LIVING MARINE RESOURCES PROJECT 58

Bryde's Whale Cue Rates and Kinematics

NEED

The Navy is interested in developing methods to improve the efficiency of processing and analyzing marine species data and providing cost effective solutions to enhance marine species monitoring capabilities (e.g., detection and classification algorithms, Passive Acoustic Monitoring automated processing tools, statistical methods).

Bryde's whale.
Gregory S. Schorr, permit 16111

SOLUTION

This effort will develop information needed to determine the feasibility of using animal cue rate (calling rate) and the cue stability for acoustic density estimation. The project team at Naval Information Warfare Center (NIWC) Pacific will modify and apply passive acoustic monitoring (PAM) tools that they previously developed to long-term recordings (from 2011–2022) from Pacific Missile Range Facility (PMRF). The work will focus on determining the animal cue rate and the cue stability of Bryde's whales (*Balaenoptera edeni*). Tracking kinematics (swimming behaviors) will also be analyzed and reported. Because the swimming behavior of Bryde's whales is poorly understood, the additional data on this species' movements will help inform models that require such information (e.g., ship-strike risk and sonar exposure models).

METHODOLOGY

The team will apply their PAM tools to PMRF datasets that span a decade to investigate the vocalizations and cues rate of Bryde's whales and to compare the cue rates over time and kinematic behavioral state. Work will include manually validating Bryde's whale calls previously identified in the datasets. The results from the analyses will also be compared to published cue rates to assess stability over time, location or population. The track kinematics will be examined against environmental variables such as time of year, season, wind and wave data, and against other situational data (such as distance to the nearest calling Bryde's whale).

Additional analyses will include trying to identify various Bryde's whale call types (such as the newly discovered "biotwang" recorded in the Mariana Archipelago) and comparing results against call rates found in other regions. If the cue rates from different regions are similar, it will increase confidence that these and other previously estimated cue rates can be broadly applicable.

If results from this work determine that a cue rate can be established for Bryde's whales and remains fairly stable, then this can be used to calculate animal density for this species from passive acoustic monitoring data.

SCHEDULE

Tool modifications and dataset analyses will be completed by September 2023.

NAVFAC Naval Facilities Engineering Systems Command
EXWC Engineering & Expeditionary Warfare Center

Bryde's whale.
Wayne Hoggard, NOAA

NAVY BENEFITS

This information can support environmental compliance assessment monitoring for Navy ranges. Understanding Bryde's whale vocalization and movement behavior will also help the Navy to better understand the group that spends time at PMRF and how that is related to other Bryde's whales in the Pacific.

TRANSITION

Results will be shared through publications on Bryde's whale call rates and kinematics and in conference presentations.

ABOUT THE PRINCIPAL INVESTIGATOR

Tyler Helble is a bioacoustics scientist and electrical engineer at the Naval Information Warfare Systems Center, Pacific. Dr. Helble earned his Applied Ocean Science Ph.D. at the University of California San Diego. His main area of focus is developing tools for detection, classification, localization and density estimation of cetaceans using passive acoustics.

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.