Bureau of Ocean Energy Management
Environmental Studies Program

Quarterly Report

Latest Reports and Study Profiles Posted to the Environmental Studies Program Information System (ESPIS)

FY 2019 Third Quarter

BOEM
Bureau of Ocean Energy Management

Photos courtesy of David Pereksta

Contents

The Environmental Studies Program (ESP) Quarterly Reports include summaries of the Bureau of Ocean Energy Management (BOEM) environmental studies completed each quarter. These studies inform BOEM's policy decisions on the development of energy and mineral resources on the Outer Continental Shelf (OCS).

Visit ESPIS at https://marinecadastre.gov/espis/

List of Studies

Determining Offshore Use by Marine Mammals and Ambient Noise Levels Using Passive Acoustic Monitoring

ATLANTIC REGION

ESPIS Link: https://marinecadastre.gov/espis/#/search/study/100069
Conducted by: University of Maryland Center for Environmental Science
National Studies List: AT-14-06
Study Products (available in ESPIS): Final report, technical summary, related publications

Purpose/Information Use:

External view of the Autonomous Multichannel Acoustic Recorder (AMAR)

As the focus of renewable energy in the United States turns to offshore wind facility development, there is an increasing need for an understanding of potential noise impacts from this development on marine mammals. Pile-driving of offshore wind turbines produces loud, low frequency sound that can travel great distances and may potentially harm or disturb marine mammals. As a result, a critical first step is to understand the current baseline ambient noise levels and the spatiotemporal distribution of marine species that may potentially be impacted. In this study, the project partners conducted passive acoustic monitoring for three years to characterize underwater ambient noise levels and identify vocalizing marine mammal species within and around the Maryland Wind Energy Area (WEA). The findings of the study will help BOEM develop appropriate protection and mitigation measures for future anthropogenic activities and will provide baseline data for determining marine mammal responses during the construction and operation of offshore wind facilities.

Findings/Results:

- North Atlantic right whales were detected during every month of the year and were most common during the November to April timeframe. Localized North Atlantic right whale calls indicated that they migrated through and further offshore of the Maryland WEA.
- The distribution of marine mammals overlaps with the Maryland WEA, but this varies seasonally. Although the risk to endangered whales (North Atlantic right, fin, and humpback) is lowest during the summer, the risk to bottlenose dolphins may be highest at that time.
- The year-round occurrence of marine mammals offshore of Maryland will require decision-makers to consider the trade-off of the potential impacts to different species and assess approaches that will minimize population-level impacts to marine mammals from offshore wind development and other activities.

Study Products

Bailey H, Rice A, Wingfield JE, Hodge KB, Estabrook BJ, Hawthorne D, Garrod A, Fandel AD, Fouda L, McDonald E, Grzyb E, Fletcher W, Hoover AL. 2019. Determining habitat use by marine mammals and ambient noise levels using passive acoustic monitoring offshore of Maryland. Sterling (VA): US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2019-018. 229 p.

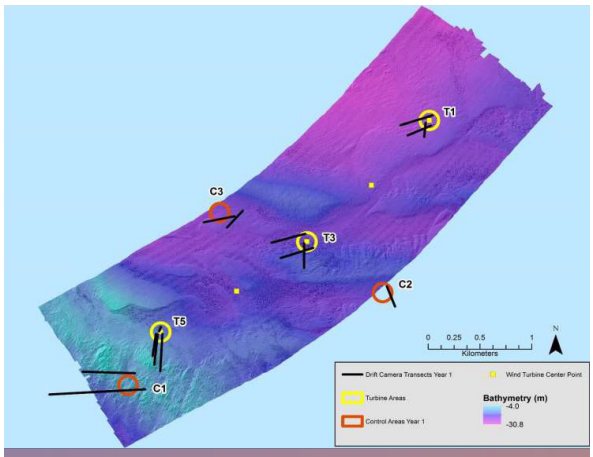
Real-Time Opportunity for Development Environmental Observations (RODEO) Task 6: Monitor Completion Activities of Wind Turbine Installation

ATLANTIC REGION

ESPIS Link: https://marinecadastre.gov/espis/#/search/study/100123
Conducted by: HDR
National Studies List: AT-14-01-06
Study Products (available in ESPIS): Final report, technical summary, related publications

Purpose/Information Use:

The Block Island Wind Farm (BIWF) is a 5-turbine, 30-megawatt facility located 4.5 kilometers from Block Island, Rhode Island, in the Atlantic Ocean. It is the nation's first commercial offshore wind farm, supplying power to Block Island and transmitting any excess power to mainland Rhode Island. The overall goal of the study was to better understand the nature and potential spatial and temporal scales of anticipated changes in benthic macrofaunal community characteristics caused by long-term placement of turbine foundations on the seafloor. Key community characteristics evaluated include species abundance, richness, and assemblage structure, along with relationship dynamics between macrofaunal communities and their associated environments. The data collected during this study will provide additional information necessary for BOEM's evaluation of the environmental effects of future facilities and improve the accuracy of models and analysis criteria used to establish monitoring references and mitigation practices. This report is from the first year of benthic monitoring.



Locations of transects where seabed photography images were collected using a drifting camera system for Year 1

Findings/Results:

- There were no substantial differences in benthic communities among turbine areas or between turbine areas and control areas. There was a high degree of species overlap among the groups, and the primary differences were related to species abundance, rather than species composition.
- Similarly, there were no significant differences in benthic communities or total organic carbon levels close to turbine foundations compared with those further away.
- Overall, no appreciable change was detected in biotic or abiotic variables with distance from each of the turbine foundations. This observation suggests that there were no strong localized benthic effects as a result of the presence of the turbine foundations. Such effects are expected to take longer to develop than was allowed for in this study, or effects may occur closer to the foundations, where it was not possible to sample.

Study Products

Bartley ML, English P, King JW, Khan AA. 2019. Benthic monitoring during wind turbine installation and operation at the Block Island Wind Farm, Rhode Island. Sterling (VA): US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2018-047. 155 p.

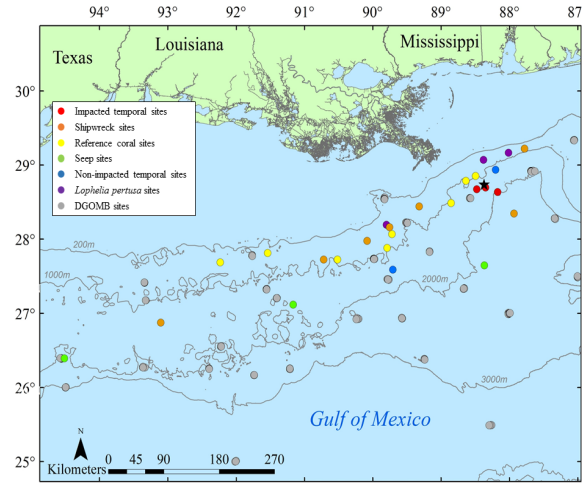
Quantifying Changes to Infaunal Communities Associated with Several Deep-Sea Coral Habitats in the Gulf of Mexico and their Potential Recovery from the *Deepwater Horizon* Oil Spill

GULF OF MEXICO REGION

ESPIS Link: https://marinecadastre.gov/espis/#/search/study/100155
Conducted by: United States Geological Survey
National Studies List: GM-15-08
Study Products (available in ESPIS): Final report, technical summary, related publications, data

Purpose/Information Use:

The 2010 *Deepwater Horizon* oil spill impacted several deep-sea coral habitats, and the recovery of associated sediment communities may take several years. This study presents an assessment of the long-term effects of the *Deepwater Horizon* oil spill on deep-coral ecosystems in the Gulf of Mexico. Deep-sea corals create complex three-dimensional habitats that support distinct sediment communities. Sediment macrofauna represent important indicators of oil spill disturbance, primarily due to their sedentary lifestyle and their rapid response to change. Monitoring benthic infaunal communities yields important insights into the patterns and trajectory of change within these ecosystems by identifying their sensitivity and resiliency to disturbance. The results of this study will inform future monitoring and restoration activities and help with the development of effective adaptive management and conservation strategies for deep-sea coral habitats.



Map of study locations in the Gulf of Mexico

Findings/Results:

- Patterns in community parameters (e.g., density, diversity, community structure) differed between impacted and non-impacted sites, suggesting different environmental controls on these communities.
- Macrofaunal communities at impacted sites continually changed between years, indicating constantly changing communities on relatively short time scales. In contrast, post-spill community metrics at non-impacted sites were more stable over time.
- Temporal variability within pre- and post-spill communities was low, suggesting natural coral sediment communities are relatively stable over time.
- Infaunal communities at impacted sites did not resemble non-impacted communities or any other deep Gulf of Mexico habitat, suggesting that, after seven years, impacted communities had not recovered to any known natural community.

Study Products

Bourque JR, Demopoulos AWJ. 2019. Quantifying changes to infaunal communities associated with several deep-sea coral habitats in the Gulf of Mexico and their potential recovery from the *Deepwater Horizon* oil spill. New Orleans (LA): US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2019-033. 43 p.

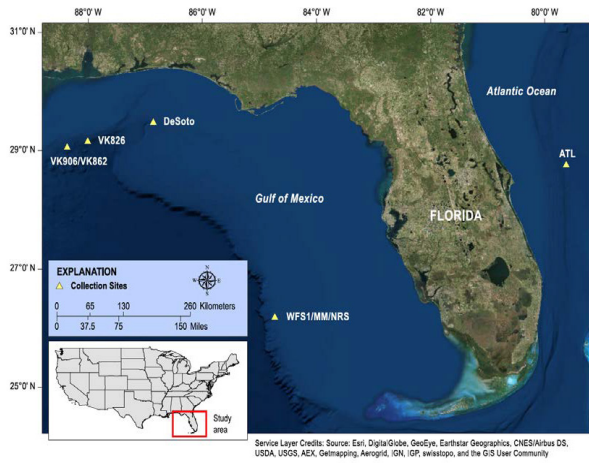
Multi-Disciplinary Assessment of Deep-Water Coral Ecosystems: Tools to Detect Impacts of Sub-Lethal Stress

GULF OF MEXICO REGION

ESPIS Link: https://marinecadastre.gov/espis/#/search/study/100156
Conducted by: United States Geological Survey
National Studies List: GM-15-08
Study Products (available in ESPIS): Final report, technical summary, related publications, data

Purpose/Information Use:

The long-term change and recovery potential of deep-sea coral ecosystems following disturbances is unresolved, as is knowledge about deep-sea coral response to the *Deepwater Horizon* oil spill. Quantification of long-term ecosystem dynamics and projections about recovery of impacted populations is incomplete; *Deepwater Horizon* oil may persist in sediments for decades if sequestered. As a metric, mortality is of limited use, but appropriate tools, such as biomarkers, that can be used to characterize coral health and identify their sensitivity and resiliency to disturbance are essential. The overall objective of this project was to develop assessment tools that may be used in future regional scenarios and elsewhere to predict and assess impacts to deep-water coral habitats. BOEM will use the information contained in this report to address critical information gaps needed for informed decision-making.



Study area map

Findings/Results:

- The study identified taxonomic groups or functional genes that are proposed as potential targets for development of diagnostic indicators of the deep-sea coral, *L. pertusa*. The functional genes described in this study provide a baseline that may be used to assess coral health in deep reefs worldwide.

- Results on deep-sea black coral iodine speciation and iodine isotope variability provide key information on iodine behavior in natural and anthropogenic environments and its geochemical transport pathways. Uptake of organo-iodine in deep-sea corals is potentially a sensitive recorder of continental material flux over decadal to millennial timescales.

- This study used a set of powerful quantitative geochemical tracers (i.e., stable and radioisotopes, lipid biomarkers, and compound-specific isotopes) from sediment traps deployed before and after the *Deepwater Horizon* spill to demonstrate a qualitative reduction in biomass export in 2010–2011, at least 6–18 months after the spill started.

Study Products

Prouty NG, Kellogg CA, Morrison CL. 2019. Multi-disciplinary assessment of deep-water coral ecosystems: tools to detect impacts of sub-lethal stress. New Orleans (LA): US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2019-034. 126 p.

The Department of the Interior Mission

The Department of the Interior 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 is to manage development of U.S. Outer Continental Shelf energy and mineral resources in an environmentally and economically responsible way.

The BOEM Environmental Studies Program

The mission of the Environmental Studies Program (ESP) 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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