Environmental Studies Program: Ongoing Study

Field	Study Information
Title	Establishing the Partnership for an Offshore Wind Energy Regional Observation Network (POWERON)
Administered by	Center for Marine Acoustics
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Procurement Type(s)	Contract
Conducting Organization(s)	Coastal States Stewardship Foundation
Total BOEM Cost	$4,699,836
Performance Period	FY 2024–2028
Final Report Due	9/30/2028
Date Revised	10/14/2024
Problem	Offshore wind development may affect the distribution and behavior of baleen whales.
Intervention	A large-scale passive acoustic monitoring network will monitor for potential changes in baleen whale presence and vocal behavior over space and time.
Comparison	We will compare baleen whale call rates and call presence before and after wind farm construction.
Outcome	We will understand whether baleen whales have changed their distribution, movement, and behavior as a result of offshore wind development, or another existing stressor.
Context	Atlantic OCS, but lessons learned would be translatable to other regions.

BOEM Information Need(s): There are many questions regarding the potential impacts of offshore wind development on marine species. For example, will the presence of this new infrastructure result in measurable changes to the distributions of marine species? Will some species be attracted to the structures, while others may avoid them? BOEM is required to assess and monitor the impacts of its permitted activities on marine species, to better inform future leasing decisions and to ensure compliance under the National Environmental Policy Act. Given the critically endangered status of the North Atlantic right whale (NARW), whose migratory corridor overlaps with some of the most reliable wind resources on the Atlantic Outer Continental Shelf (OCS), one driving question has garnered significant attention: will there be a measurable change in baleen whale distributions as a result of offshore wind development? This proposed study will use passive acoustic monitoring (PAM) as a tool to monitor large-scale, long-term presence of baleen whales throughout the Atlantic OCS. It will also allow for long-term measurements of the acoustic environment to understand the contributions of anthropogenic noise sources over space and time.

Background: The Regional Wildlife Science Collaborative for Offshore Wind (RWSC) was established in 2021 to serve as a coordinating body for a range of stakeholders interested in answering scientific questions about offshore wind and wildlife. They have representation from the federal, state, industry, and NGO sectors, and subcommittees for each taxonomic group with academic expertise. Given that PAM is a common tool among marine mammal scientists, much of the focus of the Marine Mammal Subcommittee thus far has been on PAM: data collection, management, and analysis.

The RWSC has convened multiple workshops in which stakeholders have discussed the opportunities and research questions that could be addressed by establishing a PAM network (Van Parijs et al 2021), and they also commissioned a power analysis to help develop an optimal PAM design (Chudzinska and Thomas 2023). Recently, the RWSC convened several stakeholders who currently have funding available to support this effort, and as a result there is a strong appetite for collaboration and resource-sharing. BOEM, with its earmark funding from the Inflation Reduction Act (IRA), will be one piece of a larger effort to address research questions using PAM.

While some other partners are focusing on single-channel hydrophone units, BOEM is considering the inclusion of directional/vector sensors or hydrophone arrays at certain strategic locations. Directional/vector sensors detect particle velocity or particle acceleration, which provide information on signal directionality in additional to amplitudes. Hydrophone arrays can increase the signal-to-noise ratio (SNR) by using beamforming, which increases the radius of detection of animal calls. Both vector sensors and hydrophone arrays can also be used to localize vocalizing marine mammals, thus providing information on animal movement, numbers, and calling behavior. Finally, information gained from these sensors can also be used to estimate marine mammal densities, thus providing answers to potential population-level changes.

Objective(s): The objectives of this study are: (1) Establish and run a program for PAM in the Atlantic OCS, with a specific focus on areas near windfarm development; (2) Obtain first-order data products from PAM deployments, ensure that the data products are of high scientific quality, are consistent across projects, and are made publicly available through appropriate data portals and archives; 3) conduct a multivariate analysis that uses PAM data products along with other oceanographic data to tell a more complete story about baleen whale movements and behaviors.

Methods: This study will establish and maintain the Partnership for an Offshore Wind Energy Regional Observation Network (POWERON) initiative through coordination and implementation of all BOEM-funded PAM efforts in the Atlantic OCS. Through coordination and communication with existing PAM operators and researchers, the study will identify key priority areas where additional PAM is needed and create a deployment plan. This study will implement PAM through equipment acquisition, deployment, maintenance, and data collection. Finally, the study will analyze acoustic data collected from acoustic arrays and directional sensors to achieve the objective of understanding of baleen whale presence, distribution, movement, and behavior in relation to offshore wind development.

Specific Research Question(s):

1. Do baleen whales avoid windfarms once they are operational? Alternatively, are they attracted to these areas? Or is there no change?
2. *If* there is a measurable change in baleen whale distributions across the Atlantic OCS, can we derive whether this change was due to offshore wind development or a different ongoing stressor?

3. Assuming that the structure provided by turbine foundations attracts fish communities, can this process of “settlement” be documented using PAM? How long after a windfarm is constructed do soniferous fishes to settle in the area?
4. What are the general characteristics and long-term trends of the underwater soundscape in the study area? In particular, what is the contribution of anthropogenic noise sources (e.g., turbine operations, maintenance vessels) to the underwater soundscape within windfarm areas?
5. What are the propagation characteristics of sound sources associated with offshore wind operations? i.e., at what distance are certain sound sources no longer audible?
6. Are there observable changes in acoustic behavior and/or behavioral ecology of baleen whales?

Current Status: The contract is awarded and the kick-off meeting was held on October 16, 2024. In December 2024, additional IRA fund of $700 K was added to expand the sampling efforts of PAM with additional sensors.

Publications Completed: “N/A”

Affiliated WWW Sites: www.rwsc.org

References:

Van Parijs, S.M., Baker, K., Carduner, J., Daly J., Davis, G.E., Esch, C., Guan, S., Scholik-Schlomer, A., Sisson, N.B. and Staaterman, E. (2021) NOAA and BOEM Minimum Recommendations for Use of Passive Acoustic Listening Systems in Offshore Wind Energy Development Monitoring and Mitigation Programs. Frontiers in Marine Science, 8:760840, 18pp. DOI: https://doi.org/10.3389/fmars.2021.760840

Chudzinska, M. and Thomas, L. 2023. Power analysis for optimal design of a passive acoustic monitoring network for US East Coast offshore wind. Sterling (VA): U.S. Department of the Interior, Bureau of Ocean Energy Management. 89 p. Report No.: OCS Study BOEM 2023-041.