Environmental Studies Program: Studies Development Plan | FY 2024–2025

Field	Study Information
Title	Improving Methods and Identifying Best Practices for Defining and Delineating Low-relief Hardbottom Essential Fish Habitat in Wind Energy Areas – Case Study in Carolina Long Bay
Administered by	Office of Renewable Energy Programs
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Procurement Type(s)	Interagency Agreement
Performance Period	FY 2023–2025
Final Report Due	March 2025
Date Revised	March 31, 2023
Problem	Carolina Long Bay contains hardbottom Essential Fish Habitats (EFH) that are at risk of impacts from offshore wind development. The National Marine Fisheries Service (NMFS) Southeast Regional Office (SERO) has expressed specific concerns regarding possible presence of unidentified low- and high-relief habitats in this area. Current surveying and data analysis methods are limited in their ability to detect low-relief, often cryptic habitats that may be ecologically significant and pervasive throughout the lease area and transmission corridor.
Intervention	Review existing survey and assessment data for Carolina Long Bay to investigate ability to detect low-relief hardbottom habitats using new AI-based methods. Conduct new targeted hydrographic and ground-truthing surveys to rigorously map the distribution and type of hardbottom habitats in Carolina Bay, with broader methodological applicability to other regions with similar habitats.
Comparison	Prior ecological assessments at Carolina Long Bay provide critical data for initial interpretation of select hardbottom habitats in Carolina Long Bay, yet new field and data processing methods have since developed that could substantially improve our understanding of EFH within the lease areas. Refinement and application of these new methods will improve the ability to map habitats of concern within Carolina Long Bay in support of avoiding, minimizing impacts, and guiding mitigation measures to protect EFH.
Outcome	Improved habitat maps to inform EFH assessments, consultations, and permitting for Carolina Long Bay, as well as informing Marine Minerals Program (MMP) G&G Authorizations, leasing, and the National Offshore Sand Inventory. Improved methodology and guidelines to inform habitat mapping in support of other offshore wind (OSW) activities in the Atlantic and Gulf OCS.
Context	Carolina Long Bay, North Carolina, Atlantic OCS.

BOEM Information Need(s): NMFS has expressed concerns to BOEM regarding the presence of sand, low-relief 'pavement,' and high-relief hardbottom (e.g., ledges) Essential Fish Habitat (EFH) within the Carolina Long Bay lease areas and potential transmission corridors. While broad multibeam, sidescan, and limited direct visual data for certain high-relief hardbottom features exist within the lease areas

from prior BOEM-supported work (Taylor et al. 2016), new field data is needed to pair with advanced modeling methods that require refinement to delineate low-relief habitat features of management concern within the lease areas. Review of existing data as well as new predictive models and classified maps derived from this effort will be used to inform permitting decisions for Carolina Long Bay and provide recommendations that could be used to update BOEM guidelines on benthic habitat surveying (i.e., U.S. Department of Interior, 2019). This region is also a high priority to the Marine Minerals Program (MMP), where the sand need is considered substantially higher than the current supply (Taylor Engineering, Inc., 2020). The improved guidance on benthic habitat mapping that is an outcome of this study will allow for informed development of MMP sand resources and support the MMP's National Offshore Sand Inventory. The field and data processing methods developed in this study will be directly applicable towards upcoming survey work in Carolina Long Bay, and broadly applicable for future lease development activities in the South Atlantic, Gulf of Mexico, and US territorial regions that share similar marine habitats. Additionally, given overlap in NOAA researchers between this study and the Southeast Fishery Independent Survey (SEFIS, NMFS Southeast Fisheries Science Center), an opportunity exists to include additional sampling points within the Carolina Long Bay lease areas during the upcoming SEFIS survey at no additional cost to this project. These data will link economically and ecologically important species to the EFH present in the lease areas and will provide valuable insights for future EFH consultations for Carolina Long Bay.

Background: In June 2022, the Carolina Long Bay renewable energy leases (OCS-A 0545 and OCS-A 0546) were issued. Both lessees are currently developing survey plans to support their Site Assessment Plan and are planning broader surveying campaigns for subsequent years to support their Construction and Operations Plan. Beginning in 2014, NOAA NCCOS conducted extensive habitat mapping within the Carolina Long Bay lease areas–providing a strong foundation for understanding habitat interactions, particularly for high-relief hardbottom habitat. Since this study, NOAA NCCOS has continued to develop field and data processing methods that extend beyond high-relief hardbottom habitat towards cryptic, low-relief habitats that are likely present throughout the lease area and are of EFH concern. The new methods have been developed in coral reef and unconsolidated habitats and require deeper evaluation and refinement with ground-truthing to ensure their rigor for delineating a range of hardbottom EFH features found in Carolina Long Bay. An opportunity exists to strengthen and refine NOAA NCCOS' field and data processing methods towards broad scale implementation by the Carolina Long Bay lessees during survey campaigns in support of their Construction and Operations Plans. The outcome of this project will be new interpretive tools for delineation of a broad range of EFH, as well as a fish community assessment linking fish species with EFH within Carolina Long Bay to inform future EFH consultations. These tools and resources can be immediately applied towards the management needs of Carolina Long Bay but would also more broadly be applicable to other lease areas with similar habitat features (e.g., South Atlantic, Gulf of Mexico, and US Territory regions).

Objectives: Inform site assessment and permit review for construction and operations for development of the Carolina Long Bay renewable energy lease areas through the following:

1. Review and synthesize existing data on the distribution of hardbottom habitats, including high-relief habitats (e.g., ledges) and cryptic low-relief habitats (e.g., pavement); assess data gaps for ground-truthing habitat classifications.

2. Acquire new ground-truthing data to support expanded habitat maps focused on quantifying the distribution of a broad range of high- and low-relief hardbottom habitats in Carolina Long Bay. Collect fish community data through additional SEFIS sampling points within the Carolina

Long Bay lease areas to support a fish community assessment that describe linkages between species and EFH.

3. Develop interpretive tools (e.g., data processing, visualization) and best practices (e.g., survey instrumentation and procedures) for how hardbottom habitat, and particularly low-relief hardbottom and pavement, are quantified, detected, and delineated to support OSW planning and permitting.

Methods: This project will be accomplished in three phases:

Phase 1 (Q3 FY23 - Q2 FY24): NCCOS will review previously collected sidescan and multibeam sonar data to evaluate the potential for detection and delineation of low-relief hardbottom. A gap analysis will determine requirements for additional multibeam hydrographic survey and ground-truthing data, as well as identify key areas for fish community data collection.

Phase 2 (Q3 FY24 - Q1 FY25): NOAA will conduct new hydrographic, ground-truthing, and fish community surveys in key areas of Carolina Long Bay identified in the review and gap analysis. NOAA research ships will conduct high-resolution multibeam and shallow sub-bottom sonar surveys to derive initial seabed habitat classification maps, followed by a rigorous benthic imaging and ground-truthing survey employing drop cameras and new micro-AUVs with camera payloads. Statistical and predictive models will be developed to define seabed habitat classes and validated with ground-truthing observations. Resolution of maps, level of detail in habitat classes, and prediction uncertainty will be assessed as part of the modeling. SEFIS survey vessels will collect fish community and visually-derived habitat data (i.e., drop cameras) at sampling points within the Carolina Long Bay lease areas.

Phase 3 (Q3 FY24 - Q1FY25): NOAA will produce interpretive geospatial data tools and best practices for remote sensing (e.g., multibeam sonar frequency, drop camera, micro-AUV, or ROV) and ground-truthing observations for delineating and quantifying hardbottom habitats to guide and inform requirements from government or lessee-led surveys for site assessments, design, and construction review processes. NOAA will also develop a fish community assessment that describes linkages between fish species and habitats within Carolina Long Bay to support future EFH consultations.

Specific Research Question(s):

1. What are the data requirements and appropriate modeling approaches to classify and quantify the distribution and types of hardbottom (e.g., low-relief) and EFH in offshore wind areas?

2. What are the best practices in sensor selection and survey design for assessing the spatial distribution of hardbottom habitats in the Carolina Long Bay lease areas?

3. What are linkages between EFH and fish communities within Carolina Long Bay lease areas?

Current Status: N/A

Publications Completed: N/A

Affiliated WWW Sites: N/A

References:

Taylor JC, Paxton AB, Voss CM, Sumners B, Buckel CA, Vander Pluym J, Ebert EB, Viehman TS, Fegley SR, Pickering EA, et al. 2016. Benthic habitat mapping and assessment in the Wilmington-East Wind Energy Call Area. Sterling (VA): U.S. Department of the Interior, Bureau of Ocean Energy Management and U.S. Department of Commerce, National Oceanic and Atmospheric Administration. 149 p. OCS Study BOEM 2016-003 and NOAA Technical Memorandum 196.

Taylor Engineering, Inc. 2020. U.S. Army Corps of Engineers South Atlantic Division Sand Availability and Needs Determination (SAD SAND) Summary Report. Jacksonville (FL): U.S. Army Corps of Engineers. 256 p. Report No.: W912BU-15-D-0006.

U.S. Department of Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs (BOEM OREP). 2019. Guidelines for providing benthic habitat survey information for renewable energy development on the Atlantic Outer Continental Shelf pursuant to 30 CFR Part 585. 9 p.