Environmental Studies Program: Ongoing Study

Title	Evaluating the Accuracy and Detection Range of an Autonomous Real Time Whale Detection Buoy in the Massachusetts Wind Energy Area (NSL #NT-17-x21)
Administered by	Office of Renewable Energy Programs
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Conducting Organizations(s)	Massachusetts Clean Energy Center
Total BOEM Cost	$99,958
Performance Period	FY 2017–2019
Final Report Due	July 2019
Date Revised	May 15, 2019
PICOC Summary	
Problem	During pile driving for the installation of offshore wind foundations, intense sound is generated that potentially will have negative impacts on marine mammals. Novel mitigation measures are needed to address reducing the potential for impact.
Intervention	By using real-time acoustic monitoring, whale presence can be detected and operations can pause until the whale has left the area.
Comparison	Currently, marine mammal observers are used to detect whale presence. Often whales are not visible, so alternate methods are needed.
Outcome	The development of acoustic monitoring will reduce the impacts of sound on whales.
Context	Offshore wind development is anticipated along the entire Atlantic Coast over the next 20 years.

BOEM Information Need(s): Under the Marine Mammal Protection Act, BOEM has the responsibility to mitigate potential effects from offshore wind development and to ensure that the development reduces harm to marine mammals. Sound generated during the construction of offshore wind facilities may exceed threshold levels for the protection of marine mammals out to some distance. As part of mitigation, industry is required to cease operations should marine mammals be observed within a zone defined by the threshold. However, marine mammals are generally below the surface, where the cannot be observed by visual means, so alternate methods such as passive acoustic monitoring may prove more effective as a mitigation.

Background: During activities that produce sound that may potentially harm marine mammals, mitigation measures include posting of marine mammal observers who can stop operations when whales are in the area. There are limitations to this methodology because observations cannot be made at night and whales spend most of their time below the surface. To augment these observations, the use of passive acoustic

monitoring has been proposed. For this method to be useful, the detection must be made and communicated in real time, not days, weeks, or months later.

The Woods Hole Oceanographic Institution (WHOI) has developed technology to detect, classify, and report the sounds of large whales in near real time from a variety of autonomous platforms, including moored buoys. The system can detect four species of whales, humpback, sei, fin, and North Atlantic right whales. The system was initially deployed in 2015-2016 and collected some baseline data. However, questions as to the accuracy of the system and the detection range are still unanswered. Through this proposed work, the system will be redeployed along with additional hydrophones to address the accuracy and detection. The proposed work will be co-funded with the Massachusetts Clean Energy Center. In addition, NOAA Northeast Fisheries Science Center has funded the preparation, deployment, operation, and recovery of the buoy in support of the Coast Guard, which will defray costs for this effort. The buoy is located in the Massachusetts Wind Energy Area and therefore data from the buoy is of great interest to BOEM.

Objectives: The objective is to improve the capability of real-time monitoring using passive acoustics for four whale species. The study will: 1) evaluate the accuracy of near real-time estimates of whale occurrence (presence/absence); and 2) estimate the detection range for the four large whale species monitored by the system.

Methods: The accuracy of the near real-time estimates of whale occurrence will be assessed in two ways: (1) comparing near real-time occurrence estimates to simultaneously collected audio, and (2) comparing near real-time occurrence estimates to visual observations of large whales collected by aerial surveys in the region. Hydrophone arrays will be placed near the buoy to simultaneously collect whale vocalizations and compare. Surveys from the area were conducted by the New England Aquarium and funded by Mass CEC and BOEM will be used to cross-check with recorded whale calls. Oceanographic parameters will be collected to aid in the data evaluation. Detection range will be evaluated from the hydrophone system and the use of call backs.

Specific Research Question(s): Can acoustic measurements be made in real-time to use for prevent impacts to whales during pile driving?

Current Status: The whale detection buoy was deployed and recovered. The collected data is being analyzed. A final report is in preparation.

Publications Completed: None.

Affiliated WWW Sites: None.