BOEM Bureau of Ocean Energy Management

Evaluation of Hydrodynamic Modeling and Implications for Offshore Wind Development: Nantucket Shoals

April 25, 2023

Dr. Mary Boatman | Sponsor Briefing

BOEM – Introductions of staff

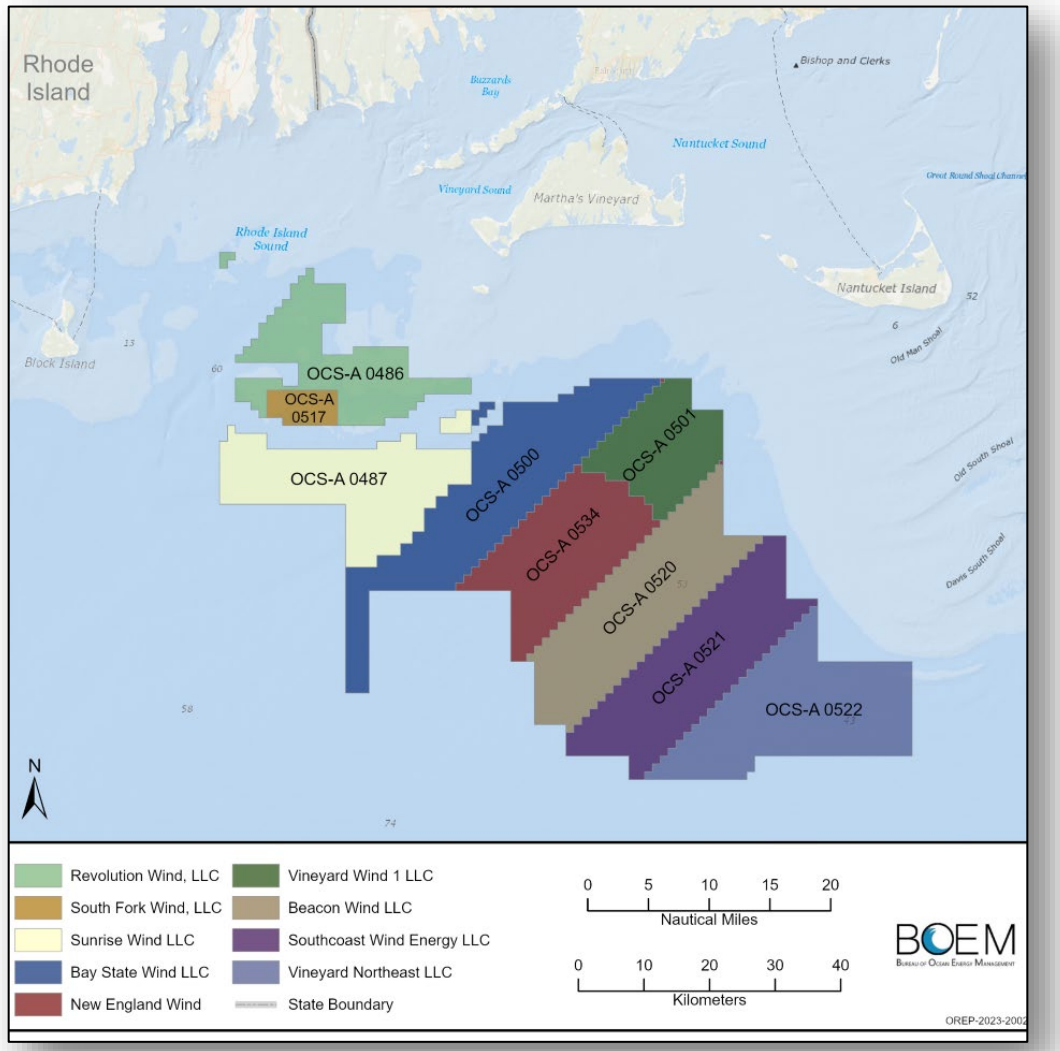
- Dr. Mary Boatman – Science Coordinator for Office of Renewable Energy Programs
- Dr. Yoko Furukawa - Chief, Branch of Physical and Chemical Sciences
- Dr. Thomas Kilpatrick – Oceanographer
- Dr. Desray Reeb – Marine Biologist

Outer Continental Shelf (OCS) Energy

- **"The Outer Continental Shelf (OCS) is a vital national resource reserve held by the Federal Government for the public, which should be made available for expeditious and orderly development, subject to environmental safeguards, in a manner which is consistent with the maintenance of competition and other national needs."**
  - Outer Continental Shelf Lands Act (OCSLA) | *Sec 3(3)*

- **"… may grant a lease [for] energy from sources other than oil and gas … in a manner that provides for safety and protection of the environment."**
  - Energy Policy Act of 2005 | *Sec. 388*

BOEM Statement of Task



- 2 projects approved, construction this summer:
  - South Fork (0517)
  - Vineyard Wind (0501)
- 4 projects in review:
  - Revolution Wind (0486)
  - Sunrise Wind (0487)
  - New England Wind (0534)
  - South Coast Wind (0521)
- 2 Construction and Operations Plans Received:
  - Bay State Wind (0500)
  - Beacon Wind (0520)

Environmental Studies

Use of Finite-Volume Modeling and the Northeast Coastal Ocean Forecast System in Offshore Wind Energy Resource Planning (2016)

- Question being addressed: Does the presence of turbines affect larval transport? (considered oceanic flow—structure interactions but not turbine impacts on surface winds)
- Used Northeast Coastal Ocean Forecast System with nested Finite Volume Coastal Ocean Model (FVCOM)
- Assessed extreme impacts of the offshore wind facility on the local and regional physical environment under severe weather conditions: February 1978 Nor'easter storm (a hundred-year storm) and the August 1991 Hurricane Bob
- Model parameters included 135 wind turbines with 5 km spacing and tower diameter of 5 m

Environmental Studies

Hydrodynamic Modeling, Particle Tracking and Agent-Based Modeling of Larvae in the U.S. Mid-Atlantic Bight (2021)

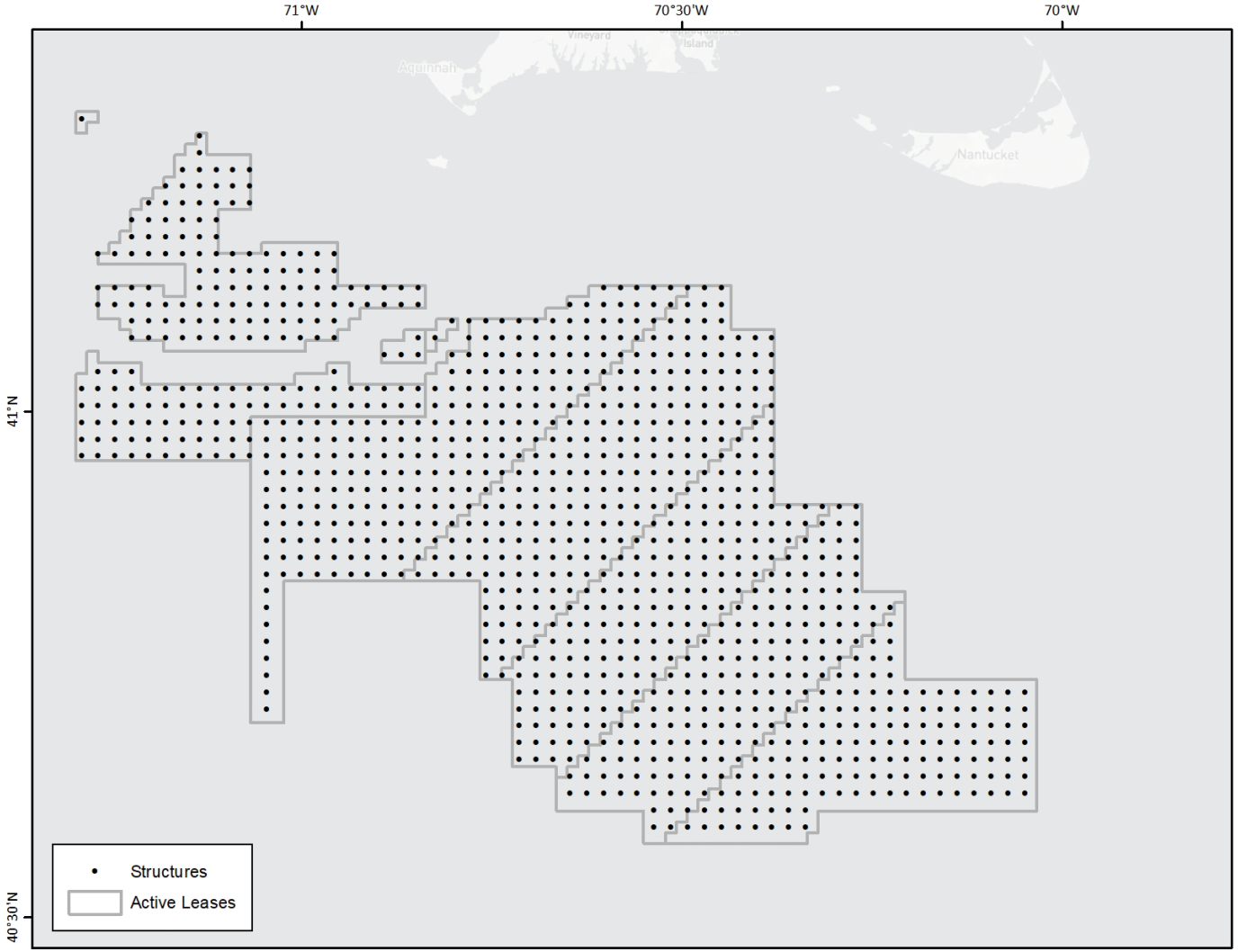
- Question addressed: Impact to larval transport from Georges Bank to the Mid-Atlantic
- Included both modeling of currents and wind speed reduction in the wind farm
- Examined local and regional hydrodynamics for 2017-2018 and the resultant impact on circulation and sediment, nutrient, and larval transport
- Used the 1 nm X 1 nm grid
- Scenarios of development including full build out of 1,063 towers
- 12-15 MW turbines, hub height 140 m, foundation diameter of 12 m

Environmental Studies

Offshore Wind Impacts on Oceanographic Processes: North Carolina to New York

- Ongoing study awarded in August 2022
- Two contracts awarded: DHI Water & Environment (MIKE model) and RPS Group, Inc. (Delft3D model)
- Assess how the construction of multiple offshore wind energy facilities in the Mid-Atlantic Bight will affect local and regional hydrodynamics and the resultant impact on circulation and sediment, nutrient, and larval transport
- Three model segments will be necessary to address the objective: wind wake, ocean circulation, and particle tracking

BOEM Model Considerations



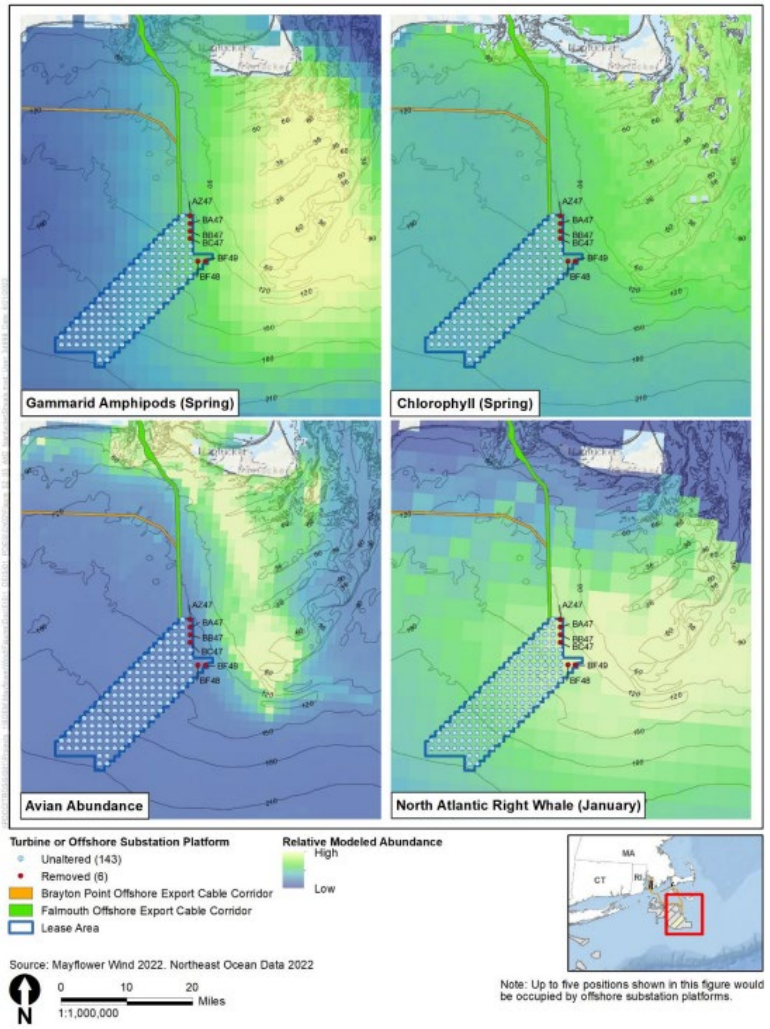
For Analysis Purposes Only

- Grid spacing of 1 nm X 1 nm
- Not all locations will have turbines
- Total of 1,063 locations

BOEM Model Considerations

	Cape Wind	Europe	US offshore wind
Turbine Rating	3.6 MW	5 MW	11-15 MW
Hub Height	78.5 m	90 m	130 -160 m
Rotor Diameter	111 m	126 m	200 -240 m
Tower Diameter	5.1-5.5 m	6 m	11-12 m

Biological Considerations



- BOEM's previous modelling studies focused on larval transport of commercially important fishery species; scallop, silver hake (whiting), and summer flounder.
- Concerns have been raised regarding other plankton that support higher tropic levels (example of public data from South Coast DEIS at left).
- Site specific data regarding plankton can be found in: *Megafauna Aerial Surveys in the Wind Energy Areas of Massachusetts and Rhode Island with Emphasis on LargeWhales: Summary Report Campaign 5, 2018-2019*
  https://espis.boem.gov/final%20reports/BOEM_2021-033.pdf

Biological Considerations Continued

- Megafauna Aerial Surveys in the Wind Energy Areas of Massachusetts and Rhode Island with Emphasis on Large Whales: Summary Report Campaign 5, 2018-2019
  - Section 3.2

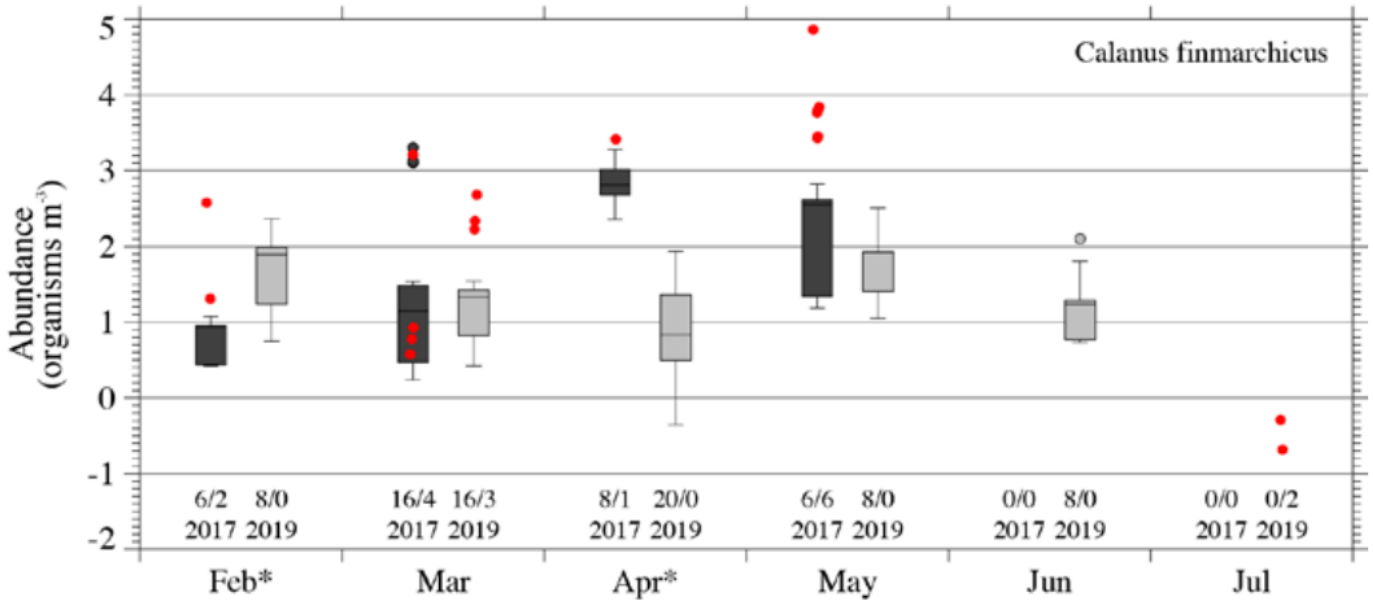


Figure 39. Interannual comparison of monthly base-10 log-transformed copepod abundance for *Calanus finmarchicus*, *Centropages spp.*, and *Pseudocalanus* spp.

Our Vision

To protect and promote the recovery of North Atlantic right whales while responsibly developing offshore wind energy.

- Path forward for the agencies and partners to best understand the potential for impacts and take effective measures to avoid or minimize impacts.
- 'Living' Strategy regularly reviewed and results periodically shared.

Draft Strategy Goals

1 Mitigation and Decision-Support Tools

Develop, use, and evaluate measures that avoid or minimize impacts of OSW activities on NARWs and their habitat. Establish quieting performance standards for OSW. Work to improve and develop tools to support decision-making as it relates to OSW development and NARW recovery. Ensure mitigation and decision-support tool development are undertaken in close coordination with those entities involved in regulation, rulemaking, and decisions related to NARWs and OSW.

- Includes baseline mitigation and monitoring measures.
- Focuses on avoid (primary) and minimize (secondary).

2 Research and Monitoring

Identify, support, and conduct research and monitoring to better understand the current status of NARWs (e.g., abundance, distribution, life history, health, habitat use, and ecological interactions); understand the impacts to NARW from project-level and cumulative effects from multiple projects; and evaluate and address any uncertainty associated with the effects of OSW development.

- Identifies priority science questions and key actions to address them.

3 Collaboration, Communication, and Outreach

BOEM and NOAA Fisheries recognize that continued collaboration between the two agencies is needed for the success of this Strategy. Further, the two agencies recognize that internal and external communication and outreach are important for the success of this Strategy. NOAA Fisheries and BOEM will have a transparent process for communication and outreach to support the appropriate goals of this Strategy. To meet this goal, BOEM and NOAA Fisheries will develop and implement this Strategy by strengthening partnerships, combining resources, and sharing and communicating information. BOEM and NOAA Fisheries will also ensure professional, transparent, and equitable communication; and engagement with Tribes, Federal and state agencies, partners, and stakeholder groups.

- Includes formation of multi-agency implementation team to collaborate across partners in carrying out Strategy.

BOEM Expectations

- Ensure BOEM is using the best available science and appropriately interpreting/applying models to inform impact assessments
- Scale of effects relative to natural variability and ability to measure the effects
- Provide recommendations for model validation

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