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STUDY TITLE: A Method for the Evaluation of the Relative Environmental Sensitivity and Marine Productivity of the Outer Continental Shelf

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BACKGROUND: Understanding the effects of Bureau of Ocean Energy Management (BOEM) regulated activities on the Outer Continental Shelf (OCS) and coastal habitats are important aspects of the decision-making process at BOEM. The potential effects of OCS renewable and conventional energy exploration, development and production must be considered in National Energy Policy Act (NEPA) documentation supporting all of these activities. Understanding the sensitivity of these ecosystems is a primary factor in the balancing and decision-making processes undertaken by BOEM and Department of Interior leadership as they exercise their stewardship of these OCS resources and environments.

The importance of understanding the sensitivity of the ecosystems that could be affected by BOEM regulated activities is evident in the many programmatic and NEPA documents created to aid BOEM decision-making processes. These analyses are undertaken for BOEM mission areas related to conventional energy and renewable energy development and they strongly support national and interagency Coastal and Marine Spatial Planning (CMSP) activities. These analyses can cover broad areas (e.g. entire OCS planning areas) or relatively small scale projects (e.g. siting a wind farm off the Atlantic Coast).

Previously, BOEM has examined the issue of environmental sensitivity most closely during the development of the 5-Year oil and gas leasing programs. These analyses are useful as first steps, but they fail to take into account adequately the full suite of BOEM activities. Further, these analyses have been

limited by their approach which relied on a focus on direct impacts to individual species, species groups or shorelines (but not open water or seafloor habitats). In previous BOEM Relative Environmental Sensitivity Analyses, the term "sensitivity" has been interpreted to mean the "vulnerability of…ecological components to the potential impacts" of a proposed project (BOEM 2010). These previous analyses often have been controversial or counter-intuitive, as areas with high numbers of species were viewed as "more sensitive" as an artifact of the analysis methodology.

The previous analyses have included NOAA's Environmental Sensitivity Indices for coastlines as an important component, which have aimed at quantifying the sensitivity of three general components; the geologic aspects of an area, the biological resources, and the services provided to humans. While this approach provides a relatively straightforward and quantifiable measure of potential impacts, it does not consider the cumulative effect that the impacts have on an ecosystem's ability to resist fundamental, or "state," change, a characteristic known as "resilience." Assessments based either on sensitivity or resilience alone provide important, though different and potentially conflicting, information about the potential impacts of ocean energy development.

This study provides a sound foundation and develops a process for analyzing the sensitivity and resilience of the coastal and marine environments in which the BOEM oversees activities, or that may be affected by BOEM regulated activities. Results from this study provide a method for OCS decision-making for renewable energy development, CMSP activities, and conventional energy activities. Further, this study serves as a sound, scientific basis for scoping and development of NEPA documents for programmatic and project specific activities and analyses.

OBJECTIVES: There were three main objectives for this study.

1. Evaluate information sources for and multiple approaches to estimating relative environmental sensitivity and marine productivity.
2. Develop options for replacing or supplementing previous BOEM methodologies for evaluating relative environmental sensitivity of the OCS planning areas, identifying pros and cons for each and recommending one.
3. Test the functionality and performance of the selected methodology.

As part of the evaluation of approaches, this study also will suggest how information developed in the marine productivity analysis should be incorporated into the relative environmental sensitivity ranking and explore other issues that may need to be considered (e.g. ecological resilience or potential seasonal variation in productivity or marine species abundance).

DESCRIPTION: BOEM has been engaged in developing new methods for the evaluation of the relative environmental sensitivity and marine productivity of the OCS. The primary use of this method will be in assessing the relative compatibility of the BOEM Planning Areas with the regulated activities of offshore oil and gas development, siting of renewable energy generation and transmission facilities. A team with members from Normandeau Associates, Inc., RPS ASA, LGL Ecological Research, Inc., and led by URS Group, Inc., undertook the development of a new method to evaluate the relative environmental sensitivity of the 26 Planning Areas that cover the OCS. An earlier study from a team led by Continental Shelf Associates (Balcom et al. 2011) developed a method for the comparing the marine productivity of the OCS Planning Areas. Accordingly, the study described in this report combined with the results of the CSA work provides a new approach for the BOEM regulation of the OCS. The purpose of this report is to describe the Relative Environmental Sensitivity Analysis method (RESA) developed by the URS Study Team and its initial results.

SIGNIFICANT CONCLUSIONS: The study results produced a scientifically robust and largely quantitative method for evaluating the relative environmental sensitivity of OCS regions to future BOEM regulated activities and applied to the areas covered by the 26 planning areas. The method is a substantial improvement over the method previously used by the agency and is clearly better suited to the needs of BOEM than any of the other similar methods that have been developed elsewhere. The present version of this method has produced reasonable results into all areas that it has been applied. It has served to provide assurance that the method is viable in the full range of applications needed to cover the diverse regions of the OCS. It has provided different types of sensitivity results to demonstrate the influence of parameter selection criteria and to promote an understanding about how the components of the analysis interact to produce the final scores. One of the biggest changes in the new RESA method is the reliance on individual species rather than species groups. In addition, the species components have been expanded to include invertebrates. The new RESA method is a successful prototype that can readily be expanded and made more detailed. It is also useful in establishing the need for an appropriate level of environmental data, much of which is available in a variety of literature sources, but some of which still needs to be determined.

STUDY RESULTS: Relative environmental sensitivity scores were calculated for each of nine broad OCS regions to test the newly developed method. Scores were computed for each habitat and species selected for each broad OCS region. These scores form the foundation of the final sensitivity score. In terms of oil and gas activity, the Southeastern U.S. and Gulf of Mexico broad OCS regions scored highest, followed by the Northeastern U.S. and East Bering Sea. The Pacific and Gulf of Alaska broad OCS regions had moderate scores, and Chukchi and Beaufort broad OCS region the lowest. In terms of renewable energy, the Southeastern U.S. broad OCS region had the highest sensitivity score. The Eastern Gulf had the second highest score, followed by the Western Gulf and Northeast U.S. Alaskan and Pacific broad OCS regions scored lowest. In every case, oil and gas sensitivity scores were substantially higher than those for renewable energy. This reflects in part that renewable energy activities take place in a narrower geographic range, the continental shelf, in comparison to oil and gas.

When scores are combined for the two types of BOEM activities, the Southeastern U.S. broad OCS region scored highest, followed by Eastern Gulf of Mexico and Western Gulf of Mexico. Northeastern U.S. had a moderate score. Alaskan and Pacific broad OCS regions scored lowest. The Southeastern U.S. scores are reasonable considering that scoring included both species and habitats with high sensitivity, such as Florida manatee, Atlantic sturgeon, and Sabellariid worm reefs. The relatively high sensitivity score for renewable energy for the Southeastern U.S. was surprising. However, sensitive shallow water habitats such as Sabellariid reefs and submerged aquatic vegetation would be vulnerable to nearshore activities for renewable energy, and would be slow to recover, increasing the final sensitivity score.

The Chukchi/Beaufort Sea region had the lowest combined sensitivity score, a result of low species and habitat scores. The low species score was in part a result of the lack of federally-listed fish species. In addition, the species that were scored included some moderately-high scoring species such as Baltic macoma clam, polar bear, and spectacled eider. Most of the remaining species had relatively low scores due to their high resilience to change. Some of the habitats (pack ice, deep/coldwater coral, offshore fine unconsolidated sediment) had very little overlap with impacting factors, resulting in low vulnerability and therefore low sensitivity. In addition, there were no high-scoring habitats in the area.

Results from the Relative Environmental Sensitivity analysis (oil and gas and renewable energy) are compared with those developed by BOEM for the 2007-2012 planning study (BOEMRE 2010). The previous BOEM analysis was limited to oil and gas development impacts.

While the 2010 method had more geographic detail, based on BOEM planning areas rather than broad OCS regions, results were comparable in most cases. Southeastern U.S. and Gulf of Mexico had highest sensitivity ranks in both methods. The moderate relative sensitivity scores of the Northeast U.S. are comparable to the "less" and "most" sensitive categories of the North and Mid-Atlantic BOEM rating. The low moderate relative sensitivity scores for California Current and Gulf of Alaska parallel those "less sensitive" scores from BOEM (BOEMRE 2010). East Bering Sea was ranked "least sensitive" by BOEM in 2010, but scored in the low-moderate in this study. Most surprising were results for the Chukchi/Beaufort Sea, which ranked lowest for oil and gas in this study, but were ranked from less to more sensitive depending on the individual planning area in the previous BOEM evaluation (BOEMRE 2010).

STUDY PRODUCT:

Niedoroda, A., S. Davis, M. Bowen, E. Nestler, J. Rowe, R. Balouskus, M. Schroeder, B. Gallaway, and R. Fechhelm. 2014. A Method for the Evaluation of the Relative Environmental Sensitivity and Marine Productivity of the Outer Continental Shelf. Prepared by URS Group, Inc., Normandeau Associates, Inc., RPS ASA, and LGL Ecological Research Associates, Inc. for the U.S. Department of the Interior, Bureau of Ocean Energy Management. Herndon, VA OCS Study BOEM 2014-616. 80 pp. + appendices.

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