Monitoring Offshore Wind Development Impacts On Fisheries With An Integrated Ecosystem Assessment

Gulf of Maine, USA

rodafisheries.org/portfolio/iea/

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Annual meeting of the American Fisheries Society
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1 Northeast Fisheries Science Center
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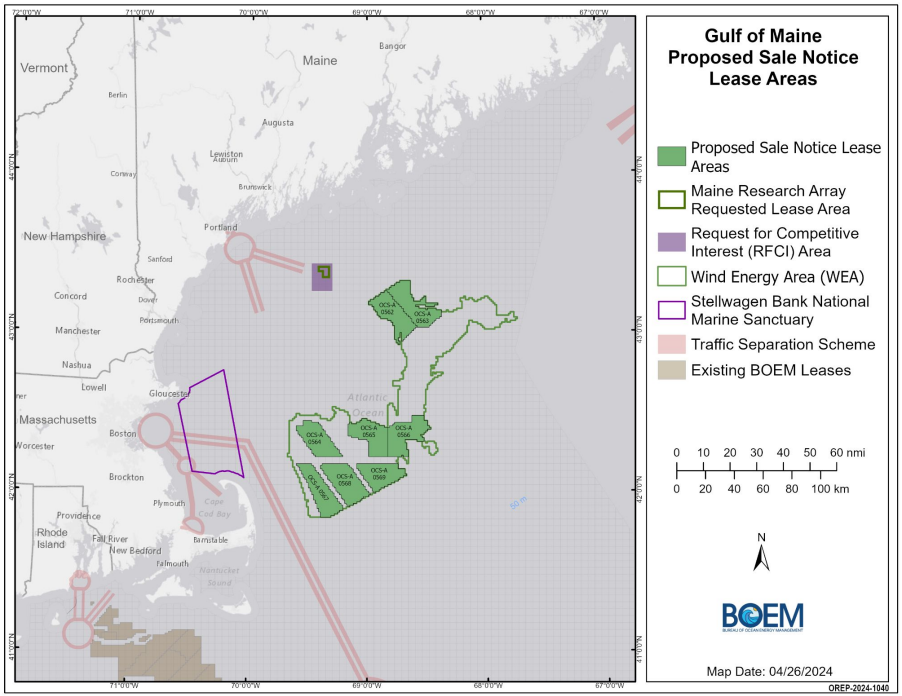
Wind energy in the Gulf of Maine



- August 19, 2022: Request for Interest in Gulf of Maine offshore wind announced
- March 15, 2024: Final Wind Energy Area announced
- April 30, 2024: 8 proposed lease areas identified (auction expected in fall 2024)
- August 19, 2024: State Research Array lease executed

https://www.maineoffshorewind.org/research-array/

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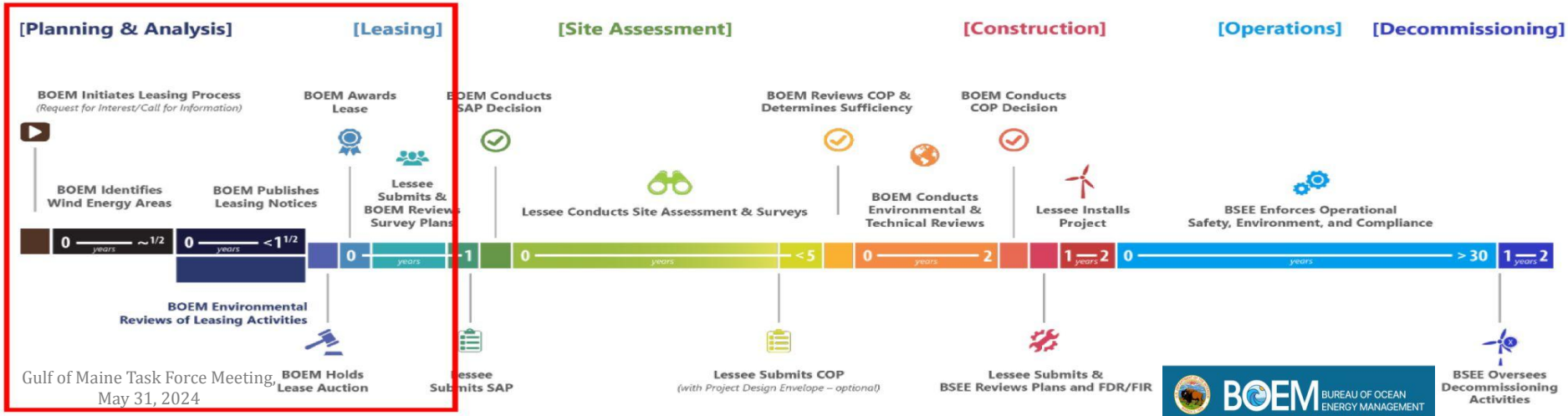
https://www.noaa.gov/fisheries

Data & analysis needs

- Guidelines for data assessment
- Cumulative & indirect impacts
- Potential on-ramps to decision making processes
  - Environmental Impact Statements
  - Monitoring plans by federal and state governments, wind developers, and others
  - State of Maine environmental requirements in Power Purchase Agreement(s)



BOEM BUREAU OF OCEAN ENERGY MANAGEMENT

Addressing needs with IEA

PROJECT GOAL

Collaboratively work with ocean users to identify complex interactions between offshore wind, fisheries, and the environment and provide tools to inform environmental analyses and reviews.

PROJECT STEPS

1. **Map key linkages and interactions** between offshore wind development, fisheries, and the environment through conceptual modeling and knowledge co-development
2. **Identify priority concerns and key indicators, and gather data** that can help measure the current conditions and future effects from offshore wind through these linkages
3. **Assess and monitor** indicators, risks, and tradeoffs over time
4. **Communicate report** through existing management pathways
5. **Iterate & improve product**

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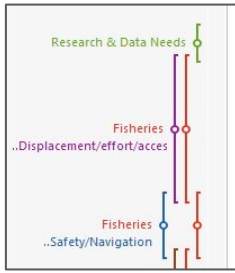
Public comment analysis

- Sensitive to fishermen's time and to avoid duplicative effort,
  we used thematic coding to analyze comments submitted to BOEM's Request for Information for the Gulf of Maine on regulations.gov
- We focused on fishing industry comments as a starting point

Code System	Fishing Industry
Siting Location & Design	28
Shoreside communities	4
Mitigation	40
IPFs	17
Marine mammals	10
Fisheries Biology/Ecology	9
Habitat	20
Oceanographic Impacts	8
Fisheries	81
Costs/compensation	2
Displacement/effort/access	12
Future use	4
Safety/Navigation	8
fishing ports/communities	6
Species	2
Fishing location/activity	20
Regulations/Management	12
Complex/unique ecosystem	11
Leasing Process	85
Research & Data Needs	107



Currently, there are no commercial scale floating offshore wind projects in the world that can provide insight into how fishing activity might be impacted, but generally speaking, offshore wind can cause significant displacement of fishing effort from historic and current grounds, as fishermen may be excluded from an area through various channels, including liability insurance, or for safety reasons, or because their gear type simply isn't compatible with the installation of the turbines (e.g. towing a net through a floating array with inter-array cables suspended in the water column would not be possible). Wind farms and transmission cables can create safety and navigation hazards, through radar interference, or potential risk of getting towed fishing gear caught on a buried cable that fails to stay sufficiently buried. Offshore wind farms may

Key themes from public comment analysis

Environment and Ecology

- Sedimentation
- Changes to pelagic and benthic habitat
- Upwelling, currents, and stratification
- Habitat for specific life stages
- Trophic interactions
- Population dynamics
  - Spawning
  - Migration
  - Larval & juvenile recruitment
  - Natural mortality
- Protected species
- Complex effects of climate change

Safety at Sea

- Accidents at sea
- Search and rescue efforts
- Navigation
- Radar
- Damage and risk

Research, Monitoring, and Management

- Accessible by boat or ROV / drone
- Permitting requirements
- Survey gear compatibility
- Stock assessment data needs
- Increased scientific uncertainty leading to more restrictive management

Social, Cultural, and Economic

- Fishing identity
- Place based identity
- Sense of place
- Well-being
- Heritage & traditions
- Cultural value
- Social and place relationships
- Community networks

Fishing Activities

- **Area**
  - Accessible area
  - Available / open fishing areas
  - Transit lanes
  - De facto exclusion of fishing
- **Activity**
  - Displacement of fishing effort
  - Fisher responses to changes
- **Gear Constraints**
  - Gear entanglement
  - Gear damage
- **Catch**
  - Amount caught
  - Amount landed
  - Bycatch rate

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Conceptual model

Note: Arrow shading and direction reflects degree of distance from a direct interaction with offshore wind energy development related factors. Relative strength of specific relationships between nodes is not reflected at this level of model.

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Public workshops

Date	Location	Description of participants
12/11/2023	Ellsworth, ME	Fishing industry
12/12/2023	Brunswick, ME	Fishing industry
12/13/2023	Portsmouth, NH	Fishing industry
12/14/2023	Gloucester, MA	Fishing industry
1/4/2024	Virtual	Academic & governmental researchers
1/5/2024	Virtual	Academic & governmental researchers
1/5/2024	Virtual	Academic & governmental researchers

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	Social, Cultural, and Economic	Environment and Ecology	Research, Monitoring, and Management	Fishing Activities	Safety at Sea
Fishing community workshops (four locations, 35 total participants)	Cultural value & wellbeing (not just $$$) Vulnerability and equity of impacts Ability to influence offshore wind decisions	Species migrations, EMF, heat, benthic disturbances Impacts to target species	Lack of data leading to more restrictive management Monitoring as mitigation	Displacement & increased costs Impacts to onshore infrastructure Cumulative stressors	**Perceived risks drive behavior changes**
Common themes	Community dependence on fisheries will drive impacts	**Dynamism, climate change & non-wind drivers** Larval distributions	**Scientific survey impacts**	**Perceptions influence fishing activity**	Uncertainty around safety impacts
Researcher workshops (three events, 28 total participants)	Community macroeconomics Multiple levels & scales of conflict **Perceptions influence behavior** Existing values and perceptions research	Habitat, trophic interactions, and hydrodynamics Research & outreach to communicate accurate risk information	At-scale impacts Need for data & knowledge sharing strategies	Shoreside infrastructure, community culture, macroeconomics	Connections to socioeconomic impacts

Recurring areas of interest from public discussions

- Dynamism, climate change & non-wind drivers
- Scientific survey impacts
- Perceptions influence behaviors & activities

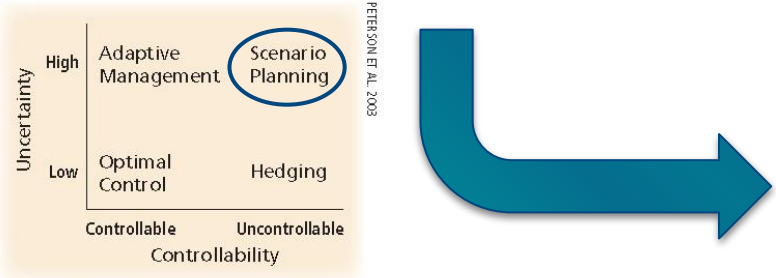


Figure 3. Appropriate management responses based on uncertainty and controllability.

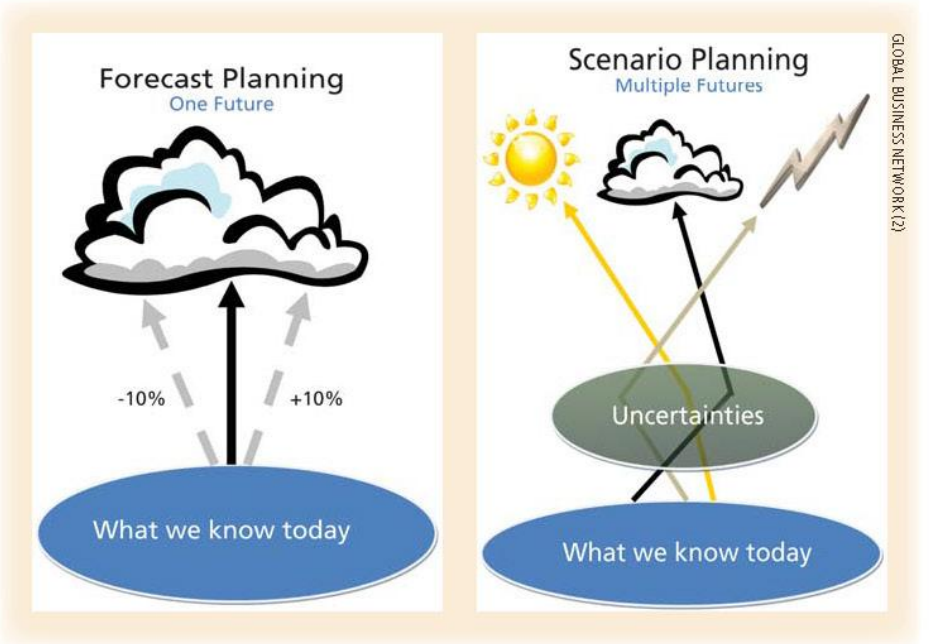


Figure 2. Forecast planning (*a*, at left) vs. scenario planning (*b*, at right).

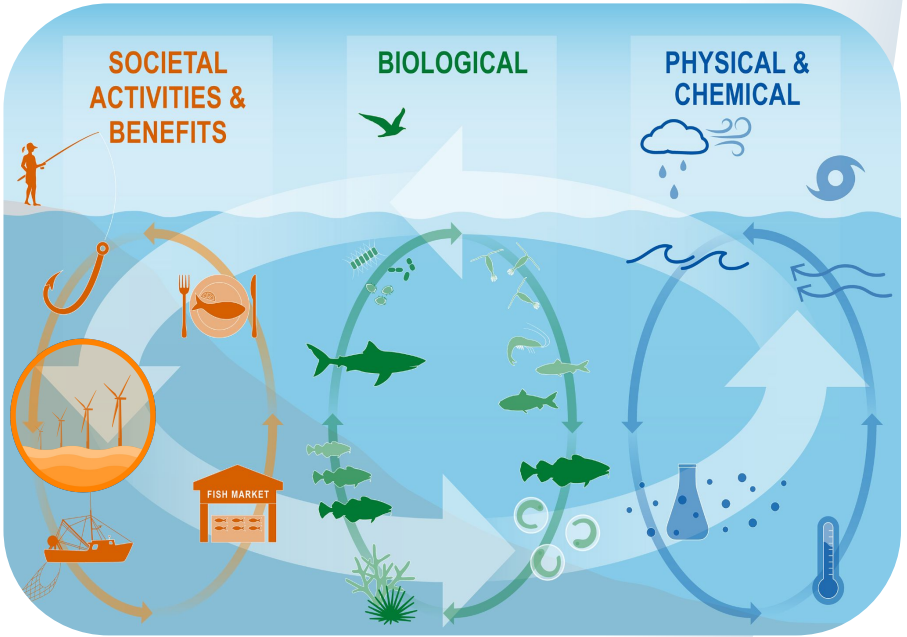
Weeks et al. 2011

Data inventory

- Identify data that can be used to monitor and assess conceptual model nodes and connections
- Incorporate existing NOAA datasets and related projects
  - Regional Wildlife Science Collaborative for Offshore Wind database
  - Responsible Offshore Science Alliance "FishFORWRD" database

Indicator development & next steps

- Create candidate indicators from data inventory
  - Explicit time, space, and units
  - Indicators are proxies of key conceptual model themes: social, cultural, and economic; environment and ecology; research, monitoring, and management; fishing activities; safety at sea
- Score indicator utility
  - Contribution to understanding the system
  - Ability to create, maintain & update
- Work with steering committee to select indicators
- Create & assess indicators; report out & iterate



State of the Ecosystem Report 2024

Acknowledgements

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Steering Committee Members	
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