Environmental Studies Program: Ongoing Study

Field	Study Information
Title	Using Outcomes from Marine Protected Area Implementation to Infer Potential Socioeconomic Consequences of Offshore Energy Development to Commercial Fisheries (PC-21-02)
Administered by	Pacific OCS Regional Office
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Procurement Type(s)	Cooperative Agreement
Conducting Organization(s)	University of California, Santa Barbara
Total BOEM Cost	$775,000 (includes Environmental Studies Program and Pacific Region funds)
Performance Period	FY 2021–2023
Final Report Due	October 3, 2024
Date Revised	October 31, 2023
Problem	Most commercial fishery sectors will be excluded from offshore leases when development of floating wind or marine hydrokinetic energy occurs (creating de facto marine protected areas) and potential socioeconomic consequences from restricting access to a portion of fishing grounds are not well understood.
Intervention	Using outcomes from marine protected area implementation as analogs to offshore energy development, infer the potential socioeconomic consequences to the commercial fishing industry of reduced access to fishing grounds.
Comparison	Affected fisheries (from closures) with unaffected fisheries.
Outcome	Identification of a suite of socioeconomic indicators that can be used to estimate of the intensity of potential impacts to fishing industry from offshore energy, and a better understanding of how to mitigate these impacts.
Context	All Planning Areas in the Pacific Region

BOEM Information Need(s): Most commercial fishery sectors will be excluded from OCS leases when development of floating wind or marine hydrokinetic energy occurs. The potential socioeconomic consequences of these closures represent a challenge to understand, predict and mitigate them due to a variety of factors, including the confidentiality of fishing data and the challenge of determining what an appropriate control might be in an experimental design. Enhancing the predictive capacity of managers to determine the scope of potential impacts from offshore energy to other users of the OCS will have widespread utility, and aid BOEM in identifying potential lease areas, informing NEPA documents, designing appropriate mitigation measures, and communicating with stakeholders, including affected State governments and renewable energy task forces.

Background: Given the ubiquity of fishing activity on the OCS, any site selected for offshore energy development will overlap with areas currently used by one or more commercial fishing sectors. Although BOEM does not specifically prevent fishing within OCS leases, the marine infrastructure

associated with offshore energy facilities often obstructs the ability of fishers to use certain gear or harvest methods (e.g., trawl, pot/trap, longline, nets, etc.), and this space-use conflict between industries creates, in effect, a marine protected area (MPA). For example, reef fishes that inhabit marine energy infrastructure offshore southern California show typical ecological responses to MPA protection, such as larger mean sizes and higher densities, when compared to unprotected areas (Schroeder and Love, 2004). Ashley et al. (2014) suggest that this MPA effect may also be present at offshore wind and wave energy installations.

Evidence exists that offshore energy structures may function as de facto MPAs in an ecological context. However, a full accounting of potential commercial fishing impacts from offshore structures must also include socioeconomic consequences and not just ecological ones, and, to date, studies focusing on this aspect have been in short supply. Datasets and opportunities exist to examine this question for various MPA implementation campaigns, particularly on the US West Coast. Even though there is the potential for such analyses, the short-term economic consequences of MPAs to fisheries have rarely been examined. Some scholars predicted that economic consequences would be roughly equivalent to the value of species harvested in the restricted area (e.g., Leeworthy and Wiley, 2003), but the accuracy of this prediction was never tested. Elsewhere scientists demonstrated no detectable effects of large closures to longline fisheries (Lynham et al. 2020). Understanding which factors may influence the direction and intensity of potential effects of offshore energy development to fisheries remains a high priority information need for BOEM.

Objective(s): The objective of this study is to describe the detectable socioeconomic consequences experienced by the commercial fishing industry from implementation of marine protected areas, and to use this information to inform impacts analyses of prospective offshore energy projects.

Methods: Researchers will first identify socioeconomic indicators most likely to be useful to measure potential effects of prospective offshore wind energy developments in the Pacific, and include commercial, recreational and tribal sectors. Sources of data to determine relevant indicators will be existing literature, stakeholder outreach summaries, case studies of current OWFs and their outcomes, and analogs of offshore closures (e.g., military activities, MPAs, offshore conventional energy, offshore aquaculture, etc.) that have generated space-use conflicts.

When disentangling the causal effect of MPAs from other drivers in fishery socioeconomic outcomes, researchers will focus on relevant metrics (e.g., total landing revenues, catch per unit effort, number of trips, kilometers traveled, etc.) derived in the previous task, and establish proper treatment and control datasets. To estimate effects between these two groups, investigators may employ difference-in-differences regressions (analogous to a Before-After-Control-Impact design commonly used in ecology) or a modified approach of event attribution that is used in climate change science (e.g., Knutson et al. 2017).

Specific Research Question(s):

1. Given available sources of data and analysis techniques, what socioeconomic indicators (e.g., number of trips, distance traveled, catch per unit effort, etc.) will best measure potential impacts to commercial fishing from offshore wind and wave energy development?
2. Which ecological, cultural, and governance indicators enhance the interpretation of socioeconomic indicators identified in the first question?

3. Using outcomes from previous case studies, what are the predicted short-term socioeconomic consequences of MPA implementation to commercial fishing sectors from proposed renewable energy development offshore California?
4. Focusing on areas offshore the Pacific Northwest, what consequences were there to the distribution of fishing effort when the Pacific Fishery Management Council modified the Rockfish Conservation Areas?
5. How will offshore wind lease issuance and potential energy development shift the distribution of fishing effort along the US West Coast, especially in relation to the Pacific Coast treaty Indian tribes usual and accustomed (U&A) fishing areas?

Current Status: The cooperative agreement between BOEM and the University of California, Santa Barbara was awarded September 23, 2021. The agreement was amended on September 21, 2023, to add additional tasks (specific research questions 4 and 5), funding, and to extend the period of performance to October 3, 2024.

Publications Completed: One publication has been submitted to a journal and is in review.

Affiliated WWW Sites: None

References:

Ashley MC, Mangi SC, and Rodwell LD. 2014. The potential of offshore windfarms to act as marine protected areas – A systematic review of current evidence. *Marine Policy* 45:301-309.

Leeworthy VR and Wiley PC. 2003. Socioeconomic impact analysis of marine reserve alternatives for the Channel Islands National Marine Sanctuary. NOAA, NOS, Special Projects, Silver Spring, MD. https://nmssanctuaries.blob.core.windows.net/sanctuaries-prod/media/archive/science/socioeconomic/channelislands/pdfs/2003_analysis.pdf.

Lynham J, Nikolaev A, Raynor J, Vilela T, and Villaseñor-Derbez JC. 2020. Impact of two of the world's largest protected areas on longline fishery catch rates. *Nature Communications* 11(1):1-9.

Knutson T, Kossin JP, Mears C, Perlwitz J, and Wehner MF. 2017. Detection and attribution of climate change. In: Climate Science Special Report: Fourth National Climate Assessment, Volume I [Wuebbles, D.J. et al. (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 114-132, doi: 10.7930/J01834ND.

Schroeder DM and Love MS. 2002. Recreational fishing and marine fish populations in California. *California Cooperative Oceanic Fisheries Investigations Report* 43:182-190.