

The annual spearing harvest of lake sturgeon occurs on all lakes in the Lake Winnebago system. The Upriver Lakes and Lake Winnebago yield numerous fish every year. And while these lake sturgeon spend a great deal of their lives in these lakes, the early days of their lives are spent in their tributaries. Researchers know that lake sturgeon hatch and stay in the rivers of the Lake Winnebago system until they are old enough to venture out into the lakes. However, when an adult lake sturgeon is harvested, we don't know which river it came from. To decipher this mystery, researchers at the University of Wisconsin-Stevens Point and the Wisconsin Department of Natural Resources are using chemical signatures found within the ear bones of harvested lake sturgeon to identify where those fish hatched.

During the 2018 and 2019 harvest seasons, spearers at registration stations were asked to voluntarily donate the head of their sturgeon allowing researchers to collect specific inner ear bones called otoliths (Photo 1). Otoliths help with hearing and balance and continue to grow throughout the lifespan of a fish. An otolith acts like a time capsule by absorbing chemicals that are present in the water, creating snapshots of the environment throughout a fish's life. As the fish ages, new layers with new environmental snapshots are added to the outside of the otolith. Once a layer is added to an otolith, it does not change. This layering process in the otolith creates a reliable timeline of the different environments the fish lived in throughout its lifetime. By cutting into an otolith, researchers can analyze the rings in the otolith that correspond to individual years in the life of the fish similar to how foresters can learn about the weather conditions throughout the years of a tree's life by cutting into the tree and analyzing a tree cookie.

UWSP and DNR researchers will analyze the chemical makeup of cross sections of lake sturgeon otoliths, particularly the center region referred to as the core. The core forms in the first year of the sturgeon's life and absorbs the chemical structure of the river water where the sturgeon hatched. The researchers will also analyze otoliths from age-0 (< 1 year old) lake sturgeon that have not left their natal river (Photo 2). The otolith from an age-0 lake sturgeon contains the environmental snapshot of where that fish hatched. Similarly, the core of an adult's otolith contains the environmental snapshot of where the adult hatched decades before.

Researchers will analyze the otoliths by vaporizing them with a laser and obtaining a chemical signature for each otolith. The chemical signature of an adult lake sturgeon otolith will be compared to the chemical signatures of the rivers (obtained through otoliths of age-0 fish that hatched in those rivers) and matched up to the river that has the most similar chemical signature. When an adult is matched to a river, that indicates that the fish hatched there, and that river will be called that fish's natal origin. This process will be repeated for the chemical signatures of otoliths from each of the harvested adult lake sturgeon to determine the natal origin of each adult.

This study is the first to use otoliths to identify the natal origins of lake sturgeon. Although some spawning sites are already known, otoliths will help identify new spawning areas and will help fisheries biologists manage and improve the habitat of rivers that are producing fish that survive to adulthood. Sustained conservation of the population will ensure that the long-standing tradition of lake sturgeon spearing in Wisconsin continues to be passed down through the generations.



Photo 1: Otoliths removed from an adult lake sturgeon that was harvested in 2018.

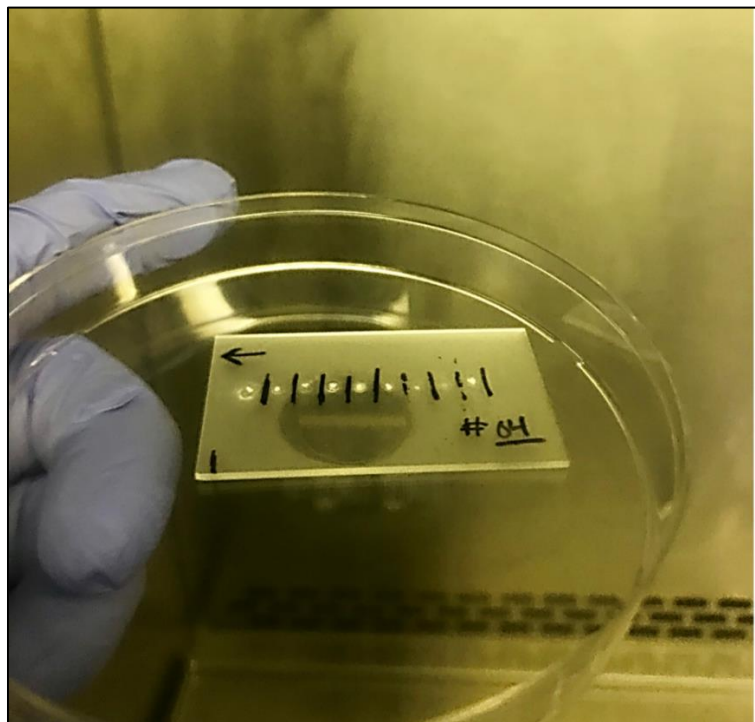


Photo 2: Otoliths removed from juvenile lake sturgeon collected during 2018 sampling.