

Environmental Studies Program: Studies Development Plan | FY 2025–2026

Field	Study Information
Title	Behavioral Response Workshop for North Atlantic Right Whales (AT-25-02)
Administered by	Office of Renewable Energy Programs
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Procurement Type(s)	Contract
Performance Period	FY 2025–2027
Final Report Due	TBD
Date Revised	February 12, 2024
Problem	A sensitivity analysis on model parameters needs to be conducted on an existing bioenergetics model for North Atlantic right whales to better understand the critical model parameters driving population impacts. An expert elicitation needs to be conducted to improve behavioral response assumptions in the model that direct the energetic consequences of disturbance in the model.
Intervention	Convening a sensitivity analysis and behavioral response workshop for a recently developed predictive model for the bioenergetic consequences of behavioral disturbance, and identifying future research and monitoring needs will address improve the model.
Comparison	Compare the population model parameters to the most current information and expert elicitation on model parameters.
Outcome	A review of a recently developed predictive bioenergetic model will improve the model and provide a sensitivity analysis of the most important variables in the model.
Context	Atlantic

BOEM Information Need(s): BOEM needs to synthesize the state of the science for behavioral responses in rights whales and conduct an expert elicitation on some key model parameters as they relate to offshore wind. This will help BOEM make the requisite environmental impact assessments and mitigation recommendations and/or requirements as mandated by the National Environmental Policy Act and help BOEM meet its requirements under the Endangered Species Act and the Marine Mammal Protection Act as applied to critically endangered North Atlantic right whales (*Eubalaena glacialis*).

Background: Disturbance to wildlife populations can have repercussions on individuals. These non-lethal disturbances could result in effects that potentially have population-level consequences on marine mammals (Booth et al. 2014; Farmer et al. 2018; King et al. 2015; Natural England 2017; Pirodda et al. 2015; Costa 2012; Noren et al. 2009; Pirodda et al. 2019; Van der Hoop et al. 2017; Villegas-Amtmann et al. 2015). In 2022, an online expert elicitation exercise was carried out under BOEM contract 140M0121C0008 to estimate a dose-response function for critically endangered North Atlantic right whales exposed to pile-driving noise during offshore wind farm construction. The behavioral response function quantifies the probability that an individual right whale will cease foraging for the duration of pile driving activities. This function was applied to a model built on the population consequences of

multiple stressors (PCoMS) framework. These behavioral response assumptions drive the energetic consequence calculations of the model. However, the elicitation that resulted in the development of this function highlighted information gaps in our understanding of the behavioral responses of right whales to impulsive noise sources. Although much of this uncertainty is driven by a lack of empirical data, the elicited dose-response function may be improved through expert opinion on certain model parameters. While BOEM works on closing these information gaps, the model would benefit from the following additional work, including but not limited to:

- Response scenarios for foraging disturbance based on the project design envelope of likely constructions scenarios.
- The "average" response of an individual during different behavioral states during noise exposure regardless of where on the behavioral response curve exposure occurs.
- Differences in behavioral response between different age classes or health condition.
- Changes in behavioral response over time or number of exposures.
- Other factors identified in coordination with BOEM.

A follow-up elicitation should therefore be conducted to address limitations, and where solutions are identified, produce a revised dose-response function that better reflects the complexities of right whale behavior and the range of scientific opinions on their sensitivity to piling noise. A combination of virtual and in-person elicitations should be conducted over multiple sessions to provide experts ample time for deliberation and function development. The revised dose-response function could readily be integrated into the existing predictive bioenergetic model to expand on previous BOEM funding investment.

Objective(s): The objective of this study is to conduct a sensitivity analysis of the existing predictive bioenergetic model and conduct an expert elicitation workshop on behavioral responses in North Atlantic right whales.

Methods: The analysis and elicitation workshop should be developed through the best available information from peer reviewed literature, gray literature, and expert elicitation. This model must be peer-reviewed and developed collaboratively with partners such as BOEM, NOAA, marine mammal physiologists, and population modelers.

Specific Research Question(s):

1. How much bioenergetic disturbance is required to result in an individual fitness-level impact during migration, feeding, displacement, or nursing of calves?
2. How can non-lethal impacts of disturbance be incorporated into existing population models to assess a population-level consequence?

Current Status: N/A

Publications Completed: N/A

Affiliated WWW Sites: <https://boem-wind.wp.st-andrews.ac.uk/>

References:

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