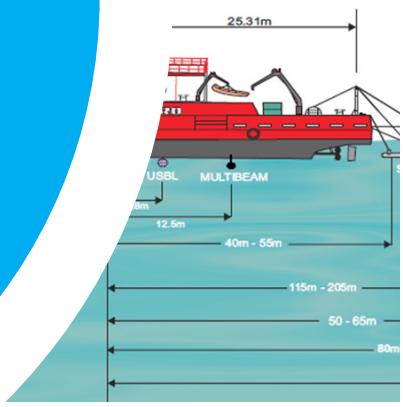
BOEM
Bureau of Ocean Energy Management

2017 Atlantic Science **Year in Review**



Office of Renewable Energy Programs

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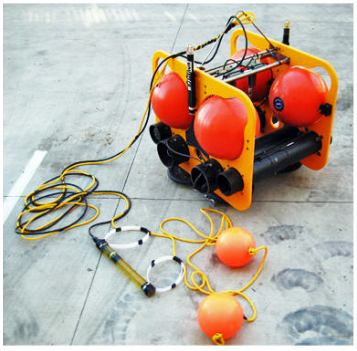
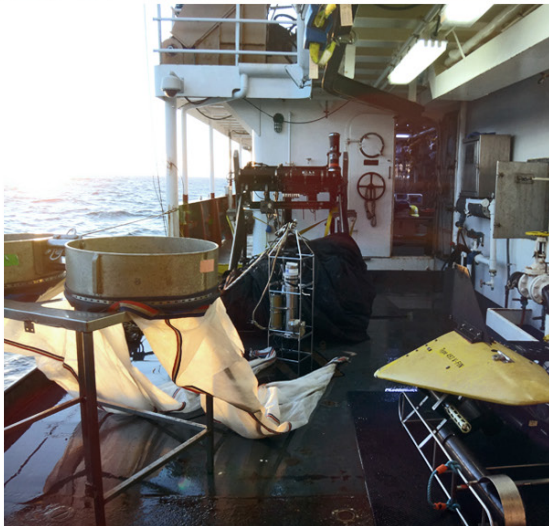








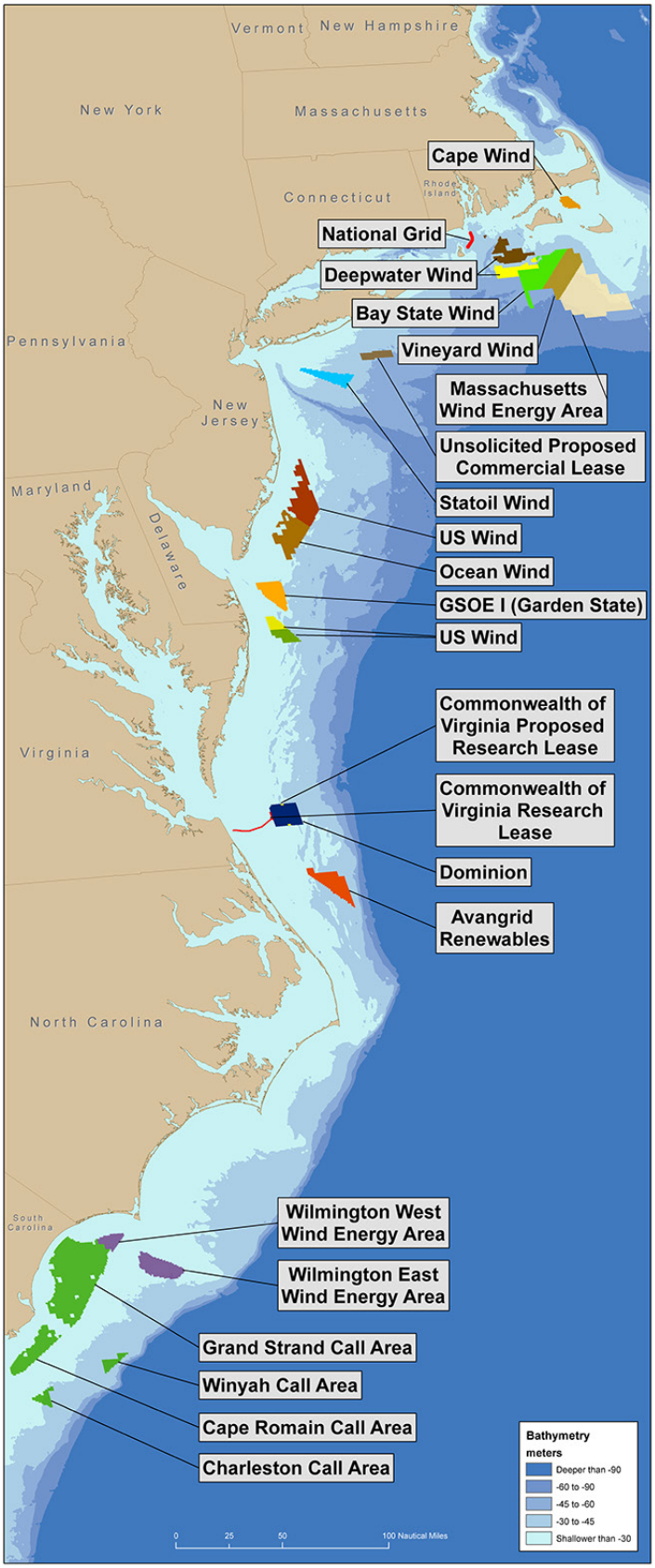
Overview

The Bureau of Ocean Energy Management (BOEM) funds environmental studies for information needed to predict, assess, and manage impacts from offshore energy and marine mineral activities on human, marine, and coastal environments as mandated under Section 20 of the Outer Continental Shelf Lands Act.

This year in review presents the studies completed in 2017 in support of BOEM's Offshore Renewable Energy Program along the Atlantic coast. The studies represent a broad spectrum of research and monitoring to address a variety of environmental concerns and issues. This review represents a snapshot of the ongoing and completed studies funded in whole or in part by BOEM.

To learn more about other studies, please visit the BOEM website at **www.boem.gov**.

Atlantic Outer Continental Shelf Renewable Energy Leases



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Atlantic Marine Assessment Program for Protected Species I (2010–2014)

Conducted by: National Marine Fisheries Service and U.S. Fish and Wildlife Service

Key Researchers: D.L. Palka, S. Chavez-Rosales, E. Josephson, D. Cholewiak, H.L. Haas, L. Garrison, M. Jones, D. Sigourney, G. Waring, M. Jech, E. Broughton, M. Soldevilla, G. Davis, A. DeAngelis, C.R. Sasso, M.V. Winton, R.J. Smolowitz, G. Fay, E. LaBrecque, J.B. Leiness, Dettloff, M. Warden, K. Murray, and C. Orphanides

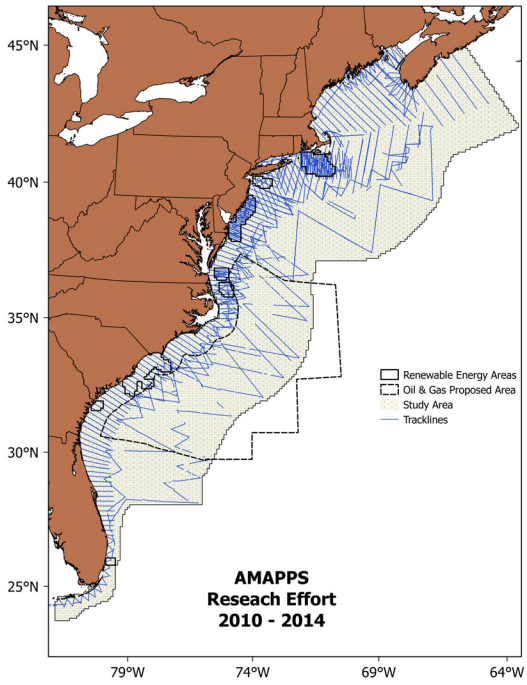
Funded by: Bureau of Ocean Energy Management (BOEM) and the U.S. Navy, with in-kind contributions from the National Marine Fisheries Service and the U.S. Fish and Wildlife Service

The Atlantic Marine Assessment Program for Protected Species (AMAPPS) is a comprehensive, multi-agency research program on the U.S. Atlantic Outer Continental Shelf (OCS). The goal of AMAPPS is to assess the abundance, distribution, ecology, and behavior of marine mammals, sea turtles, and seabirds from Maine to the Florida Keys in order to provide mapped estimates of where they are likely to be located throughout the year. AMAPPS I was conducted from 2010–2014, and AMAPPS II is ongoing from 2015–2019.

Searching for whales using binoculars.

FINDINGS

- Abundance estimates for many marine mammal species were higher than previously estimated due to improved calculation techniques
- Beaked whales are present throughout the year along on the shelf break based on new data from acoustic monitoring
- Areas of persistent higher concentrations of marine birds were found off the Outer Banks of North Carolina, off eastern Long Island, and in the Martha's Vineyard/Nantucket Island region
- During summer months, loggerhead turtles are found in relatively high densities in coastal waters from Cape Hatteras, NC, to Long Island, NY



Tracks of surveys conducted between 2010 and 2014.

How BOEM will use this information:

- Identify new lease areas for offshore wind energy
- Develop of mitigation measures for construction and operation of wind facilities
- Inform wind energy developers when siting wind facilities and developing post construction monitoring plans

Additional information:

Final report: **https://marinecadastre.webqa.coast.noaa.gov/espis/#/search/study/100019**

Study information: **https://nefsc.noaa.gov/psb/AMAPPS/**

Determining Fine-scale Use and Movement Patterns of Diving Bird Species in Federal Waters of the Mid-Atlantic United States Using Satellite Telemetry

Conducted by: U.S. Fish and Wildlife Service, in partnership with the Sea Duck Joint Venture, U.S. Geological Survey, Biodiversity Research Institute, and Memorial University of Newfoundland

Key Researchers: A. Berlin, A. Gilbert, C. Gray, W. Montevecchi, I. Stenhouse, C. Spiegel

Funded by: Bureau of Ocean Energy Management (BOEM)

This study researched the fine-scale use and movement patterns of three diving bird species (red-throated loon, surf scoter, and northern gannet) in the mid-Atlantic because of their declining populations, lack of information on the Atlantic south of New England, and potential to be affected by wind energy development. From 2012 to 2015, the researchers captured, tagged, and tracked 239 adult birds using satellite transmitters. The tracking data were analyzed using dynamic movement models to create space use distribution maps. These maps include BOEM leased areas.

FINDINGS

- All species exhibited a largely near-shore, coastal, or in-shore distribution. Habitat use was concentrated in or around large bays (e.g., Delaware, Chesapeake, Pamlico Sound), with the most extensive use at the bay mouths
- Relatively very little of the total winter core use and home range areas overlapped with the BOEM leased areas
- The results complement findings from the BOEM ongoing study "Integrative Statistical Modeling and Predictive Mapping of Seabird Distribution and Abundance on the Atlantic Outer Continental Shelf (AT 13-03)"

Northern Gannett with tag. *J. Fiely*

How BOEM will use this information:

- Inform decisions regarding identification of future areas to lease
- Refine requirements for pre- and post-construction surveys
- Address the Migratory Bird Treaty Act

Additional information:

Final report: **https://marinecadastre.webqa.coast.noaa.gov/espis/#/search/study/100060**

Field team collecting birds for tagging. *J. Fiely*

Flight Activity and Offshore Movements of Nano-Tagged Bats on Martha's Vineyard, MA

Conducted by: U.S. Fish and Wildlife Service

Key Researchers: Z. Dowling, P. Sievert, E. Baldwin, L. Johnson, S. von Oettingen, J. Reichard

Funded by: Bureau of Ocean Energy Management (BOEM)

The northern long-eared bat (Myotis septentrionalis) was recently listed as a threatened species under the federal Endangered Species Act in 2016. The Cape Wind Energy Project Final Environmental Impact Statement stated that bats (including the northern long-eared bat) infrequently cross Nantucket Sound to hibernate on the mainland and therefore are at little risk for colliding with the proposed project.

The northern long-eared bat does use islands like Martha's Vineyard for roosting in the summer. Although it is well known that some bat species fly over the open ocean during migration, it is not known whether northern long-eared bats migrate to the mainland or travel from island to island.

Northern Long–Eared Bat captured for tagging.

FINDINGS

- Movements of northern long-eared bats were confined to a relatively small area compared to other bat species
- None of the tagged northern long eared bats traveled offshore, while other bat species did
- Northern long-eared bats hibernate on the island

How BOEM will use this information:

- Confirm that non-migratory bats (including the northern long-eared bats) appear to be at very low risk of collision because they infrequently cross Nantucket Sound
- Incorporate observations in future consultations under the Endangered Species Act

Additional information:

Final report: **www.boem.gov/Flight-Activity-and-Offshore-Movements-of-Nano-Tagged-Bats-on-Marthas-Vineyard**

Telemetry receiver on Martha's Vineyard.

Habitat Mapping and Assessment of Northeast Wind Energy Areas

Conducted by: National Oceanic and Atmospheric Administration Northeast Fisheries Science Center, in collaboration with the Woods Hole Oceanographic Institution and the University of Massachusetts – Dartmouth School for Marine Science and Technology

Key Researchers: V. Guida, A. Drohan, D. Johnson, J. McHenry, H. Welch, V. Kentner, J. Brink, D. Timmons, E. Estela-Gomez

Funded by: Bureau of Ocean Energy Management (BOEM), with in-kind contributions from the National Marine Fisheries Service

This study developed a comprehensive multi-scale benthic assessment and comprehensive database of eight Atlantic Outer Continental Shelf Wind Energy Areas (WEA). Each area is described through the geologic setting, physical oceanographic conditions, and species present. The assessments add to our knowledge of the benthic structure, function, and valued resources within the Atlantic WEA network, prior to development. The WEAs range from Massachusetts to North Carolina and encompass over 7,000 km2 of seafloor for offshore renewable energy development.

FINDINGS

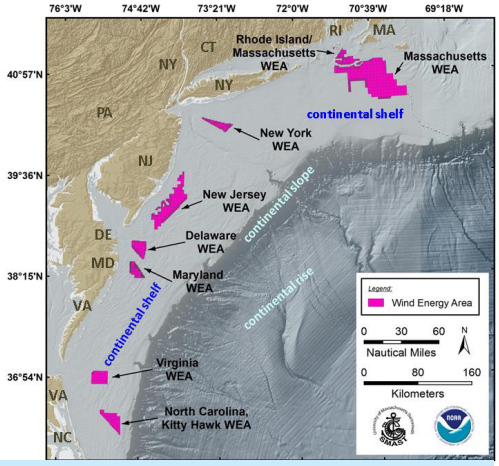
- All of the WEAs have relatively flat topography with overall slopes never exceeding one degree and local slopes only rarely reaching four degrees
- Sediments in all WEAs are primarily sand or sand-dominated
- All WEAs are subject to small ranges of salinities and large annual ranges in water temperature
- The species of concern in this area are ones that are immobile, or nearly so during at least one life stage, and are unable to escape from habitats disturbed by human activity

How BOEM will use this information:

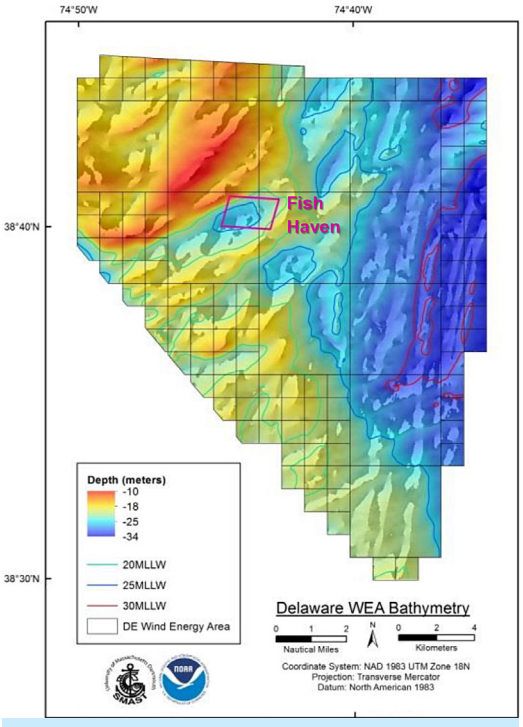
- Identify areas within WEAs that are most suitable for development
- Identify essential fish habitat in accordance with the Magnuson-Stevens Fishery Conservation and Management Act

Additional information:

Final report: **www.boem.gov/espis/5/5647.pdf**



Wind Energy Areas assessed.



Delaware WEA bathymetry.

Socio-Economic Impact of Outer Continental Shelf Wind Energy Development on Fisheries in the U.S. Atlantic

Conducted by: National Oceanic and Atmospheric Administration (NOAA) Northeast Fisheries Science Center

Key Researchers: A. Kirkpatrick, S. Benjamin, G. DePiper, T. Murphy, S. Steinback, C. Demarest

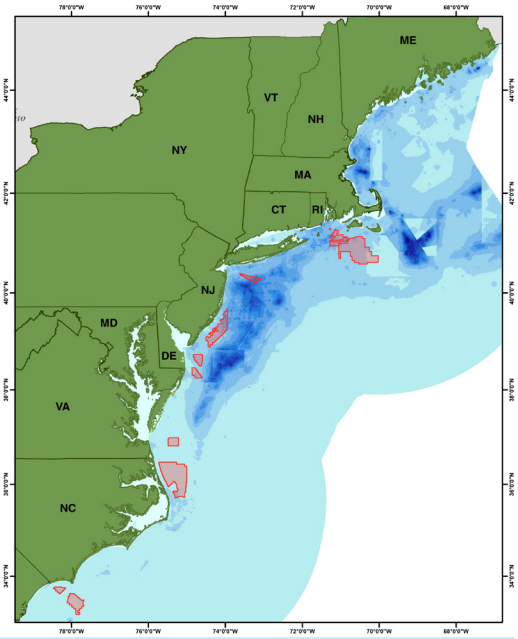
Funded by: Bureau of Ocean Energy Management (BOEM)

This study characterizes commercial and recreational fishing from Maine to North Carolina and provides insight into revenue generated by federally permitted fishermen. The report details the average value of fish harvested over the six-year period between 2007 and 2012 ("exposed revenue") and identifies the ports and fishery sectors (e.g., gear, species) supporting that activity. NOAA also developed a model to estimate the socio-economic impact of wind energy development on commercial fishermen.

FINDINGS

- The ports of New Bedford, MA; Atlantic City, NJ; Cape May, NJ; and Narragansett, RI, are the most exposed to potential impacts from wind energy development in terms of total revenue
- By total value, sea scallops are the single most exposed species at an average annual $4.3 million in revenue sourced from the potential wind energy areas, but this value only represents one percent of the total scallop landings along the Atlantic
- The results generally indicate that commercial fisheries are expected to be minimally impacted due to availability of alternative fishing areas

Vessel conducting fisheries trawl surveys near the Block Island Wind Farm. *Courtesy of Deepwater Wind*



Commercial fishery revenue in relation to BOEM wind energy areas. Darker blue indicates higher revenue (2007-2012) for federally permitted commercial fishers.

How BOEM will use this information:

- Identify areas of potential conflict with commercial fishing
- Determine where additional analysis may be needed

Additional information:

Final report: **https://marinecadastre.gov/espis/#/search/study/100058**

GIS raster data: **www.boem.gov/Renewable-Energy-GIS-Data**

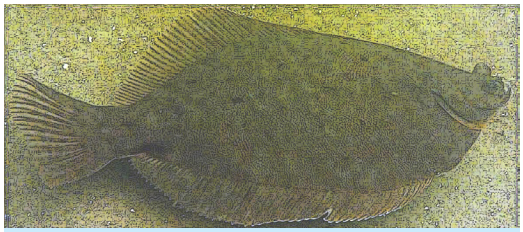
Southern New England Juvenile Fish Habitat Research Paper

Conducted by: Coonamessett Farm Foundation, Inc.

Key Researchers: L. Siemann, R. Smolowitz

Funded by: Bureau of Ocean Energy Management (BOEM)

The Coonamessett Farm Foundation, Inc., completed a series of five winter dredge surveys in southern New England waters between December 2015 and early April 2016 for a project funded by the National Oceanic and Atmospheric Administration. The dredge survey locations overlapped with BOEM lease areas, and the fish catch data collected during the dredge surveys provided needed information about fish winter presence in the area. Video footage also provided information about benthic habitat. The objectives of this study were to generate maps of the habitat types and distribution of fish catch numbers, analyze types of habitats preferred by fish species, and compare the results of this study with other surveys conducted in the area.

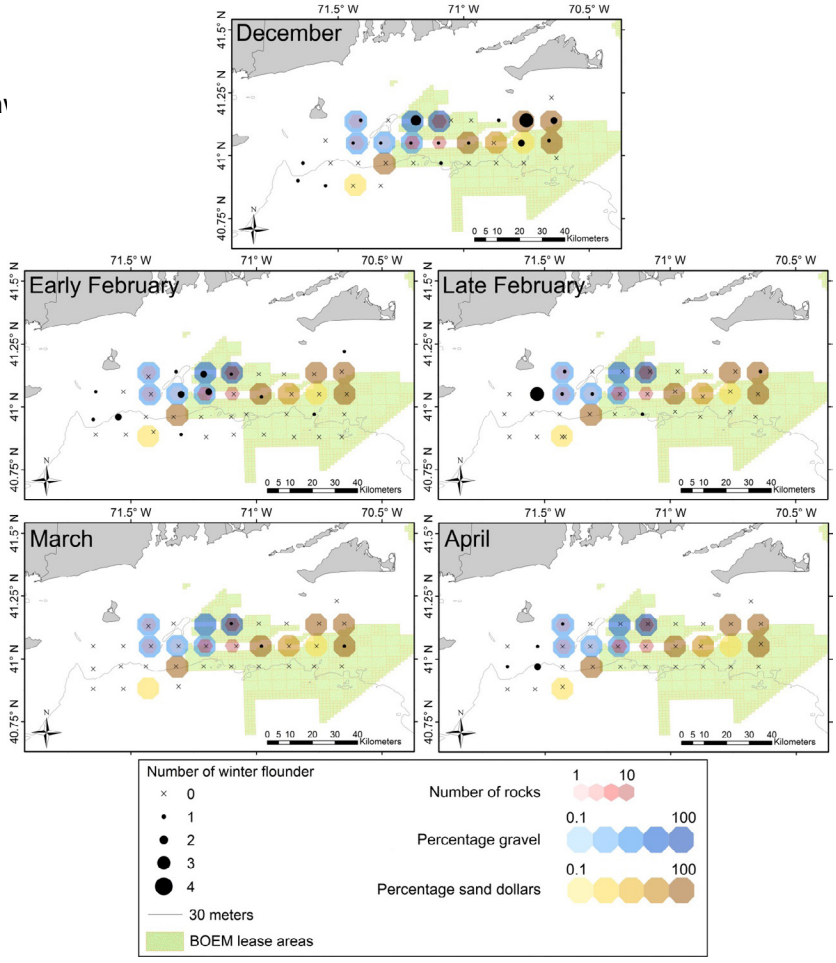


Winter flounder.

FINDINGS

- In Southern New England, winter flounder spa further offshore than previously believed
- Flounder catch is strongly dependent on survey month rather than other physical parameters such as temperature and sediment type

Winter flounder catch by month



How BOEM will use this information:

- Consider flounder expands when siting wind turbines within the wind energy areas
- Identify essential fish habitat in accordance with the Magnuson-Stevens Fishery Conservation and Management Act

Additional information:

Final report: **https://marinecadastre.gov/espis/#/search/study/100178**

Geophysical and Geotechnical Investigation Methodology Assessment for Siting Renewable Energy Facilities on the Atlantic Outer Continental Shelf

Conducted by: Fugro Marine GeoServices, Inc.

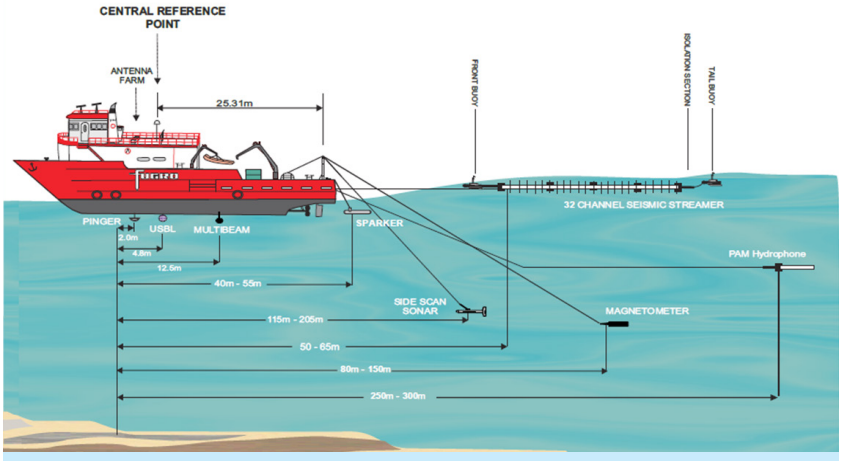
Key Researchers: Fugro Marine GeoServices, Inc.

Funded by: Bureau of Ocean Energy Management (BOEM)

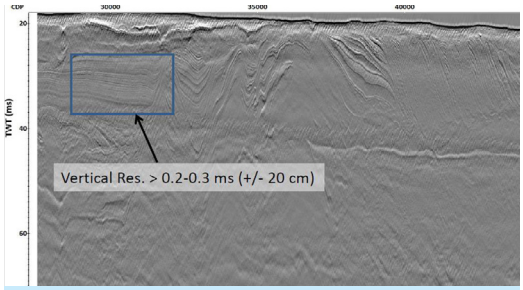
The Atlantic Outer Continental Shelf (OCS) is considered by BOEM to be a "frontier region," where little information exists about the geologic conditions and how those conditions may impact development of offshore wind facilities. Although knowledge from experience in other regions can be transferred to the Atlantic OCS wind industry, the differing water depths, geologic conditions, and construction methods presents a unique combination of variables for the nascent U.S. Atlantic wind industry. This study investigates and assesses the various methods and equipment choices for performing site investigations to identify shallow hazards, geologic hazards, biological conditions, geotechnical properties, and archaeological resources.

FINDINGS

- The report presents detailed information regarding geologic conditions in offshore wind energy lease and planning areas located in the Atlantic OCS
- The geologic conditions are used to understand the benefits and risks associated with various geophysical and geotechnical methodologies and approaches



Configuration of geologic surveys.



High-resolution vertical profile example.

- The report also includes best practice recommendations for geophysical surveys and geotechnical investigations and an equipment guidebook that presents information on anticipated performance in the identified geologic setting of the Atlantic OCS

How BOEM will use this information:

- Review and potentially revise existing guidance
- Inform the developers about the complexities and tradeoffs associated with the various options of geophysical and geotechnical site investigations

Additional information:

Final report: **www.boem.gov/G-and-G-Methodology-Renewable-Energy-Facilities-on-the-Atlantic-OCS**

Munitions and Explosives of Concern Survey Methodology and In-field Testing for Wind Energy Areas on the Atlantic Outer Continental Shelf

Conducted by: CALIBRE Systems, Inc., University of Delaware, Hawaii Institute of Geophysics and Planetology School of Ocean and Earth Science and Technology, and Environet, Inc.

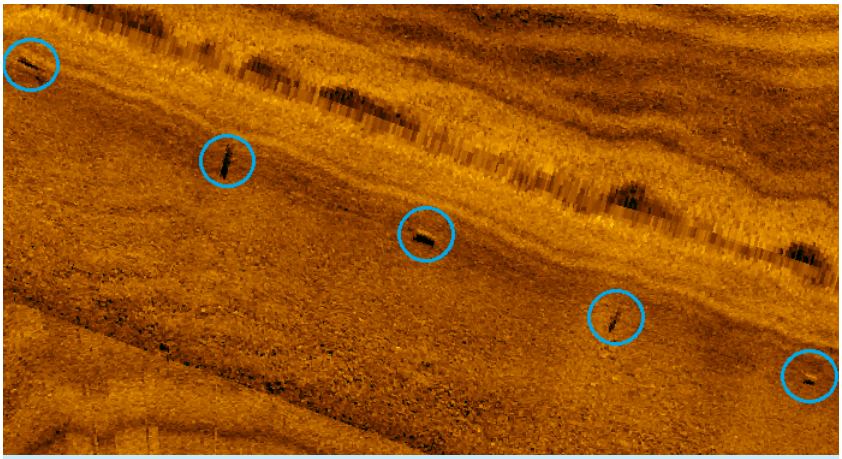
Key Researchers: G. Carton, C. DuVal, A. Trembanis, M. Edwards, M. Rognstad, C. Briggs, S. Shjegstad

Funded by: Bureau of Ocean Energy Management (BOEM)

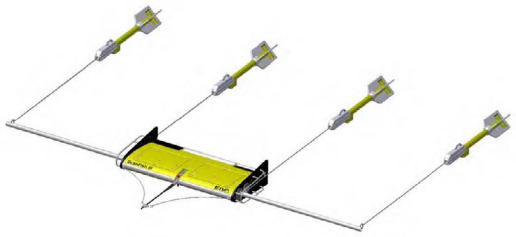
Munitions and explosives of concern (MEC) must be identified prior to installation of offshore wind facilities. There is little detailed guidance on how to identify and remove surficial, partially buried, and fully buried MEC (to a depth of 10 meters) likely to be encountered on the Atlantic Outer Continental Shelf (OCS). The goal of this project is to study the available technology and methods in order to allow safe construction and operation of wind turbines, power cables, and similar offshore energy projects. The project was split into two phases: the first phase gathered information to develop a methodology that would be capable of detecting hazardous objects, and the second phase verified the effectiveness of the developed methods.

FINDINGS

- A substantial number of historical activities provided information on locating MEC in federally regulated offshore wind energy lease areas
- Technical solutions do exist for detecting MEC



Side-scan sonar imagery of test materials to mimic MEC.



Example of a series of magnetometers for towing. *Image Courtesy of EIVA.*

- Risk assessments are essential to develop methods for site clearance and determine the level of effort necessary to safely develop a site

How BOEM will use this information:

- Develop guidance for lessees on surveying for MEC on the Atlantic OCS
- Inform the developers about the site specific hazards associated with historical activities that took place in the areas surrounding offshore wind lease and planning areas

Additional information:

Final report: **www.boem.gov/Munitions-and-Explosives-of-Concern-Survey-Methodology-and-In-field-Testing-for-Wind-Energy-Areas-on-the-Atlantic-Outer-Continental-Shelf**

Observing Cable Laying and Particle Settlement during the Construction of the Block Island Wind Farm

Conducted by: HDR EOC

Key Researchers: J. Elliot, K. Smith, D. Gallien, A. Khan

Funded by: Bureau of Ocean Energy Management (BOEM)

This study presents key observations, data, findings, and results from environmental monitoring surveys conducted during the installation of a submarine cable from the mainland at Scarborough State Beach to Block Island's Fred Benson Town Beach. The cable was installed by use of a customized jet plow. Real-time monitoring gathered data that included visual observations of the installation process and measurements of suspended sediment concentrations in the water column.

FINDINGS

- No sediment plume was observed as a result of the jet plow operations
- Suspended sediment levels on site during jet plow activity were found to be up to 100 times lower than those predicted by the modeling work
- Most of the overspill sediments deposited within the overspill levee

Cable Lay Barge CLB Big Max.

Dredge used for cable laying.

How BOEM will use this information:

- Provide additional information necessary for BOEM's evaluation of environmental effects of future facilities
- Generate data to improve the accuracy of models and analysis criteria employed to establish monitoring controls and mitigations

Additional information:

Final report: **https://marinecadastre.gov/espis/#/search/study/100122**

North Carolina Collaborative Archaeological Survey: Kitty Hawk Wind Energy Area

Conducted by: Bureau of Ocean Energy Management (BOEM) and National Oceanic and Atmospheric Administration Monitor National Marine Sanctuary

Key Researchers: B. Carrier, N. DeLong, W. Hoffman, J. Hoyt, W. Sassorossi

Funded by: BOEM

This study obtained baseline archaeological information in and around the Kitty Hawk Wind Energy Area (WEA). The study completed a reconnaissance survey using sidescan sonar of approximately half of the WEA, and scientific divers investigated six targets with archaeological potential.

FINDINGS

- Two of the six targets investigated were confirmed to be archaeological sites, and the study recommended avoidance buffers and additional investigation for these sites
- The remaining four targets were determined to be modern debris or geological features, and no further investigation was recommended

How BOEM will use this information:

- Reduce the impact of wind energy development on archaeological sites by identifying their location and providing a zone for avoidance
- Assist BOEM in considering the effects of its activities on cultural resources under the National Historic Preservation Act and National Environmental Policy Act

Additional information:

Final report: **www.boem.gov/ESPIS/5/5633.pdf**

The tanker Byron D. Benson torpedoed by a German U-boat during World War II.

Evaluating Benefits of Offshore Wind Energy Projects in the National Environmental Policy Act (NEPA)

Conducted by: AECOM

Key Researchers: AECOM

Funded by: Bureau of Ocean Energy Management (BOEM)

The NEPA defines "effects" to include both direct and indirect effects and both adverse and beneficial effects. However, less effort has been invested in defining ways to determine beneficial effects than for adverse effects. For example, the addition of hard substrate in a marine area where little hard substrate occurs naturally may be beneficial to species using that hard substrate if it is in limited supply, but establishment of hard substrate is not the objective of the project. This study is for interested members of the general public who seek a better understanding of how benefits can be captured, described, and evaluated during the NEPA process.

Turbine at the Block Island Wind Farm.

FINDINGS

- Benefits from the development of offshore wind energy projects, in particular offshore wind projects, can accrue in three primary areas: system benefits, environmental benefits, and socioeconomic benefits
- Offshore wind power has environmental benefits when compared to conventional electrical power generation, such as very low carbon dioxide emissions over its life cycle and negligible emissions of mercury, nitrous oxides, and sulfur oxides

How BOEM will use this information:

- Provide guidance for incorporating an analysis of benefits in environmental assessments
- Address the requirement of the National Environmental Policy Act to consider the benefits of a proposed action

Additional information:

Final report: **www.boem.gov/Final-Version-Offshore-Benefits-White-Paper**

Improving Efficiencies of National Environmental Policy Act (NEPA) Documentation for Offshore Wind Facilities Case Studies Report

Conducted by: Marine GeoServices Inc. and Fugro GB Marine Ltd.

Key Researchers: P. English, T. Mason, J. Backstrom, B. Tibbles, A. Mackay, M. Smith, T. Mitchell

Funded by: Bureau of Ocean Energy Management (BOEM)

For more than 20 years, several European countries have been building large offshore wind projects and have conducted environmental monitoring at these project sites. This study conducted a review and synthesis of European monitoring studies, where publicly available. The researchers then developed 29 case studies to demonstrate impacts for resources, conditions, geographic locations, and vulnerabilities that may be similar between European developments and U.S. offshore developments.

FINDINGS

- Through a series of 29 case studies, this document presents the findings of a systematic review and synthesis of European offshore wind facility monitoring campaigns and consolidates available impact and mitigation data with the intention of improving stakeholder understanding of comparable work done in Europe

Installing the foundation at Block Island Wind Farm.

How BOEM will use this information:

- Identify common elements from European offshore wind project monitoring to reduce NEPA analysis and avoid repeat study
- Reduce uncertainties associated with current state-of-the-practice knowledge
- Identify critical data gaps that may require further and more detailed study specific to U.S. conditions
- Inform mitigation implementation
- Ensure the future environmental reviews include the necessary evaluation of these impacts

Additional information:

Final report: **www.boem.gov/Improving-Efficiencies-of-National-Environmental/**

Bureau of Ocean Energy Management (BOEM) Offshore Wind Energy Facilities Emission Estimating Tool

Conducted by: Eastern Research Group, Inc

Key Researchers: R. Chang, B. Do

Funded by: BOEM

In order to ensure consistency in calculating air quality impacts for BOEM's environmental reviews, a software tool has been developed to estimate the net effect on air emissions by a proposed wind energy project. The tool takes into account both the air emissions associated with the lifecycle of a proposed offshore wind energy project, such as offshore vehicle and helicopter emissions from construction and maintenance activities, as well the fossil fuel combustion emissions that the wind farm's generated energy would replace.

FINDINGS

- The tool outputs a Microsoft Excel file with emission summaries by phase, location, and equipment type, as well as a summary of the inputs and emission factors used in the calculations
- Emissions calculated by the tool include: carbon dioxide (CO2), methane, nitrous oxide, CO2 equivalents, black carbon, carbon monoxide, nitrogen oxides, particulate matter, sulfur dioxide, and volatile organic compounds
- A user's guide is provided on how to use the tool

Installing wind turbines at Block Island Wind Farm.

How BOEM will use this information:

- Consistently quantify project emissions for BOEM's environmental assessments
- Aid in air quality permitting and project planning
- Characterize the cumulative impacts of development projects on air quality

Additional information:

Tool and supporting documentation: **www.boem.gov/BOEM-Stakeholder-Engagement/**

Phased Approaches to Offshore Wind Developments and Use of the Project Design Envelope

Conducted by: RPS

Key Researchers: J. Rowe, A. Payne, A. Williams, D. O'Sullivan, A. Morandi

Funded by: Bureau of Ocean Energy Management (BOEM)

This study researched an appropriate approach to process and prepare the Project Design Envelope (PDE) for phased offshore wind development in the U.S. PDE is a mechanism for assessing, interpreting, and presenting phased development. This study analyzed experience of previous PDE applications for phased developments in U.K.-based offshore wind projects and reviewed lessons learned from the U.K. projects to identify best practices that could be applied to offshore wind development in the U.S. market.

FINDINGS

- The permitted/consented PDE provides essential flexibility to a developer in an industry that is rapidly evolving in terms of new technology and methodologies
- Clear communication of the phased approach and the PDE is a critical element to successfully implementing these tools/processes
- Phasing and the PDE need to be outlined in a construction and operations plan and assessed using the maximum design scenario process

Block Island Wind Farm as seen from the Southeast Lighthouse on Block Island.

How BOEM will use this information:

- Inform Lessees and Developers about flexibility in the National Environmental Policy Act process
- For future updates to BOEM's Guidelines for Information Requirements for a Renewable Energy Construction and Operations Plan: **www.boem.gov/National-and-Regional-Guidelines-for-Renewable-Energy-Activities/**

Additional information:

Final report: **www.boem.gov/Phased-Approaches-to-Offshore-Wind-Developments-and-Use-of-Project-Design-Envelope/**

Atlantic Ocean Energy and Mineral Science Forum

Conducted by: Bureau of Ocean Energy Management (BOEM)

Funded by: BOEM

On November 16–17, 2016, in Sterling, VA, BOEM hosted the Atlantic Ocean Energy and Mineral Science Forum (Forum) to present BOEM's ongoing and recently completed studies, particularly studies supporting BOEM's Renewable Energy and Marine Minerals Programs.

The Forum objectives were to: 1) share with the public information from BOEM's and other recently completed studies and ongoing science activities in the Atlantic region, 2) identify research needs/information gaps for the development of new studies through BOEM's Environmental Studies Program, and 3) provide the public an opportunity to learn how BOEM utilizes the best available scientific information to support our decision-making processes.

Over the two days, BOEM staff, BOEM-funded researchers, and other Atlantic region experts gave 34 interdisciplinary presentations to provide the public updates on a range of social and environmental science subject areas. Topic areas included fish and fisheries, marine mammals, coastal and marine birds, social and cultural resources, environmental stressors, sound propagation, and the marine minerals program resource evaluation efforts.

How BOEM will use this information:

- Throughout the two days and during a special session at the end, Forum participants were asked to provide input for emerging issues and future directions of the studies program

Additional information:

Final report: **www.boem.gov/ESPIS/5/5579.pdf**

Best Management Practices Workshop for Atlantic Offshore Wind Facilities and Marine Protected Species

Conducted by: Bureau of Ocean Energy Management (BOEM), Office of Renewable Energy Programs

Funded by: BOEM

BOEM conducted a workshop on March 7–9, 2017, in Silver Spring, MD, to assemble a panel of industry representatives, non-governmental organizations, scientists, European experts, and Federal representatives engaged in offshore wind development. The goal of the workshop was to identify major protected species issues, stakeholder perspectives, and recommendations for developing best management practices (BMPs) for Atlantic offshore wind. Major themes included BMPs for high-resolution geophysical surveys, pile driving, vessel speeds, and monitoring needs for marine mammals and sea turtles.

Panel recommendations:

- Precautionary practices are warranted for the critically endangered North Atlantic right whale, and mitigation and monitoring strategies should be implemented for other protected species.
- BOEM should develop simple and effective BMPs providing flexibility to adapt to project-specific needs
- Standardized monitoring methods should be developed, so data can be compared between projects
- Focal behavioral response monitoring studies should be completed for individual projects as needed

How BOEM will use this information:

- Develop BOEM's mitigation and monitoring strategy for Atlantic offshore wind development

Additional information:

The final report is in preparation and will be available on the BOEM website.

Workshop Objectives and Daily Schedule: **www.boem.gov/BMP-Workshop-Protected-Species/**

What's Next?

Here are a few of the new and continuing studies that are underway at Bureau of Ocean Energy Management (BOEM):

Mapping the seafloor is expensive and time-consuming, and very little of the areas where wind development may occur is mapped in detail. Often, models are used to fill in the gaps. BOEM is funding a project with National Oceanic and Atmospheric Administration to enhance seafloor modeling through detailed data collection and improving the predictive models currently in use.

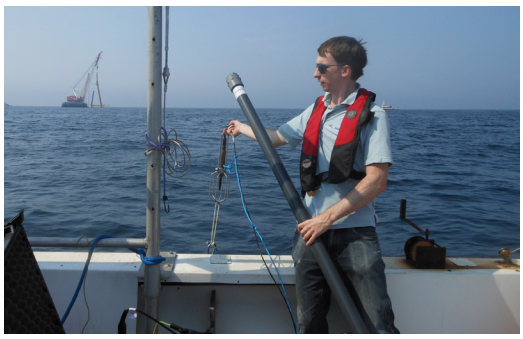
[EXPECTED COMPLETION: 2019]

For several years, BOEM has been funding **acoustic monitoring** in both the Virginia and Maryland wind energy areas. These monitors record the sounds made by whales, particularly the North Atlantic right whale, as they migrate along the coast. The monitoring stations are part of a larger network to expand our understanding of whale migration from Nova Scotia to Florida.

[EXPECTED COMPLETION: 2019]

During the construction of the first U.S. offshore wind farm near Block Island, RI, BOEM contractors were in the field making **observations about the construction activities**, including the sound levels produced in air and underwater, seafloor disturbance, and activity duration. The results will be used to improve model predictions and refine assessments of the effects on the environment.

[EXPECTED COMPLETION: 2019]




BIWF5
Fred Olsen Windcarrier
BS

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Bureau of Ocean Energy Management

The Department of the Interior Mission

The Department of the Interior (DOI) protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities.

The Bureau of Ocean Energy Management

The Mission of the Bureau of Ocean Energy Management (BOEM) is to manage development of U.S. Outer Continental Shelf energy and mineral resources in an environmentally and economically responsible way.

BOEM Environmental Studies Program

The mission of the Environmental Studies Program is to provide the information needed to predict, assess, and manage impacts from offshore energy and marine mineral exploration, development, and production activities on human, marine, and coastal environments.

The proposal, selection, research, review, collaboration, production, and dissemination of each of BOEM's Environmental Studies follows the DOI Code of Scientific and Scholarly Conduct, in support of a culture of scientific and professional integrity, as set out in the DOI Departmental Manual (305 DM 3).

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