Offshore Wind Energy Update

Sam Rauch

May 26, 2021 - MAFAC Meeting
Current Leases and Call Areas

- 17 active commercial & 1 active research leases in the Atlantic
- 1 active research lease off OR
- New Wind Energy Areas identified in NY Bight in March 2021
- Call Areas off SC (2015), HI (2016) and CA (2018)
- Creation of the Gulf of Mexico Intergovernmental Renewable Energy Task Force in 2021
Environmental Review & Workload

- White House goal to approve at least 16 Construction & Operations Plans (COPs) by late 2024/early 2025
- 14 submitted COPs
- Site Assessment Plan reviews
- New industry to U.S. waters—unknown impacts

Floating offshore wind turbines
Offshore Wind Energy Science Updates

Andy Lipsky, Elizabeth Methratta, Chris Orphanides, Angela Silva, and Jon Hare
NOAA Northeast Fisheries Science Center

Presentation to the MAFAC
May 26, 2021
NOAA Fisheries
Offshore Wind Needs

1. Support to Regulatory Process
2. Scientific Support for the Regulatory Process
3. Address impacts of wind on Federal Surveys & Scientific Advice
4. Understanding Interactions with NOAA Trust Resources
Scientific Support for the Regulatory Process
Scientific Support needed for cumulative development
Regulatory Process to Integrate Scientific Advice

If current NOI release rates by BOEM continue (every 30 days) we would contribute concurrently to an **Additional Six EIS’s** before the end of 2021
Addressing Impacts of Offshore Wind Development on NOAA Scientific Surveys & Advice
Represents 394 Years of Total Survey Effort
Underpin fisheries valued at $27B/year commercial fisheries & $6.5B recreational fisheries (NMFS, 2018)
Northeast NMFS Survey Interactions with Offshore Wind

- **Atlantic Surfclam Survey**: Range: 3-21%, Total: 9%
- **Gulf of Maine Cooperative Bottom Longline Survey**: Range: 2-7%, Total: 2%
- **North Atlantic Right Whale Survey**: Range: 5-50%, Total: 5%
- **Northern Shrimp Survey**: Range: 1-39%, Total: 5%
- **Ocean Quahog Survey**: Range: 1-21%, Total: 9%
- **Large Coastal Shark Bottom Longline Survey**: Total: 5%
- **Scallop Survey**: Range: 1-76%, Total: 5%
- **Ecosystem Monitoring Survey**: Range: 1-37%, Total: 5%
- **Cooperative Atlantic States Pupping and Nursery (COASTSPAN)**: Total: <1%
- **Bottom Trawl Survey**: Range: 1-76%, Total: 5%
- **Protected Species Abundance Surveys Aerial**: Total: 3%
- **Shipboard + Aerial**: Total: 2%

**Map Legend**
- Wind Lease Areas
- U.S. State Boundaries
- Maine Area of Interest (AOI)
- NY Wind Energy Areas & SC Planning Areas

**Range** = Minimum and maximum overlap with survey strata
**Total** = Percent overlap of wind development with total survey area
Wind Energy Actuates Impacts to Scientific Surveys in Four Ways:

1. **Preclusion** - displacement by infrastructure
2. **Impacts to Statistical Survey Design**
3. **Habitat Change** that affect species distribution, abundance, and vital rates within and outside wind energy areas
4. **Impacts to sampling** outside of developments by wind energy-induced transit effects that can result in lost sampling time
Implications of NOAA Fisheries Survey Disruptions

**American Public**
- Adverse impacts on fishermen and fishing communities and American public who consume seafood and expect recovery and conservation of endangered species and marine mammals

**Commercial/Recreational Fishermen & Fishing Communities**
- Increase uncertainty in estimates of abundance—through application of the precautionary approach—impacting setting of quotas,
- Increase in more precautionary protected species management measures

**Protected Species**
- Greater uncertainty in protected species assessments/recovery programs

**Non-fishing Sectors-Shipping & Energy**
- Uncertainty in protected species information and stock assessments

**Federal Agencies**
- Harm caused by the need to include more precautionary mitigation measures, e.g., Incidental Take Statements (ITA) through ESA Biological Opinions and MMPA ITAs

**Climate Science**
- Disruptions of 60+ year time series decreases ability to understand and mitigate the effects of climate change, impacting American Public
Implementing a Federal Survey Mitigation Program

1. **Evaluate survey designs**: Evaluate and quantify effects and impacts of proposed project-related wind development activities on scientific survey operations and on provision of scientific advice to management.

1. **Identify and develop new survey approaches**: Evaluate or develop appropriate statistical designs, sampling protocols, and methods, while determining if scientific data quality standards for the provision of management advice are maintained.

1. **Calibrate new survey approaches**: Design and carry out necessary calibrations and required monitoring standardization to ensure continuity, interoperability, precision, and accuracy of data collections.
Implementing a Federal Survey Mitigation Program

5. **Develop interim provisional survey indices:** Develop interim indices from existing data sets to partially bridge the gap in data quality and availability between pre-construction, and operational periods while new approaches are being identified, tested or calibrated.

6. **Wind energy monitoring to fill regional scientific survey data needs:** Apply new statistical designs and carryout sampling methods to effectively mitigate survey impacts due to offshore wind activities from operations for the 30 year operational life-span of project developments.

5. **Develop and communicate new regional data systems:** New data collections will require new data collection, analysis, management, dissemination and reporting systems. Changes to surveys and new approaches will require substantial collaboration with fishery management, fishing industry, scientific institutions and other partners.

https://www.disl.edu/research/fisheries-ecology-research
## Northeast Surveys: Status of Survey Mitigation Steps

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Development of an Adaptation strategy for Multi-Species Bottom Trawl

- **Determine effects of wind development on survey data, stock assessments and management measures.**
  - Evaluate range of impacts (e.g., Eliminate all observations from WEAs and recalculate abundance indices)
  - Must look at over 40 assessed stocks for bottom trawl survey

- **Identify potential combination(s) of sampling methodologies and statistical designs for inside WEAs**
  - Results should be able to be incorporated with historical and existing sampling for continuity of time-series

- **Observing System Simulation Experiments (OSSE) and/or other modeling approaches**
  - Interagency Agreement with Bureau of Ocean Energy Management
  - **Stakeholder workshops in 2021**
    - Identify impacts of offshore wind energy development on fisheries
    - Impacts on stock assessment and management advice
    - Define the objectives and questions that OSSE needs to answer
    - Design analytic and empirical framework

- **Build Model, evaluate alternatives, identify survey adaptation actions**
What we know, don’t know, & need to know
Understanding Interactions of Offshore Wind with NOAA Trust Resources

Johari Window adapted from (Luft and Ingham (1955))
Addressing Human Dimensions Research Needs

The scallop fishery is one of the most valuable U.S. fisheries ($500M/year)

Scallop fishing activity 2015-16 and current wind areas
Socio-economic Data Tools: Impacts of Offshore Wind Development

- Highlights annualized landings and revenue by species, gear type, ports and fishery management plan
- Can be used to prepare fisheries monitoring plans and socio-economic impact analysis
- Next steps: Developing a predictive displacement model for the Atlantic sea scallop fishery
ICES Workshop on the Socio-economic Implications of Offshore Wind on Fishing Communities (WKSEIOWFC)

1. ICES Wind&Fisheries Working Group determined that no common, consistent, and accepted framework for defining and quantifying socio-economic impacts exist in Europe nor the United States.

1. Workshop attended by participants from 9 countries representing policy/regulation, fishing industry, offshore wind industries, consultants and academia.

1. Objectives of the Workshop:
   • To determine the routes by which offshore wind could cause change in fishing practices and the implications at individual, community and societal levels.
   • Determine existing evidence, identify methods to fill data gaps, and develop recommendations for generating evidence.
Offshore Wind in the NE U.S. Shelf Ecosystem

Methratta et al. 2020 *Oceanography* 33: 16-27.

- Regional scientific surveys and the scientific advice that they underpin will be impacted.

- Fisheries resources will be affected via impact producing factors (sound, EMFs, artificial reef effects, hydrodynamics).

- Fisheries may be affected through changes in fishing effort distribution, navigation, collision potential, gear switching, etc.

- Socio-economic impacts include changes in CPUE, landings revenue, and shoreside communities.
• Interactions vary among impact producing factor, development phase, space, time, and life stage

• Need to improve understanding of economic and societal impacts of OWFs & linkages to ecosystem services that support fisheries

• Survey and monitoring data at OWFs are needed by fisheries managers

Gill et al. 2020 *Oceanography* 33: 118-127
• Activities during all phases of wind farm lifetimes produce underwater sound

• Data on acoustic impacts of OWFs are very limited for most species’ populations, life stages, and other phases

• Much more research is needed
Electromagnetic Fields (EMFs)
Hutchison et al. 2020 Oceanography 33: 96-107

- Existing evidence from field and laboratory studies indicates the potential for EMFs from cables to affect navigation, predator detection, communication, and finding mates for finfish and shellfish.

- Electrosensory species and those that use a magnetic map sense are particularly vulnerable.

- More research is needed to understand individual to population level effects.
Artificial Reef Effect
Degraer et al. 2020 Oceanography 33: 48-57

- Turbines support a diverse and abundant artificial reef community that includes epibiota, mobile shellfish, and finfish
- Finfish and shellfish as well as birds and marine mammals also profit from locally increased food availability and/or shelter
- Understanding the artificial reef effect requires study at broad spatial and temporal scales
Effects of Altered Hydrodynamics

- OWFs may alter local or regional hydrodynamics through modification of (1) the wind fields, and (2) oceanographic parameters including turbulence, mixing, and vertical stratification.

- Existing studies focus on how altered hydrodynamics affect **local** processes: sediment resuspension or sedimentation, temperature change, nutrient transport, and substrate availability

- **Regional** affects are possible via spillover effects on surrounding ecosystems and natural oceanographic connectivity

Protected Species Research & Monitoring

Aerial Surveys & Passive Acoustic Monitoring

whalemap.org
1. NOAA/USGS right whale expert elicitation to develop a population viability assessment examining the potential impact of offshore wind on right whale population

2. Collecting data on zooplankton energy density, species, and concentrations to better understand right whale habitat use in MA/RI WEA

3. Future field work to assess right whale health and demographics in the MA/RI WEA region

Leiter et al. 2017. Endangered Species Research 34:45-59/
Habitat use by North Atlantic right whale in wind energy areas

Quintana et al. *in press*. Endangered Species Research
Residency, demographics, and movement patterns of North Atlantic right whales in wind energy areas
Offshore Wind Effects Occur across Multiple Spatial Scales

Current monitoring programs

Here’s where we want to be

courtesy of Steven Degraer
Regional Science Collaborations

• RODA, BOEM, and NOAA Synthesis of the Science Workshop and White Paper
  ▪ Synthesize existing science, identify gaps and research priorities (Oct. 2020-present)
  ▪ *Upcoming* State of the Science-Fisheries and Floating Wind Technology

• ROSA Guidelines for research and monitoring
  ▪ Establish guiding principles for study design, methods, data collection, analysis, scale (July 2020-March 2021)

• Establishing Regional Wildlife Science Entity collaborating with DOI, developers, states, and eNGOs

• NOAA SeaGrant/Fisheries & DOE-Research Funding Opportunity
  ▪ International Council on Exploration of the Sea

Questions
Additional Information
Regulatory scientific demands

- U.S. Goal Set for 30 GW of offshore wind power by 2030
- U.S. Goal Set for 110 GW of offshore wind power by 2050
- New Wind Energy Areas now established in NY Bight- Adds 800,000 acres to existing 1.7M acres of leases
- Notice of Intent to proceed with 16 Construction and Operations Plans/EISs by 2025
- 16 Record of Decisions by the end of 2024


Ecological, human, and management dimensions of OW in the NE U.S.


Ecological, societal, management, and regulatory dimensions of OW with European and U.S. perspectives


Exploring the pros and cons of BACI and BAG experimental designs in the context of OW


Fisheries resource occurrence in the NE U.S. Shelf wind energy areas
Block Island Wind Farm: Coastal Resources

Carey et al. 2020 Oceanography 33: 70-81

- Designed studies to investigate the effects of construction and operation on hard bottom habitats, demersal fish, lobster and crabs, and recreational boating

- Important study elements included early engagement with fishermen and boaters, adaptive monitoring based on data and stakeholder feedback, and cooperative research

- Use methods that are consistent with regional surveys
Protected Species Research & Monitoring

Aerial Surveys
1. Extensive aerial survey effort by NOAA and partners to establish baseline protected species distribution and habitat use
2. Investing in a camera system to for adaptation and calibration of surveys to take into account higher survey heights with the presence of wind farms

whalemap.org
Protected Species Research & Monitoring

Passive Acoustic Monitoring (PAM)

- Developing guidelines for energy developer deployment, dissemination, and storage of PAM data
- Building repository and website for PAM data collection and dissemination
- Deployed PAM devices in WEAs
- Extensive collaboration with partners for baseline data collection
Workshop Outcomes:

- Sub-group conceptual models on three themes
- Supportive narrative behind ‘nodes’ and the connections was key information collected for identifying gaps and existing evidence
- Identified common issues and differences between the U.S. and Europe
• Monitoring has included sediment grain size, organic enrichment, and macrofauna, as well as the colonization of the jacket structures, up to four years post-installation

• After four years, mussel aggregations established within the footprint of the turbines

• Biotypes within 90 m of the turbines were linked to mussel aggregations and included several non-indigenous species

• Coordinated monitoring is needed
Human Dimensions Research Partnership

- “Advancing Research for Co-existence of Fishing, Coastal Communities, and Regional Ocean Renewable Energies”
- Sea Grant, NEFSC, DOE
- Research Priority Areas:
  - (1) Fisheries and Fishing Community Resilience
  - (2) Coastal Community and Economic Resilience
  - (3) Multi-use Maritime Activities
Hanging it all together

Do we want to push or do we want to be pulled along the continuum to Ecosystem-Based Management?

Continuum of Ecosystem-Based Management

https://www.integratedecosystemassessment.noaa.gov/national/EBM