

Environmental Studies Program: Ongoing Studies

Study Area(s): Mid-Atlantic (Offshore Maryland)

Administered By: State of Maryland, Department of Natural Resources

Title: Determining Offshore Use by Marine Mammals and Ambient Noise Levels Using Passive Acoustic Monitoring

BOEM Information Need(s) to be Addressed: Geographic information describing marine mammal presence, distribution and seasonality is needed for siting and environmental permitting of offshore wind energy projects under the National Environmental Policy Act. In addition, in order to fulfil consultation requirements under the Marine Mammal Protection Act and the Endangered Species Act, BOEM needs data to understand the potential impacts from underwater noise that may occur during activities related to the development of offshore wind energy facilities upon marine mammals and other aquatic species, as well as information regarding baseline noise levels and empirical operational acoustic data.

Total Cost: (in thousands) \$2,104

Period of Performance: FY 2014-2019

Conducting Organization(s): University of Maryland Center for Environmental Science and Bioacoustics Research Program, Cornell University

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Description:

Background: While there are marine mammal data collection efforts ongoing currently, including the Atlantic Marine Assessment Program for Protected Species (AMAPPS) (funded by BOEM), the Biodiversity Research Study (funded by DOE), and the Virginia Aquarium study (funded by VA), these studies suffer from the traditional detection biases of limited duration and geographic coverage. To help fill the gaps, the State of Maryland expressed interest in collaborating, and cost-sharing, with BOEM on a passive acoustic monitoring study for the offshore Maryland Wind Energy Area (WEA). Passive acoustic recordings allow for continuous monitoring of sound producing animals and can provide information on the daily cycles of behavior, habitat use and regional distributions of marine animals, as well as provide information on inter-annual and seasonal variation. Using three types of sound recording devices that will encompass a range of frequencies will enable the detection of vocalizations from large whales (low frequencies) and small cetaceans (mid to high frequencies) continuously over long time periods. This baseline data on marine mammals and ambient noise levels, as well as operational activity acoustic data, will be useful to BOEM and developers during the offshore wind energy leasing process and the subsequent construction and operation phases.

Objectives: The goals of this research are to provide an assessment of the species composition and geographic distributions of marine mammals present in the vicinity of the Maryland WEA and to provide a baseline of ambient underwater noise. Passive acoustic monitoring (PAM) can provide species presence information, and by using a grid-configured array, recording units can also provide location information via triangulation. Thus, with sufficient data, PAM can be used for presence-absence modeling and location-based analyses.

Methods:

- Produce a database of the temporal occurrence and spatial distributions of vocalizing marine mammals (including right whales, fin whales, humpback whales, minke whales and any small cetacean species) identified using a combination of automated call detection software and expert human validation,
- Estimate specific spatial locations and movements of North Atlantic right whales within and near the Maryland WEA, using an acoustic localization array,
- Undertake statistical analysis of location data, and
- Develop spatially explicit noise statistics to define baseline levels of underwater ambient noise.
- Collect operational acoustic data during high resolution geophysical surveys and meteorological tower installation conducted by U.S. Wind in the Maryland Wind Energy Area.
- Analyze SM3M hydrophone data to identify the timing of the HRG survey events and linking them to the corresponding time period for the dolphin detections from the C-PODs.

Current Status: Data is being analyzed to look at the effects of storm events on dolphin occurrence and behavior; dolphin foraging behavior and dolphin whistle characteristics and feed behavior in relation to ambient noise levels. Additionally, the data is being analyzed for temporal patterns in large whale detections, and related large whale detections to environmental variables. Location estimates have been calculated for approximately 282 North Atlantic right whale calls (25% stratified sampling) within and outside of the WEA. When considering the average monthly percent acoustic presence in the array, North Atlantic right whale vocal presence increased from November 2016 – January 2017. Vocal presence was at its highest levels in January 2017 (60.7%) and sharply decreased in February 2017 (2.4%). Right whale vocal presence was detected at low levels from March 2017 – May 2017, and increased to 27.8% in June 2017. No humpback vocal presence was found in June 2017. During the winter months (January-March), there was an increase in presence that peaked in spring (April-June), with the highest average monthly percent presence occurring in April 2017. Monthly presence of minke whales was 14.3% during April 2017 at the most eastern offshore site. Within the array, minke whales were only detected during March and April 2017, all months with <5% average monthly percent presence. Fin whale

analysis for the 14th January 2017 – 14th June 2017 deployment is currently in progress. Future analysis of the 14th January 2017 – 14th June 2017 deployment data will continue to elucidate patterns of presence within and surrounding the Maryland WEA. The 12th June – 24th November 2017 acoustic data is currently being analyzed for whale occurrence.

Average broadband noise levels were consistently highest along the eastern edge of the WEA, as well as offshore of the WEA during the 14th June 2017 – 23rd November 2017 deployment. This trend also occurred across all seven deployments.

Currently this study is on schedule with all analyzes based on the data collected. The postponed November 2017 cruise to recover instruments at the C-POD sites occurred in April 2018.

The C-POD detection validation manuscript was revised and resubmitted in response to reviewer comments.

Final Report Due: November 30, 2018

Publications Completed:

Wingfield, J.E., M. O'Brien, V. Lyubchich, J.J. Roberts, P.N. Halpin, A.N. Rice and H. Bailey. 2017. Year-round spatiotemporal distribution of harbour porpoises within and around the Maryland wind energy area. PLoS ONE 12(5): e0176653.
<https://doi.org/10.1371/journal.pone.0176653>.

Affiliated WWW Sites:

<https://marinecadastre.gov/epis/#/search/study/100069>

<http://www.umces.edu/cbl/project/monitoring-impact-offshore-wind-power-marine-life>.

Revised Date: July 31, 2018