LIVING MARINE RESOURCES PROJECT 4

Demonstration of High-performance PAM Glider and Profiler Float

THE NEED

The Navy is responsible for compliance with a suite of Federal environmental laws and regulations that apply to marine mammals and other marine protected species, including the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA). As part of the regulatory compliance process associated with these Acts, the Navy is responsible for implementing a marine species monitoring program to assess potential impacts from Fleet and Systems Command (SYSCOM) military readiness activities involving active sonar and underwater detonations from explosives and explosive munitions. Passive Acoustic Monitoring (PAM) is a proven means of detecting and classifying vocally active marine mammals, as well as a number of fish species. PAM sensors can be moored, drifting, towed, or mounted on unmanned mobile platforms. The Navy needs to evaluate these various platforms to determine which ones best meet their monitoring objectives.

THE SOLUTION

This project will demonstrate two autonomous PAM platforms based on commercially available gliders and floats; platforms which would allow the Navy to cost-effectively monitor marine mammals anywhere in the world including remote and non-instrumented training areas.

THE METHODOLOGY

The signal processing system being utilized for this project was developed by Oregon State University with funding from the Office of Naval Research (ONR). This system has already been used with the APEX float from Teledyne Webb Research float in previous ONR-sponsored work.

This project team will demonstrate the APEX float as well as the Seaglider from Kongsberg. The marine mammal monitoring capabilities of these platforms will be compared to those of a bottom-moored High-frequency Acoustic Recording Package (HARP) at the Quinault Training Range (QUTR) in Washington State, and to the Marine Mammal Monitoring on Navy Ranges (M3R) system at the Southern California Offshore Range (SCORE).

An acoustic float descending.

Both the float and the glider are buoyancy-driven, deep-diving vehicles capable of descending to 1,000 meters (glider) and 2,000 meters (float). While gliders can be steered remotely, profiler floats simply drift with the ocean current. The advantage of the float lies in its comparatively low cost, approximately 25 percent of the cost of a glider. Although the two mobile platforms are acoustically quiet, there are differences in body shape, steering mechanism, water flow, pump

and motor activities, and internal electronics noise. These differences likely impact the passive acoustic performance of the systems and need to be examined and evaluated.

Floats can also be parked on the ocean floor for long periods of time. Preliminary results of Office of Naval Research (ONR)-sponsored tests at the Navy's Atlantic Undersea Test and Evaluation Center (AUTEC) and SCORE have revealed that this deep operational capability can result in increased beaked whale detection ranges. Therefore, an additional goal of this project is to provide a more robust acoustic data set for the presence, distribution and density estimation of beaked whales.

THE SCHEDULE

One of the first tasks that is being undertaken with this project is developing a communication protocol for use with the Seaglider and float. Once the interface is perfected, the Seaglider will be tested at the QUTR range. Data from this evaluation test will be analyzed and a report will be issued. In the second year, the Seaglider and float will be tested at the SCORE range, and a report will be compiled with the results of this effort. In addition, a comprehensive final report will be submitted in early 2016.

NAVY BENEFITS

This technology will enable the Navy to monitor marine mammals cost-effectively in areas of interest where cabled hydrophone arrays are not available or poor weather conditions prohibit ship-based visual observation (e.g., Marianas Islands, Gulf of Alaska). The instruments feature near real-time detection/classification capabilities and can relay information on the presence of marine mammals back to a control center onshore or a marine mammal observation team on a ship.

TRANSITION

A detailed report will be issued comparing the performance of these systems with the previously mentioned HARP and M3R systems. A detailed installation and user's guide will also be developed. This will allow potential end-users, including the Navy, to buy the PAM board and hydrophone and to send it to the corresponding manufacturers for installation on a float (Teledyne Webb) or a Seaglider (Kongsberg).

The Naval Facilities Engineering Command will likely be the first Navy user of this technology. The Principal Investigator has already received requests to conduct marine mammal glider surveys in remote areas off Guam/Saipan and the Gulf of Alaska. It is expected that the technology can be transferred into use for the Navy's marine species monitoring program.

ABOUT THE PRINCIPAL INVESTIGATOR

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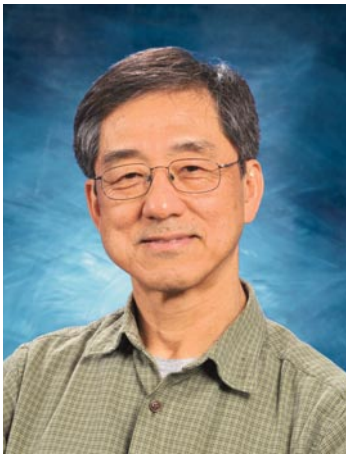

About the LMR Program

The Living Marine Resources (LMR) program seeks to develop, demonstrate, and assess data and technology solutions to protect living marine resources by minimizing the environmental risks of Navy at-sea training and testing activities while preserving core Navy readiness capabilities. For more information, contact the LMR program manager at exwc_lmr_program@navy.mil or visit www.lmr.navy.mil.