



LIVING MARINE RESOURCES PROJECT 57

Demonstrating Suction-cup Tag Systems to Support Behavioral Response Studies

NEED

Marine mammal tag technology to collect marine mammal movement, diving and acoustic data was previously developed by the Office of Naval Research (ONR) Marine Mammals and Biology program and tags have been used in several LMR projects. However, tag technology is constantly evolving with tag redevelopment or modifications being made to address identified technological issues. Such new and modified configurations of developed tags need to be demonstrated to ensure their robustness for Navy marine species monitoring applications.

SOLUTION

Digital acoustic recording tags (DTAGs) are bio-logging tags that are well suited for the study of free-ranging cetaceans, including delphinids, deep diving beaked whales and shallower diving baleen whales. Over multiple versions, these suction-cup attached tags have been a key technology for behavioral response studies (BRS). This project will demonstrate, maintain and iteratively improve the capabilities of existing state-of-the-art mixed-DTAG+ and integrated-DTAG systems.

METHODOLOGY

The project efforts will focus on six key DTAG capabilities:



Mixed-DTAG+ successfully attached to a male killer whale in Iceland in July 2021, using the aerial remote tag system (ARTS).

Nikolai Xuereb, Icelandic Marine and Freshwater Research Institute permit

1. Data quality

Systematically test DTAG core units to identify when failures occur and how to reduce their occurrence.

2. Real-time tag tracking via GPS-ARGOS signals received by a goniometer (direction and distance identification device)

Make and test changes to the goniometer antenna receiving system, the noise filtering systems in the antenna and the transmit ARGOS antenna to increase the reception range of tagged whales.

3. ARGOS-aided tag recovery

Evaluate how possible changes to the ARGOS transmit antenna could affect ARGOS transmission once the tag is floated after detachment.

4. Suction cup retention times

Suction cup sizes and materials will be evaluated for retention of the different tag configurations (e.g., existing mixed-DTAG+, smaller mixed-DTAG+, integrated DTAG)

5. Additional sensors

Two additional sensors will be evaluated on the mixed-DTAG+. One is a small video logger to enable observations of the prey field encountered by tagged whales. The second is a low-cost depth and acceleration logger as a backup device.

6. Tag size

Create and test a smaller version of the current mixed-DTAG+ design, for use with smaller animals (e.g., smaller killer whales and pilot whales).

Work will begin with the mixed-DTAG+, expected to be the primary tag used in a BRS effort in Norway. Results from the mixed-DTAG+ trials will then be used to improve design plans for the integrated DTAG. DTAG core units and integrated DTAGs will be provided by collaborators at the University of Michigan. The team will test iterative versions and conduct on-animal field test of the full suite of tag capabilities and will work with colleagues at the University of Iceland to use the resulting data to improve our understanding of the natural behavior of killer, humpback and pilot whales.

SCHEDULE

Started in 2022, the project is slated to be completed by the end of 2025. Testing will be conducted during field trials in Iceland in each of the first three years.

NAVY BENEFITS

Project efforts will provide critical validation of and improvements to the mixed-DTAG+ and integrated DTAG, which are significant technologies supporting multiple Navy-funded marine mammal research and monitoring projects. A smaller version of these suction-cup attached tags will also extend tag use to smaller animals (e.g., young killer whales), increasing the range of animals that can be studied within behavioral response studies. Results of these types of studies provide valuable data for Navy environmental compliance efforts.

TRANSITION

Tested and improved mixed-DTAG+ and integrated DTAG versions will be made available to the multinational 3S (Sea mammals, Sonar, Safety) project (see the fact sheet on LMR project number 29, 3S3: Behavioral Responses of Cetaceans Naval Sonar, for information on the 3S3 project). As new improvements are validated, the project will make new tags available to researchers that are interested in using the tags. Peer-reviewed publications will be produced during the project.

ABOUT THE PRINCIPAL INVESTIGATOR

Patrick Miller is a professor and senior research fellow at the University of St Andrews Sea Mammal Research Unit. Professor Miller has more than 25 years of cetacean research experience and 22 years of experience working on various BRS projects. He holds a Ph.D. in biological oceanography from the Massachusetts Institute of Technology and Woods Hole Oceanographic Institution joint program.

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 exwc.navfac.navy.mil/lmr.

