

Researcher studies fish populations at world's second largest freshwater lake

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Fishermen pose with their sardine haul from East Africa's Lake Tanganyika. Catherine Wagner, a UW assistant professor in the Department of Botany and the UW Biodiversity Institute, is studying interactions between the biodiversity of Lake Tanganyika and the human communities that live around the lake. Credit: Catherine Wagner

A University of Wyoming researcher is studying fish populations—and

their relationship with local fishing communities—in Africa's largest lake.

Catherine Wagner, a UW assistant professor in the Department of Botany and the UW Biodiversity Institute, is studying interactions between the biodiversity of East Africa's Lake Tanganyika and the human communities that live around the lake. The work is conducted with the support of The Nature Conservancy and with collaborator Peter McIntyre, an assistant professor in the University of Wisconsin-Madison's Center for Limnology.

Lake Tanganyika is 418 miles long, almost a mile deep and holds 18 percent of the world's unfrozen surface freshwater.

"Many animals in the lake evolved there and are found nowhere else in the world," Wagner says. "They are endemic to the lake."

This holds true for the majority of the lake's more than 300 fish species. Wagner and colleagues are studying two species of endemic sardines, which are the most abundant fish in the lake's open water zone.

"My role in the project is to use genetics to understand spatial patterns within these fish populations," Wagner says. "We take samples from natural populations to see to what extent the lake is composed of single large populations versus very local populations. Although these fish are the main source of protein for the millions of people living around the lake, we know very little about their movement within this very large fishing area.

Understanding this basic biology is an important step toward ensuring that they can be sustainably managed."

Wagner says one species of sardine spawns in the lake's open water,

while another spawns near the shore.

Juveniles of both species live near the shore. Once mature, the fish move to the [open water](#). Sardines are the predominant source of protein for communities that live near the lake. Fishing at night, fishermen use large lift nets, and frequently pull up fish by the thousands in a single draw of the net.

"They (fishermen) take everything, including the Nile perch, which are the predators of the sardines," Wagner says. "The issue is that these catches have been declining. There is debate over whether the fish are declining due to overfishing, because the lake is warming, or both.

"Decreased catch rates have led to communities increasingly fishing near shore. In some places, they're catching the sardines as juveniles rather than adults," she says. "We are interested in what impact this has on the populations, and that we need to study the patterns of movement in juveniles and adults in the lake."

With this information, it may be possible to designate protected areas that are important for juvenile growth. To understand that dynamic, Wagner says researchers have to understand where the juvenile sardines are growing up or maturing, and the degree to which there is local adaptation within these populations.

"If we catch the fish in the north (part of the lake), are they coming from the shore as juveniles in the north, or have they grown up in many different areas of the near-shore zone?" Wagner asks. "We have no idea how much the fish move during their lifetimes, or if they return to spawn where they were born."

Within Mahale Mountains National Park boundaries (the park is located in Tanzania), there is a strictly enforced 'no fishing' policy. Those near-

shore areas within the park are being used as baselines to measure fish numbers, to compare with locations outside the park where fishing is allowed, Wagner says.

"One thing that is clear: Just from observing fish while snorkeling, there appears to be a much higher abundance of fish in no-fishing zones," Wagner says.

The Nature Conservancy, which funds the project called TUUNGANE, is working to understand the impacts of fishing on [fish populations](#) in the lake, and working with communities to develop plans that are beneficial for people and for sustainable biodiversity, Wagner says.

The lake's long history

Lake Tanganyika not only is the second largest freshwater lake in the world, but it also is the second oldest, dating 9 million to 12 million years old, Wagner says. Only Lake Baikal, in southeastern Siberia just north of the Mongolian border, is older and larger among freshwater lakes.

Both are considered rift lakes, meaning they are located in parts of the Earth that are splitting apart, Wagner says. Lake Tanganyika is bordered by four countries. Most of the eastern portion of the lake is located in Tanzania; the north bordered by Burundi; the western shore is the Democratic Republic of Congo; and the southern part of the lake crosses into Zambia. In addition to [fish](#), the [lake](#) is home to crocodiles, water cobras and hippos. During their sampling this past summer, Wagner and other researchers were primarily based in Kalya, a village located south of the national park. Julian Junker, a visiting researcher from EAWAG, the Swiss National Institute for Aquatic Science and Technology in Lucerne, Switzerland, says the political history of these countries has, in some places, directly influenced the amount of fishing occurring. In

Burundi, unrest during the last decades drove thousands of people away from the shores of Lake Tanganyika. When the situation stabilized, returning farmers, in some cases, shifted from farming to fishing.

"In 2003, there were 40,000 fishermen in the area," says Junker, who is assisting Wagner with this lab research. "In 2011, there were 95,000 fishermen."

Provided by University of Wyoming

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