Sea Lamprey: Lake Ontario's native son?

The lamprey's powerful mouth parts make it adapted for attaching to fish, including Chinook salmon (on cover) and lake trout (below).

Courtesy of the Great Lakes Sea Grant Network

The results of New York Sea Grant research suggest that the parasitic sea lamprey, a species usually considered invasive with its immense economic impact on commercially and recreationally important fishes of the Great Lakes, may be native to Lake Ontario.

In research described in the recent *Transactions of the American Fisheries Society,* John Waldman of Queens College of the City University of New York, and **Isaac Wirgin**, **Cheryl Grunwald** and **Nirmal Roy** of New York University's Department of Environmental Medicine analyzed mitochondrial DNA of sea lampreys *(Petromyzon marinus)* from 10 locations along Great Lakes and Atlantic coasts.

Genetic comparisons were made of lamprey populations along hypothesized colonization pathways. Pronounced differences in gene frequency patterns between lampreys collected along the rivers of the Atlantic Coast and those in the Lake Ontario watershed, together with arguments against the viability of lamprey colonization via the Erie Canal, strongly support the idea of natural lamprey colonization by one of at least three hypothesized pathways following the retreat of the glaciers.

The sea lamprey lives throughout the North Atlantic Ocean, spawning in rivers in Europe and North America, and parasitizing a wide variety of fish. Each of the Great Lakes with the exception of Lake Ontario has documented dates of observed invasion of the sea lamprey in the twentieth century. The first sighting of the species in Lake Ontario was 1835, 12 years after the completion of the Erie Canal.

Some investigators have concluded that the canal was the means of entry of the fish into the lake. But some have held a contrary view that sea lampreys are indigenous.

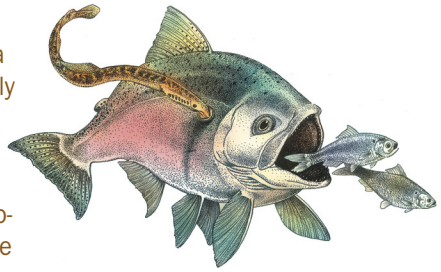
This research team's genetic evidence suggests that the sea lamprey may have colonized Lake Ontario right after the Pleistocene (about 10,000 years ago) by one of three hypothetical pathways: the Delaware-Susquehanna drainage, the Hudson-Mohawk system or the St. Lawrence River, the lake's present outlet.

Throughout the Great Lakes, parasitic sea lampreys cause a loss of revenue in both the commercial and recreational fishing industries. Numerous ongoing programs to eradicate or at least deplete their numbers are in effect. Their lack of homing behavior (failure to return to rivers in which they spawned) has sometimes exacerbated eradication methodologies. However, if sea lampreys are indigenous to Lake Ontario and therefore part of the lake's ecosystem, management policies aimed toward intense suppression might need reevaluation.

"This is a most interesting study that offers additional support for the theory of an indigenous sea lamprey population in Lake Ontario," says **Dave MacNeill**, New York Sea Grant Fisheries Specialist located at SUNY College at Oswego along Lake Ontario's eastern shore. MacNeill offered further insight into the unique relation-

ship between sea lamprey and other fish. Some speculation surrounds the relationships between sea lamprey and native fish such as lake trout and Atlantic salmon that were likely the preferred targets for lamprey. It's possible that historically there was a stable parasite/prey relationship between lamprey and these large fish, with few lamprey induced mortalities and a low incidence of scarring observed on fish. As commercial fishing and spawning habitat destruction on lake trout and Atlantic salmon reduced their populations–and the sizes of fish in the lake–the frequency of lamprey attacks per individual trout and salmon likely intensified. This resulted in more mortalities in these fish and their eventual extinction from Lake Ontario. In a sense, the initial stable parasite/prey relationship may have shifted to a predator/prey relationship. It is also likely that stream temperatures increased from deforestation; this could have improved lamprey reproductive success while reducing that of Atlantic salmon which require lower temperatures. These speculations raise some interesting questions. If the sea lamprey is native, does this weaken the case for lamprey control? Perhaps, perhaps not. Control efforts regarding any injurious species are targeted to optimize control efficacy at a level that is also economically sustainable. In other words, total eradication would be economically unfeasible so a certain amount of lampreys would inevitably remain. Given the economic damage that sea lampreys inflict upon recreational and commercial fisheries, continued lamprey control would be considered to protect economic revenues generated by these fisheries.

Sea Lamprey on Chinook Salmon. Artwork by Jan Porinchak



— Barbara A. Branca and David MacNeill

~~Boater Spending~~ *~~continued from page 3~~*

~~**Background photo of Gone Fishing Marina, Montauk. Photo by Sharon O'Donovan**~~

~~As one of the nation's major boating states, boating is a key recreational industry in virtually all areas of New York, especially the marine waters, Hudson River, Great Lakes, St. Lawrence River, the Finger Lakes, and Lake Champlain. The economic data will be used to develop tools that will allow managers to better evaluate the impact of boating on a regional scale.~~

~~The New York Sea Grant study broke out expenditure and economic impact figures by major boating region and boating major water body:~~

~~Trip related expenditures:~~

- ~~$173 million associated with trips to regions bordering the Great Lakes and Finger Lakes~~
- ~~$54 million associated with trips to Hudson River area~~
- ~~$162 million associated with trips to the New York City/ Long Island Metropolitan area~~

~~Non trip related expenditures:~~

- ~~$661 million associated with the economic regions bordering the Great Lakes and Finger Lakes~~
- ~~$194 million associated with the Hudson River region~~
- ~~$907 million associated with the New York City/ Long Island Metropolitan area~~

~~Total Economic Impact by region:~~

- ~~$600 million associated with the economic regions bordering the Great Lakes and Finger Lakes~~
- ~~$184 million associated with the Mid-Hudson and Capital District Regions~~
- ~~$843 million associated with the New York City/ Long Island Metropolitan Area~~

~~The study was conducted in 2004 with the aid of an advisory panel of agency and boating industry experts from around the state. The estimates were based on a mail survey of 6,000 boaters registered in New York State in 2003. These figures may be conservative for the marine region since data indicate boating activity may have been suppressed due to the weather that year. "June 2003 was one of the wettest on record and the threat of Hurricane Isabel striking New York's marine coast in September resulted in many people pulling their boats early, further shortening the season," said Tanski. In addition, the figures do not include spending by transient boaters and others who are not registered in the state. Additional expenditures are most likely made in water bodies bordering other states, especially around Long Island and New York City. Non-motorized boaters, such as kayaks, canoes and small sailboats, are also likely to have made economic contributions throughout New York, but were not included in the study since they are not registered by the state.~~

~~For a downloadable copy of the report, go to New York Sea Grant's home page www.nyseagrant.org and follow the links.~~

~~**— Barbara Branca Jay Tanski**~~