

Age And Growth Research

Understanding fish ages is a critical aspect of fisheries management. The information provides DNR staff with data to generate population statistics such as growth, mortality, survival and maturity. These population characteristics help biologists make informed management decisions and detect any changes over time.

For many fish species, methods for estimating age are well known and validated. However, producing accurate and precise age estimates for lake sturgeon is more complicated. The most common method for aging lake sturgeon is to examine pectoral fin rays by taking a cross-section of the bone and looking at it under a microscope. Then the ring-like annuli are counted, just like aging a tree, with each ring representing a year.

On fast-growing fish such as walleye, this process works great. The annual rings become so tightly spaced in slow-growing fish like lake sturgeon that two rings can easily be mistaken for one. This often causes an underestimation in age and has been documented for Winnebago lake sturgeon, especially in fish older than 14 years old (Bruch et al. 2009).

Other research has explored using different bones to estimate lake sturgeon age. Still, these studies show that using different bones produces similar or even less accurate results than ages estimated using fin rays.

The DNR and the Wisconsin Cooperative Fishery Research Unit at UW-Stevens Point explored four alternative methods for estimating age and growth of lake sturgeon to improve age estimating accuracy.

The first alternative was the use of otoliths, or ear bones. Prior research on lake sturgeon age using otoliths was limited because removing this structure requires fish sacrifice, which is not an

option for most populations. However, winter spear harvest on the Winnebago System provides a unique opportunity to collect these structures from hundreds of harvested fish.

During the 2017 and 2018 spearing seasons, DNR staff asked successful spearers donate their sturgeon head for this research project. Over the project's two-year collection period, over 800 otolith pairs were collected. Once back in the lab, staff removed the skull cap from donated heads and extracted the otoliths. The research found that many otoliths were either too porous to estimate age or too cloudy to read. Although there was evidence that ages from otoliths may be more accurate than ages from fin rays, only 13% of otoliths could be aged.

The next two alternatives DNR and UWSP staff explored involved age correction methods. These methods are often used successfully for other fish species and were intended to use ages estimated from otolith sections to correct the ages estimated using fin rays. This would allow biologists to continue using fin rays to estimate fish age and then use the additional data to get closer to the actual age. The results ultimately did not yield older age estimates because of the small sample percentage of readable otoliths produced in the first alternative.

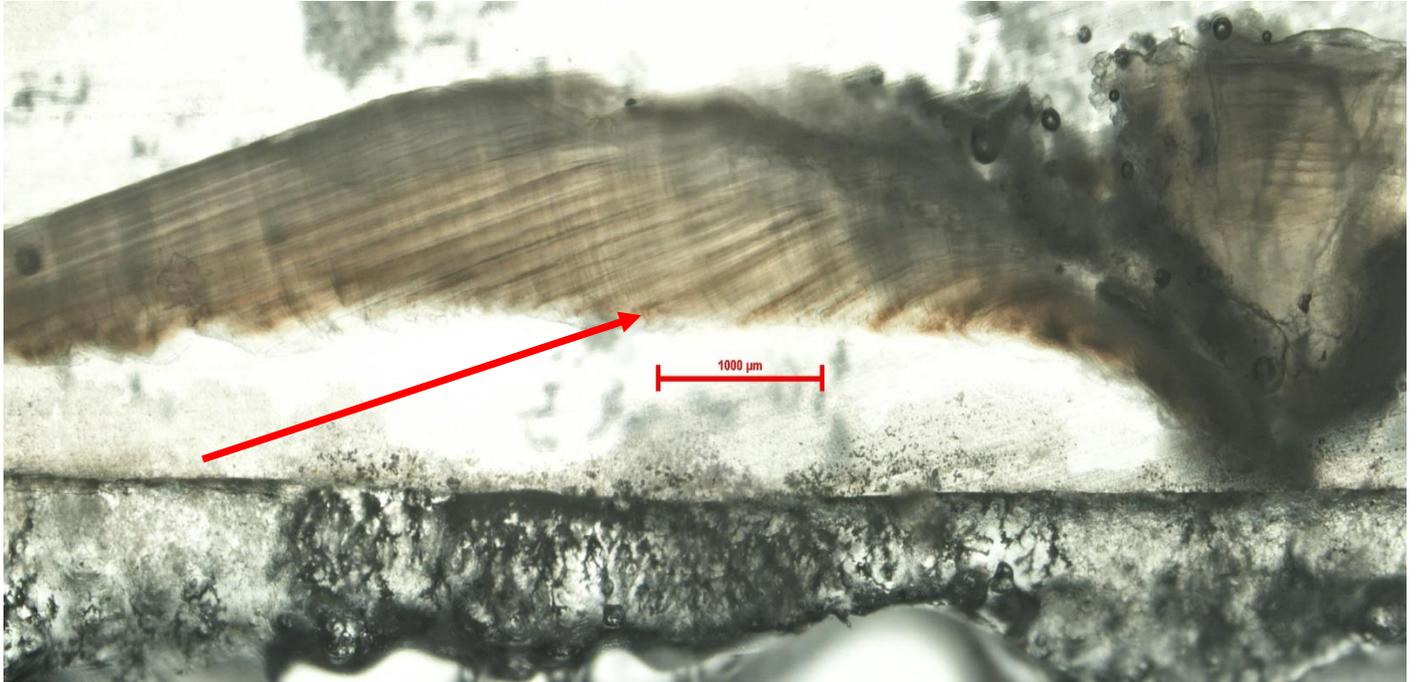
Not to be discouraged, DNR and UWSP staff began exploring a fourth method using mark and recapture modeling. This method requires biologists to record the length of a lake sturgeon when it is initially tagged and when it is recaptured in the future. Fish are often recaptured during spring spawning or the winter spearing harvest season. The measurements can then be compared to examine growth over time.

Fisheries biologists incorporated individual mark and recapture histories for over 7,000 fish into a model to estimate growth parameters for male and female lake sturgeon. Since the length of time between capture intervals is known, this method gave researchers more confidence in the accuracy of growth rates. While the process is still being refined, this final method appears

promising. Fisheries biologists will continue incorporating future mark-recapture data when estimating lake sturgeon age.



Cross section of a pectoral fin ray collected from a young (age-10) lake sturgeon. Annuli are clear and distinct. Single annulus denoted by red arrow.



Readable lake sturgeon otolith cross section. Annulus (year ring) denoted by red arrow.



Unreadable lake sturgeon otolith cross section. No annuli (rings) visible inside the section and structure is very porous.