Biological Services Program

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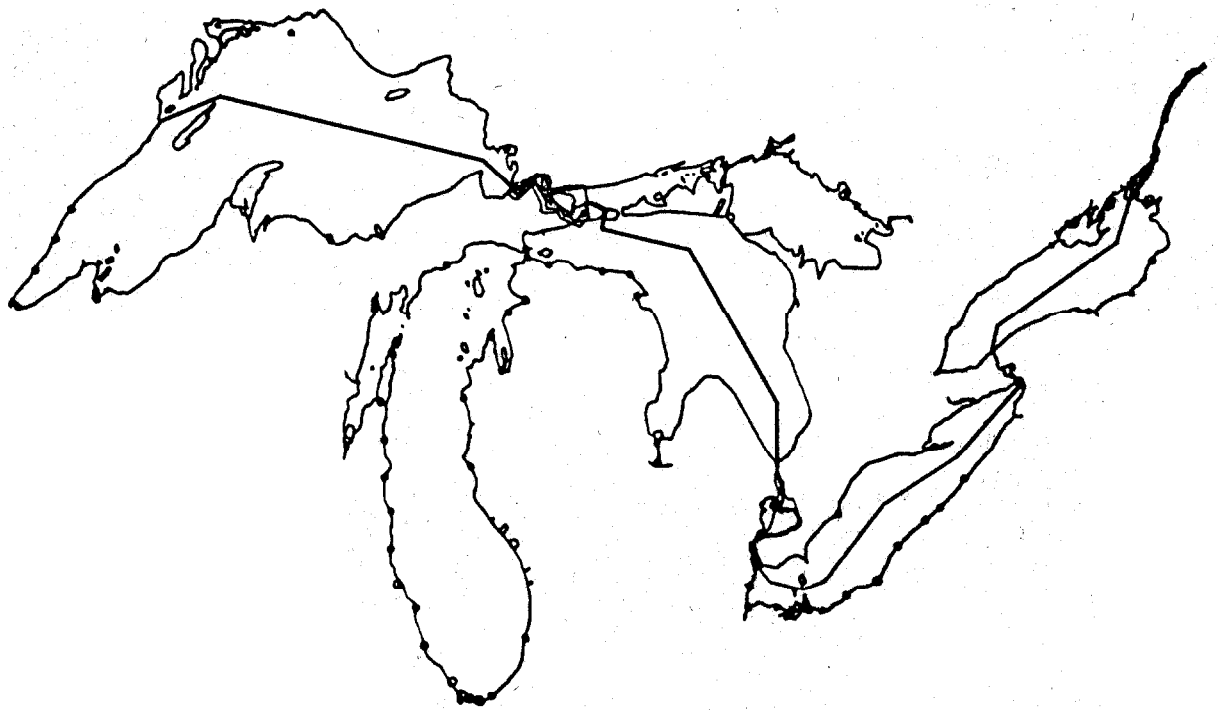
ATLAS OF THE SPAWNING AND NURSERY AREAS OF GREAT LAKES FISHES

Volume III - St. Mary's River

Great Lakes - St. Lawrence Seaway
Navigation Season Extension Program



Fish and Wildlife Service
U.S. Department of the Interior

Corps of Engineers
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The Biological Services Program was established within the U.S. Fish and Wildllfe Service to supply scientific information and methodologies on key environmental issues that Impact fish and wildlife resources and their supporting ecosystems. The mission of the program is as follows:

- To strengthen the Fish and Wildlife Service in its role as a primary source of information on national fish and wildlife resources, particularly in respect to environmental impact assessment.
- To gather, analyze, and present information that will aid decisionmnakers in the identification and resolution of problems associated with major changes in land and water use.
- To provide better ecological information and evaluation for Department of the Interior development programs, such as those relatfng to energy development.

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The Biological Services Program consists of the Office of Biological Services in Washington, D.C., which is responsible for overall planning-and management; Natlonal Teams, which provide the Program's central scientific and technical expertise and arrange for contracting biological services studies with states, universities, consulting firms, and others; Regional Staffs, who provide a link to problems at theoperating level; and staffs at certain Fish and Wildlife Service research facilities, who conduct in-house research studies.

FWS/OBS-82/52
September 1982

ATLAS OF THE SPAWNING AND NURSERY AREAS OF GREAT LAKES FISHES

VOLUME III
St. Mary's River

by

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PREFACE

The fish resources of the Great Lakes have changed markedly since the settlement of the Great Lakes Basin began in the late 1700s-early 1800s. Local declines in the abundance of some highly valued species that supported early fisheries were reported in the 1800s. By the late 1950s-early 1960s, a number of important native species had disappeared from the catch, most once-productive stocks were depleted, and the fisheries that persisted were supported mainly by species of low value and utility. These undesirable changes have been attributed to the overharvest of desirable species, the invasion and introduction of undesirable exotic species, lowered water quality, and the destruction of portions of the physical habitat, including spawning grounds, vital to the maintenance of the resource base.

Since the 1950s, intensive efforts have been mounted to reestablish stable, self-sustaining fish communities, mainly by reducing sea lamprey abundance, limiting the harvest of remnant native stocks, and stocking desirable native or exotic species to replace or supplement depleted populations. Many of the native species and some of the desirable, introduced species have responded favorably and are now supporting valuable, productive fisheries. These successes suggest that continued judicious exercise of established management strategies will result in further significant improvements in the fish resources and the fisheries. An emerging perspective suggests, however, that enduring, major improvements in the fish resources and the fisheries will require greater emphasis on rehabilitation efforts directed more specifically at safeguarding and improving the quality of the fish habitat in general, and on ensuring fuller utilization of the specialized habitat required by sensitive, embryonic- juvenile life stages of species that are to be included in any future, self-sustaining resource base. We prepared this atlas to provide a comprehensive information base against which past changes in the condition and use of spawning and nursery habitat of Great Lakes fishes could be viewed and evaluated and the needs of the future, self-sustaining resource base could be projected.

The atlas is composed of the following 14 volumes:

I. Spawning and Nursery Areas of Great Lakes Fishes: A Summary by Geographic Area

II. Lake Superior

111. St. Marys River

IV. Lake Michigan

v. Lake Huron

VI. St. Clair River

VII. Lake St. Clair

VIII. Detroit River

IX. Lake Erie

X. Niagara River

XI. Lake Ontario

XII. St. Lawrence River

XIII. Reproductive Characteristics of Great Lakes Fishes

XIV. Literature Cited

Volume I is designed to permit the reader to determine quickly whether a particular geographic area of interest contains fish spawning or nursery areas that are described in volumes II-XII. Volumes II-XII consolidate existing information describing spawning and nursery areas used by stocks of fish, including anadromous stocks, considered to be residents of the Great Lakes and their connecting waters. The information presented for each spawning or nursery area identified in volumes II-XII includes, when known, the area's precise location, history of use, season of use, water temperatures during the season of use, major substrate type, and water depth. Pre- and post-spawning migrations of mature fish and movements of young fish are also described, insofar as this information serves to better delineate spawning or nursery areas. Volume XIII contains concise descriptions of the reproductive characteristics of species included in volumes I-XII.

In the preparation of the atlas we found that considerable information was available for most of the species that support (or supported) major recreational or commercial fishes, or that are or were major components of the forage base; conversely, relatively little information was available for many other species not included in these general categories. For most species, spawning areas were more completely described than were nursery areas. The historical information in particular provided more extensive descriptions of spawning areas than of nursery areas, because much of this information was obtained from records of fisheries that had been conducted for spawning fish. Thus, although the information available to us for compilation was relatively extensive, it was nonetheless incomplete for the reasons given above. Users of the atlas are therefore cautioned not to view the lack of explicit reference to a given area as conclusive evidence that the area is or was not used as a spawning or nursery area by Great Lakes fishes.

Sources of the information incorporated in the atlas are described in volume I. Acknowledgements are also given in volume I.

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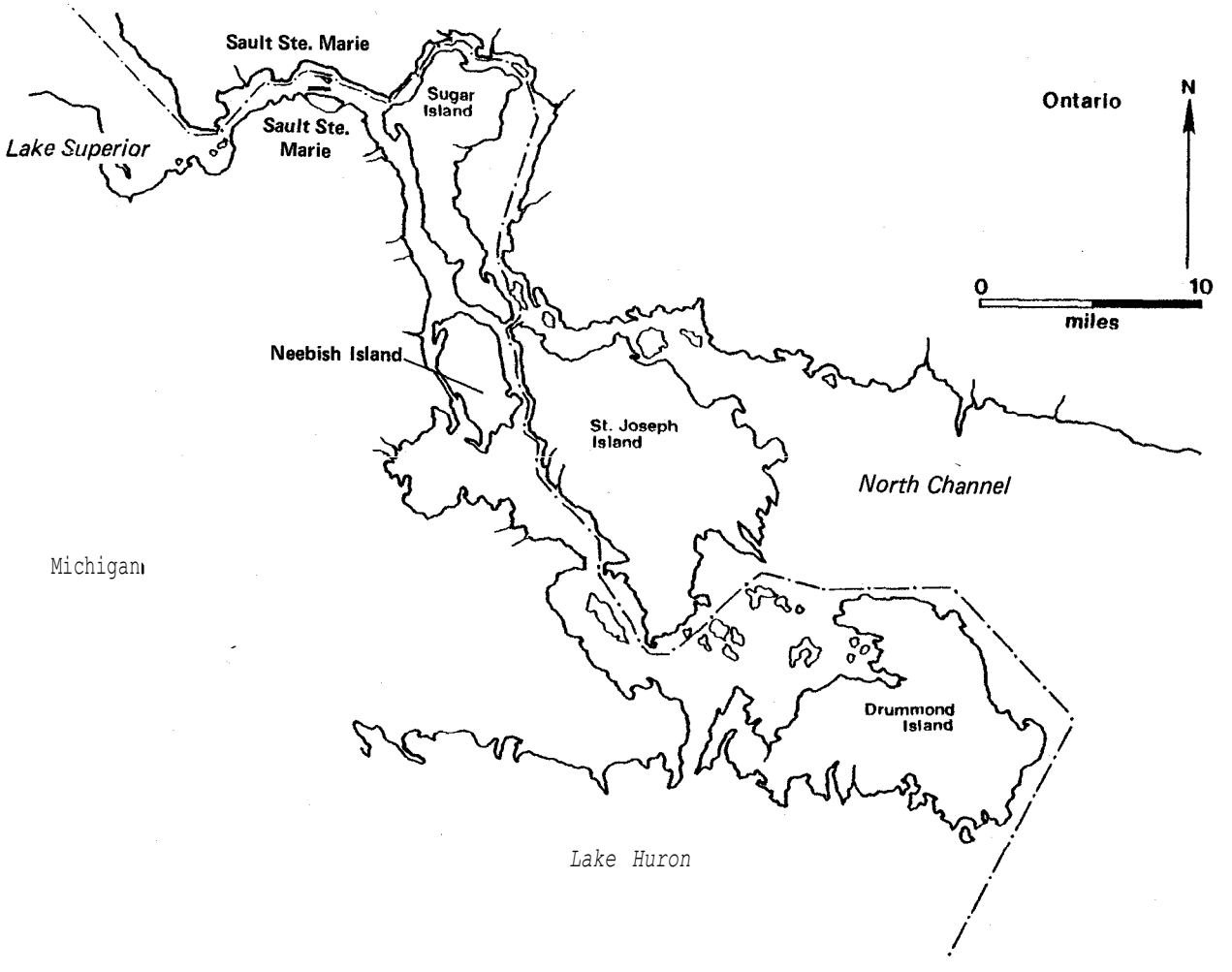
Volume III. ST. MARYS RIVER

INTRODUCTION



Historically, the St. Marys rapids were a major spawning area for lake sturgeon, lake whitefish, brook trout, and walleyes. The Canadian waters in the rapids area have a wider variety of substrate and provide more ideal spawning and nursery habitat than do the U.S. waters. Whitefish Channel contains relatively calm pools which are important reproductive habitat (Int. Lake Superior Board Control *1974);* the wetlands and extensive areas of shoals in the river also provide favorable reproductive habitat (Gleason and Rehmer *1975;* Jaworski and Raphael 1978a).

More than 60 species of fish have been recorded as residents, or migrants, in the St. Marys River (Behmer and Gleason 1975; Int. Lake Superior Board Control 1974; Liston, pers. comm. 1979; MWRC 1975; Odin 1979). This volume describes the reproductive habitat used by the 35 species for which information was available. Twenty-seven species treated in this volume were native to the river. Most of these 27 native species spawned in tributaries to the river, in the shallow bays and shoreline areas, or in the St. Marys rapids. Sturgeon is the only species believed to spawn in deeper areas in the river channel.

The eight exotic species treated in this volume have been introduced by man or have immigrated into the river from populations established elsewhere in the Great Lakes drainage. Four of these are salmonids that spawn in the rapids or in tributaries. Smelt also spawn in tributaries; alewives and carp spawn in the protected bays.

Information on nursery areas used by the 35 species treated in this volume is fragmentary, but as would be expected, it suggests that tributaries and nearshore waters, especially the bays, are important as nursery areas, at least for the earliest life history stages. Dispersal from spawning areas is rapid for some species which have small, pelagic larvae, whereas the juveniles of most salmonids that spawn in the rapids area or in tributaries may remain in or near those spawning areas for at least one year before dispersing.

The information for each species treated in this volume is presented by geographic region starting at the head of the river. For the purposes of this atlas, we define the head of the St. Marys River as that portion of the river immediately downstream from a line connecting Point Iroquois (46°29'05", 84°37'50") and Gros Cap (46°31'45", 84°35'15"); and the mouth of the St. Marys River as that portion of the river immediately upstream from a line connecting Point DeTour (45°57'30", 83°54'35") and Barbed Point (45°57'50", 83°52'55"). The river is separated from the North Channel of Lake Huron by lines connecting Koskhawong Point (46°07'50", 83°48'50") with Ray Point (46°05'30", 83°43'40") and Canoe Point (46°17'50", 83°55'35") with Woodman Point (46°18'10", 83°52'35").

SEA LAMPREY

The sea lamprey presumably entered the St. Marys River from Lake Huron, where its presence was first recorded in 1937. Spawning occurs in the river and its tributaries generally in May-July but may extend into August in areas influenced by the cold outflow of Lake Superior (Int. Great Lakes Levels Board 1973). Ammocoetes are sparse in the river above the locks at Sault Ste. Marie (46°30'00", 84°21'00"), abundant in the St. Marys Rapids (46°30'30", 84°21'15"), and present in significant numbers as far as 23 mi downstream from the rapids (Smith and Tibbles 1980) and in bays off stream mouths (SLCC 1979b). The following sites support spawning based on the presence of ammocoetes, spawning adults, or both.

Waiska River (46°24'50", 84°34'30") (Erkkila et at. 1956; FWS 1979a; Moore and Braem 1965; Smith and Braem 1976; Smith et al. 1974; Torblaa and Westman 1980).

Big Carp River (46°30'00", 84°26'30"), Little Carp River (46°30'20", 84°26'20"), and East and West Davignon Creeks (46°31'20", 84°22'50") (Dames and Moore 1978; GLFC 1973b; Price 1955, 1956; SLCC 1979b; Smith et al. 1974; Tibbles 1975; Tibbles et al. 1976a; Torblaa and Westman 1980).

St. Marys Rapids (46°30'30", 84°21'15") (Braem and Rugen 1976; GLFC 1975; Smith and Tibbles 1980; Tibbles 1975; Tibbles et al. 1976a). Whitefish Island (46°30'35", 84°21'00") has been a spawning area since the late 1950s (Dustin 1975). Successful spawning occurs above the island and also in Whitefish Channel (46°30'40", 84°21'00"). Most of the ammocoetes concentrate in quiet water over sand bottom along the drop off adjacent to the east side of the island. Some ammocoetes are also found in pockets of sand, silt, and fine gravel along the south and west sides of the island and also just below the compensating gates (Dustin 1975; Int. Great Lakes Level Board 1973; Int. Lake Superior Board Control 1974; Schleen 1974; SLCC 1979b). The U.S. portion of the rapids contains mainly large flat rocks and boulders and has no suitable spawning or nursery habitat (Schleen 1974).

Root River (46°32'30", 84°12'25"), Garden River (46°31'50", 84°09'25"), Echo River (46°30'20", 84°03'40"), and Bar River (46°25'30", 84°06'15") (FWS 1979c; SLCC 1979a,b; Smith and Tibbles 1980; Tibbles 1959; Tibbles et al. 1976a,b; Torblaa and Westman 1980). Ammocoetes have also been found off the mouths of the Root and Echo rivers (SLCC 1979b).

Desbarats River (46°20'10", 83°55'45") (MacKay and MacGillivray 1949).

Little Munuscong (46°12'55", 84°15'20") and Munuscong (46°12'30", 84°15'20") Rivers (GLFC 1973b; Torblaa and Westman 1980). In 1948, spawning was observed in Taylor Creek, a tributary of the Munuscong River, in June (Applegate 1950).

Sucker Creek (46°17'15", 83°57'20"), Two Tree River (46°12'05", 84°04'30"), Richardson Creek (46°10'55", 84°03'25"), Watson Creek (46°09'05", 83°53'30"), Brown's Creek (46°09'35", 83°52'15"), Gordon Creek (46°09'10", 83°53'35"), and Carlton Creek (46°03'15", 84°01'30") (FWS 1979c; GLFC 1975; SLCC 1979a,b; Tibbles 1959; Tibbles 1959; Tibbles et al. 1976a,b; Torblaa and Westman 7980). Ammocoetes have also been found in Tenby Bay (46°08'35", 83°52'00") (SLCC 1979b).

LAKE STURGEON

The St. Marys Rapids area (46°30'30", 84°21'15") was historically a spawning ground for the sturgeon (FWS 1979d; Odin 1979). Spawning was also historically observed in the rock area in the channel between East Neebish Island (46°20'30", 84°06'40") and Sugar Island (46°28'00", 84°12'30"), just north of Homestead (46°20'15", 84°07'20") (Hiltunen, pers. comm. 1980).

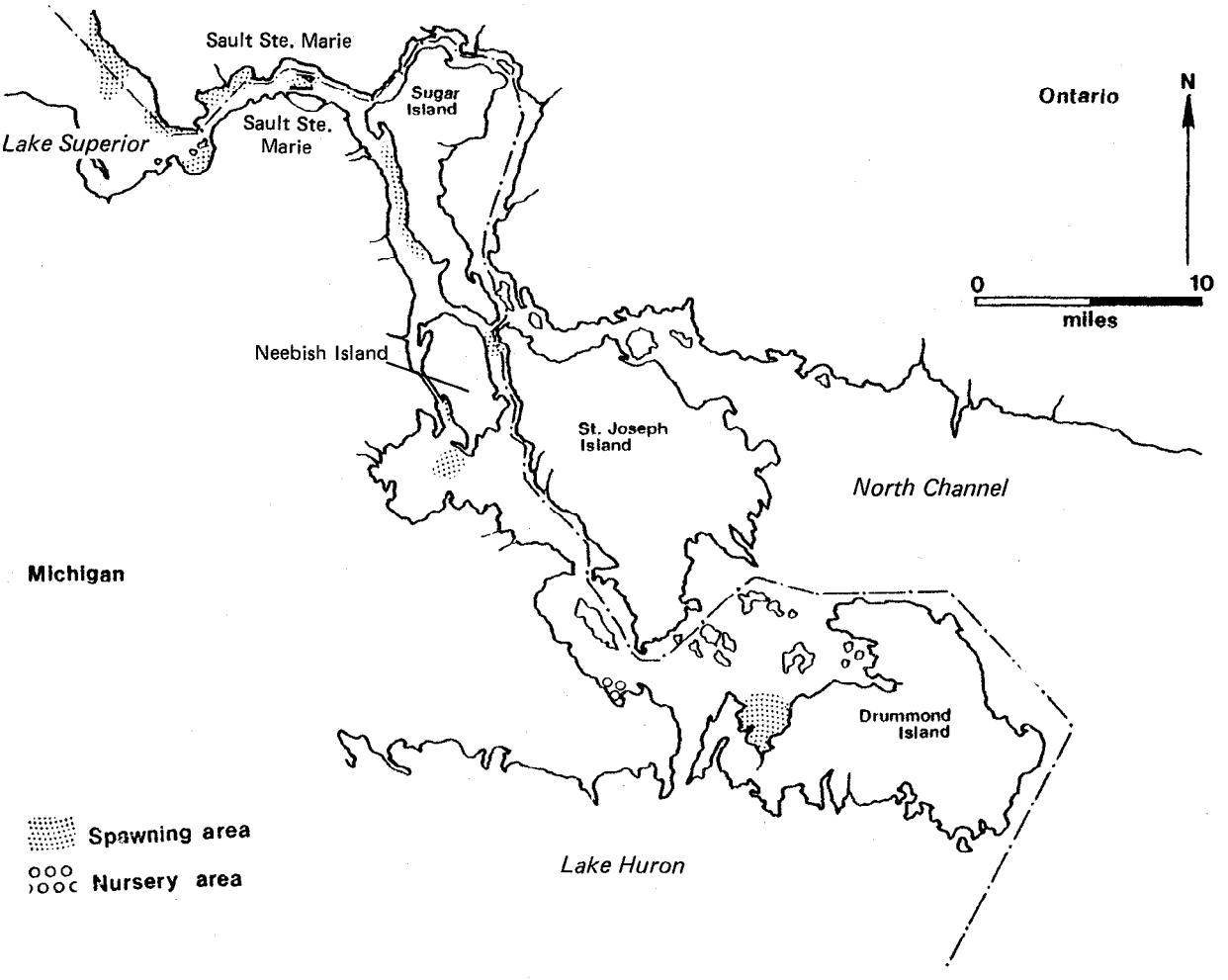
ALEWIFE

The alewife presumably entered the St. Marys River from Lake Huron in the late 1940s or early 1950s (Miller 1957). Alewives spawn in the St. Marys River, and it is also a nursery area (FWS 1977). Alewives may spawn in small numbers in Mark's (46°29'25", 84°27'30") and Leigh (46°30'35", 84°25'30") bays (Dames and Moore 1978).

LAKE HERRING

Information dating back to the early 1900s suggests that spawning occurred in the lower St. Marys River (MacDonald 1977, as cited in Gleason et al., undated). The river is a spawning and nursery ground (FWS 1977). A spawning migration occurs in the river, which provides recruits to stocks in Lake Huron (Odin 1979). Interviews with commercial fishermen suggest that spawning occurs in southern Lake Nicolet (46°21'30", 84°12'30") and Munuscong Bay (46°12'00", 84°72'30") between Kemps Pt. (46°13'55", 84°11'10") and Moon Island (46°12'55", 84°10'00") (Gleason et al., undated).

LAKE WHITEFISH



Fishermen reported that there were once major spawning runs into the river from Lake Superior (Goodier, pers. comm. *1979).* Indians claimed, however, that Lake Superior whitefish never ran down to the rapids and that St. Marys River whitefish never ascended to Lake Superior (Milner 1874a). Whitefish from Lake Huron ascended the St. Marys River to spawn (Stockwell 1875a). Whitefish congregated in large numbers for spawning in the St. Marys River (Milner 1874a), usually in October and November (Westerman and Van Oosten 1939). Whitefish that spawned in the river were once abundant at the outlet of Lake Superior, but stocks declined, possibly because the deposition of woody materials from lumbering activities degraded the habitat (Lawrie and Rahrer 1972, 1973). Whitefish presently spawn in the St. Marys River, especially in shoal areas, and it is a nursery ground (FWS *1977).*

Gros Cap (46°31'45", 84°35'15")--Pte. aux Chenes (46°28'30", 84°31'30"). The shoals on the north side of the river and south of Chene Island (46°30'05", 84°33'00") were used for spawning (Goodier, per. comm.

1979). Large numbers of fish in spawning condition are taken here in mid-November indicating that this is an important spawning area (Wohlgemuth 1978). Five eggs believed to be whitefish eggs were collected from the bottom off Pte. aux Chenes during February 27-March 13, 1979. This area has excellent spawning potential; it has a constant water flow and a bottom of sand, gravel, and larger stones (Rosa 1979).

Mark's Bay (46°29'25", 84°27'30")--Leigh Bay (46°30'35", 84°25'30"). Spawning is believed to occur in Mark's and Leigh bays (Dames and Moore 1978; Wohlgemuth 1978), and confirmatory studies are in progress. In 1978 large numbers of ripe fish were collected from Mark's and Leigh bays in gillnets at depths of 18 ft and less. Peak catches occurred from about the end of October through the first week in November in this important spawning area (Wohlgemuth 1978). One egg believed to be a whitefish egg was collected on a sandy bottom close to the mouth of the Big Carp River (46°30'00", 84°26'30") during February 27-March 13, 1979 (Rosa 1979).

Mosquito Bay (46°26'40", 84°28'40"). Ripe females were collected here in gillnets in October (FWS 1977), and the bay was identified as a spawning area (FWS 1979d).

St. Marys Rapids (46°30'30", 84°21'15"). In the 1760s, whitefish were taken with dip nets in September and October from the shoals around the St. Marys Falls, but it is not known if these were spawning-run fish (Kumlien and True 1887; MSBCF 1893). In 1824 whitefish were abundant at Sault Ste. Marie (46°30'00", 84°21'00") during October 8-16 (MacDonald 1978). The rapids area is an historical spawning ground which may be presently used. Spawning in this area probably occurs at depths greater than 2 ft (FWS 1979d; Gleason and Behmer, pers. comm. 1979; Goodier, pers. comm. 1979).

Sugar Island (46°28'00", 84°12'30"). Fishermen stated that spawning occurred on the west shore of Sugar Island from Wasig Bay (Baie de Wasai) (46°27'45", 84°15'15") south to Shingle Bay (46°21'40", 84°10'40") and around the small rocky islands north of Ninemile Point (46°23'35", 84°13'40"). Suitable substrate exists in the area off the southwest corner of Sugar Island (46°20'00", 84°10'00"). Divers reported that this substrate extended from the southwest corner of Sugar Island across the channel to Neebish Island (46°16'30", 84°09'30"); however, fishermen did not report this as a spawning area (Gleason et al., undated).

Neebish Island (46°16'30", 84°09'30"). Fishermen indicated that the northeast corner of Neebish Island just east of Hen Island (46°18’40”, 84°07'40") is a possible spawning site, but suitable habitat in this area was found only at the largest island of the Chicken Islands group (46°18'20", 84°07'35"). One fisherman suggested that spawning may take place along a line from Roach Point (46°11'10", 84°10'40") to Conley's Point (Kemps Pt., 46°13'55", 84°11'10") adjacent to the Moon Islands (46°12'55", 84°10'00"). Another fisherman reported that spawning may occur off the north end of Neebish Island near buoy 52 (46°22'10", 84°13'15") of the downbound shipping channel. The area just down river of the south dike of Rock Cut (46°15'05", 84°10'35") was reported to be a

major spawning area; this area is on or near a site that was dredged in the early 1960s (Gleason et al., undated). Another suspected spawning area (46°13'05", 84°05'40") lies just southeast of Neebish Island (Odin 1979).

Maud Hay (46°01'30", 83°58'20"). In 1974, young-of-the-year (YOY) whitefish were collected in tow-nets off Maud Bay in September and October; sixty YOY were also taken in bottom trawls in Maud Bay in early October (Behmer and Gleason 1975).

Sturgeon Hay (46°01'00", 83°48'00"). Whitefish historically spawned here during November 15-30 (Van Oosten 1927a).

COREGONUS spp.

Rocky Point (46°10'45", 84°07'20"). In 1979, several eyed-stage coregonid eggs were collected in dredge samples taken in about 6 ft of water on a hard sand bottom off the east shore of Rocky Point on March 12 (Gleason et al., undated).

PINK SALMON

Since this species was accidentally released in 1956 into Canadian waters of Lake Superior, self-sustaining populations have spread to all the Great Lakes (Wagner 1979). No information was found concerning the first occurrence of pink salmon in the St. Marys River; however, the first recorded capture of pink salmon in Lake Huron occurred in 1969 (Wagner 1974a). These fish presumably entered Lake Huron from Lake Superior via the St. Marys River. In 1979, a run of pink salmon was observed in the river (Wagner 1979). The rapids area near Whitefish Island (46°30'35", 84°21'00") is probably a spawning ground; pink salmon move into this region during the spawning season, and dead adults have been observed there (Gleason and Behmer, pers. comm. 1979). Whitefish Channel (46°30'40", 84°21'00") and protected pockets on the south edge of Whitefish Island have gravel substrate suitable for spawning (Int. Lake Superior Board Control 1974).

COHO SALMON

The first recorded capture of coho salmon in the St. Marys River occurred in the late 1960s (OMNR 1976b); presumably these fish originated from plantings made in Lake Superior in 1966 or Lake Huron in 1967 (Parsons 1973). Occasional catches of coho salmon are made in the St. Marys River (OMNR 1976b), suggesting that spawning may occur there. The Big Carp River (46°30'00", 84°26'30") and Little Carp River (46°30'20", 84°26'20") are significant spawning and nursery grounds for coho salmon

(Dames and Moore 1978). Whitefish Channel (46°30'40", 84°21'00") and protected pockets on the south edge of Whitefish Island (46°30'35", 84°21'00") have gravel substrate suitable for spawning (Int. Lake Superior Hoard Control 1974).

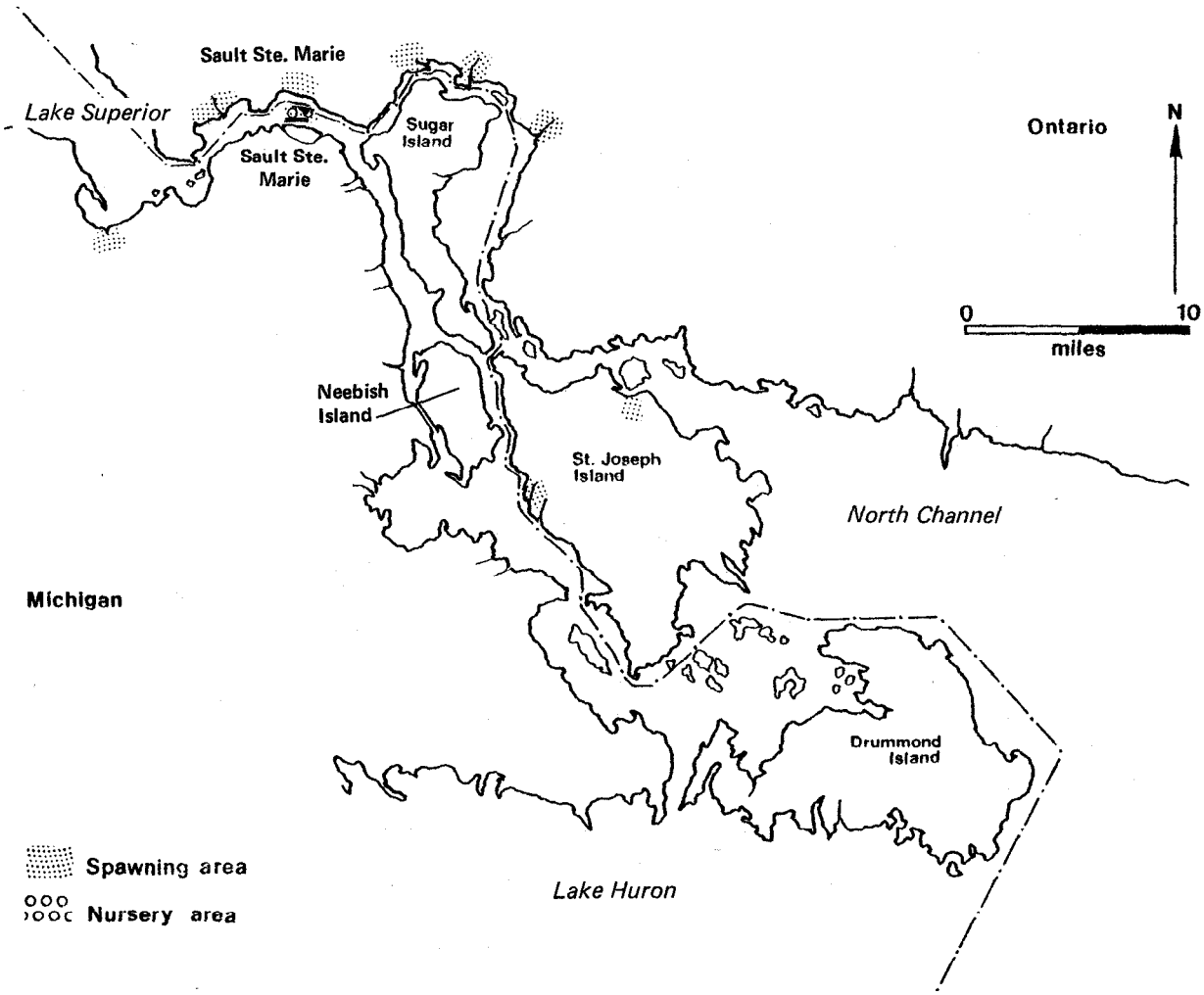
CHINOOK SALMON

The first recorded capture of chinook salmon in the St. Marys River occurred in the late 1960s (OMNR 1976b); presumably these fish originated from plantings made in Lake Superior or Lake Huron in 1967 (Parsons 1973). The mid-river portion of the rapids area near Whitefish Island (46°30'35", 84°21'00") is believed to be a spawning ground; ripe and dead, spent fish have been observed there, but reproduction may not be successful. Substrate in this area ranges from rubble to large boulders (Gleason and Behmer, pers. comm. 1979). Whitefish Channel (46°30'40", 84°21'00") and protected pockets on the south edge of Whitefish Island have gravel substrate suitable for spawning (Int. Lake Superior Hoard Control 1974).

ROUND WHITEFISH

Round whitefish may spawn in Mark's (46°29'25", 84°27'30") and Leigh (46°30′35″, 84°25′30″) bays, but there appears to be an absence of gravel and rock substrate in this area (Dames and Moore 1978).

RAINBOW TROUT



Rainbow trout were first introduced into the St. Marys River in *1883* by the Ontario Government and were abundant in the river after 1900 (MacCrimmon and Gots 1972). Spawninq runs may occur in the spring or fall, but most spawning occurs in the spring (OMNR 1976b). A major run of rainbow trout occurs in the river (Environ. Can. 1977c; Odin 1979; OMNR 1976b). Sportsmen believed that most spawning areas were located on the Canadian side of the river because the U.S. side did not have adequate amounts of sand or gravel substrate (Anderson 1952; Westerman 1952a). Spawninq was reported at the following areas:

Waiska River (46°24'50", 84°34'30") (Moore and Braem 1965).

Big (46°30'00", 84°26'30") and Little (46°30'20", 84°26'20") Carp Rivers (Dames and Moore 1978; OMNR 1976b; Price 1955).

Roundwood Creek (46°30'50", 84°24'45") and Bennett Creek (46°31'40", 84°23'10") (OMNR 1976b).

East and West Davignon Creeks (46°37'20", 84°22'50") (OMNR 1976b; Price 1955).

St. Marys Rapids (46°30'30", 84°21'15"). Natural reproduction occurs in this area (FWS 1979; Odin 1979; Proctor and Redfern 1978), which has a bottom of rock, boulder, exposed bedrock, gravel, and sand (FWS 197911). Spawning occurred in May (Ont. Game Fish 1912). The rapids area in mid-river, where the substrate ranges from rubble to large boulders, is used for spawning. Young have also been collected in this area (Gleason and Behmer, pers. comm. 1979). Spawning conditions in the rapids are best when all the control gates are open; a large decrease in flow can leave the spawning and nursery beds dry (Purych 1972).

Whitefish Island (46°30'35", 84°21'00"). Spawning takes place in the Whitefish Channel (46°30'40", 84°21'00"). The channel and protected areas along the south side of Whitefish Island have suitable gravel substrate for spawning (Int. Lake Superior Board Control 1974). Spawning has occurred in the south end of Whitefish Channel in May and June at water temperatures of 42-55°F (Int. Great Lakes Levels Board 1973). In 1953, spawning may have occurred on a stream on Whitefish Island; 20 spawning redds were counted and many large rainbow trout were seen "chasing about" on May 6, when the stream temperature was 45°F. However, spawning did not appear to be successful, because only dead eggs were found in the redds (Loeb 1953; Moffett 1954). Parr less than 1 in. long found at the south end of Whitefish Channel indicate that this is a nursery area (Int. Great Lakes Level Board 1973).

Root River (46°32'30", 84°12'25") and Garden River (46°31'50", 84°09'25") (OMNR 1976b).

Echo River (46°30'20", 84°03'40") (MacCrimmon and Gots 1972).

Two Tree River (46°12'05", 84°04'30") and Sucker Creek (46°17'15", 83°57'20") (OMNR 1976b).

BROOK TROUT

Brook trout spawn in Whitefish Channel (46°30'40", 84°21'00") (Int. Great Lakes Level Board 1973). Big (46°30'00", 84°26'30") and Little (46°30'20", 84°26'20") Carp rivers have rubble and gravel substrate and are significant spawning and nursery grounds; most of the fish using these streams are residents, but some fish move into them from the St. Marys River to spawn (Dames and Moore 1978).

LAKE TROUT

Until 1950, a small area at the southwest end of Portlock Island (46°18′30″, 83°54'40") was used for spawning in late October (Smith 1968). A spawninq migration occurs in the river (Odin 1979). The dominant substrate in the channel along the north shore of St. Joseph Island (46°13′00″, 84°00′00″) from Portlock Island to East Neebish Island (46°20′30″, 84°06′40″) and Maskinonge Bay (46°20′15″, 84°05'00") is honeycombed rock and is excellent spawning habitat (Smith 1968), but spawning has not been documented there.

RAINBOW SMELT

Rainbow smelt eggs planted in the St. Marys River system in 1906 are believed to be the first introduction of this species to the Great Lakes, however, this and subsequent plantings of smelt eggs in the river are thought to have been unsuccessful. Smelt eggs planted in Crystal Lake (44°40′, 86°10') (Lake Michigan drainage) in 1912 are believed to be the source of smelt found in all the Great Lakes except Lake Ontario (Van Oosten 1937a). Smelt were first reported in the St. Marys River in the early 1930s (Dymond 1944; Van Oosten 1937a). Records of dispersal suggest that smelt entered the river from Lake Huron (Van Oosten 1937a). In 1933, smelt entered Stoby (Stobie) Creek (46°20'00", 83°53'05") near Portlock (46°20'30", 83°53'00") in mid-April to mid-May (Savage 1935). In mid-late April 1935, the first runs occurred on Drummond Island (46°00′00″, 83°40′00″) in Pigeon Cove Creek (45°59'15", 83°47'45"), in small streams 1/2 mi E of Drummond Island, and at Sault Ste. Marie (46°30′00″, 84°21′00″) (Van Oosten 1937a).

Spawning begins in the St. Marys River in early April and lasts about 3 weeks (MacKay 1969). Spawning occurs on the rocky shores of the river and in tributaries (FWS 1977; Liston, pers. comm. 1979). The river is also a nursery ground (FWS 1977).

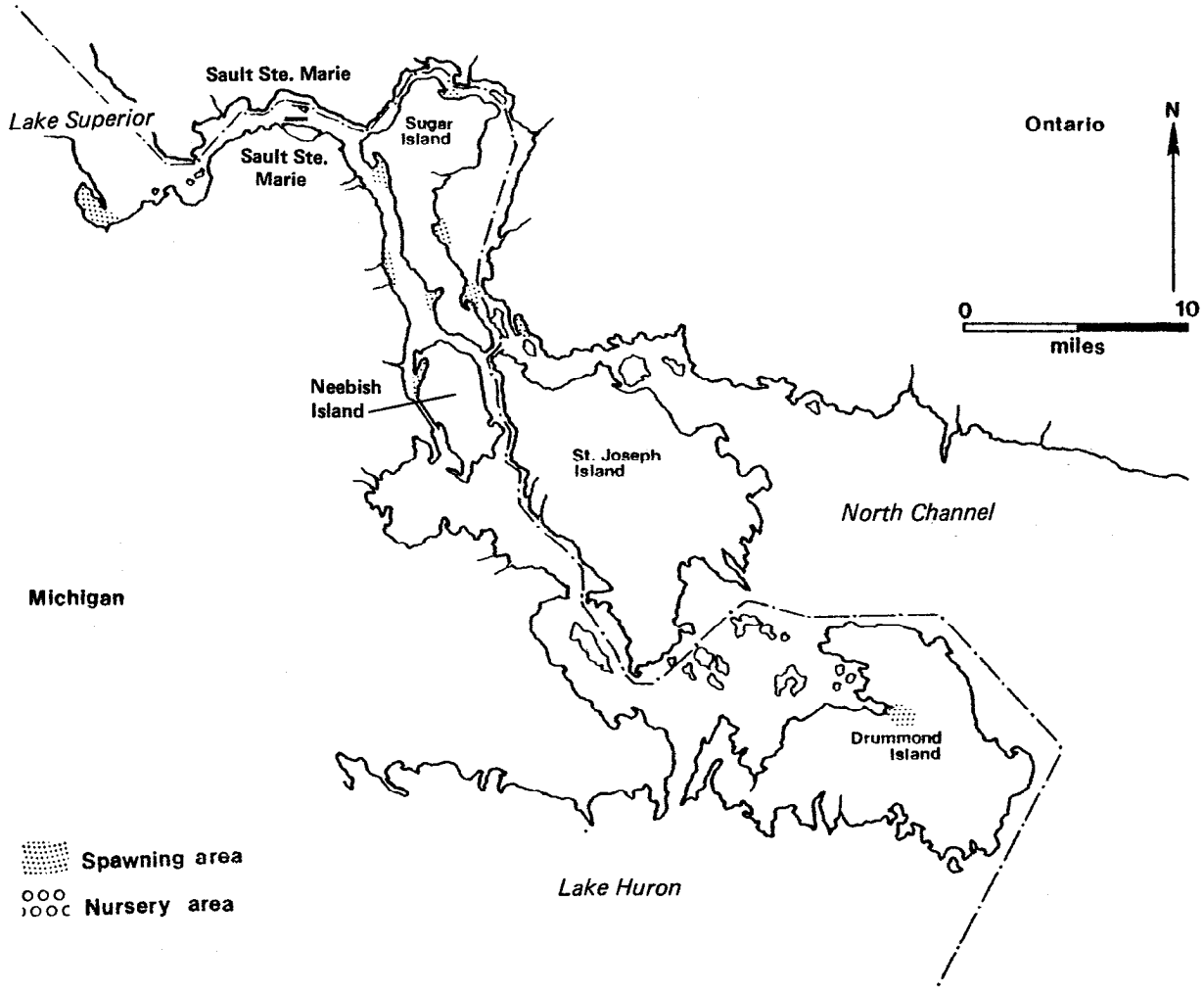
Big (46°30'00", 84°26'30") and Little (46°30'20", 84°26'20") Carp Rivers. Spawning may occur in these rivers (Dames and Moore 1978).

Sugar Island (46°28'00", 84′12′30″). Spawning occurs in some years in rivulets on the north end of the island (Hiltunen, pers. comm. 1980).

Echo River (46°30'20", 84°03'40") and Two Tree River (46°12′05", 84°04′30″). In 1968, a few smelt were caught in these rivers in the Canadian Department of Fisheries and Oceans sea lamprey weir (FWS 1979c).

Maud Bay (46°01'30", 83°58'20"). In 1974, young-of-the-year smelt were caught in bottom trawls in Maud Bay on October 3-4 (Behmer and Gleason 1975).

NORTHERN PIKE



In the *1800s,* fishing for northern pike was conducted in the river during May (Smith and Snell 1891), presumably for spawning-run fish. The river is a spawning and nursery ground (FWS *1977).* Spawning occurs in shallow beds of vegetation in bays and marshes throughout the river in April and May (FWS 1979d; Int. Great Lakes Level Board *1973;* Liston, pers. comm. *1979;* Odin *1979).* Fry remain in the spawning areas for about 2 weeks until they absorb their yolk sacs (Int. Great Lakes Level Board *1973).*

Waiska Bay (46°26'00", 84°35'40"). Ripe adults have been collected here (Gleason and Behmer, pers. comm. *1979).*

Mosquito Bay (46°26'40", 84°28'40"). Spawning may occur in the bay (Gleason and Behmer, pers. comm. 1979).

Mark's Bay (46°29'25", 84°27'30")--Leigh Bay (46°30'35", 84°25'30"). Spawning may occur in the nearshore areas of these bays (Dames and Moore *1978).*

Frog Bay (46°31'50", 84°11'45"). Spawning was observed in late April during the late 1940s and early 1950s in the marshy areas of the bay. Spawning pairs were observed in a floating mat of marsh five-finger (Potentilla palustris) that composed part of the vegetation in the zone of sedges (Carex spp.) and willows (Salix spp.). In recent years the density of the horsetail (Equisetum spp.) has declined and fewer northern pike have been seen in the bay (Hiltunen, pers. comm. 1979).

Wasig Bay (46°27'45", 84°15'15"). Ripe adults were collected in Wasig Bay. Ninemile Point (46°23'35", 84°13'40"). Spawning occurs among vegetation across the channel from Ninemile Point and is usually completed by about May 1. Whipple Point (46°25'15", 84°11'20"). Spawning probably occurs from Whipple Point to the south, for an unstated distance. Shingle Bay (46°21'40", 84°10'40"). Ripe adults have been collected here. Maskinonge Bay (46°20'15", 84°05'00"). Spawning probably occurs here. Sand (Jones) Bay (46°18'30", 84°12'00"). Spawning occurs here (Gleason and Behmer, pers. comm. 1979).

West Neebish Channel (46°16'30", 84°12'00"). Spawning may occur in the channel (Odin 1979).

Potagannissing River (46°02'20", 83°40'15"). Spawning adults have been observed ascending the river (Hiltunen, pers. comm. 1980).

CARP

Carp were present in the St. Marys River as early as 1920 and presumably originated from populations in Lake Huron (McCrimmon 1968).

Frog Bay (46°31'50", 84°11'45"). A population resides in the bay and presumably spawns there (Hiltunen, pers. comm. 1980).

Shingle Hay (46°21'40", 84°10'40"). Spawning carp have been observed in the bay (Gleason and Behmer, pers. comm. 1979).

Munuscong Bay (46°12'30", 84°15'20"). Carp arrived in Munuscong Bay in June in large numbers, presumably to spawn (Westerman and Van Oosten 1939).

EMERALD SHINER

Young-of-the-year are generally common near the shoreline of dredge spoil islands in the St. Marys River (FWS 1977). Spawning occurs in Mark's (46°29'25", 84°27'30") and Leigh (46°30'35", 84°25'30") bays (Dames and Moore 1978).

SPOTTAIL SHINER

Young-of-the-year (YOY) were collected in shallow water over the large sand bars around the spoil islands in Mosquito Bay (46°26'40", 84°28'40"); they are common in seine catches in this type of habitat (FWS 1977). Spottail shiners spawn in Mark's (46°29'25", 84°27'30") and Leigh (46°30′35″, 84°25′30″) bays (Dames and Moore 1978). Large numbers of YOY were caught in Maud Bay (46°01′30″, 83°58′20″) bottom trawls (Behmer and Gleason 1975).

MIMIC SHINER

Mimic shiners may spawn in Mark's (46°29'25", 84°27'30") and Leigh (46°30′35″, 84°25′30″) bays (Dames and Moore 1978).

NORTHERN REDBELLY DACE

Northern redbelly dace spawn in Mark's (46°29'25", 84°27'30") and Leigh (46°30'35", 84°25'30") bays (Dames and Moore 1978).

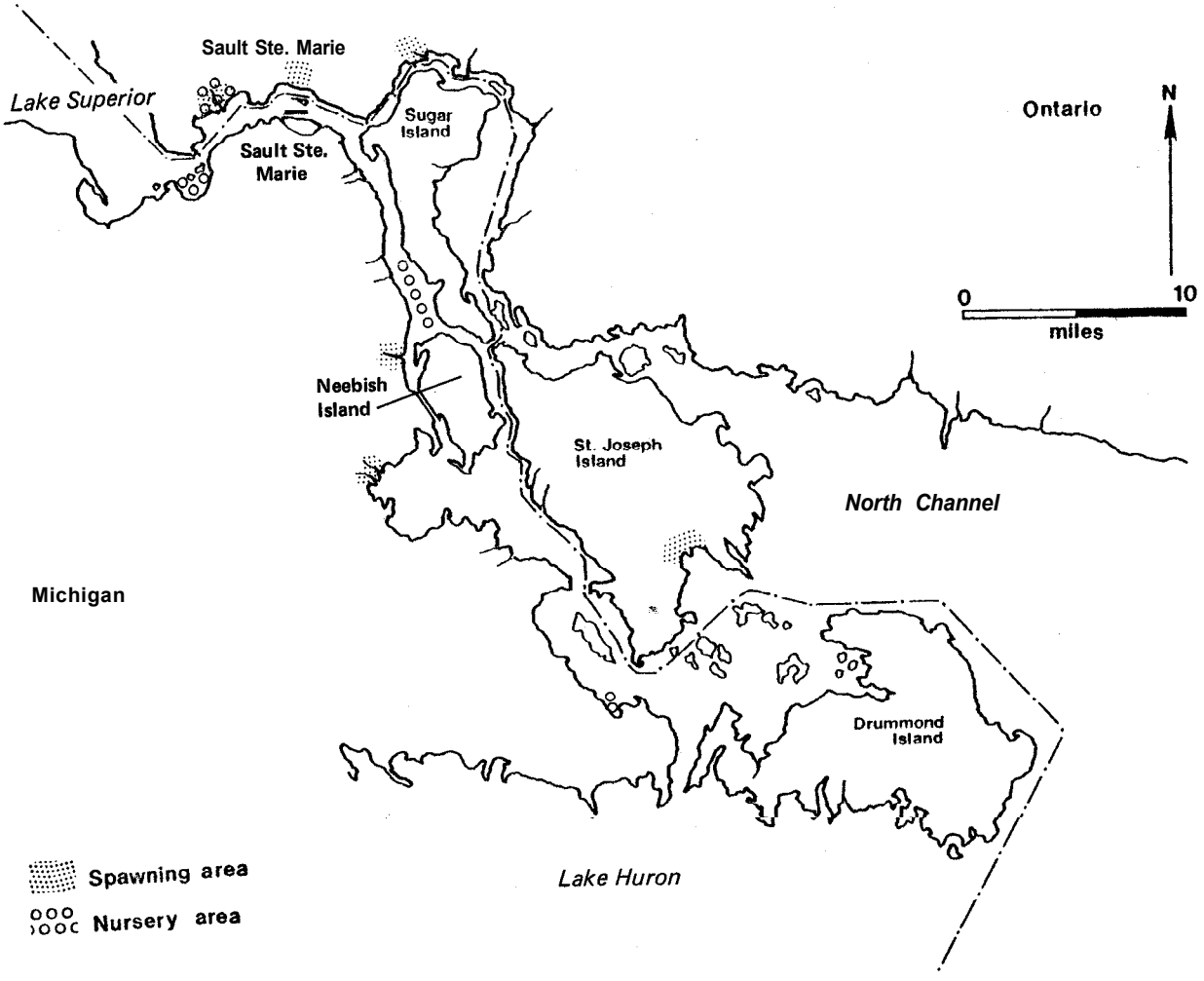
CYPRINID spp.

In early summer, unidentified minnow postlarvae have been seen migrating in small schools upstream along the littoral margin of Little Lake George (46°32'40", 84°11′15″). These schools often frequent shallow embayments or weed beds in waters deeper than 6 ft (Hiltunen, pers. comm. 1979).

LONGNOSE SUCKER

A small population of longnose suckers may spawn in Mark's (46°29'25", 84°27'30") and Leigh (46°30'35", 84°25'30") bays; however, the area generally lacks the gravel and rock substrate most suitable for spawning by this species. Spawning also may occur in Big (46°30'00", 84°26'30") and Little (46°30'20", 84°26′20″) Carp rivers (Dames and Moore 1978).

WHITE SUCKER



White suckers are common in the St. Marys River and spawn in the river and its tributaries (FWS *1977;* Liston, pers. comm. 1979). Larvae hatched in tributaries drift downstream to the river (Liston, pers. comm. 1979) 1 Young-of-the-year (YOY) white suckers are common in seine catches near shorelines of dredge spoil islands (FWS 1977), and along the littoral margins and embayments where they have been observed schooling with YOY perch and minnows (Hiltunen, pers. comm. 1978).

Mosquito Bay (46°26'40", 84°28'40"). Young-of-the-year have been caught in shallow water around spoil islands in the bay (FWS *1977).*

Big (46°30'00", 84°26'30") and Little (46°30'20", 84°26'20") Carp Rivers. These rivers are significant spawning and nursery areas; the heavier run occurs in the Big Carp River (Dames and Moore *1978;* Price *1955).*

East and West Davignon Creek (46°31'20", 84°22'50"). Spawning runs occur from April into June (Price 1955).

Root River (46°32'30", 84°12'25"). Many white suckers have been collected here in April-July (Dahl and McDonald 1980).

Lake Nicolet (46°21'30", 84°12'30"). Young-of-the-year white suckers are the most common species seined at the spoil islands in Lake Nicolet (FWS 1977).

Charlotte River (46°19'05", 84°13′15"). Spawning runs begin in late April and continue into May (Gleason and Behmer, pers. comm. 1979).

Munuscong River (46°12'30", 84°15′20″). Spawning runs occur here and probably also in the Little Munuscong River (46°12'55", 84°15'20") (Gleason and Behmer, pers. comm. 1979).

St. Joseph Island (46°13'00", 84°00′00″). Large numbers of spawning white suckers were observed in mid-late May 1974 in Brown's Creek (46°09'35", 83°52′15″) and Watson Creek (46°09'05", 83°53'30") on St. Joseph Island (Davis et al. 1975a).

Maud Bay (46°01'30", 83°58′20″). In 1974, YOY were captured in bottom trawls in Maud Bay on October 3-4 (Behmer and Gleason 1975).

SILVER REDHORSE

Spawning runs of silver redhorse begin in April and continue into May in the Charlotte (46°19'05", 84°13′15″) and Munuscong (46°12'30", 84°15'20") rivers. Spawning may also occur in the Little Munuscong River (46°12′55″, 84°15′20″) (Gleason and Behmer, pers. comm. 1979).

SHORTHEAD REDHORSE

The shorthead redhorse is not common in the St. Marys River, but runs have been reported in the Charlotte River (46°19'05", 84°13′15″) during the spawning season (Gleason and Behmer, pers. comm. 1979).

CATOSTOHID spp.

In early summer, unidentified catostomid postlarvae can be seen migrating in small schools upstream along the littoral margin of Little Lake George (46°32'40", 84°11′15″). These schools often frequent shallow embayments or weed beds in waters deeper than 6 ft (Hiltunen, pers. comm. 1979).

BROWN BULLHEAD

The St. Marys River is a spawning and nursery ground for this species (FWS 1977). Ripe fish were collected on spawning grounds in Wasig Bay (46°27′45″, 84°15′15″). Spawning occurs in Shingle Bay (46°21′40″, 84°10′40″) and possibly also in Jones (Sand) Bay (46°18′30″, 84°12′00") (Gleason and Behmer, pers. comm. 1979). Young-of-the-year were collected in Munuscong Bay (46°12'00", 84°12'30") in mid-July 1955 and in Potagannissing Bay (46°04'20", 83°45'00") in mid-July 1969 (Behmer and Gleason 1975).

TROUT-PERCH

Trout-perch may spawn in Mark's (46°29'25", 84°27'30") and Leigh (46°30′35″, 84°25′30″) bays (Dames and Moore 1978); in 1974, young-of-the-year were collected in Maud Bay (46°01′30″, 83°58'20") (Behmer and Gleason 1975).

BURBOT

Burbot may spawn in Mark's (46°29'25", 84°27'30") and Leigh (46°30'35", 84°25'30") bays, but these areas generally lack the gravel and rock on which burbot usually spawn (Dames and Moore 1978). Eggs collected at the southwest corner of Sugar Island (46°28'00", 84°12'30) have been tentatively identified as burbot eggs (Gleason et al., undated).

WHITE BASS

In 1973, young-of-the-year white bass were collected in Munuscong (46°12′00″, 84°12′30″), Raber (45°06'00", 84°03'30"), and Maud (46°01'30", 83°58'20") bays in September and October (Behmer and Gleason 1975).

ROCK BASS

Rock bass may spawn in the nearshore areas of Mark's (46°29'25", 84°27'30") and Leigh (46°30'35", 84°25'30") bays (Dames and Moore 1978).

PUMPKINSEED

Several young-of-the-year pumpkinseed were seined in Munuscong Bay (46°12′OO″, 84°12′30″) on July 4, 1955 (Behmer and Gleason 1975).

SMALLMOUTH BASS

Bay Mills Point (Elisa's Point) (46°26'00", 84°35'00"). Adult smallmouth bass have been collected here during the spawning season; the substrate in the area is gravel (Gleason and Behmer, pers. comm. 1979).

Cedar Point (46°26'45", 84°30'00"). A resident population of smallmouth bass is assumed to spawn in the area; the substrate here is rubble and large rock (Gleason and Behmer, pers. comm. 1979).

Mark's Bay (46°29'25", 84°27'30")--Leigh Bay (46°30'35", 84°25'30"). Spawning may occur here, but the area generally lacks gravel substrate suitable for spawning (Dames and Moore 1978).

Duck Lake (46°21'40", 84°08′40″). The shallow water at the outlet of Duck Lake was a known spawning area for smallmouth bass (MSBFC 1909a).

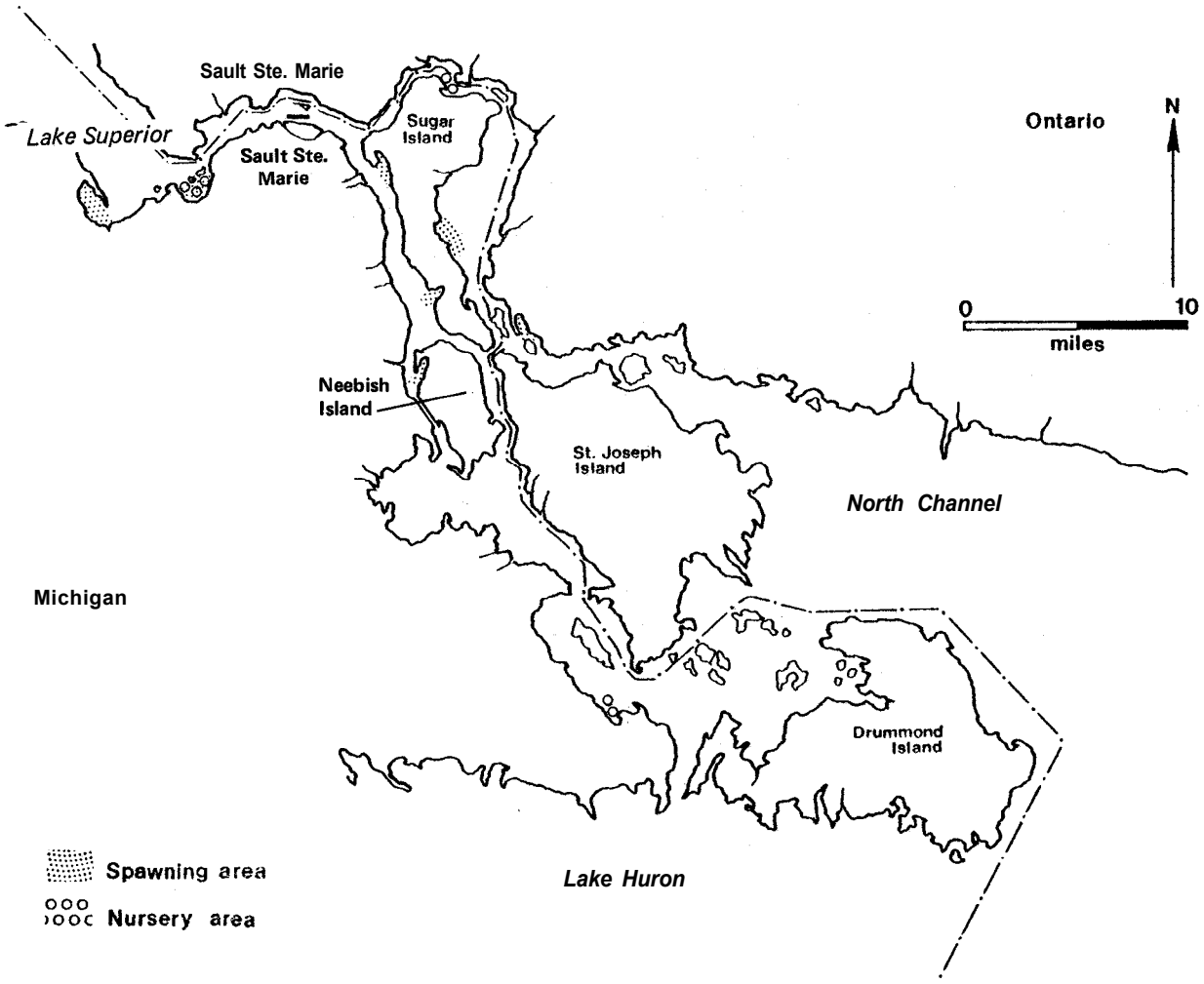
Moon Island (46°12′55″, 84°10'00"). Moon Island, and adjacent spoil areas, may be spawning areas (Gleason and Behmer, pers. comm. 1979).

JOHNNY DARTER

Mark's Bay (46°29'25", 84°27'30")--Leigh Bay (46°30'35", 84°25'30"). Johnny darters spawn in these bays (Dames and Moore 1978).

Little Lake George (46°32'40", 84°11′15″). Males have been found guarding eggs deposited underneath sunken, waterlogged flotsam along the shore of Little Lake George (Hiltunen, pers. comm. 1980).

YELLOW PERCH



Yellow perch are common in the St. Marys River. Spawning occurs in the spring, probably near littoral areas (FWS 1977; Liston, pers. comm. 1979) among rooted vegetation and debris (FWS 1979d; Odin 1979).

Waiska Bay (46°26'00", 84°35'40"). Ripe fish were collected in this area during the spawning season (Gleason and Behmer, pers. comm. 1979).

Mosquito Bay (46°26'40", 84°28'40"). Ripe adults were collected here, usually during the first week in June, but as late as mid-June. Ripe fish are present in this area later than other areas. Young-of-the-year (YOY) have been caught in shallow water around the spoil islands in the bay (FWS 1977; Gleason and Behmer, pers. comm. 1979).

Mark's Bay (46°29'25", 84°27'30")--Leigh Bay (46°30'35", 84°25'30"). Yellow perch may spawn here in the nearshore areas (Dames and Moore 1978).

Frog Bay (46°31'50", 84°11'45"). In early summer, YOY and older yellow perch congregate in Frog Bay, frequently schooling with shiners and YOY white suckers (Hiltunen, pers. comm. 1979).

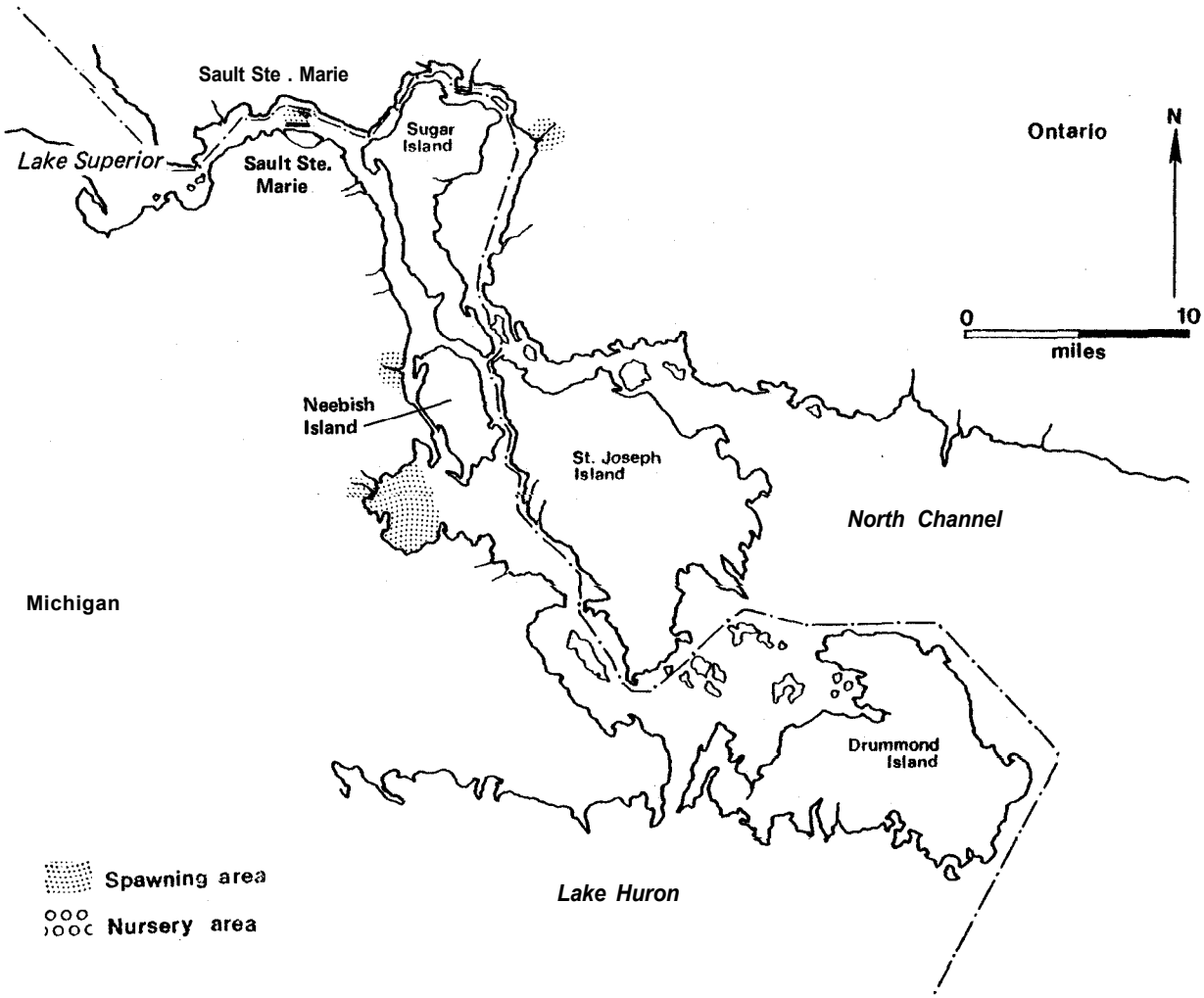
Wasig Bay (Baie de Wasai) (46°27'45", 84°15′15″). Ripe adults were collected in the bay during the spawning season. Whipple Point (46°25′15″, 84°11'20″). The entire shoreline south from the point is probably a spawning area for yellow perch. Duck Lake (46°21'40", 84°08′40″). Fishing occurs for yellow perch here during the spawning season. Shingle Bay (46°21'40", 84°10'40") and Maskinonge Bay (46°20'15", 84°05′00″). Ripe fish were collected in these bays during the spawning season. Jones Bay (Sand Bay) (46°18′30″, 84°12′00″). Yellow perch spawn here (Gleason and Behmer, pers. comm. 1979).

Maud Bay (46°01′30″, 83°58′20″). In 1974, over 500 YOY yellow perch were collected in Maud Bay on October 3 and 4 (Behmer and Gleason 1975).

LOGPERCH

Logperch may spawn in Mark's (46°29'25", 84°27'30") and Leigh (46°30′35″, 84°25′30″) bays (Dames and Moore 1978).

WALLEYE



In the *1800s,* fishing for walleyes was conducted in the river during May (Smith and Snell 1891), presumably for spawning-run fish. Spawning occurred between Sault Ste. Marie (46°30'00", 84°21'00") and De Tour (45°59'30", 83°53'55"), and a fishery took large numbers of spawners there for many years (MSBFC 1911). Walleyes spawn in the lower river (Int. Lake Superior Board Control *1974)* over rock and rubble in shallow areas subjected to currents (Int. Great Lakes Level Board 1973). The St. Marys River is also a nursery ground for walleye (FWS 1977).

Whitefish Channel (46°30'40", 84°21'00"). Walleyes spawn in the channel on Whitefish Island (46°30'35", 84°21'00") (Int. Lake Superior Board Control 1974).

St. Marys Rapids (46°30'30", 84°21'15"). Spawning has occurred in the rapids area (FWS 1979d).

Echo River (46°30'20", 84°03'40"). Spawn was collected in Echo Lake (46°30′20″, 84°03′40″) (Ont. Game Fish 1945, 1948), when many fish moved upstream under the ice (Ont. Game Fish 1945). According to Canadian sources, the Echo River still supports a spawning run (Gleason and Behmer, pers. comm. 1979).

Charlotte River (46°19'05", 84°13′15″). Spawning runs enter the Charlotte River, possibly under the ice, but no young have been found (Gleason and Behmer, pers. comm. 1979; Liston, pers. comm. 1979).

Munuscong Bay (46°12′OO″, 84°12′30″). In the early *1900's,* Munuscong Bay was a principal walleye spawning area (FWS 1979d; Schneider and Leach 1977, 1979; Westerman 1927). During a recent Michigan DNR study, ripe walleyes were collected in the bay in April off the mouth of the Munuscong River (46°12'30", 84°15'20"). The substrate in this area is mainly silt, although there are rubble patches in the area (Gleason and Behmer, pers. comm. 1979). Spawning is also believed to occur in the bay at Birch Point (46°10′50″, 84°09'00"), Roach Point (46°11′10″, 84°10′40″), Barbeau Point (46°01'35″, 84°14′45″), Munuscong Island (46°12'45", 84°14′30″), *and* between Barbeau Point and Maple Point (46°10'40", 84°11′40″) (FWS 1979d; Odin 1979). Walleyes congregate in the bay in late March and early April reaching peak densities during the first 2 weeks of April (Gleason and Behmer 1975). Riffle areas in many of the tributaries to the bay are potential spawning grounds (Gleason and Behmer, pers. comm. 1978). The Munuscong River is believed to be a spawning area (FWS 1979d).

Potagannissing Bay (46°04'20", 83°45'00"). Walleyes congregated under the ice in Potagannissing Bay in March prior to spawning (Westerman and Van Oosten 1939).

SLIMY SCULPIN

Big (46°30'00", 84°26'30") and Little (46°30'20", 84°26'20") Carp Rivers. Slimy sculpins may spawn in these streams (Dames and Moore 1978).

St. Marys Rapids (46°30'30", 84°21'15"). Spawners were collected in mid-river in the rapids area, where the substrate ranges from rubble to large boulders (Gleason and Behmer, pers. comm. 1979).

Little Lake George (46°32'40", 84°11'15"). Slimy sculpin eggs have been observed underneath stones in Little Lake George (Hiltunen, pers. comm. 1979).

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15. Supplementay Notes

This document is one of a set of fourteen volumes.

16. Abstract (Limit: 200 words)

This atlas is a compilation of current spawning and nursery information concerning the fishes of the Great Lakes. The complete set consists of fourteen volumes. The information may be used to support permit and project reviews, impact statement reviews, planning of baseline research, and coordination with other agencies, and identification of data gaps. The repor locates spawning and nursery areas in the Great Lakes and describes spawning and nursery characteristics, timing, and habitats of major fish species of the Great Lakes area.
The first volume is a summary by geographic area, volumes II through XII contain the specific areas referenced in volume I. Volume XIII contains the species spawning and nursery charac teristics for the major species, and Volume XIV cites the references used in compiling this work.
The titles of the volumes addressing the spawning and nursery areas for each fish species site specifically are: II, Lake Superior; III, St. Mary's River; IV, Lake Michigan; V, Lake Huron; VI, St. Clair River; VII, St. Clair Lake; VIII, Detroit River; IX, Lake Erie X, Niagara River; XI, Lake Ontario; XII, St. Lawrence River. The title of Volume XIV is, Species Reproduction Characteristics.

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