Synthesis of the Science:
Floating Offshore Wind Development and Fisheries
May 1, 2025

Estimated Attendees: 93

The Synthesis of the Science II: Floating Offshore Wind Development and Fisheries discussed the impacts of floating offshore wind development on fisheries. Approximately 93 attendees participated in the workshop representing numerous industries including commercial fishing industry, offshore wind developer, state and federal agencies, and non-governmental organizations. Presentations included a summary of literature review, introduction to floating turbine technology and associated structures, and panel discussions with industry experts. Participants explored challenges such as potential loss of fishing grounds, displacement of fishermen, and the need for protecting long-running data sets for stock assessment and research. The conversation ended with breakout sessions to discuss management and research aspects, emphasizing the importance of involving the fishing industry in decision-making processes and the need for more comprehensive studies on the long-term effects of offshore wind development.

Floating Offshore Wind and Fisheries Literature Review

Dr. Fiona Hogan presented a literature review on the impacts of floating offshore wind technology on fisheries and the environment. The majority of the literature focused on the technology with fewer studies discussing the environmental impacts of floating technology.

Biological impacts include increased interactions from vessels and entanglement risk for protected species, and changes to behavior for fish such as attraction, avoidance, and migration disruption. Current studies anticipate less habitat loss but the benthic habitat will still be impacted by anchoring and interarray cables. Hydrodynamic and atmospheric changes are likely to occur similar to fixed turbine technology, but possibly to a lesser extent. EMF and noise impacts are likely to be less during the construction phases as pile driving will not occur, but anchoring and noise from chain movements is anticipated to last the life of the project. Impacts to fisheries and the fishing community include displacement effects (which are difficult to measure), unknown impacts to culture and heritage and impacts to fisheries regulations and management as these areas are expected to exclude other marine uses. Existing literature does study the economics of turbine technology and creation of offshore wind jobs, but does not yet capture changes to fishing economics and lost fishing jobs.

More research on the impacts of floating technology on fisheries is needed, particularly on whether there is the potential for fishing gear to operate within a fixed array, and, if not, the challenges for fisheries management in the event of full exclusion of other ocean users. The presentation will be available on RODA's website.

Floating Offshore Wind Technology Discussion

Representatives from The Carbon Trust provided a presentation on the spatial requirements, platform and mooring designs, cable designs, and substation arrangements for floating offshore wind. They also discussed the operational and maintenance procedures and the potential challenges and innovations in the technology. The presentation is available on the RODA website.

Fisheries Access in Floating Offshore Wind Arrays

A panel consisting of fishing industry members and academic researchers discussed the challenges of fishing in areas with floating offshore wind farms. Panelists expressed concerns about the probable loss of fishing grounds, the impact on fish populations, and the displacement of fishermen. They also discussed the need for careful planning and monitoring to minimize the impact of offshore wind farms on the fishing industry.

The panelists highlighted the compounding effects of multiple spatial constraints on historic fishing grounds - marine protected areas, restrictions from fisheries management, and other emerging ocean uses such as marine carbon dioxide removal and aquaculture. Offshore wind development is creating an additional exclusionary measure which leaves fishermen with fewer areas to harvest. The effects of spatial squeeze may have costly implications to food security and loss of shoreside business that will likely not be rebuilt as the many new conflicts are deterring new investments.

The panelists and audience discussed the benefits and shortcomings of co-location of floating offshore wind arrays with other marine uses - such as marine protected areas or nurseries. Panelists pointed out that unfortunately due to habitat disturbance from anchoring and mooring lines, these areas would likely not meet the objectives of a protected area.

The panelists emphasized the importance of considering the long-term effects of offshore wind development on the fishing industry and the need for a more comprehensive approach to address these issues.

Fisheries Management Implications from Floating Offshore Wind Development

A panel consisting of fisheries representatives, regional fishery management council staff, and state agency staff discussed the challenges fisheries managers face in relation to floating offshore wind. Preserving long-running data sets for stock assessment and research was considered a priority. There is a possibility for state surveys to step into foreseeable gaps. The State of Maine has been developing a research array and is trying to support any associated surveys for as long as possible after the federally mandated pause in offshore wind development.

Another suggestion was to incorporate additional data sources to mitigate any disruptions to long-running data collection efforts. For example, industry based surveys that are informed by gear performance, oceanic sampling and time of day or seasonal surveys. It is especially important for paired sampling efforts to begin to take place for sufficient time series to develop conversion factors for existing federal surveys. Incorporation of port-side sampling, structured interviews and other fishery dependent data streams should be employed to inform stock assessments, particularly when traditional independent data streams are constrained from offshore wind development.

The panelists also discussed the lack of tools to measure displaced vessels and the need for adaptive management. The panelists discussed the feasibility of incorporating new data into long-standing data collection efforts due to financial and workforce limitations: panelists provided a "dose of reality" to changes that can actually occur in the near future. They agreed that the fishing industry needs to be involved in the decision-making process.

Breakout Sessions

Attendees were split into breakout sessions to discuss fisheries management implications and research needs and technology adaptations.

Research Needs and Technology Adaptations

The breakout session participants identified the need for more research on the impacts of offshore wind on fisheries and the importance of understanding the relationships between existing data collection streams, this could include estimating conversion factors between different surveys

(e.g., eDNA, acoustic surveys). Data from developer surveys are not always open source and methodologies can vary with variable surveys as there is no universal monitoring plan for developers to utilize. The location of floating arrays can be in deep water off the shelf, which are areas where there is little information on fish resources or fishing operations.

Cooperative research and using industry vessels to conduct surveys were also high priorities to address impacts to the fisheries management system. The importance of understanding the impacts on communities, including smaller ports, was also highlighted. Working directly with affected communities was considered critical to understand overall impacts and to generate adequate mitigation strategies to allow fishing communities to survive. Cooperative research may be vulnerable to the effects of offshore wind development if conditions become riskier within or around an array.

The role of research or pilot scale projects was highlighted as they would provide data on the impacts to upwelling and on communities and to test the technology. Data could be collected at various stages including pre- or during deployment of the turbines including on the potential for biofouling or leakage of toxic chemicals. Participants requested basic information regarding the footprint of floating turbine arrays, which is currently unknown given that a range of turbine sizes and associated substructures are still being explored. Modeling of potential layouts should be explored in the event that a 1 x 1 nautical mile grid was not optimal or if transit lanes could be included.

Siting was also discussed including the possibility of minimizing the area required for an array by packing the turbines in as tightly as possible. Siting modeling should incorporate fishing activity at a finescale. The role of indicators (including socioeconomic) was briefly discussed; work is in progress on developing some indicators but more work is needed on their implementation and on the addition of any additional indicators. Examining the potential to site floating arrays further off the shelf may reduce interactions with fisheries.

Risk to safety for fishing vessels using various gears should be explored. Impacts to insurance costs and coverage for fishing vessels operating in and around wind arrays needs to be investigated. Floating turbines may result in increased transit time if vessels are forced to transit around the array, which may affect time available for fishing especially if a fishery is managed using effort controls like days at sea. Vessels may not be able to retrieve gear if weather turns and it is not safe to operate within the array.

Economic impacts in fisheries should be researched with the attempt made to identify the individual and cumulative effects of the varying interactions floating offshore wind development can have with fisheries. If vessels are forced to switch gear types to reduce risk to safety, the economic feasibility (i.e., is a profitable fishery) and impacts to fisheries and local communities should be studied. To better understand the impacts of the whole seafood supply chain and how to mitigate for potential economic impacts, seafood marketing research was recommended to increase domestic consumption.

Mapping and monitoring of the dynamic nature of fishing and fisheries was proposed to understand the impacts on fisheries, but it might be a challenge to distinguish the effects of offshore wind energy on fisheries from other influences. Better understanding of the impacts to local currents and upwelling events was considered essential for participants from the U.S. west coast. Studying the impacts of climate change and offshore wind energy development side by side should be explored to determine what is influencing fisheries more.

Participants suggested that we need a better understanding of the risk for secondary entanglement for individual animals and also for different gear types with offshore wind energy cables. The level of risk of secondary entanglement, or an already entangled individual getting caught on a cable, was considered unknown for all vulnerable species. It was unclear whether floating cables would have the same impacts as fishing lines have in the water; given the recent efforts to reduce lines in the water column to mitigate entanglement, research is needed to determine vulnerability of marine mammals. The tightness of cables or associated floating lines may increase or decrease risk of entanglement with tight ropes being less likely to form loops. Information is also needed on how marine mammals might interact with floating turbine structures. A participant suggested that whales may scratch their bodies on the cables or any accessible structures, which could potentially cause damage

Electromagnetic fields were not considered well understood with outstanding questions regarding the impacts on sharks and tuna, species that are electrosensitive, and what impacts the floating (i.e., not buried) cables would have on these species on migration and foraging. Noise associated with the movement of the anchor cables should be quantified in terms of decibels and distance.

Additional studies on the physical presence of turbines in the marine environment was suggested. Including a better understanding of erosion from movement of the cables as well as the potential for scour protection at anchor points, the potential for microplastics to be shed by the turbines, and impacts to larvae from colonization of structures by mussels and other species.

Fisheries Management Implications

Focusing on how fishery independent and dependent data might be affected by offshore wind, participants highlighted how important surveys were in fisheries management. Some concerns were raised regarding existing surveys and cooperative research was seen as a way to improve data collected, especially with the challenge posed by floating turbines. Research on fishery independent data should be done on individual datasets and at a higher level. In the event that impacts on a survey cannot be avoided, then mitigation measures should be developed to minimize the impacts to fisheries management. Overhauling the survey process in conjunction with the fishing industry was suggested as a way to improve data and incorporate new survey methodologies (industry-based, acoustic, eDNA) into management. It was clear to participants that all stock assessments would be affected by any change in fishery data collection systems.

Concern about the flexibility of management was raised. FMP development is often a multi-year process with limited flexibility to make structural changes with the introduction of unforeseen or uncalculated impacts. Additionally, management policies are employed to meet certain objectives - such as a designation of EFH to protect spawning, feeding and growth of particular species. Removing a management measure in exchange for impacts from offshore wind development may not be possible as the original objective of that measure, like protecting nursery grounds, remains the same with or without wind energy development.

Management should allow for additional experimental gear types to be utilized that may allow fishing to continue. Making room for the adaptation of fishing through experimental fishing permits should be considered by managers.

Utilization of fishermen's knowledge to better understand impacts and inform management was suggested. This knowledge can provide necessary context on catches within or across different regions targeting the same species, e.g., regional differences in monkfish catch per unit effort. The Northeast Trawl Advisory Panel has been discussing industry surveys and could serve as a resource in the event any survey needs to be modified if samples cannot safely be made within an array.

Research on fishery dependent datasets and any potential improvements that quality should be explored. This could be done through outreach to the fishing industry to improve trust by showing how these data are used. Fishery dependent data are also used in assessments and international quota negotiations; reduced catch because of reduced access needs to be accounted for in assessments to not doubly penalize the fishery.

Environmental monitoring could continue to expand to being deployed on floating turbine infrastructure, however, these are likely to be passive data collection systems and would need to

be integrated into the existing system. Researching environmental conditions to distinguish the effects of changing ocean conditions and those brought on by offshore wind energy development was recommended. Changes in productivity, stock mobility, spatial distribution of fish species, changes in upwelling, hydrological conditions, and local changes in ecology were all identified as important.

Research is needed on how the displacement of fisheries and surveys will be accounted for within fisheries management. Displacement could affect observer (fisheries and protected resources) data and biological sampling because of an inability to collect samples.

Flexible fishing permits could be explored as a potential adaptation strategy. Limited entry fisheries do not allow vessels to easily fish for alternative species without purchasing a new permit and gear, which can be prohibitively expensive for some fisheries.

There was concern raised over the limited amount of time available to address all the potential impacts floating offshore wind technology will have on fisheries management. It was questioned whether there were sufficient resources to address these issues as well.