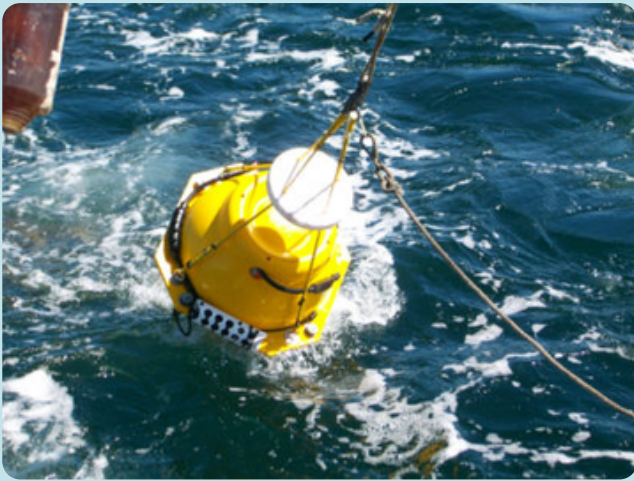


Seeing with Sound

Investigating the Soundscapes of Coral Reefs



Have you ever been told you can hear the ocean when you hold a shell up to your ear? Unfortunately, that is not the ocean - you are hearing the sound of air moving around the curved surfaces inside the shell (a lesson for another day), BUT like medical providers, scientists have special tools that help them listen to the sounds of the ocean.



A listening device is being deployed that will continuously listen for and record ocean sounds. Image Credit: Denise Risch, NEFSC/NOAA.



A researcher gets ready to launch an underwater vehicle called a "glider." The glider records all sounds as it follows a programmed path. Image Credit: Anne Smrcina, NOAA



A hydrophone is deployed on a tropical reef where restoration began three years previously in Indonesia. Image Credit: Tim Lamont



A biologist checks on one of the Marine Autonomous Recording Units (MARUs). Image Credit: NOAA (2021)

What We've Learned:

- Biologists use special tools to collect sound samples in the ocean.

LISTEN.
LISTEN...



Click the button to the left to listen to a sound sample collected from **Coral Reef A**. In the space below, describe the sounds you hear.

Click the button to the left to listen to a sound sample collected from **Coral Reef B**. In the space below, describe the sounds you hear.

Now, listen to the recordings again. Describe any differences you notice from the sound samples collected from Reef A and Reef B.

After listening and comparing the sounds from Reef A and B, what questions do you have? List your questions in the space below.

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After listening to the sound samples, look at the photos of the reefs below. What image is most like Reef A? What image is most like Reef B? **Explain your thinking.**



Blank space for writing an explanation for Image 1.

Blank space for writing an explanation for Image 2.

What We've Learned:

- Biologists use special tools to collect sound samples in the ocean.
- Healthy coral reefs sound different than unhealthy coral reefs.



But Why ?

Why do healthy coral reef ecosystems sound different than degraded reef ecosystems?

To answer this question, we must first know **HOW** we analyze sound in a natural environment.

Soundscape

You may have heard the term *landscape*, which refers to a place's physical (hills, water, rocks) and biotic (living) characteristics. Generally, you can see hills, dunes, trees, and rivers in a landscape.

Similarly, the mix of sounds you hear associated with a place are called the *soundscape*.

Sounds of a marine soundscape can be classified into three categories:

- **Biophony** the sound of marine life
- **Geophony** the sound of Earth's processes
- **Anthrophony** the sound of human activities

Collaborate: In your small group, think of sounds you might hear in or around the ocean. Use the chart on the right to categorize sounds based on their source (an example has been provided for each).

Biophony	Geophony	Anthrophony
Ex. Whales singing	Ex. Waves Crashing	Ex. Shipping Horn

What We've Learned:

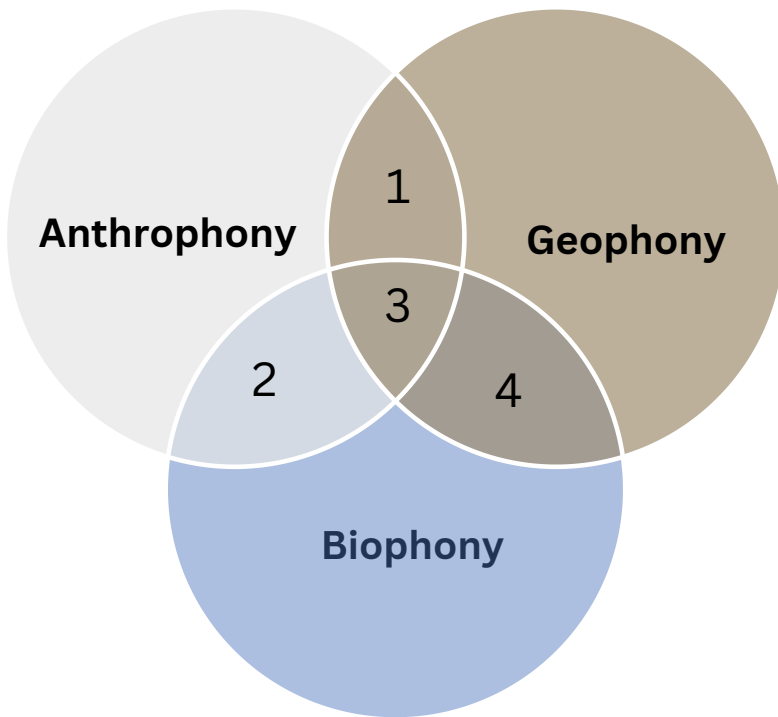
- Biologists use special tools to collect sound samples in the ocean.
- Healthy coral reefs sound different than unhealthy coral reefs.
- Sounds mix to create a soundscape and can be categorized by their source.



But Why ?

Why do healthy coral reef ecosystems sound different than degraded reef ecosystems?

Numbers on the Venn diagram represent sound samples obtained from different coral reefs. Apply what you know about the relationship between sound and coral reef health to answer the following questions.



What sample (provide the number) would you expect to come from the healthiest reef? Explain your thinking.

What sample (provide the number) would you expect to come from the most impacted reef? Explain your thinking.