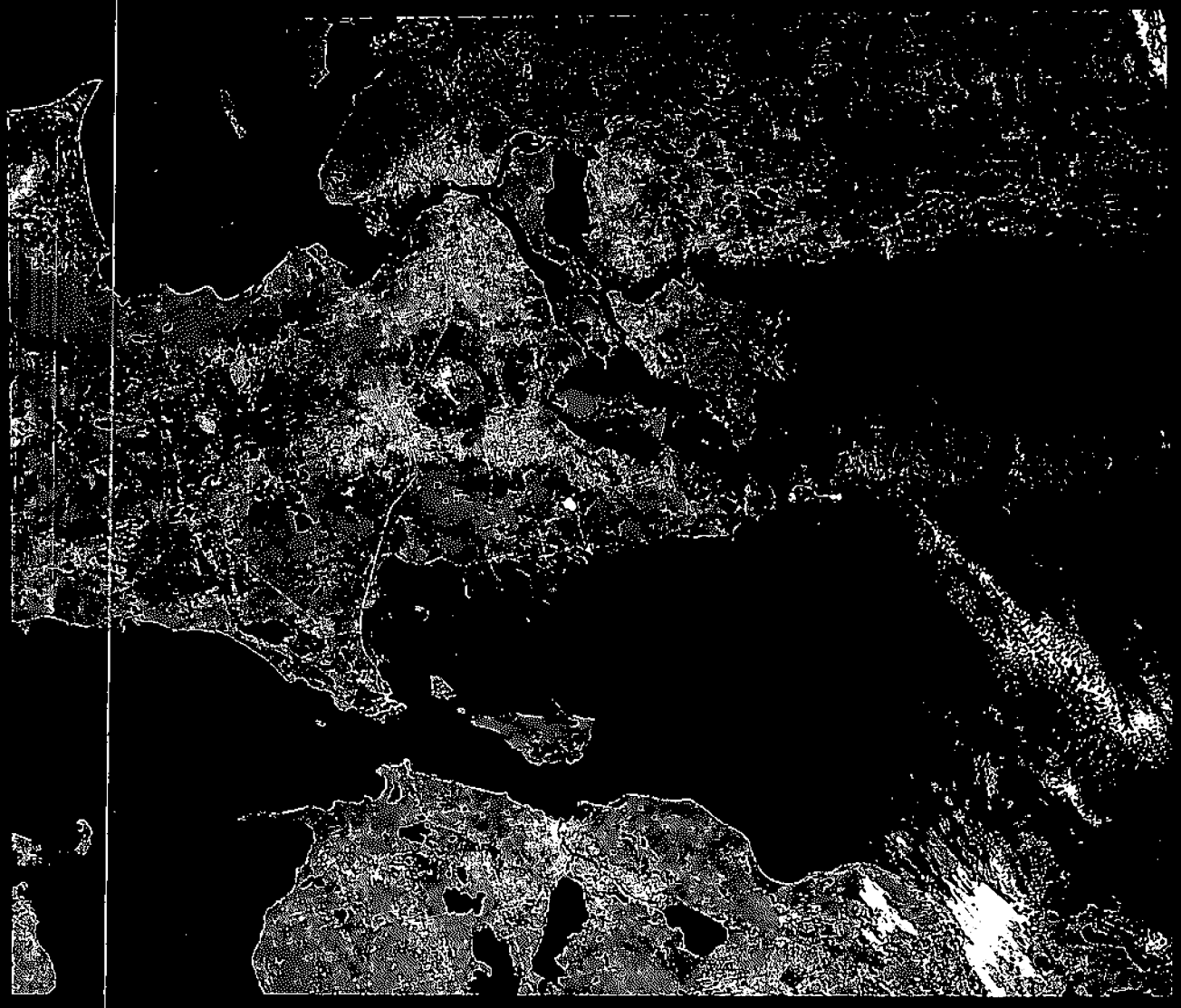

A PROFILE OF ST. MARYS RIVER

Thomas A. Edsall and John E. Gannon
National Fisheries Research Center-Great Lakes
U.S. Fish and Wildlife Service, Ann Arbor, Michigan

Cover: The St. Marys River and Surrounding Areas

The eastern end of Lake Superior, Whitefish Point and Whitefish Bay are visible at the upper left. The St. Marys River originates in Whitefish Bay and flows in a southeasterly direction through the St. Marys Rapids and past the cities of Sault Ste. Marie, Michigan and Sault Ste. Marie, Ontario.

At Sugar Island the river divides forming Lake Nicolet on the west and Little Lake George and Lake George on the east.

The outflow of Lake Nicolet divides at the head of Neebish Island, a portion of the water following the West Neebish Channel and the rest following the East Neebish Channel into Munuscong Lake and then through Detour Passage between Pt. Detour and Drummond Island into the north end of Lake Huron.

The outflow of Lake George divides at the head of St. Joseph Island and a portion of it enters the East Neebish Channel and the rest goes into the St. Joseph Channel and then into the North Channel of Lake Huron, north of Drummond Island.

The input of highly turbid water from the Munuscong and Little Munuscong Rivers is readily visible at the upper end of Munuscong Lake and its influence extends downstream into Potagannissing Bay between St. Joseph and Drummond Islands and into northern Lake Huron.

Image data processing by the Environmental Research Institute of Michigan (ERIM), Ann Arbor, Michigan.

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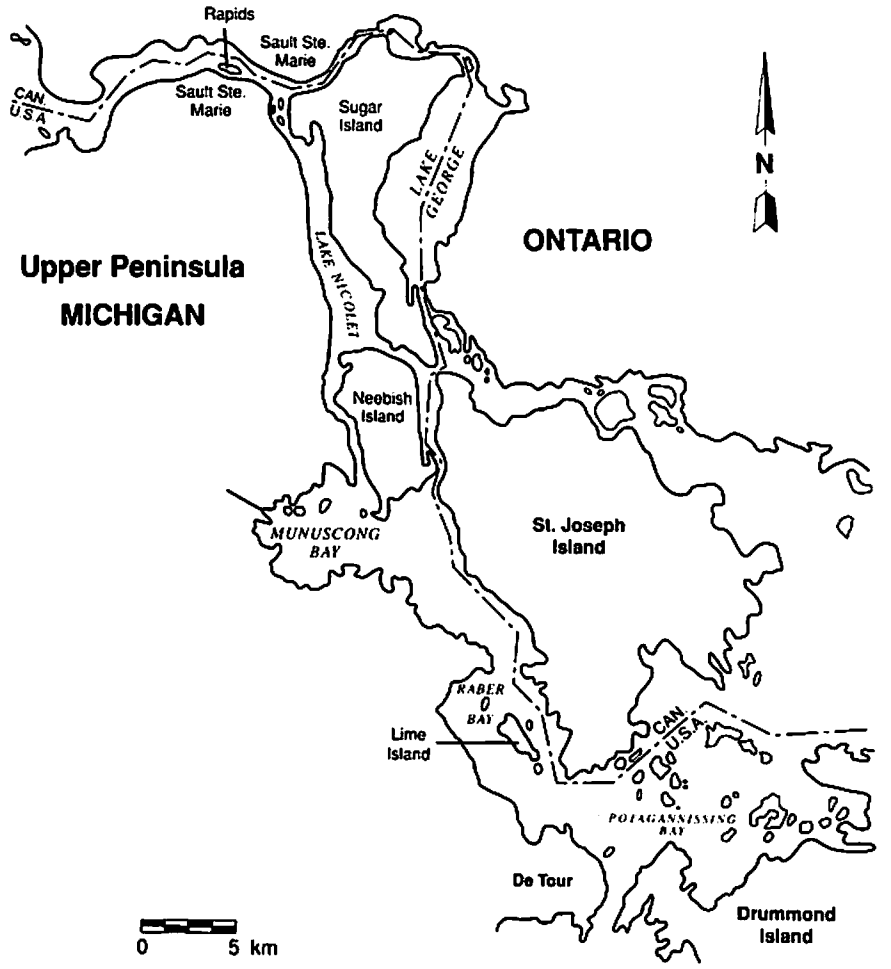

A PROFILE OF ST. MARYS RIVER

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National Fisheries Research Center-Great Lakes
U.S. Fish and Wildlife Service, Ann Arbor, Michigan

Courtesy of Gordon Daun Collection, Bayliss Public Library

"A river is more than an amenity. It is a treasure."
— Oliver Wendell Holmes

View of the St. Marys River from the Canadian side in the early 1800s

A PROFILE OF ST. MARYS RIVER

The St. Marys River is a magnificent natural resource shared by the United States and Canada. The waters, wetlands, and riparian areas are habitat for important fish and wildlife resources that provide recreational opportunities for residents and for visitors who may travel considerable distances to enjoy them. Boating is popular and the recreational fishery is valued at more than 2.5 million dollars. (U.S.) annually. The cities of Sault Ste. Marie, Michigan, and Sault Ste. Marie, Ontario—often colloquially referred to as the "Soo"—are the major population and industrial centers on the river and face one another across the St. Marys Rapids. The river is the municipal and industrial water supply for the Soo and receives its municipal and industrial wastes. The river is the navigation channel between Lake Superior and Lake Huron for commercial shipping, and a large flow control structure, navigation locks, and hydropower facilities dominate the St. Marys Rapids.

Although much of the river, its wetlands, and riparian ecosystems are productive and virtually unimpaired by human activities, other portions are heavily affected. For example, the water, riverbed, and biota for some distance downstream from the Soo are contaminated with wastes released historically and presently into the Ontario side of the river. In the St. Marys Rapids, which once supported a highly productive fishery for aboriginal inhabitants and early settlers, more than half of the riverbed has been dredged or filled for navigation and hydropower development. Much of the remaining fishery habitat in the rapids is threatened or degraded by water flow management policies directed at serving hydropower and navigation interests. Navigation-related dredging and the extension of the navigation season into the normally quiescent winter period when ice covers the river has raised many unanswered questions about adverse impacts on the ecosystem and its biota.

Geological History

The St. Marys River is geologically the newest of the five large rivers that form the connecting channels of the Great Lakes and carry the outflow of the lakes to the Atlantic Ocean. The St. Marys River came into existence about 10,000 years ago as a strait between Lakes Superior and Huron, when the last of the glaciers covering the Great Lakes basin retreated to the northeast. The St. Marys River occupies a valley bordered in Ontario by volcanic and metamorphic rock, covered in places with a thin layer of glacial till and lake clays. In Michigan, the valley floor is mainly lake clays, glacial moraines, remnant lakeshore features, and marshlands. Dolomite, a sedimentary, carbonate rock, underlies much of the Michigan shoreline in the lower river. The St. Marys Rapids are perhaps the newest major geological feature of the river. They were formed about 3,000 years ago as the sandstone bedrock beneath the river rebounded slowly upward after the glaciers melted and their weight on the land surface decreased.

Settlement and Development

Archeological records indicate a sequence of human occupation in the St. Marys River valley beginning about 11,000 years ago. The earliest inhabitants of the valley were probably members of hunting cultures that moved about in search of areas where game was abundant. As aboriginal fishing implements improved and spears and gorges were replaced with nets, fish became a more important food resource for these early people. This change resulted in the establishment of seasonal or permanent villages at sites where there were significant concentrations of catchable fish. Whitefish Island in the St. Marys Rapids was one such site that was occupied continuously, beginning about 2,000 years ago, by Ojibwas and other Woodland Indians. In the mid-1600s, French missionaries traveling through the area found several thousand "Saulteurs" (People of the Rapids) occupying the island and engaged in fishing in the rapids. Some of these early fishers were permanent residents of the island and others were seasonal visitors from tribes as far away as Wisconsin, James Bay, and Lake Nipissing.

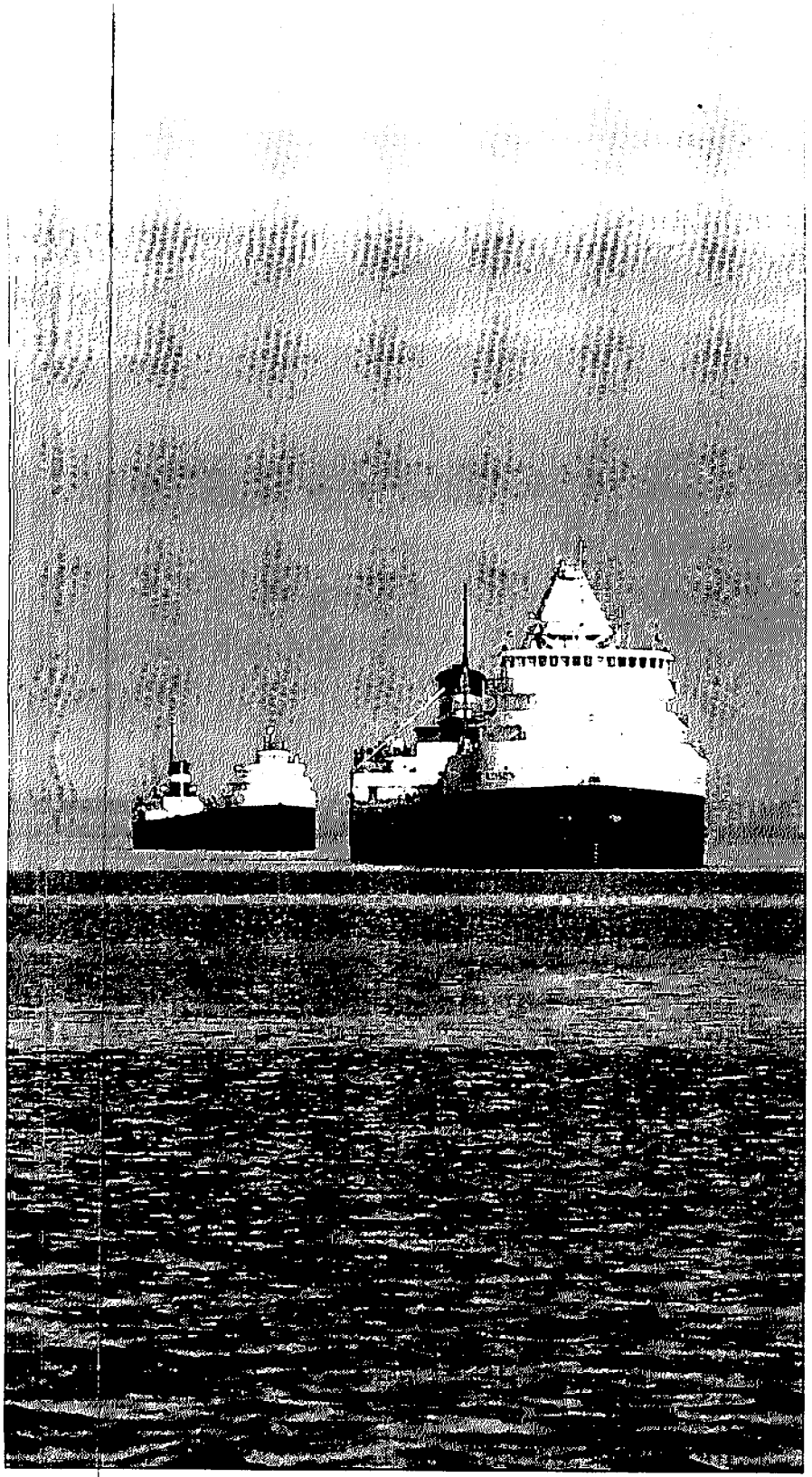
In the mid-to-late 1600s, the river and the rapids area in particular became the western focus of French trade in the Great Lakes region. However, French influence was not sustained and in the early 1700s the British began to assume control of the upper Great Lakes region and its valuable fur trade. The establishment of the river as the boundary between the United States and Canada in 1782 and the garrisoning of American troops on the south side of the river in 1822 signaled the onset of a permanent American influence in the area.

In the 1800s, the St. Marys River became the major trade route for the developing Lake Superior region to the north and west. The St. Marys Rapids posed a major impediment to shipping to and from Lake Superior until a canal and 12-foot-deep lock system was constructed on the American shore in 1855 that allowed fully loaded vessels to by-pass the rapids. This was the first ship canal in the United States and its locks were the largest in the world at that time.

The number of European immigrants settling in the area increased sharply in the latter half of the century and by the late 1800s they were the majority inhabitants of the river valley. Lumbering became a major industry in the late 1800s and large numbers of white pine logs were harvested in the eastern upper peninsula of Michigan and floated down the St. Marys River to sawmills along the river. Lumber from these sawmills was then exported by ship to eastern and midwestern ports on the Great Lakes. The lumber industry spurred development of a narrowly focused agriculture in the river valley to produce horses for hauling logs, hay and grain to feed the horses, and beef and pork to feed the loggers. Wet soils and a short growing season limited the development of a more diverse agriculture in the river valley.

The development of hydropower facilities at the St. Marys Rapids began in Ontario in the late 1800s and in Michigan in the early 1900s. The construction of the 16-gate Compensating Works at the head of the rapids provided control of the level of Lake Superior, enhanced hydropower development, and facilitated navigation, but also significantly changed the free-flowing nature of the river. Steel and pulp-paper production developed on the Ontario side by 1910 and became the major industries in the river valley.

Commercial shipping also grew in importance after the turn of the century. Large quantities of iron ore from Minnesota and Michigan and grain from western Canada moved down the St. Marys River to ports in the lower four lakes and ocean seaways, while coal, petroleum products, and finished goods moved upbound through the river. In 1953 a record 128 million tons of commodities passed through the locks. The larger Poe Lock, which was opened to navigation in 1968, and the 27-foot deep navigation channel (25.5 feet assured clear draft) allow a variety of large vessels including ocean-going ships and the 1000-foot-long lake freighters to move between Lake Superior and the rest of the Great Lakes system.



T. Buchkoe

Great Lakes freighters in the St. Marys River

The Early Fishery

The earliest commercial fishery in the St. Marys River was established by the fur trading companies in the mid-1800s. This fishery targeted lake whitefish, lake herring, and lake trout. Fishing was conducted with scoop nets in the rapids and later on with pound nets on the Michigan side. The catch was dried or salted and packed in barrels for export. By the late 1800s the catch in the rapids had declined markedly, probably due to overfishing, and the fishery had begun to shift to other parts of the river.

Lake whitefish was the principal catch in U.S. waters of the lower river in the late 1800s, but walleye also supported an important commercial fishery near the turn of the century. Michigan waters of the river from Waiska Bay at the head of the river in Whitefish Bay to Lime Island in Raber Bay in the lower river were closed to commercial fishing in 1901 to protect the sport fishery. Closure of the commercial fishery in Ontario waters of the river followed the closures in Michigan. The tribal fishery continued until the early 1900s when Whitefish Island, which was the center of that activity in the rapids, was converted to other use by the Canadian Pacific Railway.

Materna Studio, Sault Ste. Marie, Michigan

Early dipnet fishery in the St. Marys Rapids, about 1900

The early sport fishery in the river focused on lake whitefish and brook trout in the rapids and on walleye and other warmwater fish in the lower river.

Early attempts to improve the sport fishery included the stocking of lake whitefish, brook trout, brown trout, lake trout, Atlantic salmon, and rainbow trout in the late 1800s. Rainbow trout became plentiful in the river after 1900 and contributed significantly to the fishery.

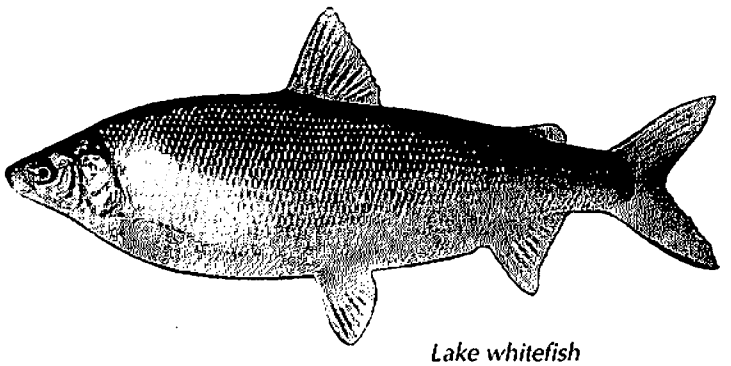
There are few statistics on the early sport fishery, but in the 1970s anglers fished for about 10,000 to 20,000 hours annually in Ontario waters of the rapids.

Large lake whitefish were common in the commercial catch in the St. Marys River in the late 1800s

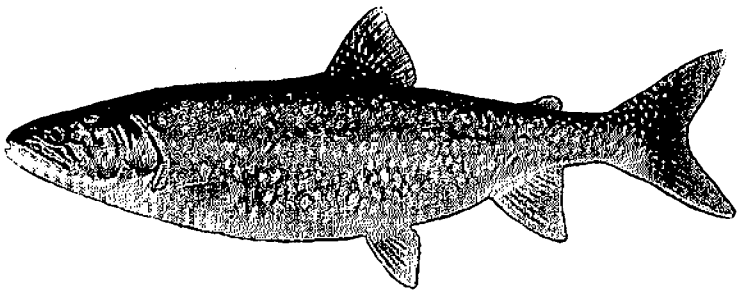
T. Edsall

"At present the best rainbow trout fishing in the world is in the rapids of the Canadian Soo. . . . It is a wild and nerve-frazzling sport . . . second only in strenuousness to fishing for tuna off Catalina Island. . . . Rainbow as large as 14 pounds have been taken. . . ."

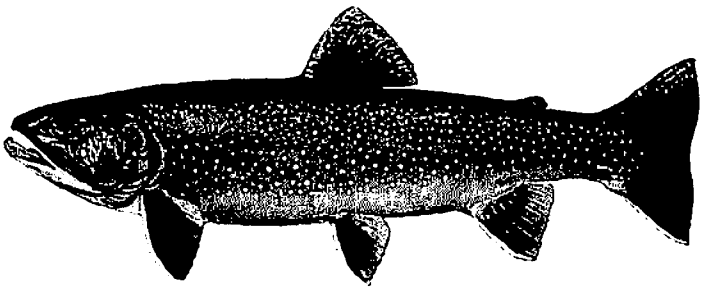
— Ernest Hemingway



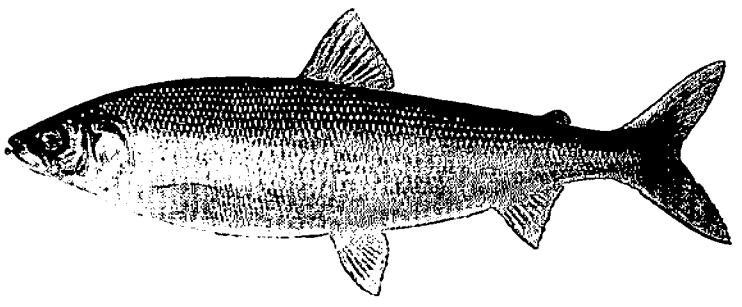
Lake whitefish



Lake trout

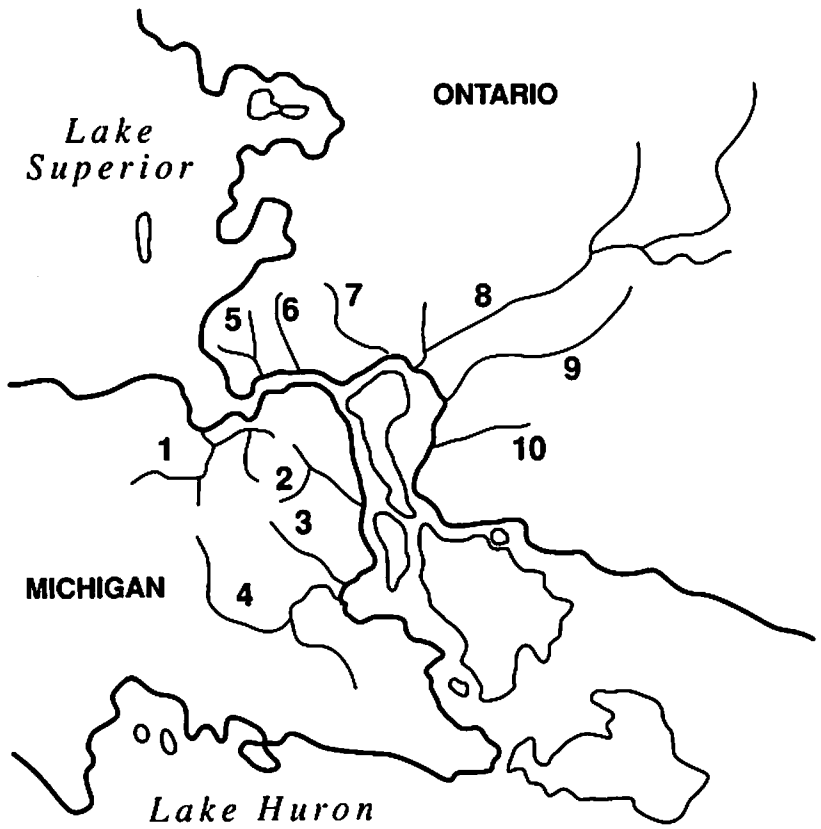


Brook trout



Lake herring

The River and its Watershed



The major tributaries of the St. Marys River.
1. Waiska River, 2. Charlotte River, 3. Little Munuscong River,
4. Munuscong River, 5. Big Carp River, 6. Bennet Creek,
7. Root River, 8. Garden River, 9. Echo River, 10. Bar River

The St. Marys River drains Lake Superior and is one of the large rivers of the world. The discharge of the St. Marys River into Lake Huron averages 73,000 cubic feet per second annually and is regulated by gated, flow-control structures at the head of the rapids.

Lake Superior contributes about 98% of the total flow of the river and the rest is added by small tributaries that enter the river directly along its course. The river is divided hydrologically into three reaches. These are the 14-mile-long upper river between Whitefish Bay and the head of the St. Marys Rapids; the 0.4-mile-long rapids separating the cities of Sault Ste. Marie, Michigan and Ontario; and the nearly 56-mile-long lower river between the foot of the rapids and Point Detour on Lake Huron.

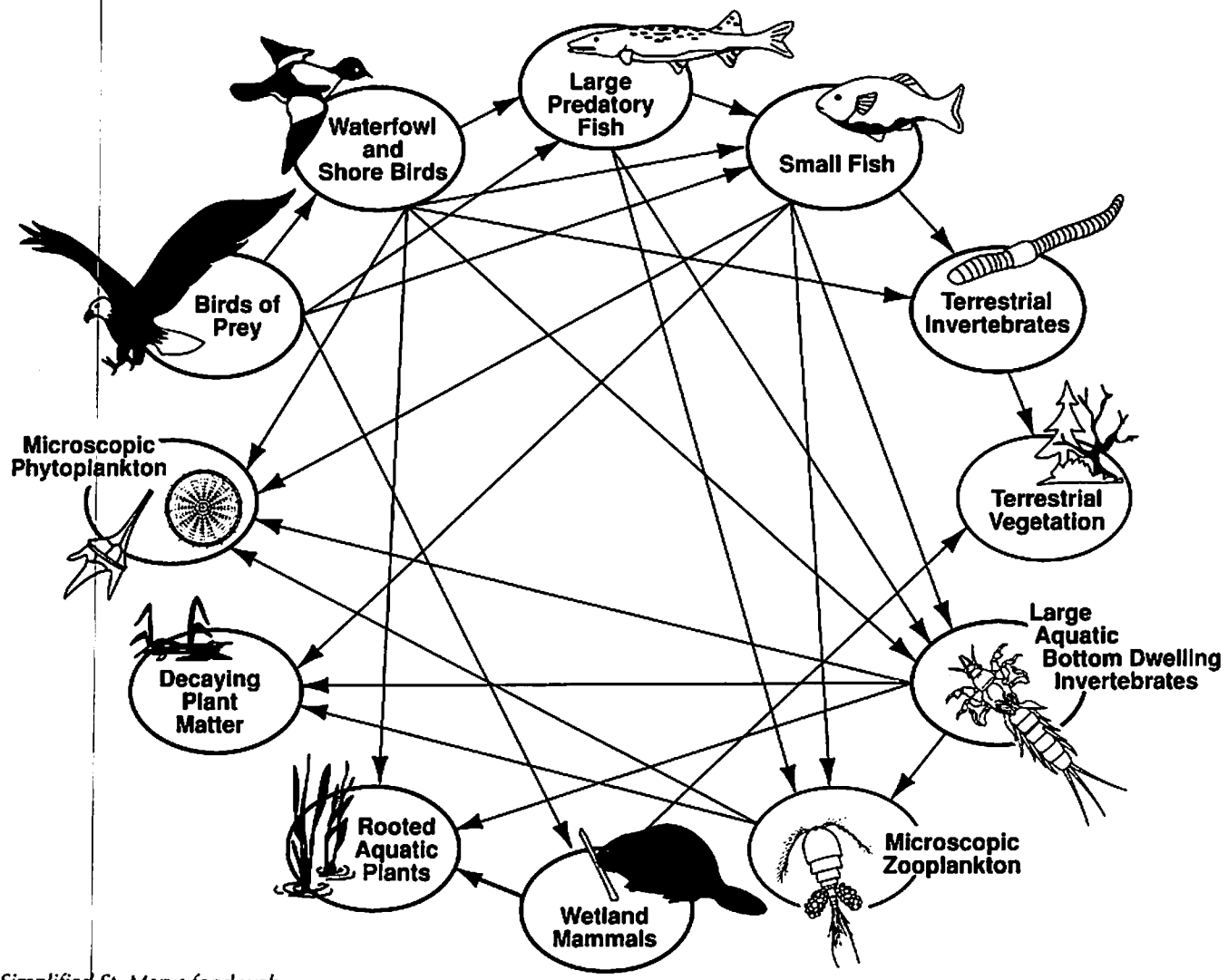
The river falls about 22 feet over its 70-mile course and 20 feet of that fall occur in the rapids. The sharp drop in the rapids together with relatively swift flows in the main channels of the upper and lower river cause most of the water entering the river to be flushed into Lake Huron in only a few days. Flushing may be incomplete or considerably less rapid in wetlands and other non-channel areas that have restricted water circulation.

Flooding is not usually a problem along the river because the flow is regulated, the river flushes rapidly, and most low-lying shorelines are undeveloped. Seasonal changes in water level in the river average about one foot and largely reflect changes in the levels of Lakes Superior and Huron and the operation of the flow control structures at the head of the rapids. The greatest recorded short-term change in water level was about five feet in three hours. This fluctuation resulted from a change in the amount of water being released through the rapids acting together with a weather-driven change in the level of Lake Huron.

Forestry and agriculture are still the predominant uses of the river valley. About 346,000 acres are in agricultural production and beef, milk, and hay are the major products. Industrial and urban development is greater on the Ontario side of the river. Hydro-electric power is a major product of the river and about 93% of the total flow of the river at the rapids is presently diverted for this use. The cities of Sault Ste. Marie, Michigan and Ontario are the only major population centers on the river. About 81,000 of the 96,000 people in this bi-national metropolitan area live in Ontario.

The Food Web and Natural Production

A diverse and complex food web supports natural production in the St. Marys River. A simplified version of that food web illustrating the major elements and linkages is given below. Green plants are the base of the food web. Aquatic plants including phytoplankton (microscopic drifting algae), larger rooted plants such as bulrush and quillwort, and terrestrial plants along the shoreline capture the energy of the sun and produce leaves, stems, and roots. This plant matter is then eaten, fresh or as it decays, by zooplankton (small, weakly-swimming invertebrates); larger, bottom-dwelling invertebrates such as caddisfly larvae, mayfly nymphs, mussels, and crayfish; and by fish, ducks, and wetland mammals. Fish also prey upon smaller aquatic animals, including other fish; birds of prey feed upon fish, smaller birds, and wetland mammals.



Simplified St. Marys food web

Fern Pondweed. A dark green plant with flat leaves pointing away from the stem on two sides, thereby giving it the appearance of a fern. Plants are known to provide habitat for small aquatic animals used as food by predator fishes, especially northern pike.

Quillwort. A small plant up to one foot long with tufts of quill-like leaves originating from a swollen base. Plants are usually restricted to areas of clean water where other plants are absent.

Aquatic plants produce about 64,000 tons (wet weight) of fresh material annually in the river. Phytoplankton is about 10% of this production and bulrushes, reeds, and other aquatic plants that extend above the surface of the water in emergent wetlands along the shoreline contribute an additional 70%. The remaining 20% is from submersed plants such as quillworts, pondweeds, and stoneworts (*Chara* and other macroalgae) that grow beneath the surface of the river. Quillwort and pondweeds are most abundant in water less than 20 feet deep and stoneworts grow in water as deep as 45 feet in soft-bottomed areas of the river.

W. Duffy

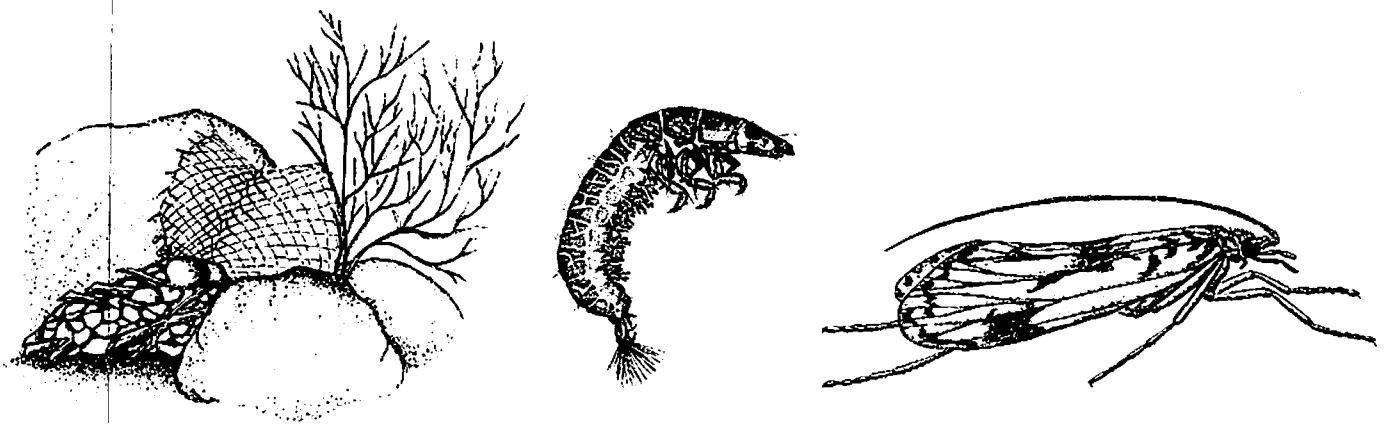
Emergent wetland

The phytoplankton community of the river is largely composed of diatoms and other clean-water forms that are dominant at the source of the river in Lake Superior. The phytoplankton community changes little as it is swept down the river and into Lake Huron. Phytoplankton probably contributes little to fish and wildlife production in the river because its population density is low and it remains in the river for only a few days.

An important exception occurs in the St. Marys Rapids where large populations of net-building caddisfly larvae feed upon phytoplankton that they strain from the swiftly flowing water. Caddisfly larvae and winged-adults are an important food for lake whitefish, trout and other fishes that frequent the rapids and the adjacent portions of the river.

Rooted aquatic plants are abundant in portions of the upper and lower river and they are the major source of nutrients and energy that enter the food web and support fish and wildlife production in the river. Most of this plant production is eaten, as it decomposes, by bottom-dwelling invertebrates including tubeworms, midge larvae, caddisfly larvae, burrowing mayfly nymphs, stonefly nymphs, snails, and crayfish.

The production of bottom-dwelling invertebrates varies widely throughout the river. Production is highest in emergent wetlands and the rapids, intermediate in offshore, soft-bottomed areas, and lowest in the navigation channels where the riverbed is continuously scoured by fast currents and vessel-induced turbulence. Midges and tubeworms are the important components in the emergent wetlands, whereas burrowing mayflies and fingernail clams dominate the invertebrate production in the soft-bottomed habitats of the river. Caddisflies, crayfish, small (non-burrowing) mayflies, midges, and stoneflies dominate invertebrate production in the rapids.



L. Lesko

case and net of larva *larva* *adult*

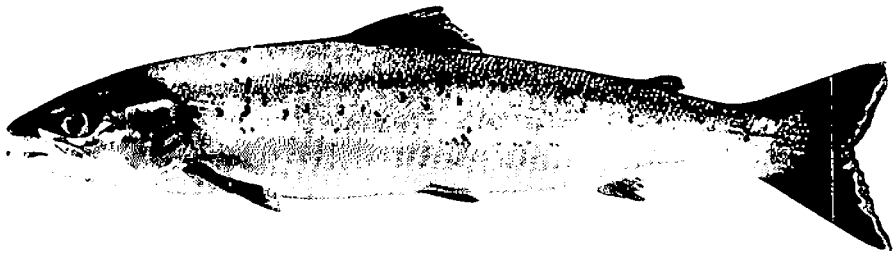
Net-building caddisfly in various life stages

The Fishery Today

Anglers continue to seek lake whitefish, lake herring, lake trout, walleye, smallmouth bass, northern pike, and other native species that supported the early fishery. Introduced species, including rainbow trout, Pacific salmon (coho, chinook, and pink) and landlocked Atlantic salmon now support popular fisheries, primarily in the St. Marys Rapids.

The first creel census conducted in the Michigan waters of the river revealed anglers fished for about 750,000 hours in 1987—an effort equal to about one-sixth of total annual fishing effort in Michigan waters of the Great Lakes in 1987. The upper river received 10% of the effort, the rapids 40%, and the lower river 50%. About 85% of the effort targeted warmwater fish and the remainder was directed at coldwater fish, including trout, salmon, lake whitefish, and lake herring. Angler harvest in Michigan waters of the river in 1987 included 5,699 pink salmon, 4,662 chinook salmon, 136 coho salmon, 1,990 rainbow trout, 538 brown trout, 203 lake trout, 141,386 lake herring, 25,187 whitefish, 316,436 yellow perch, 25,602 walleye, and 20,965 northern pike.

Most angling occurs during the warmer months of the year, but Munuscong Lake provides an important fishery through the ice for walleye.

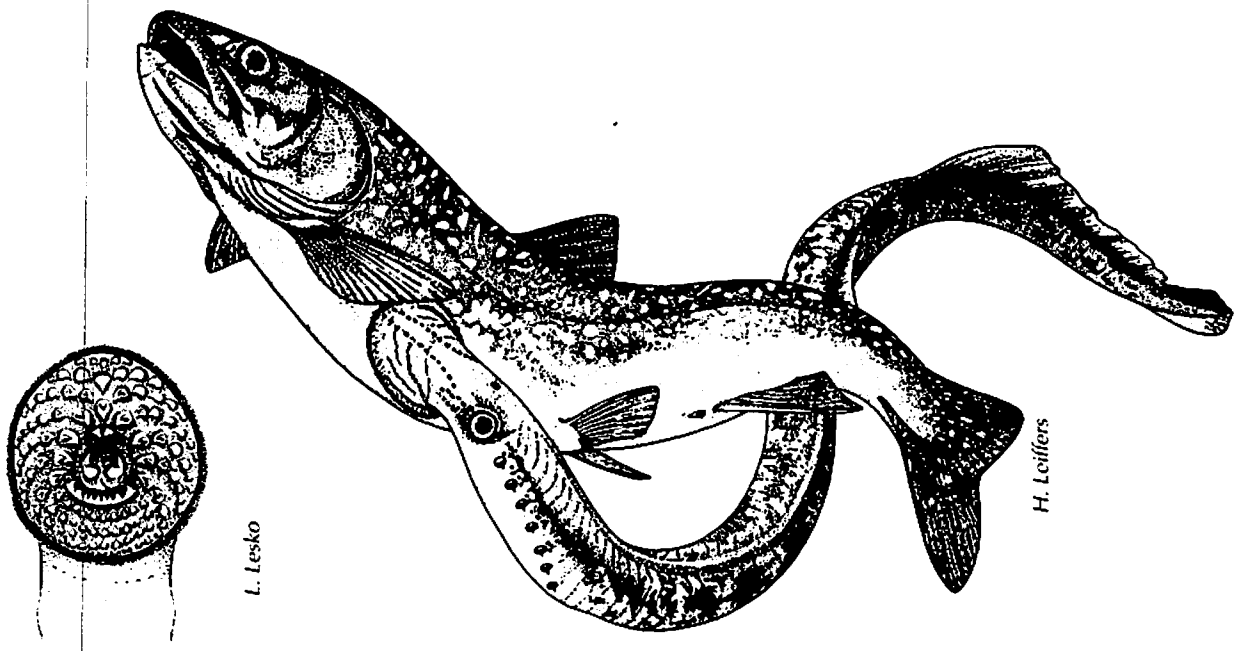


Atlantic salmon

New Hampshire Fish and Game Department, J. Scarola

Landlocked Atlantic salmon, which have been stocked annually in the St. Marys Rapids since 1987, offer the newest angling opportunity in the river. The fish are 5 to 9 inches long and 1.5 years old when they are stocked in the river. They migrate quickly into Lake Huron, where they live and grow for 1.5 to 3.5 years before returning to spawn as 2- to 20-pound fish. Most angling for them occurs in the rapids area where they concentrate, beginning in late June. There is also a popular fishery for lake herring in late June and early July in the lower river during the emergence of the burrowing mayfly, *Hexagenia*.

The Sea Lamprey Menace



The sea lamprey uses its sucking mouth to attach to lake trout and other fish. Its mouth (lower left) is lined with rows of teeth and its tongue is equipped with a single tooth that it uses to rip through the skin of the fish so that it can feed on the blood of the fish.

The sea lamprey is a non-native fish of great concern to Great Lakes fishery managers. It preys on desirable coldwater fish including trout, salmon, lake whitefish, lake herring, and chubs and is largely responsible for the extinction of the native lake trout in the lower four Great Lakes. Recent estimates indicate about 30,000 sea lampreys may now spawn in the St. Marys River annually. The young lampreys produced from these spawnings spend several years in the riverbed sediments feeding on algae, diatoms, and decomposing plant matter before they transform into predators of fish and migrate downstream into Lake Huron. Recently developed estimates indicate there may now be more than 400,000 parasitic-stage sea lampreys in Lake Huron, 90% of which were produced from spawnings in the St. Marys River. Estimates of sea lamprey-induced mortality of fish in Lake Huron are difficult to obtain, but laboratory studies indicate each sea lamprey that returns to spawn may have seriously wounded many fish and also killed about 20 to 40 pounds of fish during the 18 months it spent as a predator in the lake.

The U.S. and Canada are working jointly to reduce the abundance of sea lampreys in the St. Marys River and the wounding and mortality of fish in Lake Huron. Treatment of the river with conventional lampricides may be problematic because of the large size of the river. However, the Great Lakes Fishery Commission is completing a tactical plan to reduce the reproductive success of the population of sea lampreys that spawn in the St. Marys River. An integral part of this plan, which began in 1991 and is scheduled annually through the foreseeable future, is the release of sterile adult male sea lampreys into the river. Tests show that these sterile males will mate with fertile, wild females in the river and prevent them from producing viable offspring.

Effects of Contaminants on the River and Its Fish and Wildlife

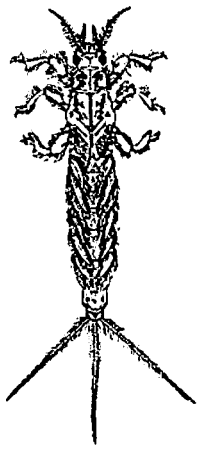
A recent study performed jointly by the U.S. Environmental Protection Agency and Environment Canada revealed levels of contaminants in the river which reflect both historical and current waste disposal practices of municipalities and industries located on the river. Industrial and municipal wastes produced on the Ontario side of the river significantly degraded water and riverbed sediments and adversely affected the biota along the Ontario shoreline. Impairment was most severe immediately downstream from Algoma Steel and St. Marys Paper and extended into the mid-reaches of Lake George.

Contaminants of concern included nutrients, particulate solids, organochlorine compounds, cyanide, heavy metals, and oil and grease. The study also showed that combined sewer overflow discharges in Sault Ste. Marie, Michigan, downstream from the Edison Sault Electric Company canal, polluted Michigan waters of the river for a short distance downstream from the rapids.

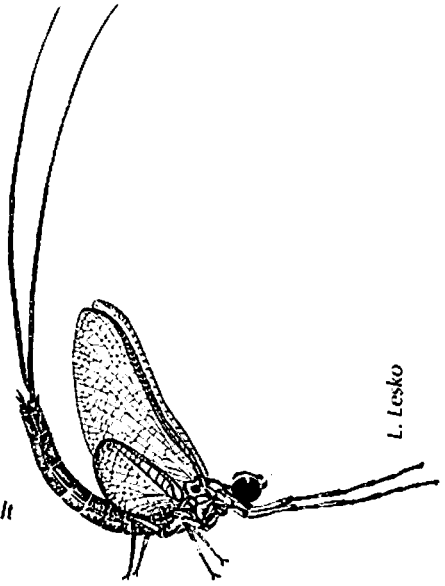
Contaminants in riverbed sediments have adversely affected the composition of the benthic invertebrate community. Only sludge worms (e.g. *Tubifex* and *Limnodrilus*) and other pollution-tolerant species are found near contaminant discharges on the Ontario shoreline.

The burrowing mayfly, *Hexagenia*, is a pollution-intolerant benthic invertebrate that is absent from most of the Ontario portion of river from the foot of the rapids to the upper reaches of Lake George, where oil and grease were found in the sediments. High concentrations of oil and grease and heavy metals in the sediments also reduced production in the surviving population of *Hexagenia* nymphs in Ontario waters of upper Lake George. These losses of *Hexagenia* are significant because the species is an important link in the food web that supports fish production in the St. Marys River.

Burrowing mayfly, Hexagenia

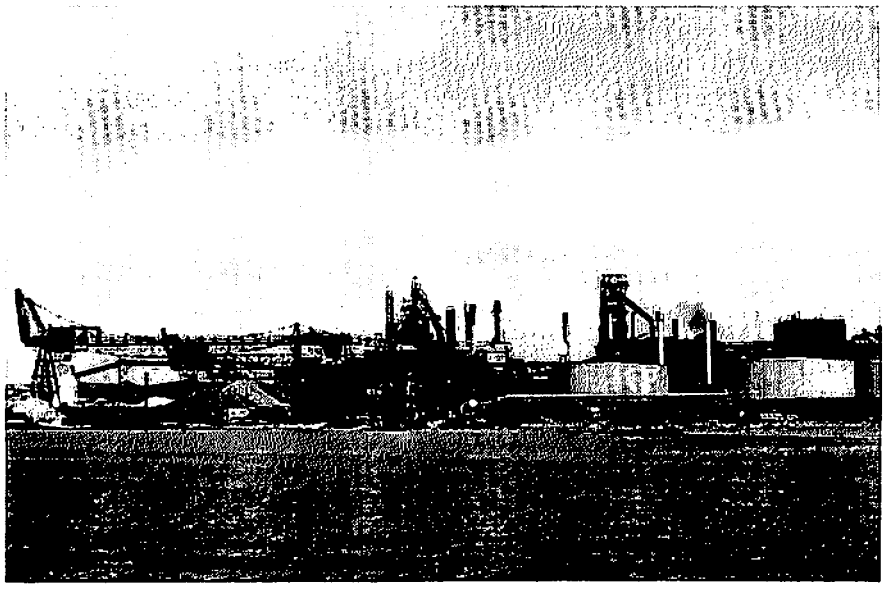


nymph



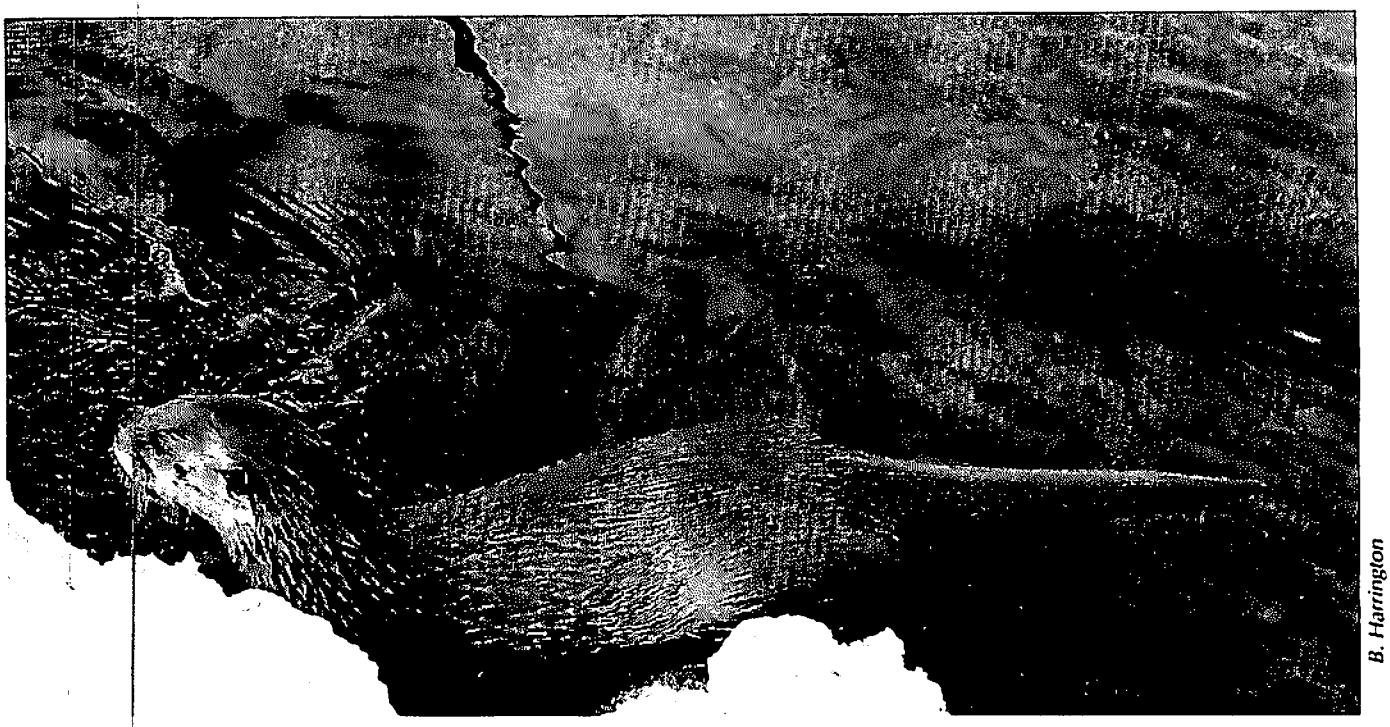
adult

L. Losko



J. Gannon

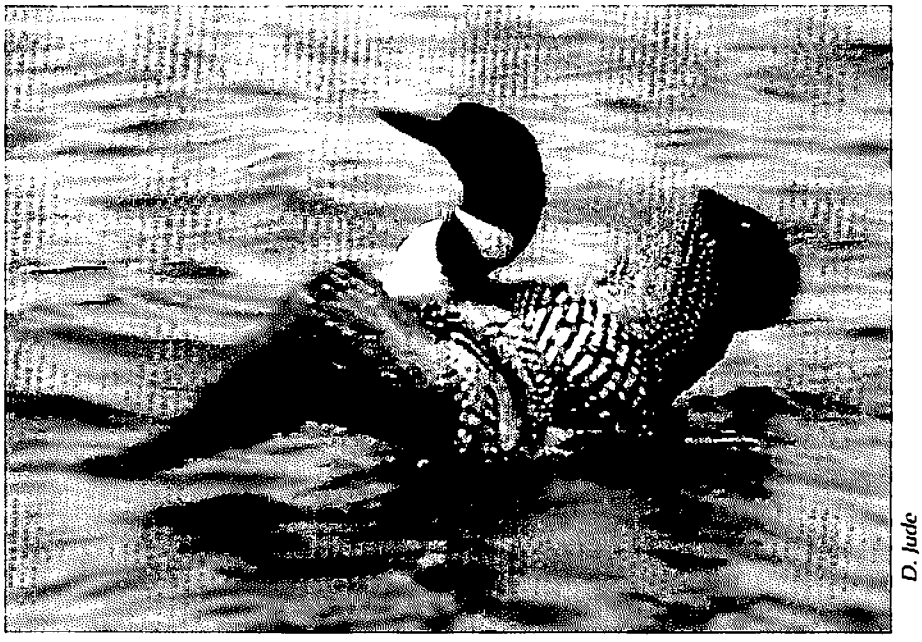
Industrialized Canadian shoreline



B. Harrington

River Otter

In addition, ducks, geese, loons, terns, gulls, ospreys, bald eagles, and wetland mammals including muskrat, mink, beaver, and otter frequent the river and are exposed through the food web to contaminants discharged into the river. Information on the effects of contaminants on these biota is limited, but indicates there is a basis for concern. Concentrations of organic contaminants measured in terns and gulls were generally below the level known to produce population effects on them. However, the levels were high enough to pose a significant threat to predators, including mink and eagles, that prey upon the contaminated terns and gulls.

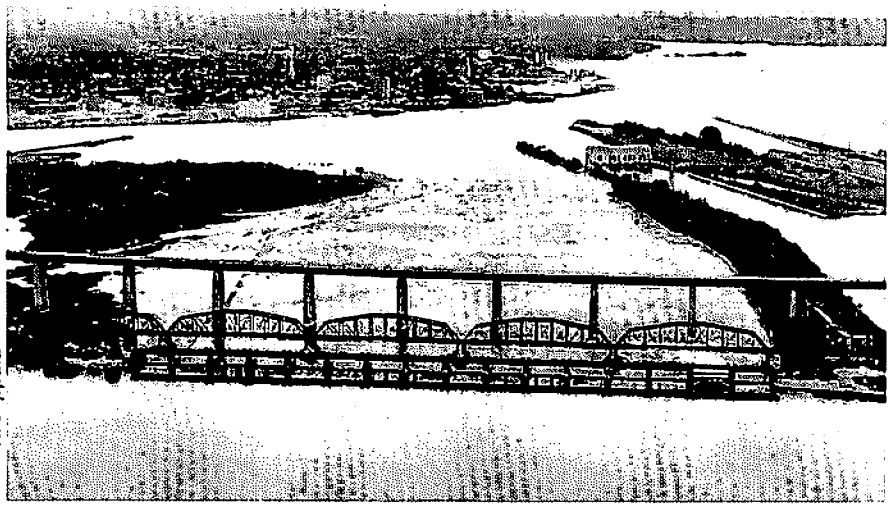


D. Jude

Common Loon

No advisory against the consumption of fish by humans has been issued by Michigan for the St. Marys River, but an advisory for restricting consumption was issued by Ontario for white suckers, longnose suckers, and walleye.

Effects of Development and Reduced Water Flows on Biota in the St. Marys Rapids



R. Seppala

Rapids, berm, and Compensating Works

The St. Marys Rapids were changed markedly by the construction of navigation locks, flow control structures, and hydropower generating facilities. These developments reduced the watered surface area of the rapids by about 50% and diverted about 93% of the total flow of the river through hydropower canals that by-pass the rapids. The effects of these major habitat losses on the fishery potential of the rapids and downstream areas are unmeasured, but they could easily have reduced aquatic production in the rapids by more than 50%.

The unnatural flow regime resulting from the present operation of the Compensating Works—the gated, flow-control structure at the head of the rapids—poses a significant threat to the biological integrity and productive potential of the remaining rapids habitat. Periods of extremely high flow when all 16 gates are opened scour the river bed and displace biota. Periods of severely restricted flow dewater more than 60 acres of riverbed in the rapids and create inadequate flow velocities for fish spawning in Whitefish Channel on the Ontario shoreline. These periodic dewaterings, which are more common than extremely high flows, are created by short-term demands for increased hydropower production. They cause significant losses in the benthic invertebrate community of the rapids and unmeasured but assuredly significant losses in the production of fish that spawn in the rapids or depend on the invertebrate community of the rapids for food. Although dewaterings have occurred for more than a decade, only recently has a serious attempt been made to correct the problem. A berm was constructed in the rapids in 1985 to help retain water along the west side of Whitefish Island during periods of reduced flow, but large areas of riverbed are still dewatered periodically in the rapids.

As the demand for electric power increases, the demand for increased diversion for hydropower will also increase and the adverse effects of low flow on the rapids habitat will be exacerbated. Regulatory agencies should be encouraged to act soon to develop minimum flow requirements that will protect the remaining rapids habitat and the valuable fishery that it supports for lake whitefish and trout and also for salmon and other desirable species that migrate into the rapids from the lower river and Lake Huron. The nominal flow that is now maintained in the rapids is achieved by a 50% opening of one of the 16 gates in the Compensating Works. Resource advocates and scientists who have studied the problem believe that two to four gates must be opened fully to provide the minimum flow needed to protect the remaining rapids habitat and its biota.

The St. Marys River is a physically and ecologically diverse system. Portions of the lower river seemingly remain in the natural state and the river as a whole supports a variety of beneficial uses including fish and wildlife production and water-oriented recreation. However, other competing uses of the river—as a municipal and industrial water supply, for navigation and hydropower production, and for the dispersal of municipal and industrial wastes—create an array of problems that imperil or exclude many natural beneficial uses. Of greatest concern are the spills and permitted discharges of persistent toxic contaminants and other pollutants that continue to impose unacceptable chemical loadings on the system. These chemical loadings adversely affect the aquatic food web, suppress reproduction in birds and mammals that frequent the river and its wetlands, and produce concentrations of contaminants in fish that can exceed Michigan and Ontario guidelines for safe consumption of fish by humans.

Problems and Solutions

A Remedial Action Plan being prepared by Ontario and Michigan is designed to relieve the effects of pollution and habitat alteration and guide restoration of the river in the 1990s and beyond. The future of the St. Marys River ecosystem will depend on the adequacy of this plan and the diligence with which it is applied to ensure sustained, beneficial use of this important natural resource.

To protect the St. Marys River ecosystem we need to:

- monitor the river and its plants and animals closely to provide early warning of any adverse changes that are occurring,
- study the natural processes that regulate fish and wildlife production so that we can better understand them and avoid harmful changes, and
- develop and implement procedures to correct past and present abuses of the system and to prevent further environmental degradation.

What Can You Do?

- Enjoy the river and encourage others to do so. A large group of concerned users can promote ecologically sustainable uses of the river and encourage the wise management of this valuable resource.
- Become informed about the resources and the conflicts among different users and voice your concerns to resource managers, decision-making agencies, and your elected representatives.
- Support actions that will eliminate pollution at municipal and industrial sources and improve the quality of the river environment and its living resources. Public support for the Remedial Action Plan being developed for the river will be required if the plan is to be used effectively to correct past abuses and protect the system in the future.
- Support actions that will lead to the establishment and maintenance of adequate minimum flows in the St. Marys Rapids.
- Support land-use controls that protect wetlands and other environmentally sensitive areas.
- Support programs to reduce the reproductive success of the sea lamprey in the river.
- Contact and support organizations dedicated to natural resource protection and stewardship of the river.

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"Whatever befalls the earth, befalls the sons of earth.
Man did not weave the web of life; he is merely a strand in it.
Whatever he does to the web, he does to himself."

— Chief Seattle

Additional Reading

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* Available from the International Joint Commission, 100 Ouellette Ave., Windsor, Ontario, Canada N9A6T3.

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Conversion Table - U.S. Customary to Metric

Multiply	by	to obtain
inches	2.54	centimeters
feet	0.3048	meters
miles	1.609	kilometers
acres	0.4047	hectares
square miles	2.59	square kilometers
cubic miles	4.168	cubic kilometers
pounds	0.4536	kilograms
tons	0.9072	metric tons

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