Field	Study Information
Title	Guidance on Compensatory Mitigation to Achieve Net Positive Impacts of Offshore Wind Energy to Seabirds (PC-25-01)
Administered by	Pacific OCS Region
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Procurement Type(s)	Cooperative Agreement
Performance Period	FY 2025–2026
Final Report Due	TBD
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Problem	Marine wildlife are impacted by offshore wind energy development, and it will not be possible to prevent all impacts. To achieve no net loss or net positive impacts to wildlife, residual impacts must be offset by compensatory mitigation measures, but there is uncertainty about how to implement compensatory mitigation.
Intervention	Develop guidance for an actionable process to assess residual impact of offshore wind energy development to seabirds and outline a process to identify costs to replace losses that may be used to compensate for residual impacts. We will also provide guidance on viable structures to pool compensatory funding across a region and strategically identify conservation actions with the best return on investment to boost populations of the most vulnerable species.
Comparison	Provide guidance for adaptive management of conservation actions used as compensatory mitigation measures to ensure viability.
Outcome	The guidelines provided will aid BOEM in developing compensatory mitigation plans for wildlife in response to offshore wind energy development.
Context	Pacific OCS seabirds will be used as a case study, and guidelines provided may be applied nationally.

BOEM Information Need(s): Seabirds are threatened by a wide array of human impacts, including fisheries bycatch, entanglement, invasive predation at breeding sites, and habitat loss (Croxall et al. 2012). The construction and operation of offshore wind energy development (OWED) will add new risks to these existing threats, with the greatest concerns being collision with infrastructure and displacement from critical habitats (Goodale and Milman 2016). With the demand for renewable energy sources increasing and current policy plans to rapidly accelerate OWED in the US, BOEM needs to ensure that wind energy projects are developed responsibly, with minimal impact on the environment and wildlife. Seabirds are vulnerable to the development of offshore wind energy, so it is imperative to identify the species most at risk of impact and prioritize conservation efforts to achieve net positive outcomes for these species. By leveraging existing modeling and monitoring tools, this project will produce a data driven and comprehensive approach to identify the species most in need of focus for research and restoration efforts, ultimately providing BOEM a framework that will allow them to handle bird impacts

in a way that will streamline the development process by reducing uncertainty around mitigation efforts.

Background: To facilitate renewable energy production, it is critical to develop a data-driven framework to assess its impact and a robust approach to avoid, minimize, and offset its negative impacts (Croll et al. 2022). For OWED, avoidance of seabird impacts consists of selecting sites for offshore wind facilities in areas of low seabird use, particularly species with declining or threatened populations. Minimization includes modification of development layout as well as structural or temporal alterations to turbine design and operation (Croll et al. 2022). Avoidance and minimization have the capacity to reduce seabird impacts but will not fully mitigate offshore wind energy impacts due to siting, engineering, and efficacy constraints (Arnett and May 2016; May et al. 2020; Smallwood and Karas 2009). Therefore, offsetting is an important potential solution to mitigate residual impacts and achieve net positive benefits such that development of offshore wind energy infrastructure could lead to the increase of threatened seabird populations (Moilanen and Kotiaho 2021).

In 2021, a team from the University of California, Santa Cruz (UCSC) led a National Center for Ecological Analysis and Synthesis working group funded by BOEM to develop a globally-applicable framework of best practices for assessing and mitigating (OWED impacts to seabirds (Croll et al. 2022). The key takeaways of this effort were the need to utilize modeling approaches as tools to evaluate impact, and to build out capacity to compensate for impacts that cannot be prevented via avoidance and minimization.

Objectives:

1. Outline a clear process for impact assessment and the conversion of residual impact into replacement cost to fund compensatory mitigation measures on a regional scale.
2. Develop guidelines to prioritize data collection and mitigation action for the species most vulnerable to offshore wind energy development.
3. Develop a process to identify the most effective compensatory mitigation actions for vulnerable populations.

Methods: Industry, agencies, and conservation managers need a streamlined approach to mitigate seabird impacts of the rapidly developing OWED industry. The lease areas in the POCS region will be used as case studies to demonstrate how existing datasets and modeling approaches can be used to estimate impacts, identify feasible mitigation options, highlight regional data gaps, and incorporate the analysis into policy.

Task 1: Develop a strategy to offset seabird impacts that cannot be prevented via avoidance and minimization measures. Compensatory mitigation and voluntary offsets have been implemented for seabird impacts of offshore wind energy internationally by individual facilities, but managing residual impacts on a site-by-site basis may be challenging for seabirds given their broad ranges and the need to address cumulative impacts from the potential buildout of OWED on the issued and foreseeable leases on the Pacific OCS. Thus, there is a need to consider management on a regional or global scale. To implement effective compensation in the U.S., a comprehensive and transparent process is required to estimate residual impacts using modeling and identify a monetary value for their replacement via conservation interventions that may be paid into a regional fund to support conservation actions. To do this work, UCSC will collaborate with Aonghais Cook (The Biodiversity Consultancy), Elizabeth Masden (University of the Highlands & Islands), and Kate Searle (UK Centre for Ecology & Hydrology), in the UK,

and Evan Adams, Kate Williams, Wing Goodale, Holly Goyert, and Julia Gulka at the Biodiversity Research Institute to build on lessons learned from the United Kingdom and the leasing process thus far in the United States.

Task 2: Develop a process to identify and estimate impacts for species most vulnerable to offshore wind energy development in a given region. To demonstrate the utility of this approach, UCSC will collaborate with Dr. Aonghais Cook (British Trust of Ornithology), and Jeffery Leirness (CSS Inc & NOAA National Center for Coastal Ocean Science) to develop a framework to identify and estimate impact to species most likely to be vulnerable to OWED impacts in the POCS region. The population viability analysis tool developed by their group will be used to identify the population-level consequences for OWED impacts as well as evaluate potential mitigation actions capable of achieving net positive impacts in response to new OWED development in the California region. The results will be published in an open-access journal such as Biological Conservation.

Task 3: With the recognition that there will be limits to funding available to support monitoring and conservation measures for seabirds, it is critical to focus available funds on projects that have the greatest capacity to make real conservation change for the most vulnerable species. The framework and outputs produced during Task 2 will be utilized to produce a comprehensive list of monitoring and mitigation needs for the most vulnerable California current ecosystem seabird species. We will work with Dr. Nick Holmes at The Nature Conservancy and Dr. Brad Keitt at the American Bird Conservancy to identify feasibility and cost for conservation projects and engage international collaborators where species conservation needs would occur outside of the U.S. The results will be published in an open-access journal such as Biological Conservation.

Specific Research Question(s):

1. What are the potential impacts to the most vulnerable avian species from OWED projects?
2. What are the replacement costs for avian species impacted by OWED projects?
3. Are there monitoring and mitigation needs for the most vulnerable avian species that can be supported through mitigation to offset impacts to reach a net conservation benefit?

Publications Completed: N/A

Affiliated WWW Sites: N/A

References:

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