

# Study uncovers hundred-year lifespans for three freshwater fish species in the Arizona desert

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A century-old buffalofish from Apache Lake, Arizona. Credit: University of Minnesota Duluth

A recent study has found some of the oldest animals in the world living

in a place you wouldn't expect: fishes in the Arizona desert. Researchers have found the second genus of animal ever for which three or more species have known lifespans greater than 100 years, which could open the doors to aging studies across disciplines, such as gerontology and senescence (aging) among vertebrates.

The study centers around a series of fish species within the *Ictiobus* genus, known as buffalofishes. Minnesota has [native populations](#) of each of the three species studied: bigmouth buffalo, smallmouth buffalo and black buffalo. The importance of this research is underscored by the fact that these fishes are often misidentified and lumped in with invasive species, like carp, and the fishing regulations in many places, including Minnesota, do not properly protect these species, and what could become a wealth of information about longevity and aging.

This new research from the University of Minnesota Duluth (UMD), [recently published in \*Scientific Reports\*](#), was a collaboration between Alec Lackmann, Ph.D., an ichthyologist and assistant professor in the Department of Mathematics and Statistics of the Swenson College of Science and Engineering at UMD; other scientists including from North Dakota State University; and a group of conservation anglers who fish the Apache Lake reservoir in Arizona.

"There is likely a treasure trove of aging, longevity and negligible senescence information within the genus *Ictiobus*," said Lackmann.

"This study brings light to this potential and opens the door to a future in which a more complete understanding of the process of vertebrate aging can be realized, including for humans. The research begs the question: What is the buffalofishes' fountain of youth?"

Lackmann has studied buffalofishes before, and [his research from 2019](#) went so far as to extend the previously thought maximum age of bigmouth buffalo from around 25 years of age to more than 100 years of

age by applying and validating a far more refined aging technique than had been used previously. Instead of examining the fish's scale, "you extract what are called the [otoliths](#), or earstones, from inside the cranium of the fish, and then thin-section the stones to determine their age," said Lackmann.

Approximately 97% of fish species have otoliths. They're tiny stone-like structures that grow throughout the fish's lifetime, forming a new layer each year. When processed properly, scientists like Lackmann can examine the otolith with a compound microscope and count the layers, like the rings on a tree, and learn the age of the fish.

Buffalofishes are native to central North America, including Minnesota, but those in this recent study were found in Apache Lake, a reservoir in the desert southwest. Originally reared in hatcheries and rearing ponds along the Mississippi River in the Midwest, the government stocked buffalofishes into Roosevelt Lake (upstream of Apache Lake), Arizona in 1918. While Roosevelt Lake was fished commercially, Apache Lake's fish populations remained largely untouched until anglers recently learned how to consistently catch buffalofishes there on rod-and-line.

When these catch-and-release conservation anglers noticed unique orange and black spots on many of the fish they were catching, they wanted to learn more about the markings, and found Lackmann's previous research. An Arizona angler, Stuart Black, reached out and invited Lackmann to a fishing expedition at Apache Lake, where the fish collected would be donated to science.

By studying the fishes collected at the angling event and analyzing their otoliths for age, Lackmann found that some of the buffalofishes from the 1918 Arizona stocking are likely still alive today, and that most of the buffalofishes in Apache Lake hatched during the early 1920s. More importantly, they discovered that the three different buffalofish species

found in the [lake](#) had ages more than 100 years. To their knowledge, such longevity across multiple freshwater [fish species](#) is found nowhere else in the world.

For Lackmann, there are exciting possibilities for the future of studying this unique group of fish, with far-reaching implications.

"These long-lived species of fishes and individuals could be monitored so that we can further study and understand their DNA, their physiology, their ability to fight infection and disease, and to compare these systems across the continuum of age," said Lackmann. "The genus *Ictiobus* has potential to prove of high value to the field of gerontology, and Apache Lake could become an epicenter for a variety of scientific research in the future."

**More information:** Alec R. Lackmann et al, Centenarian lifespans of three freshwater fish species in Arizona reveal the exceptional longevity of the buffalofishes (*Ictiobus*), *Scientific Reports* (2023). [DOI: 10.1038/s41598-023-44328-8](#)

Provided by University of Minnesota

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