UNH Media Relations

UNH Researchers Using New Sonar Technology To Study Cod Populations

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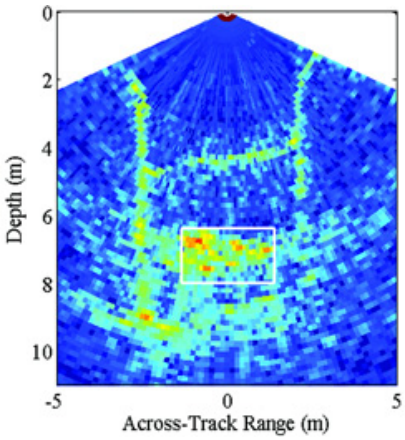
August 12, 2009



New multi-beam sonar uses a fan of 160 overlapping acoustic beams to detect cod in an underwater pen as part of a new UNH study. Photo credit: Chris Gurshin

DURHAM, N.H. - Sonar has long been vital to our understanding of seafloor features and marine creatures. Now, researchers at the University of New Hampshire are employing new sonar technologies to study imperiled cod populations in New England waters.

"Cod is considered the iconic species of the New England fishery," says Hunt Howell, UNH professor of zoology. "There are concerns about their population status, so using acoustic technologies can help researchers learn more about their abundance and habitat preferences."

Multi-beam sonar has been used to map ocean bottom characteristics, but researchers are now applying the technology to estimate cod abundance and spatial distribution. With funding provided by N.H. Sea Grant, Chris Gurshin, a Ph.D. candidate in zoology at UNH, is working with Howell to demonstrate the advantage of multi-beam sonar over more traditional methods of fisheries stock assessment.

Trawl surveys are typically used to determine fish abundance, but they can be time-consuming and relatively expensive. The data collected are only representative for a discrete point of time and limited to the sampled portion of the ocean bottom, Howell says. Using new acoustic technology allows researchers to cover larger areas at a presumably reduced cost because all the work is conducted remotely, he adds. Acoustic surveys can also eliminate the unintended mortality of fish that occurs during trawling.

Many fish species have a slightly different acoustic "signature" that distinguishes them from most other marine life and seafloor characteristics. Cod have been acoustically assessed by researchers in Norway and Canada using single beam sonar. Conversely, the multi-beam sonar used by Howell and Gurshin sends out a fan of 160 overlapping acoustic beams into the water column as far as a few hundred meters and provides a more thorough view of the abundance and location of cod.

Currently, there are numerous technological and analytical challenges associated with multi-beam sonar studies because there are many variables that can affect the acoustic estimate of fish abundance.

"When you get a large number of fish in spawning aggregations, for example, they're all heading in different directions," Howell says. "There is a lot of overlap so that the acoustic signal returning from them is not going to give you an exact picture because it's reflecting off multiple fish that are hidden behind one another. It's quite challenging."

Gurshin used the multi-beam sonar to collect data on acoustic backscatter from cod held in underwater pens and in open water. A known number and size of fish were placed in pens near the UNH open ocean aquaculture site and he used the sonar on a boat above to examine their acoustic signature. Gurshin is using these data to develop a statistical relationship that links acoustic backscatter to cod populations.

Howell and Gurshin previously conducted acoustic studies on cod in Ipswich Bay using multi-beam sonar in tandem with a trawling vessel to compare results. Although Gurshin is still analyzing the results, he expects the surveys will match one another closely.

"I'm excited to finish analyzing that data because I think it will prove valuable in describing the spatial distribution of cod during a known spawning event," Gurshin says.

Howell is currently working with Norwegian scientists to use multi-beam sonar to determine the biomass of fish in their commercial aquaculture pens. Closer to home, one of the newer NOAA research vessels, the *R/V Henry B. Bigelow*, is equipped with multi-beam sonar that was specifically designed for fisheries research.

"I think it's fair to say that using acoustical data is the future of stock assessments," Howell says.

The University of New Hampshire, founded in 1866, is a world-class public research university with the feel of a New England liberal arts college. A land, sea and space-grant university, UNH is the state's flagship public institution, enrolling 11,800 undergraduate and 2,400 graduate students.

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Image available to download: http://www.unh.edu/news/img/sonar.jpg
Caption: New multi-beam sonar uses a fan of 160 overlapping acoustic beams to detect cod in an underwater pen as part of a new UNH study.
Credit: Chris Gurshin