Field	Study Information
Title	Probability Analysis of Derelict Fishing Gear Interactions with Floating Offshore Wind Mooring Systems Offshore California (PC-25-02)
Administered by	Pacific OCS Region
BOEM Contact(s)	Dr. Desray Reeb (desray.reeb@boem.gov)
Procurement Type(s)	Cooperative agreement
Performance Period	FY 2025–2027
Final Report Due	TBD
Date Revised	July 11, 2024
Problem	Offshore floating wind turbine moorings and power cables have been identified as potential vectors of secondary entanglement of protected species due to associated derelict fishing gear. There is currently no way of assessing the probability of this happening offshore California.
Intervention	Develop a drift model for derelict fishing gear, e.g., a particle tracking model based on where fishing is occurring and using the latest oceanographic and/or current models (e.g., UCSC West Coast Operational Forecast System [WCOFS]) to assess the cloud of possible interactions.
Comparison	This would be the first effort of its kind and will provide an important assessment tool that can be tested for validation using limited empirical data.
Outcome	With limited data on fishing gear loss, this model will provide resource managers, regulators, and industry with a tool to inform the probability of derelict gear associating with offshore floating wind mooring systems. This tool would allow for the more accurate assessment of the risk and/or need for mitigation of secondary entanglement of protected species in these systems. This approach could be replicated for the Gulf of Maine using regional ocean models.
Context	Pacific with potential application to all BOEM regions

BOEM Information Need(s): BOEM has issued five leases for floating offshore wind development in California, recently announced Call Areas offshore Oregon, and Call Areas exist offshore Hawaii. There is no centralized, standardized data available on how much fishing gear is lost each year in the Pacific, and where these losses occur. To accurately assess the risk of secondary entanglement to protected species from derelict gear associating with floating wind mooring systems, BOEM needs to understand the probability of this association occurring. Impact assessment information is required under NEPA, ESA, and MMPA.

Background: Numerous stakeholders along the U.S. West Coast have commented on their concerns that offshore floating wind presents entanglement risks to marine wildlife. The most recent qualitative risk assessment done was for floating turbines in 50 m of water offshore Scotland (Benjamins et al. 2014; Harnois et al. 2015); they state that recommendations need to be developed to assess the risk of entanglement of offshore renewable energy mooring configurations at the beginning of their design process. In addition, the entanglement review stated that although risks of entanglement between derelict fishing gear and offshore marine renewable energy (ORE) moorings and structures clearly exist, further studies are required to quantify the level of risk (Benjamins et al. 2014).

BOEM is currently funding the development of a 3-D simulator to assess entanglement risk to whales and leatherback sea turtles in offshore floating wind turbine moorings, cables, and associated derelict fishing gear offshore California (PC-19-x07). This ongoing simulator development work assumes that derelict gear will interact with floating OSW infrastructure and present a potential for entanglement. The simulator will run scenarios to produce statistical assessments of whale entanglement risk from offshore floating structures and derelict fishing gear. However, there is a significant need to understand the probability of the association between derelict fishing gear and offshore wind structures, in order to provide context to these results. The proposed study builds on the simulator work by endeavoring to calculate the probability of floating OSW structures and derelict gear interacting.

Information on lost fishing gear is not systematically collected in the Pacific. Although information on replacement commercial fishing tags suggests loss up to 10% per season, experts from NOAA suggest that this is an overestimate, and that loss is more likely around 5% (https://pacificoceanenergy.org/wp-content/uploads/2020/07/POET-Cetacean-Webinar-Slidedeck.pdf).

Various modeling approaches have been used to understand the fate of objects or substances drifting in the ocean (Córdova and Flores 2022;) or for understanding and monitoring the environmental effects of marine renewable energy (Buenau et al. 2022; Johnson et al. 2021). Since there is currently no centralized, standardized data available on how much fishing gear is lost each year in the Pacific, or where the gear settles, drift models using oceanographic and available fisheries data can be developed to better understand the probability of derelict fishing gear become associated with floating offshore wind infrastructure.

Objectives: To assess the probability of derelict gear interactions with offshore floating wind structures offshore California, that can be used to identify regions of greatest risk.

Methods: Using oceanographic and publicly available fisheries data, a drift model will be developed for derelict gear e.g., a particle tracking model based on where fishing is occurring and using the latest current models. These models will allow us to explore multiple release sites and multiple release dates to get a cloud of possible interactions. Because the locations of gear loss are unknown, this approach would present regions with the greatest risk.

Specific Research Question(s): What is the risk of derelict fishing gear associating with planned floating offshore wind mooring systems offshore California?

Current Status: N/A

Publications Completed: N/A

Affiliated WWW Sites: N/A

References:

Benjamins S, Harnois V, Smith HCM, Johanning L, Greenhill L, Carter C, Wilson B. 2014. Understanding the potential for marine megafauna entanglement risk from marine renewable energy developments. Perth (UK): Scottish Natural Heritage. 95 p. Scottish Natural Heritage Commissioned Report No. 791.

Buenau KE, Garavelli L, Hemery LG, García Medina G. 2022. A review of modeling approaches for understanding and monitoring the environmental effects of marine renewable energy. J Mar Sci Eng. 10(1):94. https://doi.org/10.3390/jmse10010094

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Harnois V, Smith HCM, Benjamins S, Johanning L. 2015. Assessment of entanglement risk to marine megafauna due to offshore renewable energy mooring systems. Int J Mar Energy. 11:27–49.

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