ACCESS NUMBER: 00055

STUDY TITLE: Characterization and Potential Impacts of Noise Producing Construction and Operation Activities on the Outer Continental Shelf

REPORT TITLE: Characterization and Potential Impacts of Noise Producing Construction and Operation Activities on the Outer Continental Shelf: Data Synthesis

CONTRACT NUMBER: M10PC00055

SPONSORING OCS REGION: Gulf of Mexico

APPLICABLE PLANNING AREAS: Mid- and North Atlantic

FISCAL YEARS OF PROJECT FUNDING: 2009-2014

COMPLETION DATE OF REPORT: June 2014

COSTS: **$**494,525.35

PROJECT MANAGERS: S. Carr, B. Martin, D. Zeddies, J. MacDonnell, J. Vallarta, and J. Delarue

AFFILIATION: JASCO Applied Sciences

ADDRESS: 202 - 32 Troop Ave., Dartmouth, NS, B3B 1Z1 Canada

PRINCIPAL INVESTIGATORS*: S. Carr, B. Martin, D. Zeddies

KEY WORDS: wind energy, ambient sound, Delaware Bay, Nantucket Sound, acoustic

BACKGROUND: The renewable energy industry is rapidly evolving in the face of changing energy markets, technologies, and governmental policies. Currently, wind is of the greatest interest because of its proven technology; however, planning for this future cannot be based on past experience alone. Limited ocean-based renewable energy development has occurred world-wide and this has been primarily wind power, located offshore Europe.

Renewable energy projects link to an electricity market that is very different from the petroleum-based industry BOEM manages under the Outer Continental Shelf (OCS) Lands Act. These projects will also have very different potential environmental effects and operational needs from offshore petroleum projects. Based on current expressions of industry interests, BOEM expects that most, if not all, renewable energy projects and activities in the foreseeable future will focus on portions of BOEM Atlantic OCS. These are frontier areas with no current renewable energy operations.

Constructing offshore renewable facilities will introduce a considerable amount of noise into the marine environment for a period. To better understand the cumulative effects of noise from renewable construction and development activities on the OCS, BOEM will

conduct a study to characterize all aspects of noise-producing activities during the construction and operation of an offshore wind facility.

BOEM needs to understand the zone of influence from sound generated by these activities and to measure existing ambient noise levels in order to determine potential impacts (behavior, number of species present during activities, etc.) to marine mammals, sea turtles, fish, and the surrounding habitats.

OBJECTIVES: JASCO was contracted to record and analyze acoustic data near the Cape Wind site in Nantucket Sound, and at a lease site under consideration by Bluewater Wind in offshore Delaware Bay. This report describes the recording and analysis program, and provides results, discussion, and recommendations.

DESCRIPTION: The study will characterize both specific sources of noise from BOEM-permitted actions associated with the construction and operation of an offshore wind facility, as well as ambient noise measurements on the Atlantic OCS. These data on ambient and existing anthropogenic sounds at the project sites will help quantify the relative contribution to ambient noise levels and consequently, the potential impact(s) to marine resources from the introduction of sound into the marine environment.

SIGNIFICANT CONCLUSIONS: Percentile-level descriptions of the ambient sound levels over one year at offshore Delaware Bay and Nantucket Sound were determined and compared with the envelope values of the Wenz curves. The Wenz curves were reasonable predictors of the ambient noise levels at the two locations, but there were frequency bands and seasons when sound levels exceeded the maximal values predicted by the Wenz curves. Both natural and anthropogenic sound sources exceeded the Wenz curves: heavy shipping and large storms at lower frequencies (<100 Hz) and biological sources (fish) at higher frequencies (200–4000 Hz). The ambient sound levels differed among the deployments at each site and between sites, but the differences are largely attributed to identifiable events and sources.

Future developments at the offshore Delaware Bay site should consider the presence of endangered right, fin, and humpback whales mainly from January to March. Delphinid occurrence, on the other hand, was lowest in winter and spring. Further work is needed to identify the fish species whose calls were detected at the Nantucket site in winter. Avoiding the two-month detection period, if a species is of commercial value to local fisheries, should be considered when planning future work. Although right whale calls were detected at the Nantucket site for a few hours in April 2011, marine mammals were essentially absent from this site.

The acoustic recordings provide an accurate acoustic baseline that may be used for comparisons to ambient levels during wind turbine construction. These baseline descriptions can also be used for comparison with other sites.

STUDY RESULTS: Both manual and automated detection and classification were performed on the recordings to identify prominent sources of sound. Anthropogenic sources, such as heavy shipping, were found at each site throughout the year and could

exceed the maximal predictions of the Wenz curves. Large storms, including hurricanes and Nor'easters, produce rain and wind with high waves and are natural sources of sound.

Biological sound activity included marine mammal and fish sounds. Delphinids (likely bottlenose dolphins (*Tursiops truncatus*) and some unidentified species) and fin whales (*Balaenoptera physalus*) were the most commonly detected marine mammals at offshore Delaware Bay. North Atlantic right whale (*Eubalaena glacialis*) calls were detected on a few occasions at both sites. Humpback whale (*Megaptera novaeangliae*) call detections occurred only at the offshore Delaware Bay site. Fish choruses were heard in late summer and fall at offshore Delaware Bay and in winter and summer at Nantucket Sound. These events occasionally exceeded the Wenz curves.

Ambient sound levels differ throughout the year at each site and between each site, but the differences are largely attributable to identifiable events and sources.

STUDY PRODUCT: Martin, B, .D. Zeddies, J. MacDonnell, J. Vallarta, and J. Delarue. 2014. Characterization and potential impacts of noise producing construction and operation activities on the Outer Continental Shelf: data synthesis. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study BOEM 2014-608. 84 p.

* P.I.'s affiliation may be different than that listed for Project Managers.