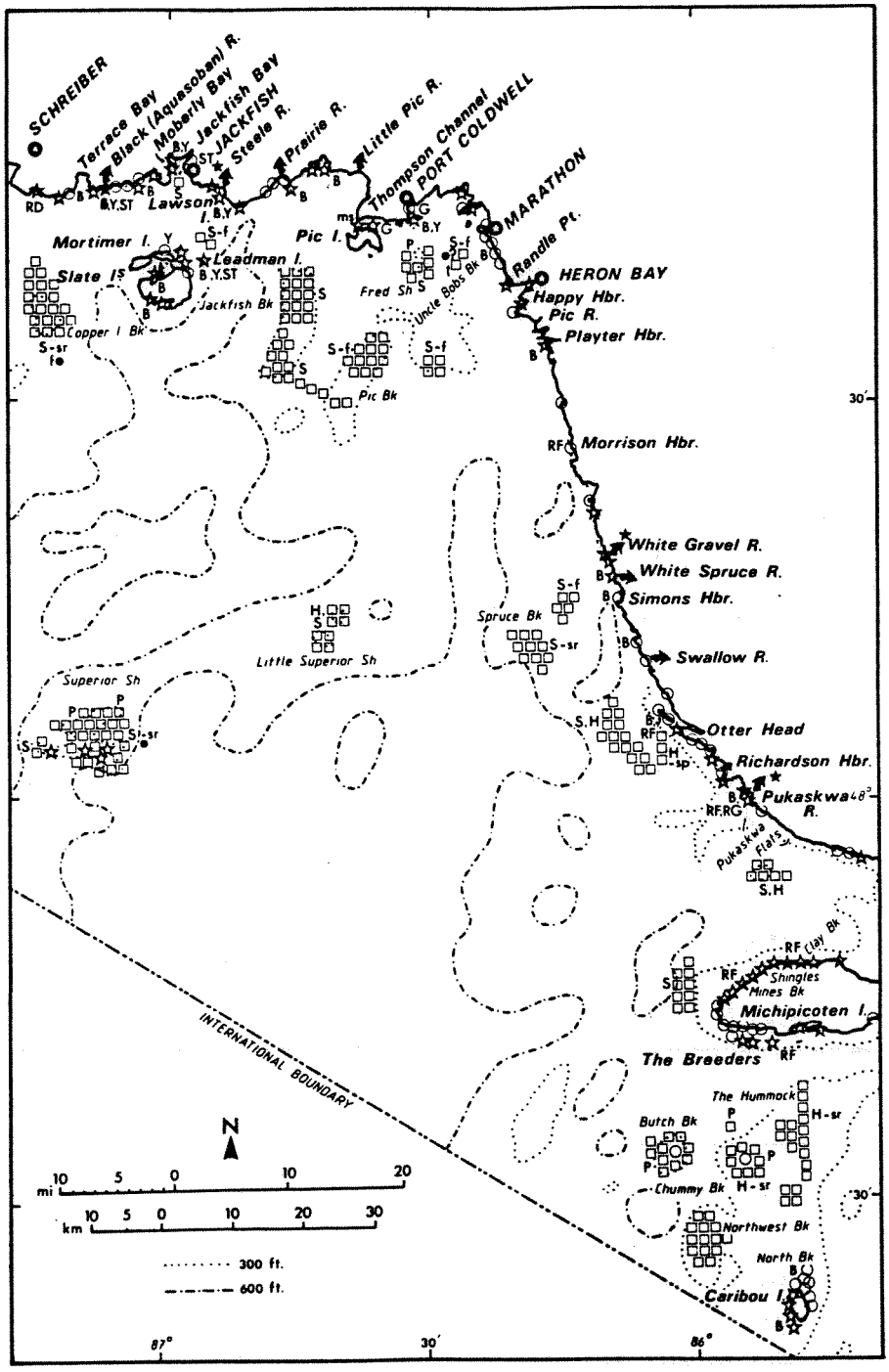

SCHREIBER
Terrace Bay
Black (Aquasabani) R.
Moberly Bay
Jackfish Bay
JACKFISH
Steele R.
Prairie R.
Little Pic R.
Thompson Channel
PORT COLDWELL
MARATHON
Lawson I.
Mortimer I.
Slate Is
Leadman I.
Pic I.
Randle Pt.
HERON BAY
Happy Hbr.
Pic R.
Playter Hbr.
Jackfish Bk
Copper I Bk
Fred Sh
Uncle Bobs Bk
Pic Bk
30'
Morrison Hbr.
White Gravel R.
White Spruce R.
Simons Hbr.
Spruce Bk
Swallow R.
Little Superior Sh
Superior Sh
Otter Head
Richardson Hbr.
Pukaskwa R.
Pukaskwa Flats
RF Clay Bk
Shingles
Mines Bk
Michipicoten I.
The Breeders
INTERNATIONAL BOUNDARY
The Hummock
Butch Bk
Chummy Bk
Northwest Bk
North Bk
Caribou I.
N
10 5 0 10 20
mi
10 5 0 10 20 30
km
300 ft.
600 ft.
87°
30'
86°

FIG. 16. SPAWNING AND FISHING GROUNDS FOR LAKE TROUT (*Salvelinus namaycush*), SCHREIBER TO PIGEON RIVER.
(From Goodier 1981).

See Fig. 14.

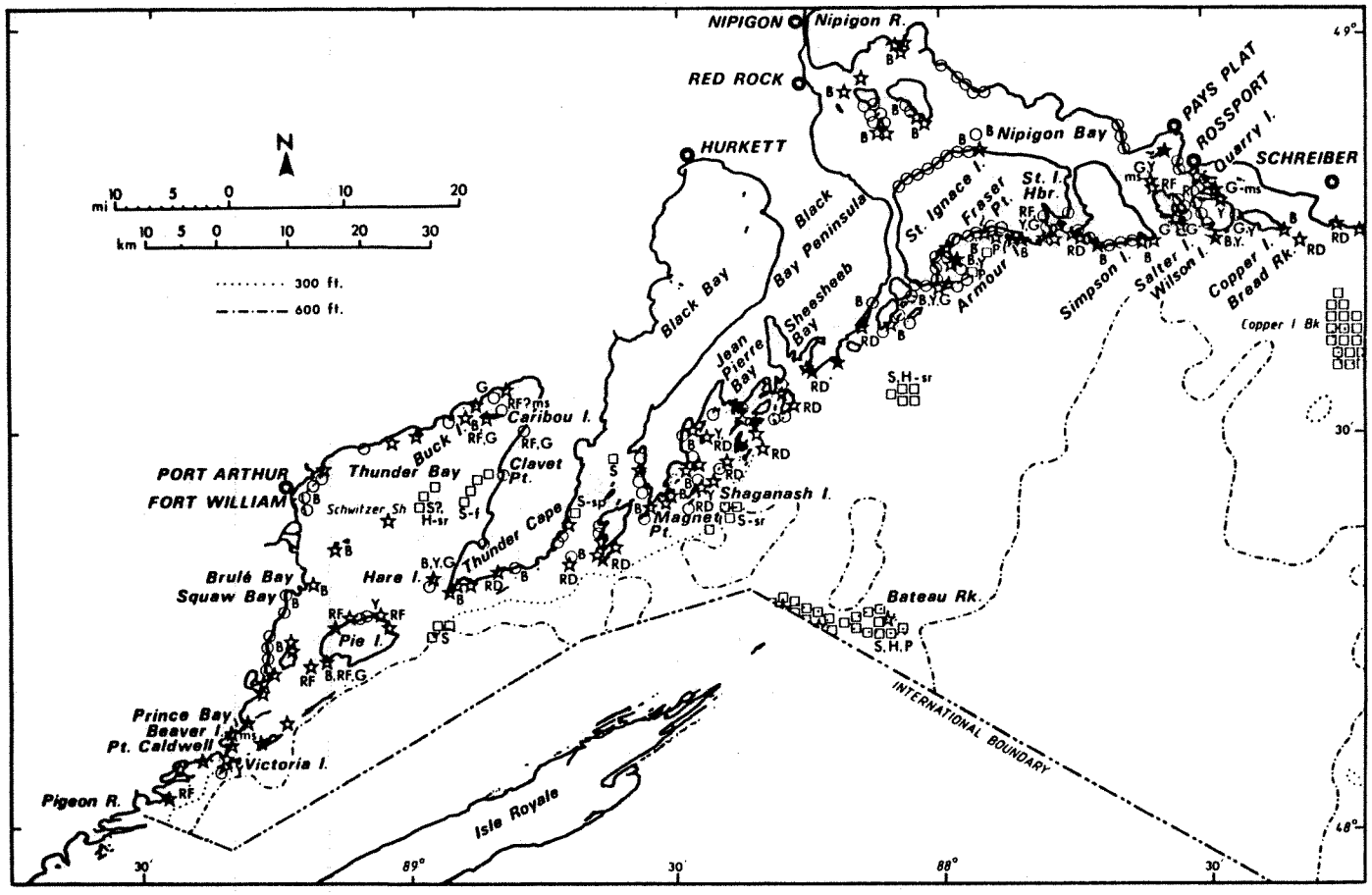

NIPIGON
Nipigon R.
RED ROCK
HURKETT
Nipigon Bay
PAYS PLAT
ROSSPORT
Quarry I.
SCHREIBER
St. Ignace I.
Fraser Pt.
St. I. Hbr.
Simpson I.
Salter I.
Wilson I.
Copper I.
Bread Rk.
Copper I Bk
Armour
Black Bay Peninsula
Black Bay
Sheesheeb Bay
Jean Pierre Bay
Caribou I.
Buck I.
Clavet Pt.
PORT ARTHUR
Thunder Bay
FORT WILLIAM
Schwitzer Sh
Thunder Cape
Magnet Pt.
Shaganash I.
Hare I.
Brulé Bay
Squaw Bay
Pie I.
Bateau Rk.
S.H.P
Prince Bay
Beaver I.
Pt. Caldwell
Victoria I.
Pigeon R.
Isle Royale
INTERNATIONAL BOUNDARY
N
mi 10 5 0 10 20
km 10 5 0 10 20 30
300 ft.
600 ft.
49°
48°
89°
88°
30'

Table 4. Spawning grounds and periods for Lake Superior lean lake trout. (From Goodier 1981)

A. SHORE SHOAL AND BANK AREAS

Fig. 14 SAULT STE. MARIE TO MICHIPICOTEN ISLAND

LOCATION	APPROX. SPAWNING PERIOD START	FINISH	DOMINANT VARIETY	COMMENT
Gros Cap to Maple Pt.	1st wk Oct		B,RG	
Maple I.	Oct 5-10 Oct 15	for 7-10 days end of Oct	B RF	-spawning heavier than along mainshore -2 distinct runs
Parisienne Shoal	Oct 15-20 Oct 22-27	for 7-10 days	B RF	-offshore stocks, spawning later than those near shore -2 distinct runs
E. Batchawana Bay	Oct 10		B	-small B, probably a discrete stock
Outside Batchawana I.	Oct 10-15		B	
S. Sandy I.	Oct 15-20			
Pancake Bay Flats			A	-observed in summer and fall
Mica Bay, Pte. Aux Mines	Oct 1	Oct 15 (?)	RF	-run unique to this area
Montreal Shoal	Sept 28-Oct 1 Oct 10-25	early Oct Nov or early Dec	RG RF	-possible stock of large RF
Montreal I.	Oct 5-10	Oct 25	RG	
Boissineau Bank			(see comment)	-unique form to this area (deeper body, thinner ventral region, colour differences from other leans) taken in late summer -spawning location unknown

Table 4. continued

LOCATION	APPROX. SPAWNING PERIOD START	FINISH	DOMINANT VARIETY	COMMENT
Agawa Bay	late Sept		RG, A	
Clay R. and Sand R. area			A	
Lizard I.	Oct 5-10	Oct 25 or later	RG, RF	
Robertson Cove			RF	-possible stock
Leach I.	Oct 5-10	Oct 25 (?)		
Sparrow Shoal	Oct 5-10	Oct 25	RG	-especially large trout
Gull I.	Oct 10-25	1st wk Nov	RG, RF, (see comment)	-in addition to RG and RF, form having unique skin colouration (silver-green body with large darker spots).
Mackinnon Bank	Oct 15	up to 1st wk Nov	RF	-possible offshore spawning stock
Red Rock	1st wk Oct		RG, (see comment)	-in addition to RG, spawning form known as "half-dollar trout" (coloured fins, pink flesh, coin-sized markings on silver-gray bodies)
N. point of Old Woman Bay	late Sept		RG	
Brulé Hbr.	3 days after Old Woman Bay Nov		RG	
			(see comment)	-large late spawners at 18 m (60 ft) - deeper than RG
Michipicoten Bay	3rd wk Sept		B, RG, RF	

Table 4. continued

LOCATION	APPROX. SPAWNING PERIOD START	FINISH	DOMINANT VARIETY	COMMENT
Fig. 15 MICHIPICOTEN ISLAND TO SCHREIBER				
Pukaskwa Flats	early Sept		B, RG, RF	
Richardson Hbr.	Sept 10			
Otter Head		after Oct 15	B, RF	-possible stocks of B
Clay Banks, The Shingles, Mines Bank (Michipicoten I.)	early Oct	3rd wk Nov	RF	-probable stocks of RF
Chummy, Northwest, The Hummock Banks				-stocks of leans -spawning habits not known
Butch Bank				-stock of leans smaller than those of the above banks
Caribou I.	Oct 1	Oct 22	B	-probable stock
Simons Hbr.			B	-possible stock
White Gravel R. area	Sept 7 Nov 1		B RF	-stock of late-spawning RF?
Playter Hbr., Happy Hbr., Randle Pt.	After Sept 7		B	
Port Coldwell area			Y, G (ST?)	-probable stocks
Thompson Channel	Nov		G	-spawning in "moss" areas
Lawson I.	Sept	Nov	B, Y	
Leadman I.			B, Y, ST	-probable stocks -large trout more abundant than at Slate Is.

Table 4. continued

LOCATION	APPROX. SPAWNING PERIOD START	FINISH	COMINANT VARIETY	COMMENT
Slate I^{S}.	Sept 20-25	for 2 wk (longer in sheltered areas)	B	-stocks probably discrete from those of mainland
N. Mortimer I. (Slate I^{S}.)			Y	
Jackfish Bay area	Sept 20-25	for 10 days-2 wk	B	
Moberly Bay, Cody I. (Jackfish Bay)	Oct 1 or later		Y	-possible stock -racer form also reported
E. arm of Jackfish Bay			ST	-possible minor stock
Superior Shoal	July? Sept?			-discrete stocks, possibly associated with particular banks -numerous instances of deformity and cannibalism
Fig. 16 SCHREIBER TO PIGEON RIVER				
Among islands S. of Rossport and Nipigon Bay	Sept 22	Oct 10	B	
Bread Rock, Quarry I.	Oct 5	Oct 15	RD	-possible stocks?
Quarry I., Rolette Shoal (N. Salter I.)	Nov	Dec	Y, G	-spawning in "moss" areas
W. Wilson I., Salter I., St. Ignace Hbr.	mid Nov	Dec	G	-probable stocks of late spawners

Table 4. continued

LOCATION	APPROX. SPAWNING PERIOD START	FINISH	DOMINANT VARIETY	COMMENTS
Nipigon Bay	Sept 30		B, silver-coloured trout	-probably discrete stocks
Armour I., Fraser Pt.	Oct 5	Oct 15	RD	-possible stocks?
Sheesheeb Bay area	Sept 17		B	
Sheesheeb Bay			(see comment)	-small trout in June distinct in appearance from those of mainshore (stockier, colouration differences) -spawning habits not known
Shaganash I.	Sept 20 late Oct	mid Oct	B Y	-possible stock of Y
Magnet Pt.	Sept 20		B	
Black Bay				-spawning stocks move only to S. portion
Thunder Cape	Sept 30		B	
Bateau Rock				-probable discrete stocks of leans
Hare I. Reef	Sept 30-early Oct	Nov	B, Y, G	
6.5 km (4 mi) N. of Clavet Pt		Nov		-possible stock of late-spawners
S. shore of Caribou I.	1st wk Oct 3rd wk Oct		B RF	

Table 4. continued

LOCATION	APPROX. SPAWNING PERIOD START	FINISH	DOMINANT VARIETY	COMMENT
N. shore Caribou I.			RF(?), G	-spawning in "moss" areas
N. end Thunder Bay		Dec		-unusually late-spawners
Buck I.			G (?)	-large, late-spawners
Breakwall at Port Arthur and Fort William	late Sept-early Oct		B	
Schwitzer Shoal				-probable stock
Grand Reef (Brulé Bay)	Sept 25	Oct 2	B	
S. of Squaw Bay	mid-Sept		B, "little grays"	
Pie I.	Sept 15 Oct 20 after Oct 20	late Sept	B RF large RF	
NW. shore Victoria I.	Nov		Y	-probable stock
Beaver I.			G (?)	-spawning in "moss" areas
Caldwell Shoal (Pt. Caldwell)	1st half Nov		large spawners	-possible stock
B. MAJOR RIVER-SPAWNING AREAS				
Montreal R.	Sept 20-25	Oct 10-15		
Michipicoten R.	Sept 17	Sept 27-Oct 8		
Dog R.	Sept 17	Sept. 30		
Eagle R.	Before Dog R.			
Pukaskwa R.	Sept 1-5	Late Sept		
Steele R.	Sept			

Table 5. Weight summaries of lake trout varieties reported by Lake Superior fishermen - kg(lb). (From Goodier 1981).

LOCATION	VARIETY SEASON	WEIGHT RANGE Min	Max	Avg
		LEANS		
Fig. 14 SAULT STE. MARIE TO MICHIPICOTEN ISLAND				
E. Batchewana Bay	B - f-gn			0.9(2)-1.4(3)
Pancake Pt. to Coppermine Pt.	B - f-gn	1.1(2.5)	2.7(6)	1.8(4)
Montreal Shoal	sr-tr		9(20)	1.4(3)-1.8(4)
Jokey Lump	sr-tr	3.6(8)	8(18)-11(24)	
Miron Bank	sr-tr	2.3(5)	25(55)	
Mackinnon Bank	sr-tr		14(30)	
Red Rock	"half-dollar trout" - f-gn			7(15)
(RIVER SPAWNERS)				
Montreal R.	f		9(20)-16(35)	3.6(8)-4.5(10)
Dog R.	f		6.6(14)	1.8(4)-3.2(7)
Fig. 15. MICHIPICOTEN ISLAND TO SCHREIBER				
Michipicoten I.	sr-tr		6.8(15)-14(30)	
Butch Bank	sr, f			0.68(1.5)-0.91(2)
Caribou I.	B - sr, f		4.5(10)	2.7(6)
Steel R. mouth	sr-tr		14(30)	2.3(5)-4.5(10)
Jackfish Bay area	B - f-gn		3.6(8)	2.7(6)
Jackfish Bay area	Y - f-gn	5.4(12)	11(25)	
Jackfish area (main-shore)	sp - gn			1.1(2.5)-1.4(3)
Slate I.	B - f-gn		2(4.5)	1.4(3)
(RIVER SPAWNERS)				
Pukaskwa R.	f	1.4(3)-1.8(4)	>8.2(18)	

Table 5. continued

LOCATION	VARIETY SEASON	WEIGHT RANGE Min	Max	Avg
Fig. 16 SCHREIBER TO PIGEON RIVER				
Among islands S. of Rossport and Nipigon Bay	B - f-gn		4.5(10)	1.4(3)-2.3(5)
	Y - f-gn	5.4(12)	9.1(20)-23(50)	
	July-pn		4.5(10)-6.4(14)	
Armour I., Fraser Pt.	RD - f-gn		6.8(15)	
Nipigon Bay			2.3(5)	
Black Bay Peninsula	B - f-gn		3.2(7)	0.9(2)-2.3(5)
Sheesheeb Bay	June		2(4.5)	0.9(2)-1.4(3)
Jean Pierre Bay area	RD - f-gn	2.3(5)	6.8(15)	
Bateau Rock		1.1(2.5)	3.2(7)	
Hare I.	Y - f-gn		23(50)	
Buck I.	RF, G - f-gn		24.5(54)	
Grand Reef (Brulé (Bay)	B - f-gn		3.6(8)	
S. of Squaw Bay	"little grays"- f-gn			1.8(4)
Pic I.	RF - f-gn		11.3(25)-13.6(30)	6.8(15)
	NON-LEANS			
Between Montreal Shoal and Montreal I.	H - gn	0.7(1.5)	2.7(6)	
	S - gn	2.7(6)	5.5(12)	
Port Coldwell vicinity	P - June - gn			1.8(4)-2.7(6)
Pic Bank	S - Aug , f-gn	4.5(10)	9.0(20)-11.3(25)	
Copper I. Bank	S - Aug f-gn		11(25)	

4. SUMMARY

The Canadian commercial fishing industry of Lake Superior, inaugurated by the Hudson's Bay Company in 1839, flourished after the 1870's. The American-owned A. Booth and Co. eventually held general sway over Canadian activities operating through a monopoly which left limited opportunities for private endeavours:

> "The price paid to the few would-be independent Canadian net fishermen for their fish by the alien corporation which practically controls the output of the Canadian fisheries is approximately 4 to 5 cents per pound, and at from 12 to 40 cents per pound, so that the profit to the corporation is apparently great. ...it would appear that while the cost of protection may be said to practically swallow up all the [Canadian] revenue derived from the fisheries, not only is the United States securing a considerable yearly revenue from them, the bulk of the profits and of the actual fish, but also no small proportion of the initial cost of capture, a situation which is obviously most unsatisfactory." (Ontario Game and Fisheries Commission 1912).

This overwhelming American presence inspired rapid industry development and expansion; today, the knowledge of hindsight would recommend a more reserved course promoting controlled management and local initiative.

A number of small firms were heir to the Booth empire in the 1930's, and many of these prospered until the troubled years of the 1950's. The success of present-day businesses may be attributed to a widespread resurgence of formerly depleted fish stocks, a wider utilization of traditionally unexploited species, improved harvest techniques, and exploitation of new grounds. Nevertheless, the number of family businesses are declining, and licenses and outfits of retiring small-scale fishermen are being acquired by several large firms.

Once did Lake Superior seem a source of fish without limit. Seasonal inshore migrations of lake trout and whitefish supplied well the small boats of the early fisheries. Fishermen competition was generally avoided, although certain aggregations of fish were, of course, more heavily exploited than others. Fishermen knew different grounds to receive fish differing in their times of appearance, market qualities, and abundances. Strategies of fishing were gauged to the habits of the various stocks: grounds were sequentially 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 species, including lake trout, migratory trout, sturgeon, pickerel, and pike. Their stocks were most susceptible to the agents of environmental change: severe storms, dredging, deforestation, log rafting, and pollution. Ease of access and capture attracted both sportsmen and poachers, and the illegality of commercial river fishing was seldom discouraging; early fisheries officers were ill-equipped for effective law enforcement. During the period of transition from federal to provincial jurisdiction, both agencies, with flurries of correspondence, accused each other of mismanagement. In tone their letters range between innuendo and acerbity, and in general constitute most interesting reading for the archival researcher.

But errors of the past can become the lessons of today. Our increased understanding of aquatic systems now permits a new

maturity of outlook in resource utilization. Dialogue between fishermen and scientists is proving mutually beneficial: wiser management will evolve from strengthened cooperation between these two groups.

PERSONAL COMMUNICATION

AGAWA, G. Goulais Mission, Aug. 22, 1978

ALMOS, A. Terrace Bay, April 26, 1979.

BERGMAN, V. Thunder Bay, June 19, 1980.

BJORNAA, O. Batchawana, May 10, 1981.

BUSSINEAU, H. Montreal River, Aug. 13, 1978.

CHARLIE, H. Squaw Bay (Thunder Bay), June 26, 1980.

CONWAY, T. Sault Ste. Marie, Aug. 22, 1978.

COOK, C. Sault Ste. Marie, May 9, 1981.

CRESS, M. Marathon, Aug. 16, 1978.

DAHL, P. Thunder Bay, Aug. 18, 1978.

DAMPIER, R. Nipigon, June 22, 1980.

GEROW, G., Rossport, May 16, 1981.

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GOULET, H. Johnson's Landing, June 25, 1980.

HAMILTON, P. Dorion, June 25, 1980.

JOHNSON, I. Schreiber, April 29, 1979.

JOHNSON, I. Schreiber, May 16, 1981.

JONES, G.A., Batchawana, May 17, 1981.

KUKKO, O. Camp Bay, June 26, 1980.

KWAIN, W.-H. Sault Ste. Marie, May 11, 1981.

LABLANCE, M. Goulais River, May 10, 1981.

LECOEUR, F. Heron Bay, May 12, 1981.

LEGAULT, F. Rossport, July 9, 1978.

LEGAULT, F. Rossport, April 27, 1979.

LEGAULT, F. Rossport, June 23, 1980.

LEGAULT, F. Rossport, May 14, 1981.

MACMILLAN, C. Marathon, July 4, 1978.

MAKI, K. Thunder Bay, June 21, 1980.

MITCHELL, W. Sault Ste. Marie, May 9, 1981.

MORDEN, L. Agawa Bay, July 3, 1978.

NORDLANDER, O. Camp Bay, June 22, 1980.

NUTTALL, A. Hurkett, June 21, 1980

NUTTALL, J. Hurkett, June 21, 1980.

NUTTALL, J. Hurkett, May 13, 1981.

PAWLUK, W. Dorion, June 21, 1980.

PRIMEAU, G. Sault Ste. Marie, May 18, 1981.

PURVIS, I. Gore Bay, Sept. 13, 1979.

PURVIS, I. Sault Ste. Marie, May 18, 1981.

RONQUIST, A. Squaw Bay (Pass Lake), June 22, 1980.

ROSS, W. Thunder Bay, Aug. 19, 1978.

SAMELUK, J. Wild Goose Point (Thunder Bay), June 21, 1980.

SANDERS, W. Sault Ste. Marie, Aug. 11, 1978.

SANDERS, W. Sault Ste. Marie, May 18, 1981.

SCHELLING, W. Rossport, July 8, 1978.

SCHELLING, W. Rossport, June 23, 1980.

SERVAIS, H. Thunder Bay, Aug. 18, 1978.

THROWER, N. Thunder Bay, Aug. 18, 1978.

TOWNES, L. Nipigon, May 14, 1981.

TYSKA, G. Thunder Bay, June 18, 1980.

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APPENDIX I RESOURCE INSTITUTIONS CONSULTED

A. GOVERNMENT AGENCIES

1. Ontario Ministry of Natural Resources

   Queen's Park, Toronto (incl. library)

   Sault Ste. Marie

   Thunder Bay

   Wawa

   Terrace Bay

   Nipigon

2. Ontario Ministry of Culture and Recreation

   Queen's Park, Toronto

   Thunder Bay

3. Environment Canada
   Hydrographic Service, Ottawa

4. Parks Canada

   Pukaskwa National Park office, Marathon

5. Great Lakes Fishery Commission

   Laboratory, Ann Arbor (incl. library)

B. PUBLIC LIBRARIES AND ARCHIVES

1. Public Archives of Canada

   Wellington Street, Ottawa

   Government Records, Tunney's Pasture, Ottawa

2. Ontario Archives, Toronto

3. Thunder Bay Historical Society Archives, Thunder Bay

4. Sault Ste. Marie Historical Society Archives, Sault Ste. Marie

5. National Library of Canada, Ottawa

APPENDIX I continued

6. University of Toronto, Toronto
   - Robarts Library
   - Science and Medicine Library
   - Sigmund Samuel Library
   - Zoology Department Library
   - Fisher Rare Book Library
   - Institute for Environmental Studies Library
7. Royal Ontario Museum, Toronto
   - ROM Library (Main)
   - Ichthyology Dept. library
   - Canadiana Collection
8. Metropolitan Toronto Central Library, Toronto
9. Sault Ste. Marie Public Library, Sault Ste. Marie
10. Fort William and Port Arthur Libraries, Thunder Bay
11. Terrace Bay Public Library, Terrace Bay
12. Nipigon Public Library, Nipigon

APPENDIX II PHOTOGRAPHS

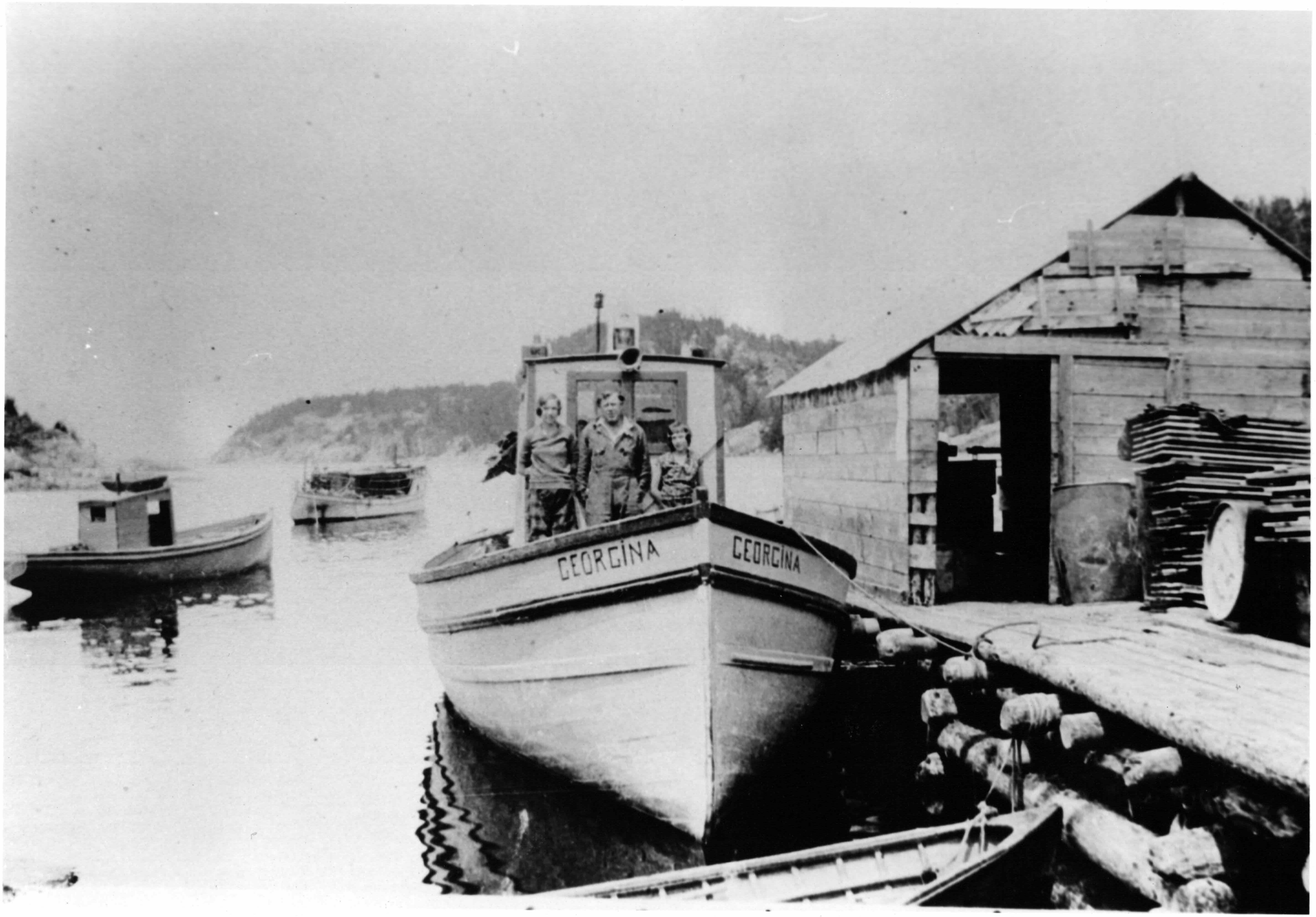
1. Michigan State fish hatchery, Duluth. 1890's. (From Young 1900).

2. Indians catching whitefish with dip nets in the St. Mary's River rapids, Sault Ste. Marie. 1890's. (From Young 1900).

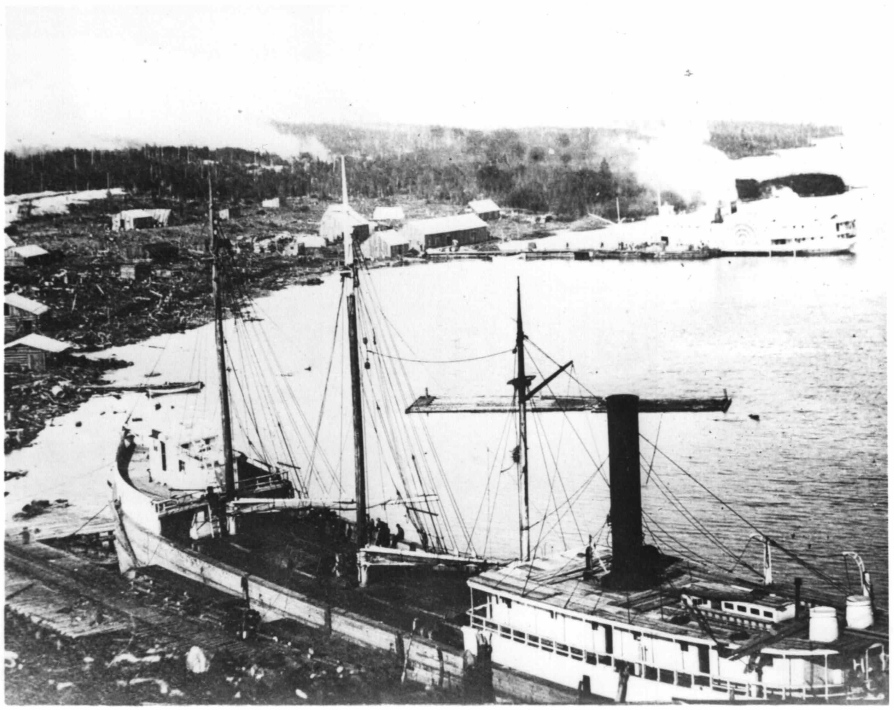
3. A 1900-pound haul of whitefish and lake trout caught in the St. Mary's River, Sault Ste. Marie. 1890's. (From Young 1900).

4. A. Booth and Co.'s station at Quebec Harbour, Michipicoten Island. circa 1900. (From Bell 1905).

5. Pound net fishermen. Location unknown.

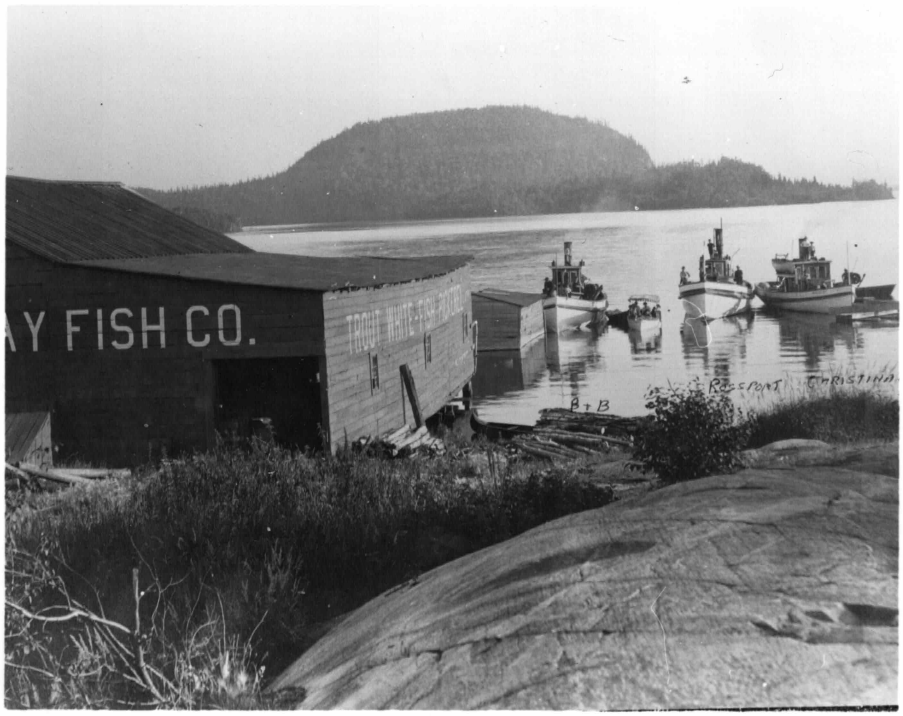


6. Port Coldwell harbour. The tug "Georgina" was first operated in the 1890's by the Union Fish Co. of Port Arthur.



7. McKay's Landing (Rossport). circa 1890.

8. Bowman Island station.



9. Nipigon Bay Fish Company fish shed, showing the tugs "B and B", "Rossport" (belonging to Fred Gerow), and "Christina Mac" (belonging to Charles Gerow), Rossport. early 1920's.

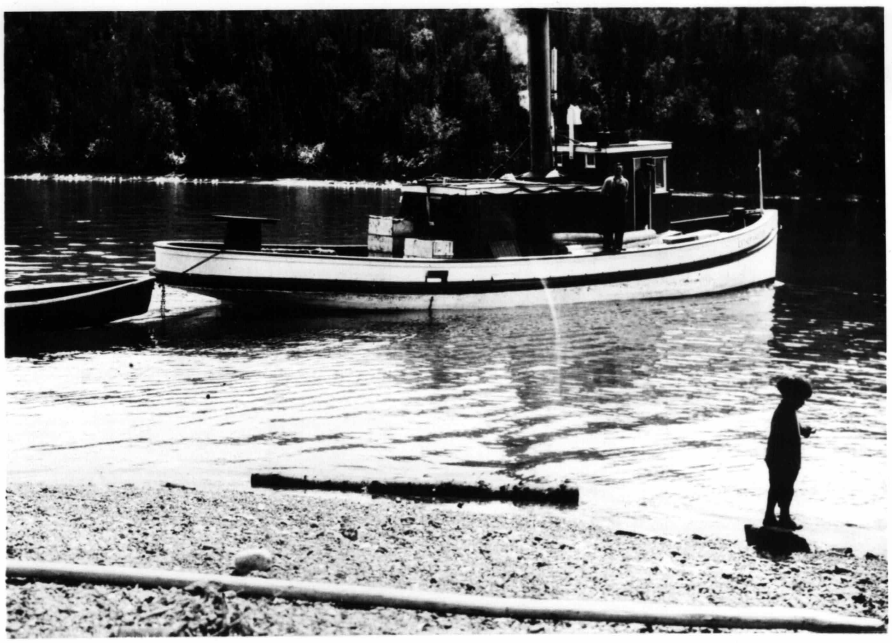
10. Rossport. late 1920's?

11. Filling the ice house for the Nipigon Bay Fish Co., Rossport.

12. Preparing the catch for shipment, Rossport.

13. Steam tug, Rossport. pre-1918.

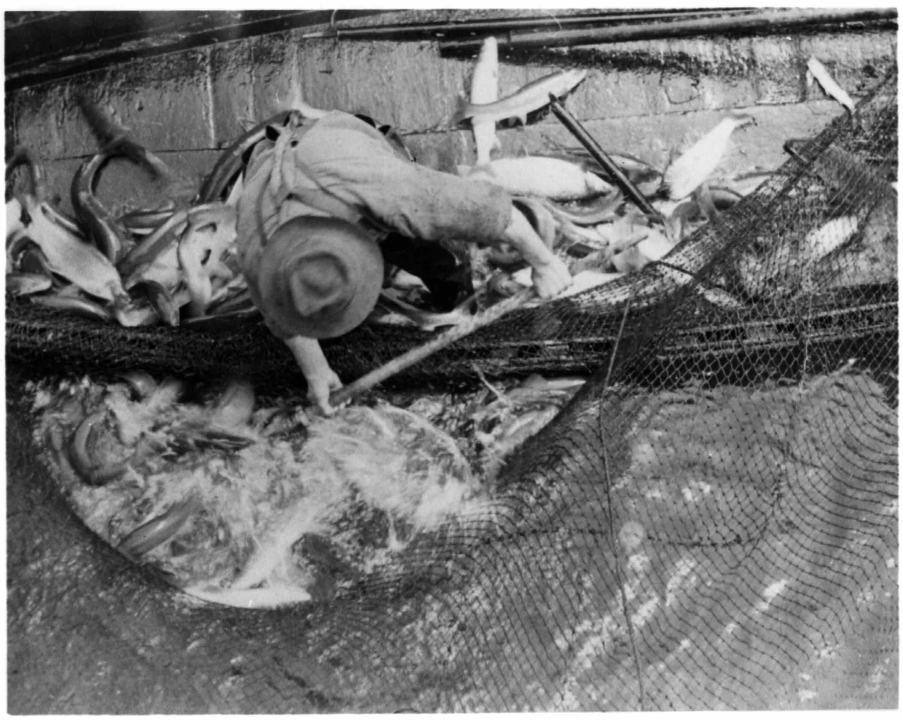
14. Felix Legault and automatic net lifter on the tug "Rossport" (belonging to Fred Gerow), Rossport. 1915.



FISHING TUG AT ROSSPORT, ONT.

15. The tug "Esther Anderson" (belonging to Oscar Anderson), Rossport. circa 1930.

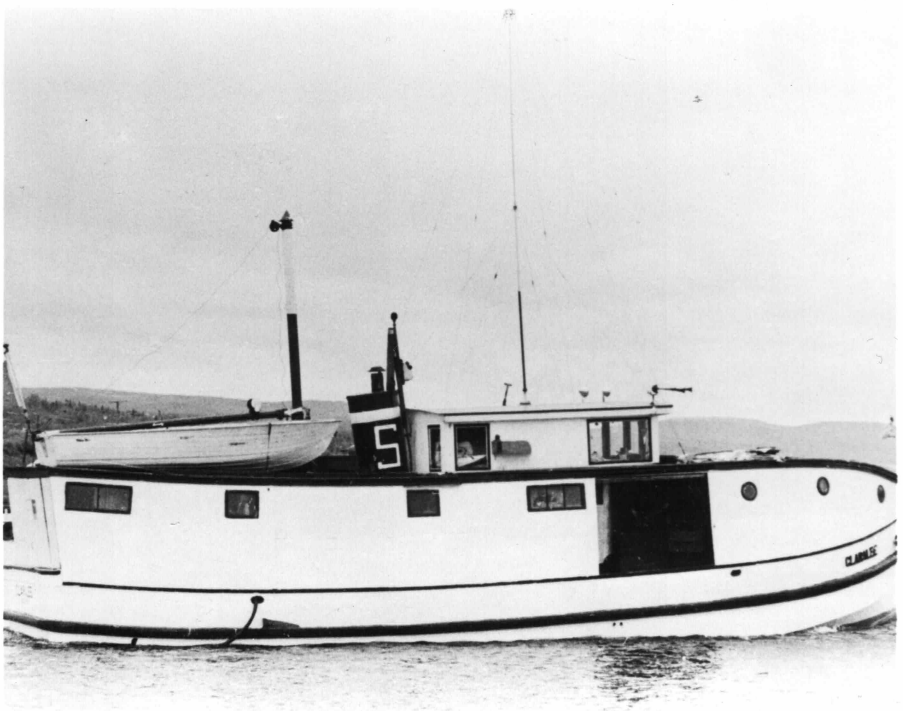
16. The tug "Redfox", operated by the Booth Fisheries Co. (Port Arthur) and by Frank Gerow (Rossport) after 1935.



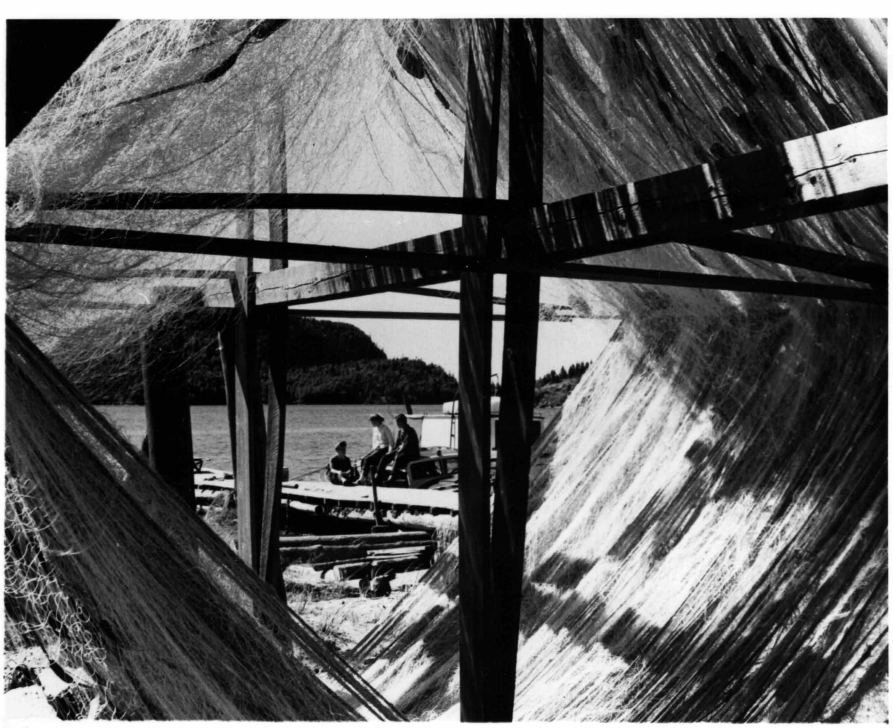
17. A catch from one of the Legault brothers' pound nets, Rossport.

18. A lake trout weighing 64 pounds dressed, with Einar Anderson, J. A. Nicol, and John Anderson, Rossport.

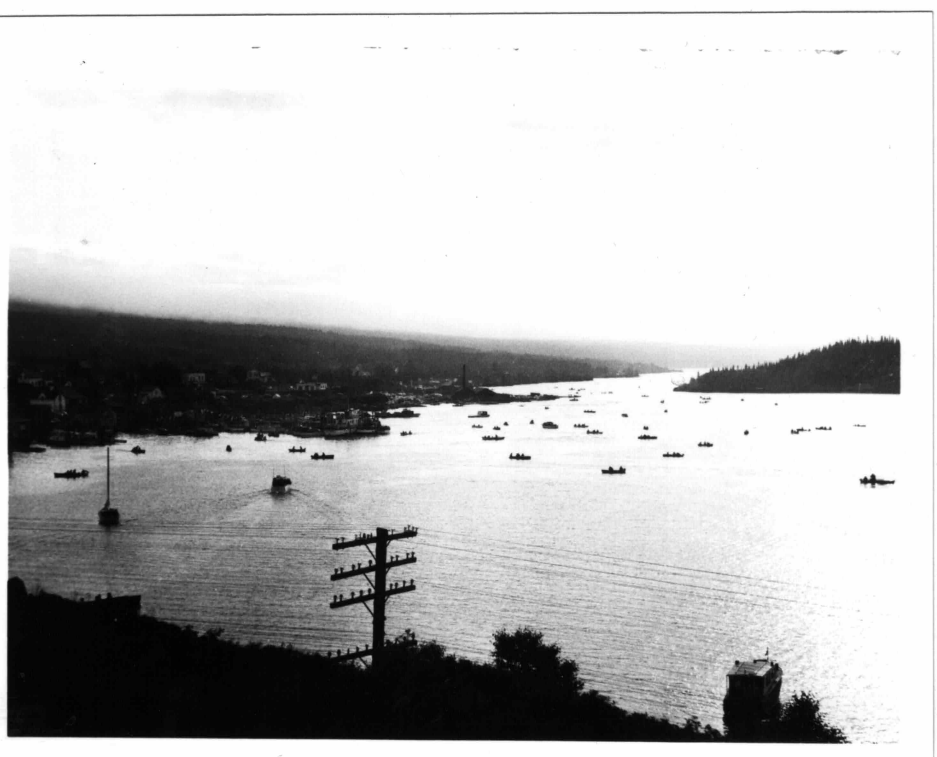
19 and 20. Mending 8-inch mesh lake trout nets, Rossport. 1930's.



21. The tug "Claralee", originally owned by William Schelling, Rossport. The "Claralee" is still being operated by Kemp Fisheries, Thunder Bay.



22. Nets drying, Rossport.

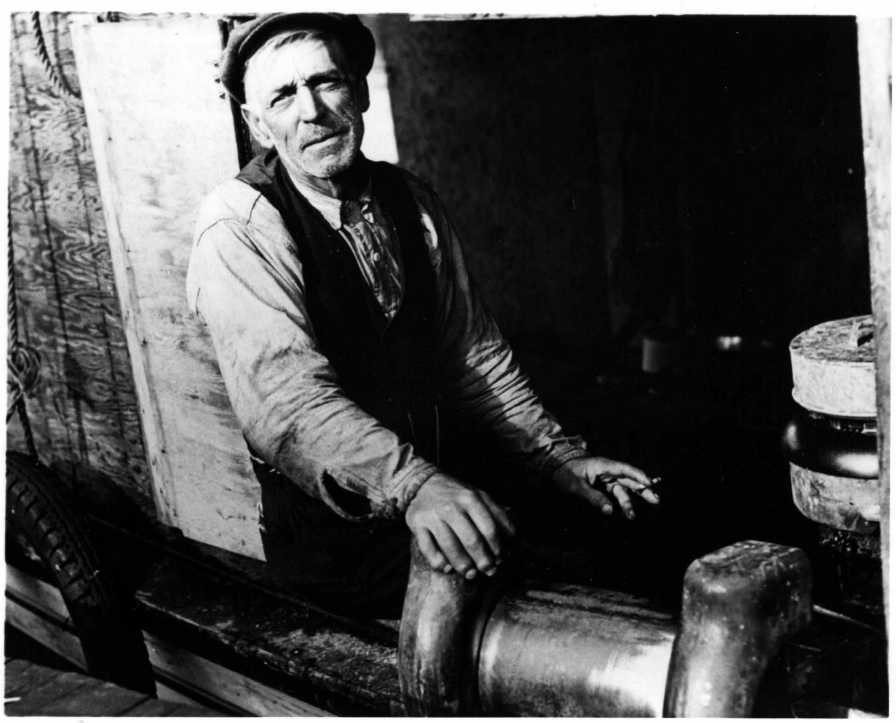


23 and 24. Derby day, fishing for lake trout at Rossport. 1950's.

25. Herring catch, Port Arthur. circa 1900. (Thunder Bay Historical Society, acc. no. 979.73.8).

26. Herring catch laid out to freeze in the cold weather of autumn, Port Arthur.

27. Tug breaking through ice in autumn.



28. The unknown fisherman.

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