FISHFLOW Integrated Ecosystem Assessment UPDATE

Summary of Workshops with Fishing Industry and Next Steps for the Gulf of Maine Fisheries and Floating Offshore Wind (FISHFLOW) Integrated Ecosystem Assessment (IEA)

Full report provided to NOAA and BOEM available here [insert link]

Project Overview available here [insert link]

Workshops Summary

With coordination supported by RODA and Rhode Island Sea Grant, the IEA team facilitated four workshops with fishing industry community members in December of 2023. Workshops were held in Elsworth, ME, Brunswick, ME, Portsmouth, NH, and Gloucester, MA. Workshops ranged from seven to 10 participants, with a total of 35 participants across all four workshops, representing a variety of species and gear types, as well as fishing association representatives and community members.

Participants expressed a range of sentiments regarding offshore wind development. Most noted concerns about potential negative impacts to fisheries and fishing communities from offshore wind related decision-making, siting, and construction processes. All discussions emphasized the need for environmental reviews and risk assessments before leasing, siting, or construction, as well as a need for improved transparency regarding data used in research and management. The table at the end of this summary lists specific topics of discussion across the fishing industry workshops.

Where the information from the workshops went

Workshop discussions helped the FISHFLOW IEA team to modify the conceptual model, identify specific topics of highest interest for indicator development, and better understand indirect, long-term impacts of concern to fishing communities.

The FISHFLOW IEA team is currently using the input from fisheries and research scientist workshops to create a list of potential indicators for tracking impacts, and refining a set of priority impacts and indicators for initial assessments, and recommendations to managers and developers. The team is considering suggestions from both fishing industry members and researchers regarding the type of indicators and data most appropriate for understanding impacts of highest concern, and is documenting an inventory of available data and data gaps for indicator assessment. Participants were concerned that the dual stressors of climate change and offshore wind development could make it difficult to identify the true cause of any observed ecosystem changes. Participants suggested that indicators that could help measure natural variability in ecosystem data would be useful for successfully attributing ecosystem impacts to either climate change or offshore wind.

Biological

Participants raised questions about migration and seasonality, trophic interactions and potential trophic cascades, and species behavioral response due to the cumulative impacts of turbine installation. Impacts to larval distribution, survivorship, and settlement for key species were suggested as high priorities to consider in future monitoring and research plans. Potential biological indicators include:

- Species migration and seasonality patterns
- Distribution, health, and reproduction of target species
- Recruitment and survivorship of young to fish populations
- Mortality rates of protected species including turtles and marine mammals

Physical

Participants were concerned about physical disturbances to the Gulf of Maine that could be caused by offshore wind construction and operation, including benthic habitat disruptions and possible oceanographic shifts to the large-scale circulation and nutrient cycling of the region due to the cumulative impacts of turbine installation. Potential physical indicators include:

- Amount of ambient noise
- Physical disturbance to benthic habitat
- Local patterns of nutrient cycling, upwelling, and downwelling
- Large-scale changes to ocean currents

Socioeconomic

The impacts to fishing activities and response by fishing communities was of shared concern across different stakeholders. Participants suggested that stock size, fish population dynamics, and fisheries-dependent data collection might be all implicated by changes to fishing activities. The cost to fish, fishermens' choice to leave the industry, fishing displacement or redistribution of fishing effort, risks to safety, rates of catch, among other dynamics, might be influenced by offshore wind development and could result in ecological as well as socioeconomic implications. Potential socioeconomic indicators include:

- Fixed and operational costs of fishing
- Proportions of community revenue from fishing industry
- Environmental Justice and social vulnerability metrics
- Employment rates in fishing and fishing related industries
- Rates of accidents at sea

Next Steps

After developing an initial list of indicators and an inventory of available and necessary data, the FISHFLOW IEA team will regularly engage with state and federal managers, fisheries community members, and offshore wind developers to iteratively review and improve the IEA indicator report to provide the best available science to understand offshore wind impacts on NOAA trust resources.

How to contact / learn more

The extended technical report on the workshops held with both fishing industry members and research scientists is available at —-[insert link]—-.

The IEA team can be contacted by emailing Fiona Hogan at fiona@rodafisheries.org.

Table: Discussion topics of greatest overall interest or concern emphasized in fisheries workshops. Discussion focused on potential interactions or impacts and areas of uncertainty. These topics will be considered alongside input from research scientists and fishery managers in guiding a finalized list of priority indicators for the IEA. Colors are thematically organized by primary system dynamic, and align with nodes in the conceptual model and submodels.

General Themes	Priority topics
Safety	Navigational hazards (gear entanglement, collisions, visibility)
	Rescue response
Fishing activities	Accessible area (transit lanes, fishery closures)
	Gear concerns (compatibility, damage)
	Onshore / shoreside fisheries infrastructure
	Distance & duration of transit to fishing grounds
	Displacement from fishing grounds
	Impacts to catch
	Cost to Fish (insurance, fuel, gear)
Fisheries Research, Monitoring, and Management	Accessible area for research / monitoring vessels
	Research & Monitoring data (fisheries surveys, vessel tracking, data continuity)
	Management Decisions (accounting for changes in monitoring data)
Environment and Ecology	Benthic habitat
	Larval survivorship
	Fish distribution
	Protected Species
	Migration patterns
	Species interactions
Socioeconomics	Fishing culture and identity, heritage
	Fishing livelihoods (economic viability of fishing as primary job)
	Fisheries - dependent communities (revenue from industry, cultural tourism)
	Environmental Justice concerns (vulnerable communities)
	Seafood production
Impact-producing factors (IPFs) of Offshore Wind Energy	Noise
	Cables (location, depth)
	Electromagnetic Fields (EMFs)
	Heat and Effluent from Cooling Water Intake Systems (CWIS) and HVDC Converter Stations
	Entanglement
	Chemical contamination
	Hydrodynamic effects (currents, turbidity)
	Benthic modification (boulder relocation, hard structure installation)
	Mitigation strategies

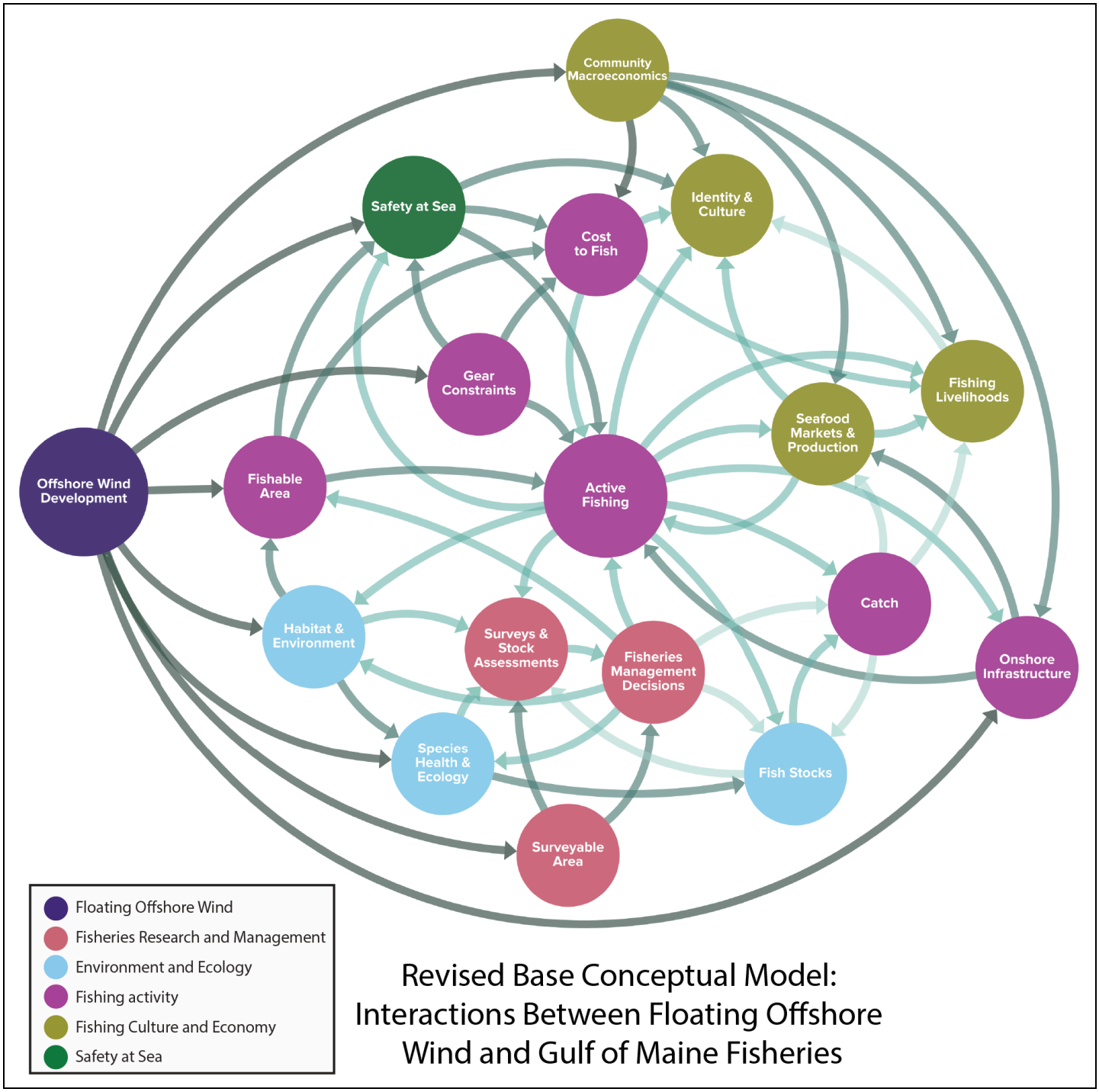

Figure: Revised base full conceptual model, following input from workshops with fishing industry and research scientists

Table: Summary information from fishing community workshops informing conceptual modeling process (four locations, 35 total participants).

Discussion area	Possible (known or perceived) impacts of most concern or interest	Areas of greatest uncertainty or lack of knowledge or data	Suggested adjustments to conceptual model themes and relationships
Socioeconomics	Loss of fishing culture and economy. Loss of livelihood viability. Impacts to community revenue and vulnerability from degradation or loss of fishing industry. Negative impacts to mental health.	Cost of development to ratepayers, responsibility for cost of maintenance and repair, location and scale of shoreside offshore wind energy infrastructure development. Non-monetary forms of mitigation.	Emphasize cultural value and mental wellbeing. Include vulnerability indicators in assessment (multiple types). Incorporate justice and equity through distribution of impacts and ability to participate in or influence offshore wind related development decision-making.
Environment and Ecology	Benthic habitat disruption, migratory species impacts, larval survivorship impacts, protected species impacts, change in fish stock distribution. Potential species impacts from electromagnetic fields, vibrations, water temperature increase, and effluent.	Effects of cables and substations on larval distribution and survivorship (through EMF, heat, effluent). Potential wake effects at the intended scale of development. Ability to attribute changes or impacts to cause given multiple drivers (e.g. fishing vs climate change vs wind development).	Include physical oceanographic drivers of biological processes. Consider inherent system dynamism and non-wind drivers. Include movement of larval distribution in ecosystem dynamics. Include species migratory patterns as potential area of impact.
Fishing Activities	Closure (de jure and de facto) of fishing areas within lease sites. Displacement from historical fishing grounds. Increased cost to fish. Increased distance of transit to fishing grounds. Space use conflict. Loss of infrastructure.	Ability to transit through/near wind energy areas. Uncertainty regarding gear incompatibility. Ability to know where submerged cables are when transiting.	Feedback from fishing activity to onshore infrastructure. Fishermen's choice to exit the industry is based on cumulative stressors, not just economic viability or regulatory restrictions.

Safety at Sea	Risks of collision if transiting near turbines. Risk of entanglement or damage through gear conflict with anchoring systems or cables - especially mobile gear. Cost of repairs.	Ability of Coast Guard to rescue/assist vessels in wind areas. Ability to acquire insurance if fishing or transiting in/near wind energy areas. Regulatory responsibility for accidents and damage in the wind energy area.	Perceptions as a mechanism of interactions. Example: Even perceived safety risk will influence ability to get insurance (de facto displacement) and impact fishers' decision-making regarding where, when, and whether to fish.
Research, Monitoring, and Management	Changes to monitoring or data availability due to offshore wind development resulting in greater stock assessment uncertainty and more restrictive fishery regulations.	Ability for research and fisheries monitoring necessary for management to continue within research arrays. Addressing lack of trust in data sources.	Role of monitoring as a potential mitigation tool. Connection between data availability or quality and management decisions. Emphasize effect of access for offshore surveys as an issue.