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THE SPREAD OF THE SEA LAMPREY THROUGH THE GREAT LAKES

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In the Great Lakes the sea lamprey (Petromyzon marinus) has been known, until recently, only from Lake Ontario and tributary waters below Niagara Falls. As a considerably dwarfed form, the species occurs naturally and abundantly in that lake, and in the Finger Lakes of New York (Gage, 1893 and 1928; Surface, 1898 and 1899; Huntsman, 1917; Dymond, Hart and Pritchard, 1929).

These authors have stressed the predatory destructiveness of the sea lamprey in Cayuga Lake and Lake Ontario. This eel-like creature, averaging about 15 inches long when mature, clings to the larger food fishes with a round sucker-mouth, beset with rows of strong, horny teeth; then rasps open a hole in the skin of its victim by means of its serrated tongue plates, and injects an anticoagulating substance into the wound, to insure the free flow of the victim's blood, with which the parasite gorges itself. A considerable proportion of the lake trout, northern pike, bullheads, carp and other fishes in Lake Ontario and the Finger Lakes are reported to bear lamprey scars. The blood-sucking attacks no doubt have a harmful affect on the host fish, and victims of heavy lamprey attacks are occasionally found dead. In Lake Ontario the lampreys even torment swimmers, though there seem to be no records to indicate that they have injured a human being.

The fish of Lakes Erie, Huron, Michigan and Superior until very recently seem to have been spared from the attacks of this vertebrate parasite, though they have been less seriously attacked by two smaller native species, of the genus Ichthyomyzon<sup>1</sup>. This freedom from attack by the sea lamprey may to a small degree have been responsible for the large production of fish in these waters, particularly in Lake Erie.

The failure of the landlocked sea lamprey to ascend Great Lakes waters above Lake Ontario has doubtless been the insurmountable obstacle of Niagara Falls. (Hubbs and Brown, 1929: 3). Though lampreys can make their way over steep falls, clinging to the rock walls with their sucking mouths, the Niagara escarpment has presented an impassably high barrier. Man-made canals, however, now afford a means by which the sea lamprey and other Lake Ontario fishes can by-pass the great falls. Hubbs and Brown (1929: '17) wrote:

The occurrence of the sea lamprey in Lake Erie is a recent discovery. The specimens collected at Merlin, November 8, 1921, were the first for the lake to be scientifically reported (Dymond, 1922, p. 60). Dr. John Van Oosten in the fall of 1927 saw one which had been caught near Sandusky and W. M. Tidd collected one there in the spring of 1928. At the same place Prof. E. L. Moseley saw another about two weeks before Mr. W. D. Bates sent us the specimen from near Rondeau. <sup>E.</sup> Mr. Bates told Dr. Van Oosten that he occasionally takes the large lamprey in his nets.

There can be little question as to the recentness of the establishment of the species in Lake Erie. That it immigrated into Lake Erie from Lake Ontario through Welland Canal is extremely probable. Since the species is much larger than the native lamprey of Lake Erie, Ichthyomyzon concolor, and is known to be very destructive to food fishes in Cayuga Lake, New York, and elsewhere, its establishment in Lake Erie adds another potential factor to those responsible for the

1/Bensley's 1915 hearsay report of Petromyzon marinus from Georgian Bay we now believe was based on a native lamprey (Ichthyomyzon).

2/This specimen, taken at Pointe Aux Pins opposite Rondeau Harbor, Ontario, was 560 mm. (22 inches) long, larger than any recorded from Lake Ontario.

depletion of the great fisheries of this important lake.

Osburn, Wickliff and Trautman (1930) reported the early taking of another sea lamprey in Lake Erie, one caught near West Sister Island, Ohio, on November 14, 1927.

The first definite indication of spawning runs by the sea lamprey of Lake Erie was furnished by Creaser (1932: 157), who wrote:

This lamprey has now penetrated the waters of Lake Erie to one of its western tributaries in the State of Michigan, the Huron River, where an adult specimen was collected at Flat Rock on May 8, 1932. This constitutes a new record for the state (the specimen has been examined), and is an indication of the complete establishment of this lamprey in Lake Erie. The way is now open for a further penetration into Lake St. Clair and Lake Huron. In the not too distant future, it will no doubt be encountered throughout the Great Lakes waters. Knowing its record of destruction among the food fishes of Cayuga Lake in New York, we must consider it as one more source of further depletion of the fisheries of the Great Lakes. The sea lamprey and the smelt (Osmerus mordax), which has recently spread over a great portion of Lake Huron and Lake Michigan, will act as great disturbers of the natural balance of the large fisheries of these extremely productive lakes, which are already in much distress.

More recently, mature sea lampreys have been taken by the Campbell brothers in Swan Creek, a tributary of the Maumee River in Toledo, Ohio, among mature native lampreys. One 455 mm. long, was collected May 8, 1934, and two others, respectively 459 and 528 mm. long, on April 26, 1935. No doubt the species is reproducing in some numbers in the streams tributary to Lake Erie.

By 1930, the sea lamprey had considerably increased in western Lake Erie, and had already made its way beyond that lake. In the second week of May of that year Mr. Melburn Huebner of Detroit, while fishing in the St. Clair River, caught a sea lamprey, recognizable as such from a colored sketch which he made. This

lamprey,  $13\frac{3}{4}$  inches long, was attached to the side of a  $4\frac{1}{2}$  pound pike-perch.

Until this year (1936) no further extension of the range of the sea lamprey into the Great Lakes came to our attention, but the pest was undoubtedly dispersing through Lakes Huron and Michigan, probably even breeding in small numbers in creeks tributary to these lakes.

As indicated in Wisconsin and Michigan newspapers, and in The Fisherman for June, 1936, Capt. Frank C. Paczocha of Milwaukee brought to the Milwaukee Public Museum on March 23, 1936, a 16-inch sea lamprey which he had taken the previous day while fishing in Lake Michigan about 15 miles east of the city. It was attached to a  $4\frac{1}{2}$  pound lake trout, just below the eye of the fish. Though this fisherman had frequently seen other lampreys on fishes, they were usually much smaller, and presumably of the native species.

The establishment of the sea lamprey in Lake Michigan was confirmed soon afterward, for a male apparently on its spawning run was captured at Elk Rapids, Michigan, on the afternoon of June 13, 1936. This specimen,  $15\frac{1}{2}$  inches long when fresh, was taken by R. B. Zupin, who turned it over to Conservation Officer Mark Crow, who in turn presented it, with appropriate information, to the University of Michigan. Mr. Crow stated that the creature must have come in from the East Arm of Grand Traverse Bay, and that it was found working its way against a swift current in the outlet of Elk Lake, in the spillway behind the Michigan Public Service Company's plant.

*see last page for insert*

The sea lamprey is no doubt not only spreading but also increasing in numbers in the Great Lakes. There is good reason to expect that it will follow the history of the smelt, eventually reaching to the limits of <sup>the</sup> Great Lakes and greatly increasing in numbers. The multiplication of the lamprey has been at a slower rate than that of the smelt, and will continue so, because the life cycle is much longer; Gage (1928) estimates the larval life of Petromyzon as 4 or 5 years, and the immature period of adult life as  $1\frac{1}{3}$  to  $3\frac{1}{3}$  years; the smelt spawns when only 2 years old. On account of its slow turn-over, the lamprey

will not likely increase alarmingly for several years. In time, however, the sea lampreys may well attain an abundance equal to or greater than that maintained in Lake Ontario and in Cayuga Lake. If that not improbable end be reached, this large and destructive blood-sucking parasite will justify the fears expressed by Hubbs and Brown and by Creaser, quoted above, that it will add one more very serious factor to those already seriously depleting the supply of lake trout, whitefish, suckers, catfish and other commercial fishes in the Great Lakes.

It is doubtful that any attempt to curtail the increase of sea lampreys would prove practicable. At great effort the increase might be retarded, though probably not prevented. As the species becomes abundant enough to produce definite spawning runs, however, definite control measures may become more effective. The New York investigators, Surface and Coge, point to the spawning run as the most vulnerable period in the sea lamprey's life cycle, for large numbers may then be caught as they move upstream into creeks, or as they build their nests and spawn.

For the present, attempts to control this unwanted and destructive immigrant into Great Lakes waters would seem practicably limited to the killing of all individuals caught by fishermen.

To help in further tracing the spread and increase of the sea lamprey in the Great Lakes, specimens caught should be reported, with data as to place and date of capture, and with a statement of the size, color and shape of the fins. The land-locked sea lampreys when adult are usually 13 to 22 inches long, averaging about 15 inches, while the native lampreys of the Great Lakes other than Lake Ontario almost never exceed 13 inches and probably never reach 15 inches in length; the sea lampreys are strongly mottled with dark and light colors, while the native lampreys are almost or quite uniform in coloration; the dorsal fins of the sea lamprey are separated from one another, rather than joined together to form a single fin, and the dorsal and caudal fins are angular rather than rounded, as they are in the native forms. Although these characters will serve to distinguish the sea lamprey from the species naturally occurring in the Great Lakes, it would be helpful and

more definite to have specimens sent in for identification. If possible they should be preserved (preferably in formalin, one part to 10 of water). A watchout should be maintained for spawning runs, which when found should be made known. All such information and specimens may be sent to the University of Michigan Museum at Ann Arbor, to the Milwaukee Public Museum, or to the appropriate state or provincial department of conservation.

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Additional information on the lamprey to be inserted in Institute Report No. 381 on page 4, just before the beginning of the last paragraph:

Last September, during the meeting of the American Fisheries Society at Grand Rapids, for which this paper was prepared, Mr. Edward Schneberger of the Wisconsin Department of Conservation gave us another specimen of sea lamprey from Lake Michigan. It is a half-grown example, not quite 9 inches long, and therefore provides a further indication that the species is reproducing in the West. It was taken on a lake trout by Urban Allie and Sons, in 17 to 20 fathoms of water in Lake Michigan, 5 miles south of Sturgeon Bay Canal, Door County, Wisconsin, on August 1, 1936.

Since that time three more adult specimens from Lake Michigan have come to hand. One 17 inches long was taken about October 19, 1936, in Lake Michigan near St. James, on Beaver Island, by W. J. Gallagher. This specimen was sent in to Dr. John Van Oosten by Capt. Ellsworth of the Michigan fisheries patrol, with word that a number of others had recently been taken about the Beaver Islands.

Another specimen, 19 inches long, was taken on a  $3\frac{1}{2}$  pound lake trout in 65 fathoms of water, 27 miles east of Port Washington, Wisconsin, by Capt. Oscar Ewig on February 4, 1937. It was sent by Lester Smith to Dr. Van Oosten, and is now preserved in the Museum of Zoology at the University of Michigan.

The latest sea lamprey received from Lake Michigan, and the largest observed from the Great Lakes to date, is a 20-inch specimen caught by Gus Mollhagen at a depth of 45 fathoms NW. x W. of St. Joseph, Michigan, on March 2, 1937. This blood-sucking creature was attached to the side of

a <sup>10</sup>~~60~~-pound lake trout just behind the gills, and it is reported that the trout was nearly dead from the attack.

Several other rumors of the taking of sea lampreys in the waters of Lakes Huron and Michigan, and tributaries have been reported to the Bureau of Fisheries and the Institute for Fisheries Research, but these reports have not yet been verified.

INSTITUTE FOR FISHERIES RESEARCH

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