Environmental Studies Program: Ongoing Study

Title	Cross-shelf Habitat Suitability Modeling (NSL #PC-15-07)
Administered by	Pacific OCS Region
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Conducting Organizations(s)	National Oceanic and Atmospheric Administration Oregon State University
Total BOEM Cost	$490,000
Performance Period	FY 2016–2019
Final Report Due	August 30, 2019
Date Revised	June 19, 2019
PICOC Summary	
Problem	Although seafloor invertebrate communities will be impacted by energy development on the US West Coast, we have not adequately characterized those habitats.
Intervention	Build a predictive model of suitable habitat to gage potential locations of these species in relation to potential energy development locations.
Comparison	A comparison of species data, available environmental parameters to build predictive models of suitable habitat. These models will be compared with older models.
Outcome	A predictive model of suitable habitat for key species of deep-water corals, sponges, and macrofauna along the US West Coast.
Context	Southern California, Northern California, Washington-Oregon

BOEM Information Need(s): The wave and wind climates along the West Coast of North America represent one of the best prospects for the development of offshore renewable energy, yet assessments of the potential ecological effects of renewable energy on benthic habitats have only just begun. The siting of renewable energy facilities on the OCS adjacent to California, Oregon, and Washington requires a knowledge base that can be applied over a regional scale. While it is costly to undertake a region-wide study, improvement of existing habitat suitability models will provide a tool BOEM can use to extrapolate data from one area across to areas where less is known. Improved models have the potential to inform regional spatial planning processes for future consideration of renewable energy facilities and the necessary consultations associated with leasing (e.g., on Essential Fish Habitat [EFH]). Improved habitat suitability modeling could also improve site assessments needed for NEPA analysis and may reduce site survey requirements for lease holders. This work would help to standardize modeling efforts among different OCS Regions.

Background: The BOEM/Oregon State University (OSU) study, *Survey of Benthic Communities near Potential Renewable Energy Sites Offshore the Pacific Northwest*,

developed a habitat suitability model for selected infaunal species and glass sponges. The model identifies a number of habitat covariates that relate to specific invertebrate communities and use those relationships to predict other locations where those communities are likely to be found. Therefore, the model is a tool to identify the key physical parameters that are more cost effective to sample than biological sampling.

BOEM, NOAA (which conducts EFH consultations), and other regional stakeholders use modeling to incorporate regional data to inform decisionmaking. Evaluating and improving the spatial extent and validating the BOEM/OSU habitat suitability model is necessary before it can be a useful tool. Currently, this model is limited to the inner and mid-shelf depths, but it is now clear that renewable energy developers are interested in areas farther offshore. By expanding the geographic scope, a cross-shelf sampling will provide a high-resolution understanding of cross-shelf dynamics. Such an understanding will improve the predictive capabilities of this model.

Models are only useful if they are accurate and used appropriately. The BOEM/OSU habitat suitability model was validated using portions of one infaunal dataset. An impartial analysis of the model using a completely separate dataset is needed to validate the accuracy and usefulness of the model. BOEM has previously funded efforts to model habitat associations of birds and mammals using different methods. Separate models also exist for fishes and invertebrates. BOEM needs to have a clearer understanding of the strengths and weaknesses of these different modeling approaches in order to ensure that the outputs are directly useful to non-modeling experts within BOEM.

Objectives: To improve the predictive capabilities of habitat suitability models available for the continental shelf and slope off California, Oregon, and southern Washington by:

1. Improving applicability of the invertebrate soft sediment model to a wider depth range;

2. Creating a presence absence model for sponges and corals; and

3. Providing a comparison among alternative modeling approaches.

Methods: Direct sampling is required to improve and validate existing models. Box core sampling focused on unconsolidated sediments; samples were collected in the summer of 2017 and species were sorted, identified, and counted. Available data was inventoried and compiled from other sources. Model pathways were evaluated. Models will be output as GIS-based raster images.

This project intends to utilize NOAA's expertise to evaluate the BOEM/OSU habitat suitability model and compare it to similar modeling approaches developed with other biological datasets. Potential examples could include existing models used for predicting Pacific groundfish fisheries or coral habitat. The BOEM/OSU habitat suitability model is based on a Bayesian network and GIS framework that is designed to be updated with new information. Novel model frameworks developed by NOAA will be

similar and compatible with habitat suitability models developed for BOEM in the Atlantic and Gulf of Mexico Regions.

Specific Research Question(s):

1. Can selected species be accurately modeled across the US West Coast with available environmental and biological data?

2. How do these models compare to previous efforts?

Current Status: The BOEM-NOAA interagency agreement was awarded in September 2016 and the BOEM-OSU cooperative agreement was awarded in June 2016. Environmental and biological datasets were acquired, models are final, and the data products and reports are being drafted.

Publications Completed: None

Affiliated WWW Sites: https://marinecadastre.gov/espis/#/search/study/100171

References: None