THE FIVE LAMPREYS OF MICHIGAN'S GREAT LAKES

a fact sheet produced by **Michigan Sea Grant**

Have you ever heard of the chestnut lamprey, or the silver lamprey? How about the American brook lamprey or the northern brook lamprey? These are the four native lampreys that inhabit the Great Lakes region, and their ancestors arrived here approximately 300 million years ago. Two of the four native Michigan lampreys are parasitic, meaning that in their adult stage they feed on the body fluids and blood of fish. Although they usually leave a deep wound, they rarely kill the host fish.

Ecologists say that the native lampreys harmoniously coexist with fish and other aquatic organisms in the Great Lakes. In contrast, the sea lamprey, a third parasitic lamprey, drifted into Michigan's waters from the Atlantic coastal region and caused a tremendous decrease in fish populations, especially lake trout, after it entered the Great Lakes in the 1930s and 1940s. In addition to putting the Great Lakes' fish populations in jeopardy, the highly competitive sea lamprey also puts stress on native lamprey populations.

A lamprey found attached to a fish in the Great Lakes region is probably a chestnut lamprey, silver lamprey, or a sea lamprey. Color can be a distinguishing characteristic for the parasitic lampreys, but it is highly variable. Young adults of any lamprey usually have lighter coloration than middle-aged adults, and sometimes just before spawning the color of the lampreys can change again. Contrary to what its name suggests, an adult chestnut lamprey often exhibits an olive color. The adult silver lamprey usually is gray and sometimes has silver coloring on the belly. Adult sea lampreys exhibit a blue or black color on top and a yellow to brown color on their belly.

Both nonparasitic lampreys, the American brook lamprey and the northern brook lamprey, usually display a dark blotch on their tail and have a yellow tinge to their fins. The American brook lamprey is gray or brown on the top, with a gray or silver belly. The northern brook lamprey is a blue-gray or muddy brown color.

In addition to color distinctions, size varies from one lamprey to another. The parasitic lampreys tend to be larger than the nonparasitic ones because in the adult stage the American brook lamprey and the northern brook lamprey stop eating (see chart below).

Species	Average Total Adult Length (inches)
Parasitic	
Chestnut lamprey	5-11
Silver lamprey	4-13
Sea lamprey	12-24
Nonparasitic	
American brook lamprey	5-7
Northern brook lamprey	4-6

Distinguishing Among The Lampreys

Although lampreys are sometimes referred to as eels, these two organisms have very different body structures. Eels, which are covered with tiny scales, have well developed jaw and bone structures, including numerous vertebrae. In contrast, lampreys, which are primitive fish, are scaleless, have funnel-like mouths, and cartilage instead of bone.

Chestnut lamprey (adult)
Ichthyomyzon castaneus

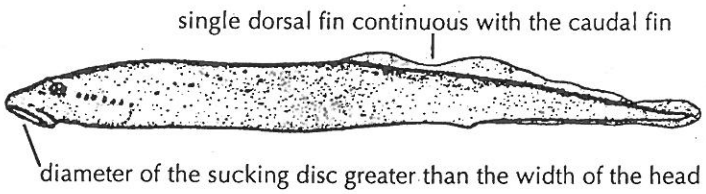
Immature lamprey (ammocoete)
Ichthyomyzon castaneus

How To Distinguish Among the Five Great Lakes Lampreys

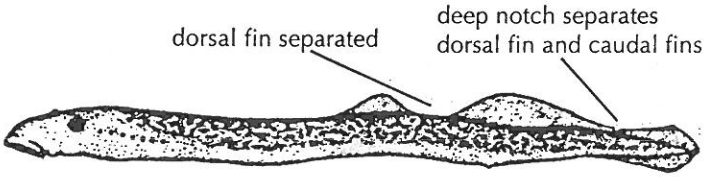
All lampreys have a dorsal (back) fin and a caudal (tail) fin. The connection between the dorsal and caudal fin often varies among species. In addition, the sucking discs vary in size, shape, and teeth arrangement. By focusing on these characteristics, the differences among the lampreys are more apparent.

The sucking disc is used by the adult parasitic lampreys to attach to prey, and a rasping tongue and teeth help lampreys break through skin and scales to draw out blood and body fluids from fish.

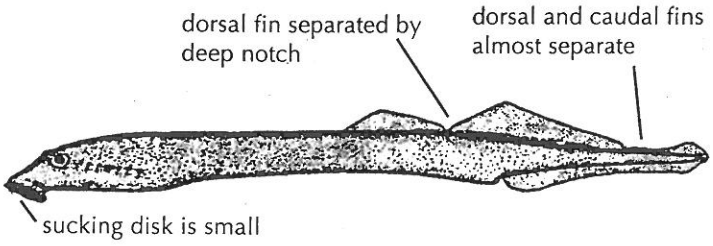
Silver Lamprey and Chestnut Lamprey



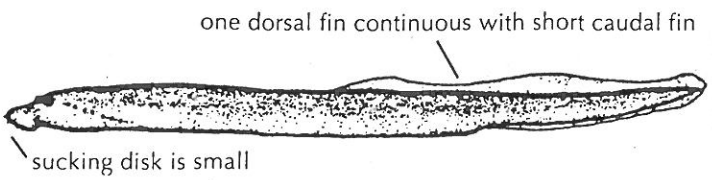
Sea Lamprey



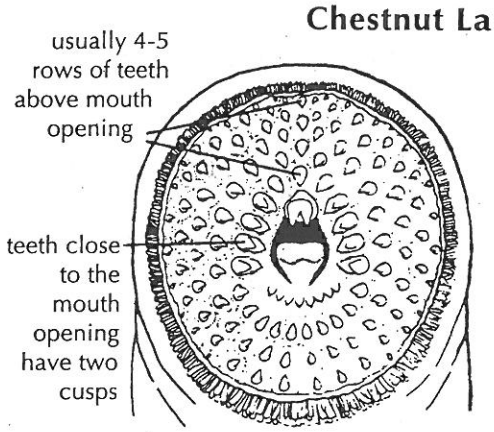
American Brook Lamprey



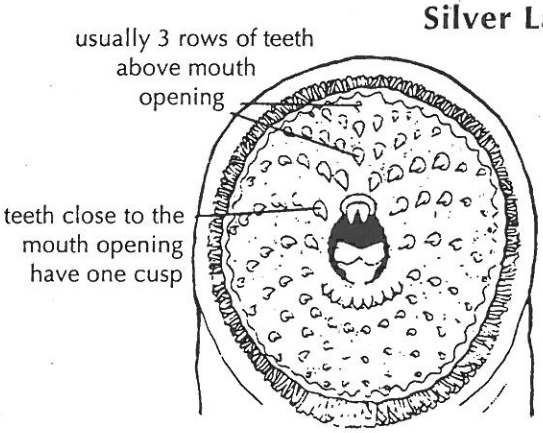
Northern Brook Lamprey



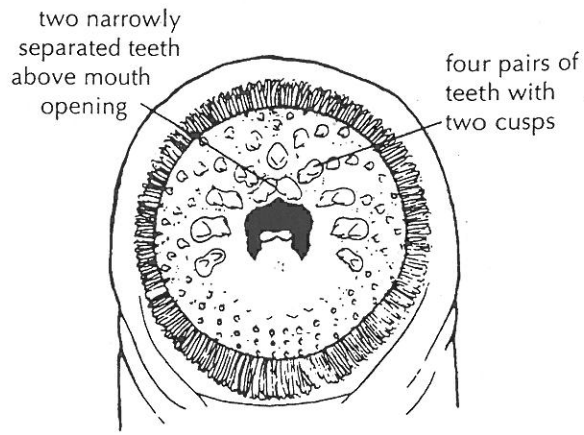
Chestnut Lamprey



Silver Lamprey

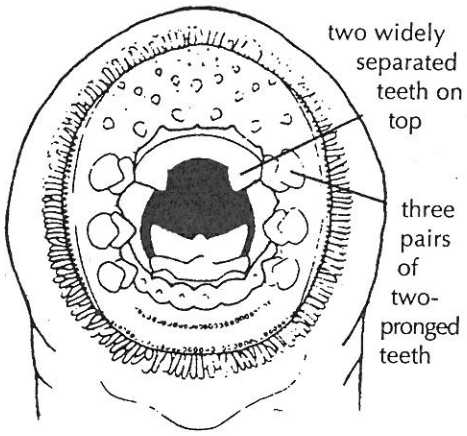


Sea Lamprey



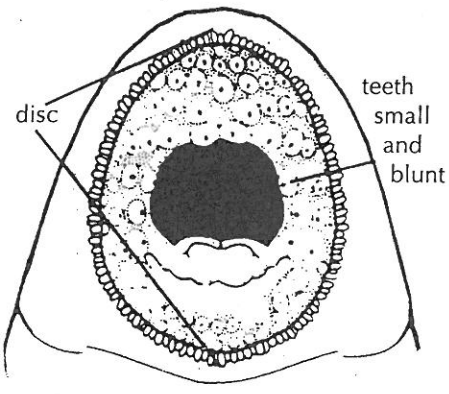
The sucking discs of the non-parasitic species are smaller and the teeth are fewer and more feeble because these lamprey do not feed in their adult stage.

American Brook Lamprey



Northern Brook Lamprey

distinct disc shape



Lampreys are secretive creatures

One reason that you might not have seen a native lamprey, or even the more abundant sea lamprey, is because they have secretive habits. Lampreys begin life as eggs that usually hatch after a few days and then develop into larvae which float downstream and burrow in U-shaped tunnels in stream bottoms. With their heads close to the surface, they feed on organic particles, algae, and microscopic organisms. Larvae often have a paler hue than the adult lampreys but their most distinguishing characteristic is a fleshy oral hood that covers their eyes (see picture on front page). The larval stage for native lamprey usually spans 3-7 years. For some sea lamprey, this stage lasts as long as 13 years.

In contrast, the adult stage is relatively short for all lampreys, ranging between 8-20 months. When the lamprey change from larvae to adults the oral hood becomes a well-formed mouth with teeth, their eyesight improves, body length increases, and sexual organs begin to develop. The parasitic lampreys emerge as adults at the beginning of the summer. They retain a functional intestine in preparation for the summer months during which they parasitize fish. The chestnut lamprey feeds on trout, especially brown trout, and the silver lamprey and sea lamprey feed on a variety of fish, including trout, whitefish, and walleye. For the non-parasitic native lampreys, transformation commences in the autumn. In contrast to the parasitic lampreys, their digestive tract becomes non-functional, and they stop eating when they are fully mature. Throughout this process, the lampreys occasionally emerge from their burrows, and eventually when transformation has been completed, they leave the nest and swim freely.

All lampreys achieve sexual maturity in the springtime, and studies by some scientists have noted that at this stage, lampreys are usually more active at night than during the daytime. In the daytime, adult chestnut lamprey and silver lamprey might hover in the crevices of rocks or logs, probably to escape predation by gulls, herons, mink, or raccoons. At night they hunt and parasitize fish with a reduced risk of predation.

To prepare for spawning (egg production), lampreys build nests in streams and rivers by making small indentations, no more than a few inches deep and wide, often with rocks on the perimeter. The lampreys arrange rocks with their mouths and shift the sediment by beating it with their tail. After the nest is built, the male attaches to the female's head and often winds around her, finds the vent, and with a rapid vibration, the eggs and sperm are released. After spawning, both the male and the female adults die.

The Future for Native Lampreys

For the most part native lampreys have different locations in which they like to feed and reproduce. Occasionally their niches do overlap. The chestnut lamprey and the silver lamprey both live in rivers, although the silver lamprey usually migrates further upstream to spawn and feed. Both the American brook lamprey and the northern brook lamprey are found in brooks, streams and small rivers, but the American brook lamprey prefers to live in colder water. If the lampreys are inhabiting the same area at the same time, there can be competition for adequate nesting areas and food supply. Because the sea lamprey has the widest habitat range, it can feed and spawn in the same areas as any of the native lampreys, and competition probably results when the sea lam-

prey enters the native lampreys' preferred habitat. More studies would lead to a fuller comprehension of the competition dynamics between the exotic and native lampreys.

Not only do the native lamprey compete for food and habitat with the exotic lamprey, but they also are affected by the chemical TFM (3-trifluoromethyl-4-nitrophenol) that is used to control sea lamprey populations. Because TFM targets larval sea lampreys, it is sprayed in streams rather than the open waters of the Great Lakes. The chemical affects both native and exotic lampreys in a similar way by inhibiting their ability to take up oxygen. If native larval lampreys are burrowing further downstream than usual, in sea lamprey territory, they will also be killed. Although native lamprey populations have been negatively affected by TFM, they are still common in many streams and rivers throughout the Great Lakes' watershed.

Distribution in Michigan

The chestnut lamprey is known primarily in the Lake Michigan drainage of the Lower Peninsula. The silver lamprey is distributed in the western Upper Peninsula, Lakes Superior and Michigan drainage areas, and areas of the western Lower Peninsula draining into Lakes Huron and Erie. Sea lamprey are present in all of the Great Lakes of Michigan and most of its tributaries. American brook lamprey are present in the eastern Upper Peninsula drainage into Lakes Superior and Michigan, the western Lower Peninsula drainage into Lake Michigan, and the east-central Lower Peninsula drainage into Saginaw Bay. The northern brook lamprey occurs in the Great Lakes drainage basin of both the Upper and Lower Peninsulas of Michigan.

Additional information about native lamprey in the Great Lakes region can be found using these sources:

Scott and Crossman. 1985. *Freshwater Fishes of Canada.* Fisheries Research Board of Canada, Ottawa.

Becker, G.C. 1983. *Fishes of Wisconsin.* University of Wisconsin Press. Madison, Wisconsin.

Special thanks Ron Kinnunen (Michigan Sea Grant Agent), Philip Cochran (St. Nobert College, De Pere Wisconsin), Trent Sutton (Lake Superior State University, Sault St. Marie, Michigan) and George Becker, for sharing their knowledge and resources of the native and exotic lampreys in the Great Lakes region.

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