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Listening to the Noise of the Deep Sea

NOAA Researchers Are Building a National Ocean Listening Network

Northeast Fisheries Science Center (NEFSC) researchers recently put five powerful recording instruments along the Northeast continental shelf break to listen to the sounds made by whales, dolphins and other marine species and to monitor ocean noise in general. It's part of a national effort to establish a network to monitor long-term changes in just how noisy the ocean is.

Five small autonomous instruments known as HARPs (High Frequency Acoustic Recording Package) were placed on the ocean floor in locations from Georges Bank to New Jersey. Like the musical instrument, these HARPs involve sound, but they record it rather than make it and they look very different. These devices are part of the Shelf Break Acoustic Ecology Project, funded by the Bureau of Ocean Energy Management. NOAA's Northeast and Southeast Fisheries Science Centers are focused on understanding biological activity along the shelf break before planned seismic exploration off the U.S East Coast.

"All of these instruments link the U.S. Northeast Passive Acoustic Sensing Network (NEPAN), which currently monitors marine mammals and fish from the northern Gulf of Maine to the New York Bight, to a new national listening network in waters around the U.S.," said Sofie Van Parijs, head of the passive acoustics research group at NOAA's Northeast Fisheries Science Center (NEFSC) laboratory in Woods Hole, Mass.

Van Parijs's acoustic team placed the HARPs while working from the 76-foot Research Vessel *Connecticut* in late April. Researchers recovered three HARPs that had been deployed since April 2015 in about 900 meters (roughly 3,000 feet) depth off Georges Bank and replaced them with new instruments. Two other HARPs were deployed for the first time in other locations along the shelf.

The five HARPs now in place are part of a network deployed from Georges Bank to Florida. When added to three additional HARPs deployed off the southeast U.S. coast they make up the Shelf Break Acoustic Ecology Project, alongside HARPs off Virginia, Cape Hatteras and Florida from part of a separate project involving Duke University and the U.S. Navy.

In addition to deploying the five HARPs, NEFSC researchers also recovered, refurbished and redeployed a NOAA Noise Reference Station in 3,000 meters (roughly 10,000 feet) of water. Noise reference stations listen to and characterize the ambient noise in the deep ocean as part of a much larger project being conducted by NOAA and the National Park Service called the U.S. Ocean Noise Reference Station Network.

Each station is deployed for one-to-two years before being recovered and redeployed. The data collected from the stations provide a baseline for what ocean sound levels are now, how they are changing over time, and how human activities are impacting marine life.

Ten noise reference stations have been operating in U.S. waters since March 2014. There are three off the U.S. East Coast: one in Stellwagen Bank National Marine Sanctuary, one off Georges Bank between the New England Seamounts, and one off Florida on Blake Plateau.

“The ocean noise reference station network will provide information on what the deep sound or SOFAR (sound fixing and ranging) channel off the Northeast sounds like, what a shallower sanctuary sounds like, and how sound conditions differ between regions around the country,” said Van Parijs. “This national network will help us fill in gaps of information and enable us to monitor long-term trends and changes in the underwater sound field.”

In addition to the HARPs and noise reference station buoys, a line of low-frequency marine acoustic recording units (MARUs), developed by Cornell University, are in place off the Northeast U.S. on the continental shelf to record the migratory movements and changing distribution of North Atlantic right whales and other baleen whales. The MARUs have been recording since October 2015 and will continue for three years.

Annamaria Izzi and Eric Matzen of the NEFSC’s Protected Species Branch deployed and recovered the HARPs and the noise reference station during the April 2016 cruise. Learn more about their adventure at NEFSC’s Field Science Blog (<https://nefsc.wordpress.com/>).

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Related links:

Passive Acoustic Research at the NEFSC: <http://www.nefsc.noaa.gov/psb/acoustics/>
NOAA’s Noise Recording Stations (NRS):

<http://www.nefsc.noaa.gov/psb/acoustics/psbAcousticsNRS.html>

High Frequency Acoustic Recording Package (HARP):

<http://cet.usd.edu/technologies/AutonomousRecorders.html>

U.S. Northeast Acoustic Network (NEPAN):

<http://www.nefsc.noaa.gov/psb/acoustics/psbAcousticsNEPAN.html>

Listening for Whales and Fish in the Northwest Atlantic Ocean:

http://www.nefsc.noaa.gov/press_release/pr2015/scispot/ss1504/

Sound Check: New NOAA Effort Underway to Monitor Underwater Sound:

<https://www.st.nmfs.noaa.gov/feature-news/acoustics>

NOAA Ocean Noise Reference Station Network: <http://www.pmel.noaa.gov/acoustics/ocean-noise-reference.html>

Discovery of Sound in the Sea:

<http://www.dosits.org/galleries/technology/observermarineanimals/archivalmarineacousticrecord ingunits/>