Title	Standardizing National Integrated Ecosystem-Based Assessment for Transparent Visualization of Scenario Trade-Offs
Administered by	Headquarters
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Procurement Type(s)	TBD
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PICOC Summary	
Problem	The lack of an integrative approach to environmental assessments leads to varying approaches across regions and programs. This results in an inability to integrate non-linear impacts, or address trade-offs, as well as repetitive work by BOEM staff with limited time and increasing demands. A regional, project-specific approach does not allow decision makers to clearly envision alternative options at various spatial scales and over time. This limited, project-specific approach does not allow BOEM to visualize comprehensively how decisions may impact Environmental Justice communities, Tribes, and other stakeholders, or account for ecosystem dynamics associated with a changing climate.
Intervention	Develop a consistent national framework by adapting existing dynamic modeling frameworks to advance integrated environmental assessments at multiple spatial and temporal scales, and account for diverse objectives, drivers, and stakeholders' priorities. Outputs can be publicly accessible, promote community participation and buy-in, and collectively support transparent, science-based decisions and strategic planning in OCS assessment that reduce conflict, reveal new opportunities, and streamline BOEM processes.
Comparison	Without this study, increasing demands on limited staff can delay thorough assessments, increasing the potential for litigation and hindering public services, and BOEM is less likely to achieve OEP's strategic goal of modernized analysis and communication. Opportunities for meaningful stakeholder participation will also remain limited, as well as for addressing non-linear, cumulative, and climate effects—concerns consistently raised in comments during the studies development, EIS, and COSA processes that, left unaddressed, can reduce stakeholder buy-in and trust, as well as the knowledge base from which BOEM operates.
Outcome	Increased efficiency and flexibility, including ready accommodation of new information. Improved stakeholder engagement and visualizations that clearly demonstrate impacts and uncertainty, revealing opportunities for BOEM, its partners, and stakeholders
Context	Multiple scales from the Status of the OCS to site specific assessments

BOEM Information Need: BOEM currently lacks an integrated, ecosystem-based approach for synthesizing diverse data sources and visualizing trade-offs across multiple uses and jurisdictions. Static, environmental assessment methods are inadequate due to increasing amounts and complexity of data, intricate ecosystem and human interactions, diverse community impacts, and a dynamic changing climate. Advancing BOEM's environmental assessment processes can promote efficient use of limited resources and stakeholder engagement while simultaneously illustrating a range of decision outcomes. This study will create tools for improved, more integrated assessments, which BOEM can employ across mission areas, such as for the identification of minimal-conflict wind energy call areas in the Pacific or Gulf Regions and the exclusion nomination process of the National Program (Musial et al 2019 and BOEM study MM-17-05 currently in progress). As a result, BOEM will be able to better envision opportunities and reduce conflicts. It will also advance much-needed improvements in evaluating uncertainty, cumulative impacts, and knock-on effects of activities occurring along the OCS.

Background: The Office of Environmental Program's long-term strategic goals include leveraging innovative emerging technology and modernizing communications and analysis while ensuring transparent, science-informed decisions. Further, federal mandates, such as in the National Environmental Policy Act, and regional ocean planning boards affirm the need to consider a range of costs and benefits – and potential tradeoffs between them – when making environmental planning and management decisions. BOEM's ability to meet these aims remains limited. Current assessment approaches do not fully capture the interconnected reality of people and natural resources in space and time, especially when factoring in multiple OCS regions and uses. This hampers the identification of conflict and non-linear effects, increasing uncertainty about future outcomes. Additionally, public outreach and engagement is not often maximized as part of advancing new analytical methods. Relying on only conventional approaches limits new and meaningful avenues for involvement and can restrict BOEM's understanding of the needs and values held by a diversity of stakeholders.

Leveraging emerging technologies can address these concerns and modernize approaches but has yet to be operationalized in OCS assessment. Powerful ecosystem models exist for a variety of environments and are in use for spatial planning and decision-making (Altman et al., 2014; Boumans et al., 2015; Fulton et al., 2015; Watters et al., 2013), including for BOEM (BOEM). Such tools pull together available data resources and expert knowledge – i.e., everything known about a system – to develop computer models of both the natural ecosystem and reliant human communities, resulting in simulation environments for testing possible courses of action. These environments operate much as a flight simulator helps a pilot train – but in this case, scientists, decision makers, and other stakeholders can provide feedback and explore the range of outcomes for different management decisions such as in a changing climate. In sharp contrast to conventional static assessments offering specific and often narrow advice, these approaches are explicitly built for understanding knock-on effects, cumulative outcomes, and tradeoffs among costs and benefits under changing conditions and over different periods of time. Because of their usefulness, they are increasingly used in science-based decision support (Link et al., 2012).

Objectives:

- Phase 1: Develop a national framework for integrated assessments by adapting existing structure to connect existing resources and engagement processes with modeling tools and forward integrated assessments across NEPA, MSA, ESA, Tribal Consultation, and others of OCS resources across programs.

- Phase 2: Create accessible, web-based tools on an existing data portal to demonstrate potential outcomes of alternative management decisions across different resources, sectors, and communities to support science-based decision-making.
- Phase 3: Forward additional, site-specific use of the framework and tools related to planning for select renewable energy or marine mineral extraction sites to account for changing distributions as a result of climate change.

Methods: This study will use existing modeling approaches and expertise to first create a basic, generalized model and scenario environment structure, and then define a plan for customizing this for more specific models and environments. This avoids the need for constructing new models and promotes a cost-effective, achievable process. Critically, the basic model's flexibility will also accommodate diverse information resources, including expert and traditional knowledge from across communities. This encourages BOEM's assessments to center diverse stakeholders and employ an iterative process of engagement. This iterative process allows feedback to improve the model, promotes community buy-in and trust (Fulton et al., 2015), and ensures the inclusion of a wider array of human needs and values. Incorporating a range of data sources also reduces the inherent uncertainty of narrower approaches that focus on only part of the system. In addition, the basic model structure will include ways of clearly documenting remaining uncertainty and testing its impacts on results, providing further insight to BOEM on knowledge gaps and future research needs. Finally, the process will include accessible ways to share outcomes with staff, stakeholders, and the public, including an online portal to explore the data used, different management options, and outcomes and tradeoffs (Kaufman et al., 2015).

The process of customizing the basic model leverages the ability to "plug and play" elements from existing models that have been sourced and involves updating the basic structure with site-specific information and data. Therefore, the stage will start with an inventory of all existing OCS environmental and socioeconomic data resources for the EIS, as well as related cross-agency and stakeholder relationships and outreach endeavors and assessment approaches already in use. This inventory will result in a comprehensive library of processes, resources, impacts, and human values and needs, which will be included in online portals accessible to BOEM staff and, when appropriate, stakeholders and the public. This information will then advance the basic structure into a systems model and simulation environment for exploration of the EIS, and outcomes of that exploration will be compared with those from a conventional static approach. Collectively, then, this will test both the process as well as its value for a specific BOEM need. Results will be shared with partners and stakeholders for feedback. An optional additional stage would employ a systems model perspective to address renewable energy and marine mineral extraction planning, demonstrating project repeatability and value to a range of BOEM responsibilities from EIS to OCS assessment more broadly.

Specific Research Question(s): How can we best account for changing ecosystems and reducing conflict in spatial planning?

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