

BOEM ENVIRONMENTAL STUDIES PROGRAM: Ongoing Studies

Region: Headquarters

Planning Area(s): All

Title: Best Practices for Physical Process and Impact Assessment in Support of Beach Nourishment and Coastal Restoration Activities

Conducting Organization: Applied Coastal Research and Engineering

Total Cost: \$386,177 (option \$107,693)

Period of Performance: FY 2010-2013

BOEM Contact: Geoffrey Wikel

Description:

Background:

Since 1995 BOEM has funded over twenty physical process studies that have considered near-field and/or far-field impacts of dredging borrow areas on the U.S. Outer Continental Shelf (OCS). Past studies have concentrated on far-field shoreline impacts, focusing on wave transformation over the borrow area and induced gradients in longshore sediment transport potential, although a few recent efforts have studied longer-term morphological evolution at the borrow area. It is current practice for applicants to treat the potential wave transformation and sediment transport effects of proposed projects as part of the environmental review process in order to use OCS resources in beach nourishment or coastal restoration projects.

A recent literature review indicated that relatively few OCS projects are likely to cause discernible far-field impacts in context of natural variability, despite wide-ranging shelf slope and morphology, borrow area configurations, hydrodynamic setting, and meteorological forcing. Impacts are generally limited because of the relative depths and distances offshore of the proposed borrow areas. Predicted impacts to wave transformation and sediment transport potential are relatively infrequent and occur during severe storms that introduce significant and variable coastal change regardless of the assumed impacts of dredging. If more severe impacts are predicted, use of the borrow area is modified or precluded. The effects that seafloor modification due to dredging may have on near-field flow and sediment transport (i.e., within and adjacent to the borrow area) have not been typically analyzed.

The physical response at the borrow area is important to more fully understand dredge depression/pit migration and infilling, as well as margin, rim, and slope behavior, which in turn can influence far-field impacts. The degree of influence depends on dredge depression/pit location (e.g., water depth, distance from shore), dredge depression/pit geometry (e.g., length, width, depth), pit orientation (e.g., the angle of critical axis and direction of flow), the magnitude and complexity of forcing, and adjacent bathymetry, sediment type, and bottom roughness elements.

Morphodynamic modeling can be a useful tool to help understand physical phenomena and evaluate potential near- and far-field impacts in such scenarios. It is recognized that the utility of such modeling approaches in site-specific application depends on calibration, validation, and/or sensitivity testing. Since modeling is time consuming and expensive owing largely to computational requirements, BOEM recognizes that modeling should be well-reasoned and useful. The application of these advanced tools may provide more much needed information about potential changes in nearshore and offshore waves and circulation, sediment transport, and morphologic evolution following dredging. From this improved understanding of physical processes, BOEM may begin to develop analysis criteria and general guidelines that would describe when and why site-specific modeling and higher-cost shoreline impact assessments would be required or could be precluded.

Objectives:

1. Design and implement a morphological modeling approach in order to improve the present understanding of impacts to near-field and far-field physical processes (including morphologic response) related to the modification of offshore bathymetry due to dredging.
2. Develop criteria for determining the necessity of site-specific modeling and best practices as to what modeling approach should be undertaken when appropriate based on the modeling results.

Methods: The contractor will identify a representative study area with adequate existing forcing and validation data to test a suite of models, including ROMS/Community Sediment Transport Model System, NearCOM, MIKE 21 Coastal Area Morphological Modeling Shell, and Coastal Modeling System against observed wave, current, sediment transport and morphologic response. The contractor will perform the necessary sensitivity testing for candidate models to assess the influence of model forcing, parameterizations, and process filtering. Each model will be skill assessed in terms of simulated wave, flows, and morphologic response. Best performing candidate models, including at least one community model, will be applied to a range of demonstrative geometries in schematized flat bed and sand ridge settings for typical and storm forcing. If possible, results from modeling will be integrated in impact modeling guidelines, addressing the assessment of potential near-field and far-field impacts.

Importance to BOEM:

Provided an improved understanding of the important physical processes, analysis criteria and guidelines can be developed that describe when, where, and why site-specific modeling and higher-cost shoreline impact assessments are necessary.

Current Status: The contractors have identified the inner shelf offshore Myrtle Beach, South Carolina as the candidate study area for model comparison. Forcing, nesting, and validation data have been compiled. Recent improvements to NearCOM have also been made. The contractor has begun initial model parameterization for all four model suites.

Final Report Due: September 2012 (subject to change)

Revised Date: February 1, 2012

ENVIRONMENTAL STUDIES PROGRAM: ONGOING STUDIES

Region: National

Planning Area(s): All

Title: Archiving of Outer Continental Shelf Invertebrates by the Smithsonian Institution

BOEM Information Need(s) to be Addressed: Continued archiving and long-term reliable curating of the vast collections of invertebrate specimens acquired through BOEM-sponsored projects are essential elements of biological quality assurance. This effort provides BOEM with the scientific credibility important to stakeholders' acceptance of decision-making in the Offshore Energy and Minerals Program. This BOEM-funded archiving program started in 1979 has been characterized as an important example for the preservation of Federally-funded data collections and specifically highlighted as a significant component of base line information with regard to the 2010 Gulf oil spill.

Total Cost: \$1,095,123

Period of Performance: FY 2009-2014

Conducting Organization: Smithsonian National Museum of natural History

BOEM Contact: [Gregory Boland](#)

Description:

Background: The BOEM conducts many biological projects in support of decision-making related to the development of offshore energy and mineral resources. These projects frequently result in large collections of invertebrate specimens. Taxonomy is a critical component to the ecological interpretation of biological data. Archiving of the collections provides for taxonomic verification and for the future use of the collections. The Smithsonian Institution's National Museum of Natural History (NMNH) is the Nation's most reliable and respected repository for biological collections. Since 1979 invertebrate specimens collected through the BOEM Environmental Studies Program have been carefully maintained through the NMNH's archiving standards and made available to taxonomists around the world. During the period 2004-2008, this project was supported by USGS funds that are available for BOEM information needs. In 2007 BOEM and USGS agreed that BOEM would continue support of this project beginning in FY 2009 and the USGS funds previously used to support NMNH would be directed to other BOEM information needs that could be addressed by in-house USGS scientists.

Objectives: An objective of this study is to provide quality assurance for biological data generated through the BOEM Environmental Studies Program. Meeting this objective serves to enhance the credibility of offshore energy and mineral resources decision-making.

Methods: To accomplish the objectives of this project, specifications for the handling, storage, and shipping of invertebrate specimens collected through BOEM environmental studies are included in applicable contracts. These specifications were developed in coordination with the Smithsonian Institution to provide contractors with information required to ensure that the collected specimens are delivered to the NMNH in the best possible condition. The Smithsonian accepts the specimens, checks the condition of the samples and taxonomic identification, and makes them part of the national collections. The collections are then maintained according to the strict guidelines of the NMNH and are made available to other researchers. Semi-annual reports to BOEM provide updates on the numbers of specimens accessioned into the NMNH collections, those remaining to be accessioned, and those on loan to taxonomists around the world. To date, over 260 species new to science have been identified in the BOEM collections.

Current Status: The current contract began in 2009 and is in its 3rd of 5 contract years. A new Oregon/northern California cooperative alternate energy study has initiated a process to transfer samples from the NE Pacific to the BOEM invertebrate archiving program for the first time. The most recent semi-annual report documented a total of 4,400 sample lots being cataloged and curated into the NMNH collections between June 1 and December 1, 2011.

Revised Date: January 2012

ESPIS

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ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2011-2013

Region: National

Planning Area(s): All

Title: Evaluation of the Relative Environmental Sensitivity and Marine Productivity of the Outer Continental Shelf (OCS)

BOEM Information Need(s) to be Addressed: BOEM is required by the Outer Continental Shelf Lands Act (OCSLA) to conduct environmental analyses for each five-year oil and gas program. One required analysis is to evaluate the relative environmental sensitivity and marine productivity of different areas of the Outer Continental Shelf (OCS). This study will develop the analysis for the upcoming 2012-2017 Five-Year Program. The analysis compares and ranks the environmental sensitivity and marine productivity of the 26 OCS planning areas. The successful completion of this study is essential for the implementation of the 2012-2017 Five-Year Oil and Gas Program.

Cost Range: (in thousands) \$400-\$600 **Period of Performance:** FY 2011-2012

Description:

Background: The OSCLA mandates that BOEM conduct leasing on the OCS through five-year programs. The OSCLA also requires BOEM to conduct several analyses to evaluate the economic and environmental costs and benefits of OCS leasing. One requirement is to evaluate the relative environmental sensitivity and marine productivity of the 26 OCS planning areas. BOEM has traditionally performed a separate analysis of relative environmental sensitivity and another for marine productivity. A separate BOEM study is currently underway to update and prepare the marine productivity analysis. The relative environmental sensitivity analysis prepared for the 2007-2012 Program was successfully litigated on the basis that its use of a single indicator of coastal oil spill sensitivity did not address the sensitivity of the marine environment. The remanded analysis used an approach that calculated planning area sensitivity by summing the individual sensitivity scores for the marine habitat, marine fauna, marine productivity, and coastal habitat components within and near the planning area. The remanded analysis also analyzed climate change effects on sensitivity.

Objectives: The objectives of this study are to develop and recommend options for replacing or supplementing previous BOEM methodologies, evaluate approaches and information sources, and conduct the environmental sensitivity and marine productivity analyses of the 26 OCS Planning Areas. This study also will evaluate how information developed in the marine productivity analysis should be incorporated into the environmental sensitivity scoring and explore other issues that may need to be considered (e.g. ecological resilience or potential seasonal variation in productivity or marine species abundance).

Methods: A review and assessment of previous analyses, other methodologies and

relevant information sources will be conducted to inform the recommendations and analyses. Methods used in the analysis will be constrained by the following considerations.

1. Data - Data and information used to depict locations, abundance, and other characteristics of environmental features used to calculate environmental sensitivity and marine productivity will optimally have the following characteristics:
 - National coverage
 - Available in digital format
 - Authoritative information source
2. Scale - The resolution of data and analytic methods used in the analysis should be appropriate for depicting broad differences in environmental sensitivity and marine productivity among planning areas. Fine scale data is not required but can be used if generalized to a broader scale.
3. Documentation - All assumptions and parameters used to calculate environmental sensitivity and marine productivity must be based on current authoritative information. Full citations must be provided.
4. Modeling - BOEM does not intend to develop complex models or custom software for the analysis. Models will be either conceptual to assist in guiding and standardizing the analyses, or computer-based models developed in standard PC software such as MS Excel or Access. Custom programming will be limited to the use of scripting languages provided with the software.

A report will be prepared that describes the methodologies and information that were used to develop the scorings of the relative environmental sensitivity and marine productivity of the 26 OCS Planning Areas. This report will document other possible methods that were not used, reasons for the selection of the approach that was used, and any weaknesses of the selected approach.

Revised Date: August 28, 2010

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2012–2014

Region: Headquarters

Planning Areas: All

Title: Enhancement of the Environmental Studies Program Information System (NT-12-01)

BOEM Information Need(s) to be Addressed: BOEM needs a more efficient and easily accessible way to provide public access to data and information collected from environmental studies. The Environmental Studies Program Information System (ESPIS) is the portal to all scientific research generated by the program and is the best way for all those interested to understand and use the reports and products of Environmental Studies Program (ESP) projects. Key users of ESPIS include our own scientists, other Federal and State agencies, academicians, non-governmental organizations and the general public.

Cost Range: (in thousands) \$800-1,000

Period of Performance: FY 2012-2014

Description:

Background: The Environmental Studies Program Information System is the primary mechanism by which the BOEM Environmental Studies Program (ESP) shares the results of scientific investigations with the public. Currently ESPIS is designed to provide reports, with limited capability to provide other information such as data files, video, and images. However, there is an increasing demand to provide information besides reports to scientists, local and state government, and regional ocean planning bodies. In addition, recent Executive Order 13366 requires that each Federal agency “be held accountable for managing its own information assets by keeping them current, easily accessible, and consistent with Federal standards.” An improved ESPIS system will facilitate sharing results of studies with the public and help BOEM meet Federal requirements and standards for data.

The enhancements to ESPIS will work in concert with a related effort to provide support to the Multipurpose Marine Cadastre (MMC). ESPIS makes the synthesized products of ESP projects available while the MMC will make selected datasets available within a web based viewer. Together, the two efforts make all of the information, data and products of ESP research fully available to any users.

Objectives: The objective of this project is to enhance the ability of the ESPIS system to provide improved public access to data and information.

Methods: The ESPIS database will be redesigned to allow greater functionality such as:

- Adding the ability to store, retrieve and search multiple media types such as geospatial data sets, images, video, audio, and other project related files.
- Enhancing the ability to search the database.
- Providing the geospatial location (“footprint) of all studies completed to date.

- Allowing linkages with the Multipurpose Marine Cadastre
- Creating an interface for uploading and maintaining data.

Revised Date: April 8, 2011

TECHNICAL SUMMARY

Study Title: Atlantic Wind Energy Workshop Summary Report

Report Title: Atlantic Wind Energy Workshop Meeting Report

Contract Number: GS-07F-0591W

Sponsoring OCS Region: Headquarters– Office of Alternative Energy Program

Applicable Planning Areas: Atlantic Outer Continental Shelf

Completion Date of Report: August 2011

Costs: \$219,257

Project Managers: Valerie Johnson and Kim Olsen

Affiliation (Project Manager): Performance-based Solutions, Inc. and CSA International, Inc.

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Key Words: alternative energy, offshore wind, offshore renewable energy, socioeconomics, offshore energy technology, environmental data, birds, bats

Background: The Bureau of Ocean Energy Management, Regulation, and Enforcement (BOEMRE) is a bureau under the U.S. Department of the Interior (DOI) that manages the nation's natural gas, oil, and other mineral resources on the Outer Continental Shelf (OCS). In managing the offshore oil and gas resources, Offshore Energy and Minerals Management (OEMM) conducts environmental studies, issues leases, and regulates operations conducted on the OCS. The regulatory responsibilities include issuing permits for oil and gas exploration, development, and production and inspecting operations during all of these activities. BOEMRE manages the offshore mineral resources in concert with other Federal, State, and local agencies and in consultation with the public. The November 23, 2010, launching of the Secretary of Interior's "Smart from the Start" wind energy initiative for the Atlantic OCS is aimed at facilitating the prioritization, rapid siting, and leasing of new projects. This workshop provided information to assist BOEMRE in the environmental review of wind energy areas and in the evaluation of sites for new offshore projects. A total of 172 people attended the workshop, including Federal and State agency staff that provided a summary of their agencies' regulatory role in the wind energy development process as well as numerous experts and project leaders that reported on completed and ongoing studies relevant to the development of offshore wind projects. The attendees participated in the workshop plenary and breakout sessions and were tasked to identify data gaps and develop partnerships for future studies.

Objectives: As part of the Secretary of the Interior's "Smart from the Start" wind energy initiative to spur renewable energy development on the OCS, this workshop provided information to assist BOEMRE and its Federal partners in environmental and technical reviews

of wind energy areas and in the evaluation of new projects. Additionally, this workshop was part of the DOI-Department of Energy (DOE), Memorandum of Understanding (MOU) process to coordinate environmental monitoring and baseline studies in support of environmental assessment and consultations for siting and leasing in the Atlantic wind energy areas.

Specific goals of the workshop included (1) providing an update of recent and ongoing environmental and social sciences research conducted since the Worldwide Synthesis and Analysis of Existing Information Regarding Environmental Effects of Alternative Energy Uses on the Outer Continental Shelf workshop in 2007 and BOEMRE technology and safety studies on renewable energy; (2) identifying key data needs and prioritize research gaps; and (3) developing partnerships and identifying potential synergies for future studies.

Description: The workshop began with a presentation by the Director Bromwich that touched on the role of offshore renewable energy development in the Administration's Blueprint for a Secure Energy Future, and explained how the bureau's Offshore Renewable Energy Program is being elevated through the overall reorganization of the former Minerals Management Service. Federal agencies then provided program updates, their respective legal mandates, and how they are coordinating with each other to increase efficiency and reduce duplication. The presentations provided a background for the later discussions in the breakout sessions. These breakout sessions consisted of: 1) Environmental; 2) Technology Assessment and Resource (TA&R); 3) Social-Economics; and 4) Birds, Bats and Offshore Wind Development. The four breakout sessions took different approaches to the panel discussions and development of identifying data needs. The Environmental; TA&R; and Birds, Bats and Offshore Wind Development sessions included technical presentations by experts that identified and discussed recent and ongoing studies and research, trends in technology, existing guidelines and standards, and existing resources available regarding the offshore wind energy program. In contrast, the Social-Economics sessions took a collaborative approach to the panel discussions that included Cultural and Historic Resources; Multi-Use Issues/Space-Use Conflicts; Public Perception, Legal Studies, Visual Impacts, and Tourism; and Economic Impact, Regulatory, Policy, Stakeholder Issues, and Infrastructure.

Although the breakout sessions developed different data needs, one primary common theme was identified by all four sessions: establishing guidelines and standards for the wind energy industry in the U.S. The needs for guidelines and standards were different for each breakout session, but the common theme persisted. The sessions identified that the types of guidelines and standards needed included: the determination of quality and quantity data sufficiency; establishment of impact thresholds for specific critical species; establishment of a structured decision making process; identification of resources; collection of baseline and monitoring data; interpretation of data; design, safety, and installation; and for the required reports and plans.

The Atlantic Wind Energy Workshop Meeting Report provides a summary of the workshop activities and results. The Report is also a resource for the permitting process and regulatory framework of the offshore wind energy program and includes a listing and summary of Federal and State agency missions and mandates. This summary includes Federal and State agencies' involvement from cradle to grave in the development, siting, construction, operation, and decommissioning of Wind Energy projects on the Atlantic OCS and all affected areas and includes links and contacts for further information, including applicable laws and rules.

Study Products: Cahill, M., K. Olsen, D. Blaha, J. Tims, A. Finio, M. Todorov, J. Ewald, J. Primo, L. Medley, D. Bigger, K. Skrupky, and B. Hooker. Atlantic Wind Energy Workshop Summary Report. U.S. Department of the Interior, Bureau of Ocean Energy Management, Regulation, and Enforcement. Herndon, VA. OCS Study BOEMRE 049-2011. 78 pp. + apps.