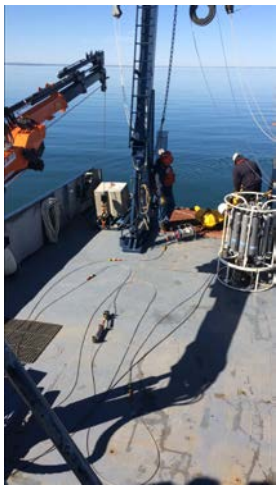
What can we hear in freshwater lakes?

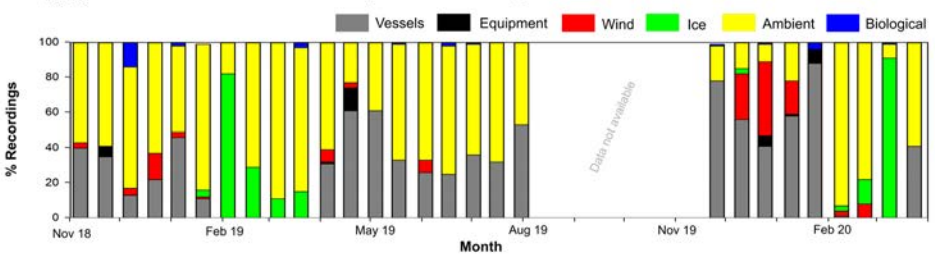


Underwater sound is used by aquatic animals to communicate, find prey, avoid predators, and navigate. Yet despite lakes and rivers being home to a diverse array of wildlife and a place for both recreational and commercial activities, little is known about the underwater soundscape of freshwater environments. To address this need, researchers at the University of Minnesota Duluth and the Large Lakes Observatory put an underwater microphone out in Lake Superior for 15 months (between November 2018 and March 2020) to explore the different sounds we can hear and compare seasonal trends (deployment pictured above).

Sound levels were much lower during the winter and spring months coinciding with ice cover and the annual closure of the nearby Twin Ports of Duluth and Superior. As shown in the figure, recordings also provided an insight into the diversity of sounds that are found in the freshwater soundscape with ice cracking, snow mobiles, ice augers and fish vocalisations identified in the winter. Whereas, in summer boat traffic dominated the soundscape, masking the detection of other sounds (Putland et al. 2022).

There is increasing concern about the effect of noise pollution from human activities on sound sensitive species and potential physiological and behavioural changes. Climate change is also expected to reduce ice cover and thickness potentially increasing the shipping season into the Twin Ports. Continued efforts to record baseline sound levels in freshwater environments and determining when, where and how often different animals are producing sound allows managers to prioritize acoustically sensitive times and areas and mitigate potential effects.

By Rosalyn Putland, Bioacoustician, Centre for Environment, Fisheries and Aquaculture Science, UK.



Thunderstruck: Using passive acoustics to eavesdrop on sturgeon spawning vocalizations

Lake sturgeon (*Acipenser fulvescens*) were once abundant in the Laurentian Great Lakes, but overfishing and habitat destruction led to dramatic declines in their population. Individuals of this keystone species are known for living up to 100 years, but these long life spans have kept their numbers low. Another obstacle to their recovery is their need for clean gravel substrates and fast currents for spawning beds, a habitat that is becoming harder to find. There have been encouraging efforts to improve water quality and establish new spawning beds in the Great Lakes, but it can still be difficult to tell where sturgeon might be breeding, especially in deeper waters.

Sturgeon use sound to communicate when spawning and male sturgeon produce what has been termed a "thunder" sound, a low-frequency rumble caused by vibrating their swim bladders. To monitor spawning sturgeon, we used underwater microphones (called hydrophones) to "eavesdrop" on sturgeon in the Detroit River (Higgs and Beach 2021). Our spawning bed was relatively quiet until water temperatures reached 15°C, after which there was an explosion of calling fish, with up to 45 fish calls/hour. The fish also seemed to prefer calling only during the day, going quiet each night. Interestingly, the fish also seemed to go quiet when a large ship passed overhead, highlighting the impact that increasing levels of sounds from human activity can have on our local fishes. There are many fish species that can vocalize, and their sounds can get picked up with consumer-grade hydrophones available for a reasonable price. Even GoPro cameras can pick up fish sounds. We encourage all fishers to bend an ear to our underwater world!

By Riley K. Beach, Grace M. Dycha, Rachel H. Pieniazek, and Dennis M. Higgs, University of Windsor. Illustration by Grace Dycha.

