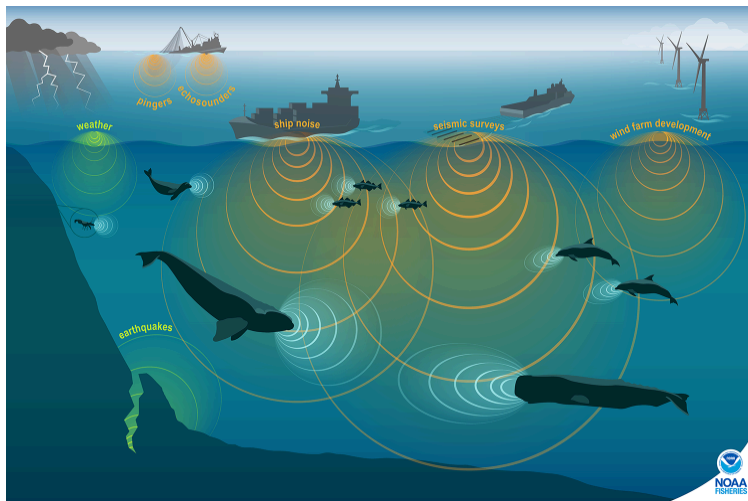


Hydroacoustics

Half of all the air we breathe we owe to ocean life, particularly phytoplankton and the nutrients from other marine animals they rely on (National Geographic). However, ocean life is under siege by sound. The BYU Hydroacoustics Lab has a solution.

In the ocean, there are several sources of active SONAR, both natural and manufactured. For instance, dolphins use high-pitched squeals to communicate with each other and locate food. These sounds are similar to the high notes that singers like Mariah Carey can hit. Communication among marine animals is vital for their survival.



Natural sounds from waves and other animals, along with some manufactured sounds from small boats and wind farms, create minimal disruption to the ecosystem. Large shipping boats and loud processes to find oil and map out the ocean floor, however, pose a greater risk.

The sound pollution caused by an increase in manufactured sound sources in the ocean is becoming a problem for marine life. In a Vox short documentary, experts explain that the ocean is getting louder and that this increase in noise endangers ocean life. Much of the sound interrupts wildlife communication. This disruption affects animals' ability to find food until they adapt, compromising many marine species.

Seismic survey machines pose an even greater danger, clearing entire sections of the ocean floor in seconds and endangering our oxygen supply for weeks or more with every instance. The machines used to find oil beneath the seafloor have 30–40 air guns firing simultaneously, creating a sound as loud as a jet takeoff as the boat moves back and forth over an area. The process creates a deafening blast that the machine measures to generate a map of the geologic structure beneath the ocean floor. Because of the large amount of acoustic energy, companies can use this data to locate fossil fuels beneath the ocean floor.

Companies may find plenty of ancient remains as fossil fuels, but with these seismic survey machines, living creatures are nowhere to be found. Large sections of the ocean become uninhabitable for weeks at a time. The sound permeates the ocean for up to 2500 miles, endangering countless marine species. Due to the sound pollution, animals are relocated, unable to communicate, and increasingly unable to fulfill basic needs. Whole sections of the ocean floor become hostile environments for ocean life we rely on, like phytoplankton, which produce half of Earth's oxygen supply.

The BYU Hydroacoustics Lab, led by Dr. Traci Neilsen, is changing the landscape for the better. Using microphones that simply listen and record sound, they record and analyze the sounds. Then, using machine learning, they achieve what only invasive sound machines have done before. Elaborate algorithms sift through background noise, temperature, and environmental changes to pinpoint animal and boat sounds and determine how they are changing. Using this data, the changes highlight the makeup of the ocean floor and enable the creation of full, detailed maps of the ocean floor with minimal to no impact on marine life.

With this creative, innovative solution, the BYU Hydroacoustics lab is changing what is possible: changing underwater mapping from invasive to harmless. Working with U.S.A. military and government organizations, the lab is establishing sound policies to protect the precious ocean life we rely on. Through their solution, they are making it possible for companies and governments to implement practical steps and adopt their innovative hydroacoustic analysis methods. Dr. Neilsen and her team are pioneering and advocating for changes that will protect the precious ocean life we rely on for every breath, every day.

Resources

[DOSITS Webinar by Dr. Neilsen on the Fundamentals of Underwater Sound](#)

[BYU Hydroacoustics Website](#)

[BYU Devotional by Dr. Neilsen describing her Research and the Messy Middle of Revelation](#)