UNITED STATES DEPARTMENT OF THE INTERIOR
Bureau of Ocean Energy Management
Office of Renewable Energy Programs

June 2019

Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585

I. Guidance Document Statement

The Bureau of Ocean Energy Management (BOEM) issues guidance documents to clarify, supplement, and provide more detail about certain BOEM regulatory requirements and to outline information required of the lessee to support their various submittals. This guidance document sets forth a policy and an interpretation of a regulatory requirement to provide a clear and consistent approach to complying with that requirement. A lessee may use an alternate approach for compliance; however, early and frequent coordination with BOEM will be especially critical to ensure the work conducted meets BOEM's regulatory requirements.

II. Introduction to Guidelines

Before the U.S. Department of the Interior, BOEM will approve the siting of a facility proposed for a renewable energy project on the Atlantic Outer Continental Shelf (OCS), a lessee must submit the results of its site characterization surveys to BOEM with its Site Assessment Plan (SAP), Construction and Operations Plan (COP), or General Activities Plan (GAP). The purpose of this national guidance document is to provide recommendations for complying with the information requirements in 30 CFR Part 585 Subpart F.

BOEM requires the results of site characterization studies to evaluate the impact of proposed activities on physical, biological, and socioeconomic resources as well as the seafloor and sub-seafloor conditions which could be affected by the construction, installation, and operation of meteorological towers, buoys, cables, wind turbines, and supporting structures. The information will be used by BOEM, other Federal agencies, and potentially affected states in the preparation of National Environmental Policy Act (NEPA) documents; interagency consultations, such as Section 7 of the Endangered Species Act (ESA); and to meet other statutory and regulatory requirements. Early communication with BOEM and adherence to these guidelines should ensure BOEM's information needs are met. Survey results obtained through procedures consistent with these guidelines should be sufficient for BOEM's decision-making process. BOEM may stipulate through lease and grant terms that lessees and grantees submit a SAP, COP, or GAP survey plan, and schedule a pre-survey meeting with BOEM to discuss the plan prior to conducting survey activities in the leased or granted area.

Site characterization activities in this document refer only to benthic habitat surveys. BOEM provides recommendations for conducting and reporting the results of other baseline collection studies in separate guidelines: *http://www.boem.gov/Survey-Guidelines/*. These national

guidelines may be updated periodically, as new information or methodologies become available. This version supersedes previous versions.

The overall purpose of the required information is to characterize benthic habitat within the survey area possibly affected by the proposed operations. The benthic habitat survey plan should aim to:

- Identify and confirm dominant macrofaunal and macrofloral communities and substrate present where development is proposed;
- Establish a pre-construction baseline that may be used to assess whether detectable changes occurred in post-construction benthic habitat associated with proposed operations;
- Collect additional information aimed at reducing uncertainty associated with baseline estimates and/or to inform the interpretation of survey results; and
- Develop an approach to quantify any substantial changes in the benthic community composition associated with proposed operations.

For all projects, lessees should also describe the measures to be taken to minimize or eliminate potential impacts to benthic resources in their COP, SAP, or GAP. In addition, for projects involving the installation of wind energy turbines on the Atlantic OCS, the lessee should prepare a benthic habitat survey plan that describes its methods for collecting sufficient information on the biology and seafloor morphology of the survey area to allow BOEM and other agencies with jurisdiction to make well-founded decisions in context with the regional biology and physical habitat.

III. Authority and Regulations

BOEM has statutory obligations under the Outer Continental Shelf Lands Act (43 USC §1337(p)) to protect the environment and conserve natural resources of the OCS. Additionally, BOEM has statutory obligations under NEPA, ESA, and the Magnuson-Stevens Fishery Conservation and Management Act. Under BOEM's regulations, a plan (SAP, COP, or GAP) must describe biological, social, and economic resource information potentially affected by activities proposed in the SAP, COP, or GAP (see SAP – 30 CFR 585.610(b)(5), 585.611(a),(b)(3), (5) and (7); COP – 30 CFR 585.626(a)(3), 585.627(a)(3), (5), and (7); and GAP – 30 CFR 585.645(a)(5), 585.646(c), (e) and (g)).

To evaluate impacts to biological, social, and economic resources, BOEM, and its Federal consulting partners, Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS), under the aforementioned statutes require sufficient baseline information on the potentially affected area. These guidelines are meant to clarify and provide a general understanding of the information which BOEM, in consultation with USFWS and NMFS, requires to adequately address impacts of offshore renewable energy projects on biological, social, and economic resources. BOEM will review the submitted SAP, COP, or GAP and associated information to determine if it contains necessary information to conduct BOEM's technical and environmental reviews. Upon completion of BOEM's technical and environmental reviews, BOEM may approve, approve with modifications, or disapprove.

Elements of these guidelines may be required as terms and conditions of a specific lease or grant. A lease or grant may also have different requirements from those discussed in these guidelines. Lessees or grantees should be aware that if these guidelines conflict with conditions in a lease or grant, the lessee or grantee must comply with the terms of their lease or grant.

IV. Early Coordination with BOEM

BOEM recommends meeting early in the process, ideally three years before COP submission, to discuss BOEM's potential information needs. Early coordination allows for BOEM and the lessee to discuss common goals and expectations prior to mobilization of a benthic habitat survey. BOEM firmly believes maintaining an early and open dialogue with the lessee is critical to timely, comprehensive execution of a benthic habitat survey. Engaging in discussions with other agencies (e.g., USFWS, NMFS, and National Park Service (NPS)) and concerned parties as early as possible will also help resolve any issues that may arise. The lessee is advised to resolve any technical issues that may be in dispute with other agencies prior to submitting their final plans to BOEM. BOEM may determine that it is prudent for a developer to resurvey some or all of the lease area in the event survey results are insufficient.

BOEM strongly recommends a pre-survey meeting. This meeting may include, but is not limited to, discussions regarding:

- applicability of existing data;
- survey logistics (proposed survey area, dates, times, survey period length, weather limitations, etc.);
- field techniques and equipment to be utilized/specifications of data acquisition systems;
- data to be acquired;
- data processing and analysis; and
- data and information to be submitted.

V. Survey Methodology

A benthic habitat survey plan that satisfies all parties' needs is an important first step towards a successful biological survey. In developing a benthic habitat survey plan, a review of previous investigations, such as other physical and biological survey efforts of the area, can be helpful to a lessee in selecting equipment, and in choosing the sampling and analytic approaches.

The applicant should employ the appropriate equipment and analytical techniques for all surveys. BOEM encourages the lessee to review the Developing Environmental Protocols and Modeling Tools to Support Renewable Energy and Stewardship (McCann, 2012) to assist in determining the most appropriate protocols for the proposed project: *http://www.data.boem.gov/PI/PDFImages/ESPIS/5/5208.pdf* (see Appendix A for other sources of information on the Atlantic OCS). Applicants are encouraged to collaborate with other developers, research institutions, and state and Federal natural resource agencies to accomplish their site characterization objectives for SAP, COP, or GAP submittal to BOEM.

The amount of new information collected should match the scale and/or complexity of the proposed project and should address any key scientific questions. For example, a commercial-

scale wind energy project may need additional site-specific survey work prior to the submittal of a construction plan. In contrast, a project to install a meteorological tower or meteorological buoy would most likely need very limited survey work as the impact to benthic resources may be restricted to a very small area. Due to the small footprint of a standard floating light detection and ranging buoy, survey information would only be needed to confirm benthic resources impacted by the installation of the mooring system.

Developers are encouraged to use existing data where applicable to their proposed activities and associated areas of potential adverse effect to characterize the natural resources present. Potential adverse effects are generally defined as impacts from all phases of the proposed action that may reduce the quality and/or quantity of the benthic habitat, and the area of potential adverse effect is the geographic area or areas within which such activity may cause adverse changes in the character or use of any natural resources present. Areas of potential adverse effect may include staging areas that are used in the course of construction, installation, and operation of a wind energy facility. In practice, the applicant should identify the reasonably foreseeable effects associated with their proposed activity and ensure that the habitats that could be affected are included in their surveys.

McCann (2012) identified the following major to moderate effects to benthic habitats resulting from offshore wind facility construction: scour and/or deposition of sediments; re-suspension of pollutants in sediments; increased turbidity and decreased water clarity due to sediment transport; chemical spills; disturbance from cable installation and cable sweep; changes to ocean currents or wave regimes; and changes in the characteristics of the benthic habitat in the footprint of the project. BOEM will consult with supporting agencies to evaluate existing data and determine if any data gaps exist. Furthermore, applicants are encouraged to collaborate with other developers, research institutions, and state and Federal natural resource agencies to accomplish their site characterization objectives for SAPs, COPs, and GAPs.

Benthic habitat surveys may be conducted simultaneously with other survey requirements. Areas of high variable relief (ridges, troughs, escarpments, etc.) identified through high resolution geophysical surveys of the action area should be validated via protocols outlined in Table 1. Geotechnical borings and/or cone penetrometer testing activity in support of engineering studies may further inform surficial sediment and biological information. Project-specific ocean monitoring equipment at the site or publically available information from regional ocean observation systems may provide relevant temperature and salinity data. Publically available commercial fishing data can further characterize existing site disturbances as well as characterize biological habitat information.

BOEM recommends applicants submit survey specifications with a SAP, COP, or GAP survey plan. BOEM will coordinate with appropriate natural resource agencies to ensure data and analyses adequately meet regulatory requirements. However, BOEM is not responsible for designing the survey. The survey specifications should state the issues to be investigated, hypotheses, assumptions, data collection techniques, standards, analytical and statistical techniques, and quality control.

Table 1. Pre-Construction Site Characterization: Benthic Community Composition Survey Protocol.

Focus	Pre-construction characterization and delineation of the abundance, diversity, percent cover, and multivariate community composition of the seafloor in the area of potential adverse effect.
Methodology	Physical sampling • Hamon grab (hard bottom), • Van Veen grab (soft sediment), and/or • Benthic sled Benthic imagery (i.e., underwater video or still imagery (soft and hard bottom) and/or sediment profile imaging (SPI)). BOEM recommends using the methods employed by the Environmental Protection Agency's (USEPA) National Coastal Condition Assessment (NCCA), such as the use of a 0.04 m^2 Ted Young-modified Van Veen grab and 0.5 mm sieve, to facilitate data comparison across regions.
Timing	Conduct 2 years of seasonal surveys (spring, summer, fall, winter).
Scope/Scale	Baseline survey should include an appropriate sample size from the entire area of potential adverse effect, generally not less than one sample per 1-2 km along a proposed line of potential adverse effect or one sample per 1-2 km^2 within a proposed area of potential adverse effect. Sampling should address seasonal and inter-annual variability of anticipated benthic communities. Control sites for post-construction monitoring should be identified.
Technical Requirements	Special attention should be given to the presence of sensitive benthic habitats. These include areas where information suggests the presence of exposed hard bottoms of high, moderate, or low relief; hard bottoms covered by thin, ephemeral sand layers; seagrass patches; or kelp and other algal beds, as well as the presence of anthozoan species.
Presentation of Results	• Tabular and geospatial datasets. • Spatial should be submitted according to the Spatial Data Submission Guidelines found on BOEM's Offshore Renewable Energy Program website: *https://www.boem.gov/Survey-Guidelines/*. • When relying on pre-existing data, provide justification for how those data are appropriate for the project's area of potential adverse effect.

Table 2. Pre-Construction Site Characterization: Sediment Scour and/or Deposition Survey Protocol.

Focus	Establish pre-construction baseline surficial sediment composition throughout the project area in order to evaluate sediment scour and/or deposition impacts, as well as potential for contaminant re-suspension and exposure post construction and during operations.
Methodology	Particle size analysis or sediment-profile imaging (SPI) and multibeam/ interferometric bathymetry (with backscatter data)
Timing	Once, prior to submittal of SAP, GAP, or COP. Data should not be more than 10 years old.
Scope/Scale	Baseline survey should include entire area of potential adverse effect. Control sites for post-construction monitoring should be identified. Remote acoustic surveys should cover 100% of the area. Other sampling resolution is site-dependent but generally not more than one sample per 1-2 km along a proposed line of potential impact or one sample per 1-2 km^2 within a proposed area of potential adverse effect.
Technical Requirements	Side scan sonar data should be of optimal quality resulting in the displays automatically corrected for slant range, lay-back and vessel speed. Mosaic the recorded data to provide a true plan view that provides 100 percent coverage of the area of potential adverse effect. Tow the sonar instrument above the seafloor at a distance that is 10 to 20 percent of the range of the instrument. Ensure line spacing and display range are appropriate for the water depth and data obtained are of such quality as to permit detection and evaluation of seafloor objects and features 0.5m – 1m in diameter within the survey area. Calibrate the instrument to enhance echo returns from small nearby objects and features without sacrificing the quality of echo returns from more distant objects and features. Completion of any necessary permit requirements (e.g. Marine Mammal Protection Act if harassment of marine mammals may occur from the activity).
Presentation of Results	Tabular and geospatial datasets. Spatial data should be submitted according to the Spatial Data Submission Guidelines found on BOEM's Offshore Renewable Energy Program website at: *https://www.boem.gov/Survey-Guidelines/*. When relying on pre-existing data, provide justification for how those data are appropriate for the project's area of effect.

VI. Survey Results and Supporting Data

To ensure the accuracy and quality of survey results, the following data elements should be provided with the benthic habitat surveys. However, individual benthic survey plan elements should be discussed with BOEM on a case-by-case basis. Benthic habitat data should be classified according to the Coastal and Marine Ecological Classification Standard (CMECS) to the lowest taxonomic unit practicable.

- All data should be processed, validated and made available as needed. BOEM also encourages uploading survey data to National Oceanic and Atmospheric Administration (NOAA) National Oceanographic Data Center (NODC) for public availability and archiving.
- Identify and confirm which benthic species (flora and fauna) inhabit the proposed project development site. NMFS-designated essential fish habitat (EFH) for eggs, larvae, juveniles, adults, and spawning adults must be identified within the action area. The NMFS EFH mapper tool may be used for species identification and habitat characteristics at a particular location and to identify any NMFS-designated EFH Areas of Particular Concern: *http://www.habitat.noaa.gov/protection/efh/habitatmapper.html*
- Characterize benthic community composition. Characterization includes documentation of abundance, diversity, percent cover, and community structure. Details of this protocol are in Table 1. Examples include the following characterizations:
    a. characterization and delineation of any submerged aquatic vegetation (seagrass or macro-algae) that occurs within the area of potential adverse effect;
    b. characterization and delineation of any hard bottom gradients of low to high relief such as coral (heads/reefs), rock or clay outcroppings, or other shelter-forming features;
    c. identification of communities of sessile and slow-moving marine invertebrates (clams, quahogs, mussels, polychaete worms, anemones, sponges, echinoderms) that may be within the area of potential adverse effect; and
    d. characterization of seasonal and inter-annual variability of the benthic community.
- Characterize and delineate the surficial sediment layers in the area. This includes a particle size analysis, and classification according to the CMECS. Details of this protocol are in Table 2.
- Characterize the physical hydrodynamic properties of the surrounding water column (e.g., seasonal water-column salinities and temperatures, flow rates, turbidity, prevailing ocean circulation patterns).
- Characterize both manmade and natural physical bottom disturbance typical for the action area. For example, identify if the area is heavily fished by bottom-tending mobile fishing gear, or if it is a natural high-energy environment regularly impacted by storms and hurricanes, etc.
- Identify area(s) of similar physical and biological characteristics outside the action area which may be used as a baseline reference to monitor construction and operation effects of the proposed action to the benthic environment.

VII. Paperwork Reduction Act Statement

The information collection provisions of this document are intended to provide clarification, description, or interpretation of requirements contained in 30 CFR 585 Subpart F. The Office of Management and Budget (OMB) has approved the information collection requirements for these regulations and assigned OMB Control Number 1010-0176.

VIII. Contact Information

For further information or inquiries regarding these guidelines please contact the Office of Renewable Energy Programs at (703) 787-1300 or *renewable_reporting@boem.gov*.

IX. References

Bundesamt fur Seeschifffarht und Hydrogeographie [BSH]. 2007. Standard Investigation of the Impacts of Offshore Wind Turbines on the Marine Environment (StUK). BSH-Nr. 7003, Bundesamt fur Seeschifffarht und Hydrogeographie, Hamburg and Rostock, Germany. Available online from: *http://www.bsh.de/de/Produkte/Buecher/Standard/index.jsp*

McCann, J. et al. 2012. Developing Environmental Protocols and Modeling Tools to Support Ocean Renewable Energy and Stewardship. Created for the National Oceanographic Partnership Program (NOPP), Project # M10PC00097, September 2012.

Rein C.G., Lundin, A.S., Wilson, S.J.K., Kimbrell, E. 2013. Offshore Wind Energy Development Site Assessment and Characterization: Evaluation of the Current Status and European Experience. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs, Herndon, VA. OCS Study BOEM 2013-0010. Pages 18-30. *http://www.data.boem.gov/PI/PDFImages/ESPIS/5/5305.pdf*

U.S. Department of the Interior, Minerals Management Service. 2007b. Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf, Final Environmental Impact Statement. October 2007. OCS Report BOEMRE 2007-046.
http://www.ocsenergy.anl.gov/ and Record of Decision document available at:
http://ocsenergy.anl.gov/documents/docs/OCS_PEIS_ROD.PDF

Appendix A. Resources for Benthic Habitat Information on the Atlantic OCS.

See *http://www.boem.gov/Renewable-Energy-Environmental-Studies/* for the most recent list of ongoing and completed studies related to renewable energy.

Atlantic Benthic Habitat Resources	Links
US Department of the Interior, Bureau of Ocean Energy Management, Guida, V., A. Drohan, H. Welch, J. McHenry, D. Johnson, V. Kentner, J. Brink, D. Timmons, E. Estela-Gomez. 2017. Habitat Mapping and Assessment of Northeast Wind Energy Areas. Sterling, VA. OCS Study BOEM 2017-088. 312 p.	*https://www.boem.gov/espis/5/5647.pdf*
U.S. Department of the Interior, Bureau of Ocean Energy Management, Taylor, J. C., A. B. Paxton, C. M. Voss, B. Sumners, C. A. Buckel, J. Vander Pluym, E. B. Ebert, T. S. Viehman, S. R. Fegley, E. A. Pickering, A. M. Adler, C. Freeman, and C. H. Peterson. Benthic Habitat Mapping and Assessment in the Wilmington-East Wind Energy Call Area. Sterling, VA. OCS Study BOEM 2016-003 and NOAA Technical Memorandum 196.	*https://www.boem.gov/BOEM-WECA-Final-Report-NCCOS/*