

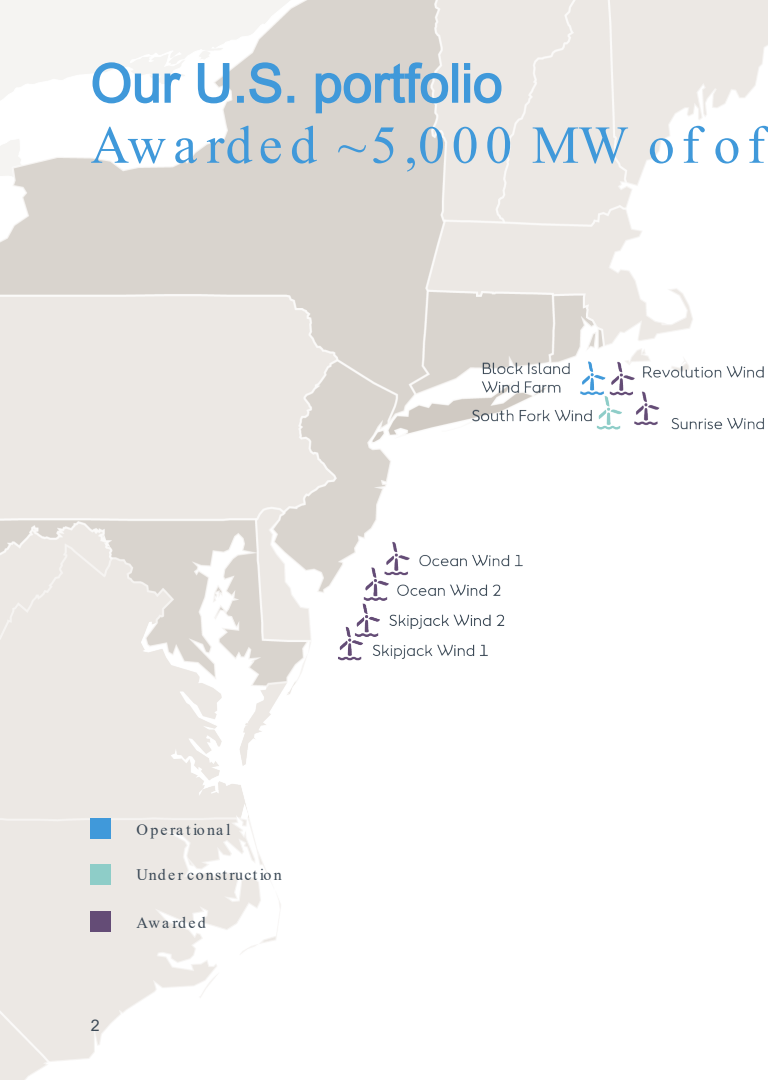
Considerations and Lessons Learned for Designing Offshore Wind Fisheries Monitoring Surveys

Greg DeCelles

Ørsted Offshore North America

Our U.S. portfolio

Awarded ~5,000 MW of offshore capacity



In Operation

Block Island Wind Farm: 30 MW

Under construction

South Fork Wind: 50/50 JV w/ Eversource, 130 MW

Awarded

Revolution Wind: 50/50 JV w/ Eversource, 704 MW

Sunrise Wind: 50/50 JV w/ Eversource, approximately 924 MW

Ocean Wind 1: 75/25 JV with PSEG, 1,100 MW

Ocean Wind 2: 1,148 MW

Skipjack Wind 1: 120 MW

Skipjack Wind 2: 846 MW

Orsted Approach to Monitoring



Agency guidance



Standardized and regional



Stakeholder engagement



Focus on monitoring priorities



Collaborative

Background

Calls for a regional approach to monitoring

“A regional approach to science would standardize monitoring methods (sampling gear, experimental design, spatial and temporal scales that more closely match the resource, and reporting standards) within a region to **make data comparable within and among projects** .”
(*Methratta et al., 2020*)

“As long as standard protocols are adhered to, then individual studies can be used to compare wind farms to one another and to explore regional trends. Therefore, data collected by wind energy developers directly through their site-specific studies require the **monitoring protocols to be identical for all developers** .” (*Massachusetts Division of Marine Fisheries, 2018*)

“Specific gear designs (net dimensions, configuration, mesh size, trap dimensions) and sampling protocols (tow length, soak time) should be developed with input from the commercial fishing industry, and should strive to **maintain consistency with ongoing regional -scale projects** , such as the Virginia Institute of Marine Science's North East Area Monitoring and Assessment Program (NEAMAP) and Southern New England Cooperative Ventless Trap Survey.” (*Petruny -Parker et al., 2015*)



Trawl surveys

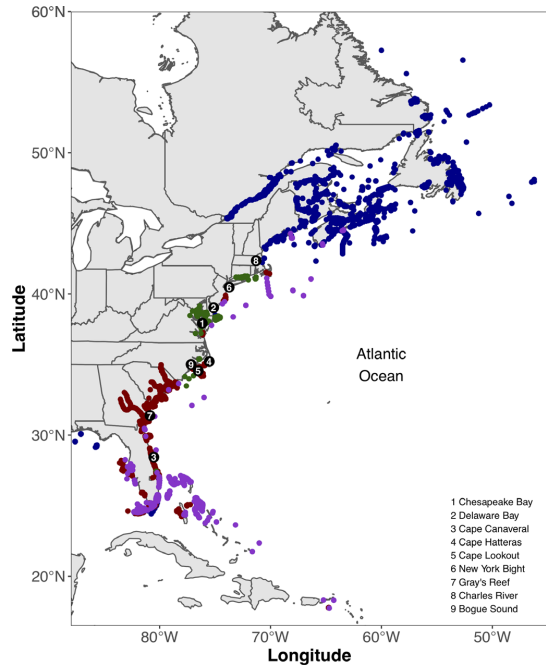
Ørsted and its research partners are proposing to carry out NEAMAP style trawl surveys at the Ocean Wind 1, Revolution Wind, and Sunrise Wind lease sites.

- NEAMAP specifications for trawl net.
- Net mensuration equipment will be used to assess trawl geometry in real time.
- Tow speed and tow duration will be consistent with NEAMAP methods.
- Sampling will be restricted to daylight hours to minimize diel variability in catch rates.
- Intend to use the same vessel and reference sites for monitoring at both the Revolution Wind and Sunrise Wind.
- F/V Darana R will be used to execute the trawl survey at Ocean Wind 1.
- Largely consistent with methods being used by Vineyard Wind at their lease sites, and proposed methods from other developers.

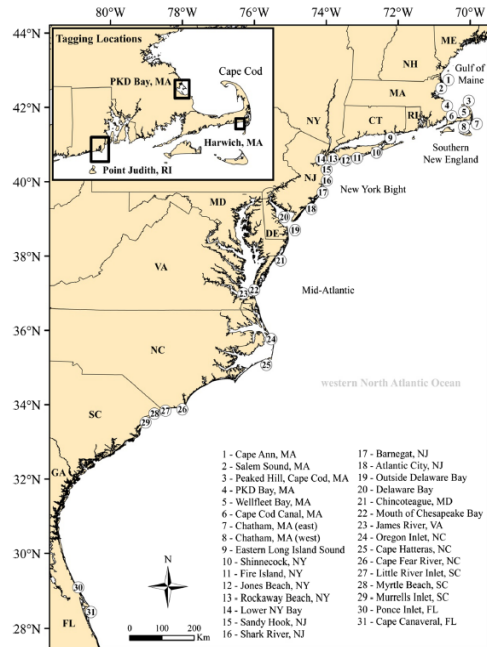


Acoustic telemetry

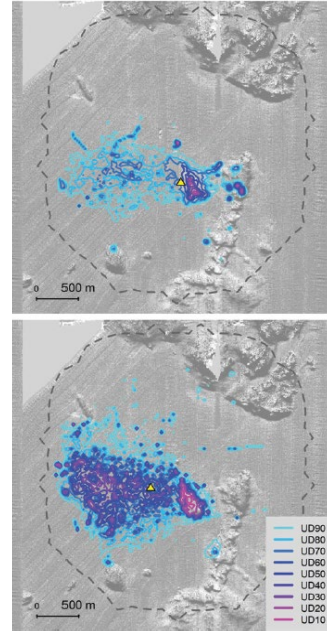
Spatial scales



Bangley et al 2020



Kneebone et al 2014



Dean et al 2014



Acoustic Telemetry

Objectives

- Evaluate changes in presence, residency, movements, and behavior between the pre-construction, construction, and operational periods.
 - Lease sites
 - Export cable routes
- Understand connectivity at a range of spatial scales:
 - Among Ørsted project areas
 - At spatial scales greater than the Ørsted project areas
 - Inshore and offshore movements



Acoustic Telemetry – Highly Migratory Species

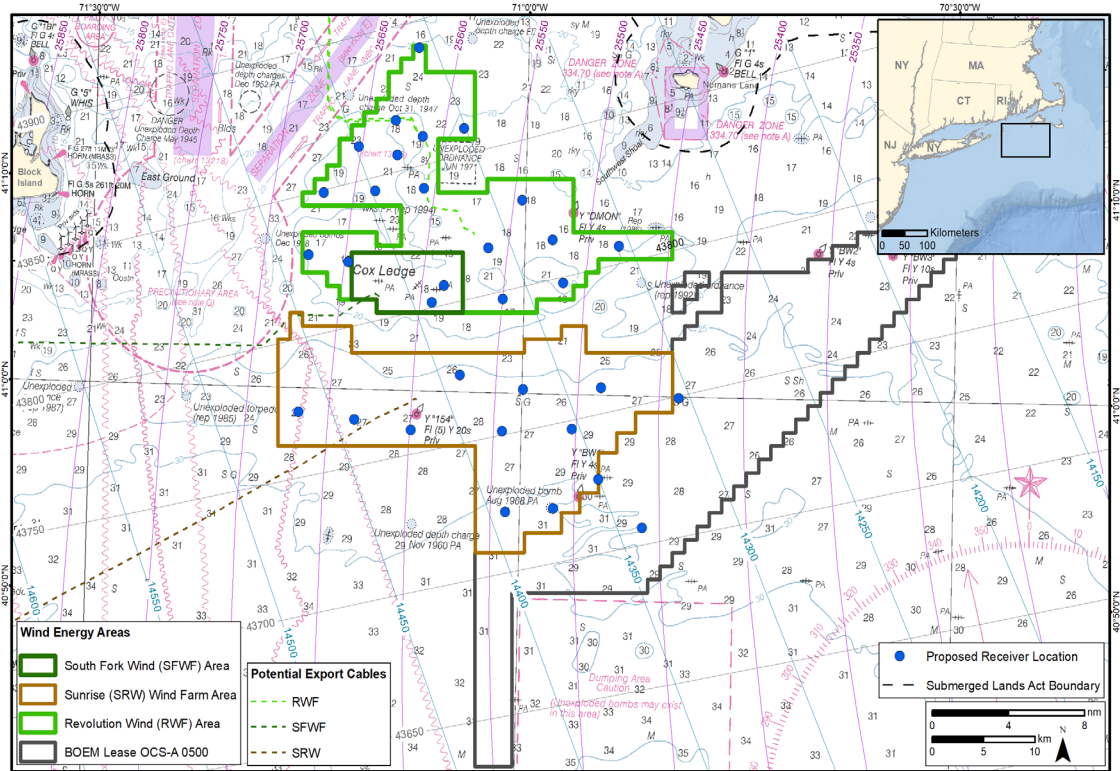
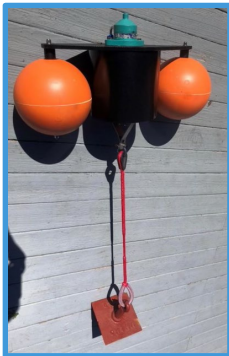
Project Timeline

- May 2022 – 32 receivers were deployed in Ørsted lease areas. Receiver array will be downloaded and maintained three times per year.
- 2023 through 2025 – 50 transmitters deployed annually on HMS species.
- Receiver array will be maintained through at least 2026.



New England
Aquarium

INSPIRE
ENVIRONMENTAL



Date: NOAA NOS Chart 12300

Document Name: Ørsted_proposed_receiver_locations_20220211

Date: 2/11/2022

INSPIRE
ENVIRONMENTAL

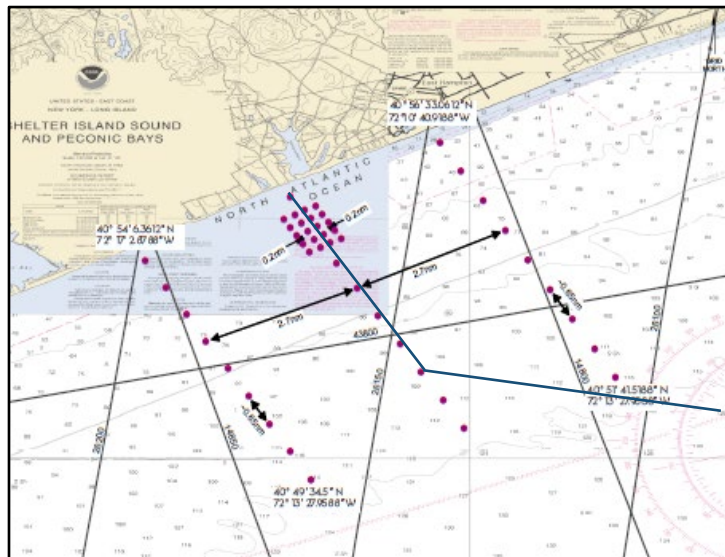


Ørsted

Acoustic Telemetry – Export Cable Routes

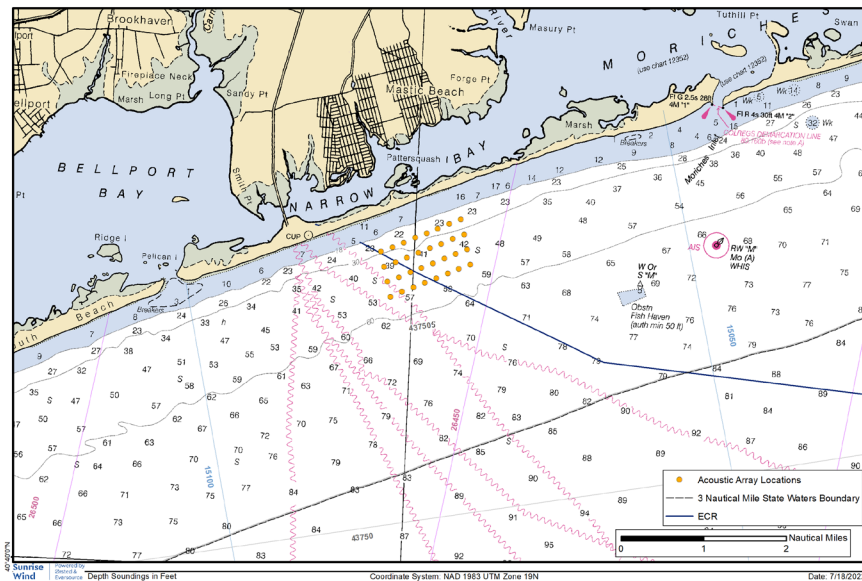
South Fork Wind Export Cable

- 44 receiver array was deployed in August 2021
- Receivers will remain year-round through 2026.
- Tagging has already commenced, and will continue through 2026.



Sunrise Wind Export Cable

- 32 receiver VPS array was deployed in July 2022
- Receivers will remain year-round through 2027.
- Tagging has already commenced, and will continue through 2026.

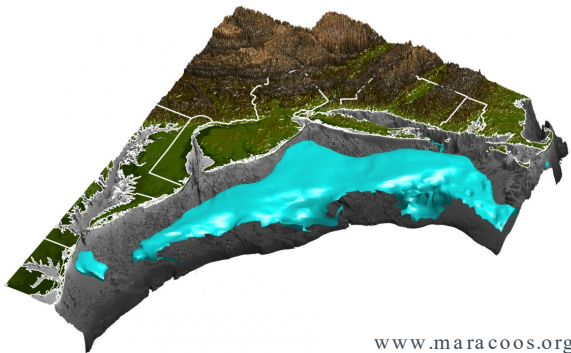


Oceanographic data

Ørsted are collecting detailed oceanographic data during fisheries monitoring surveys across all lease sites.

- Conductivity Temperature Depth (CTD) sensors are being used to collect vertical profiles of the water column at each sampling station.
- Bottom T is being recorded whenever sampling gear is deployed.
- Slocum gliders have been used at Ocean Wind to collect a range of environmental data.

ESPRESSO Cold Pool 12° C on Aug 10, 2013 01:00 UTC



www.maracoos.org
Visualized by Dr. Hugh Roarty and Mr. John Kerfoot



www.geo-matching.com



www.wateronline.com

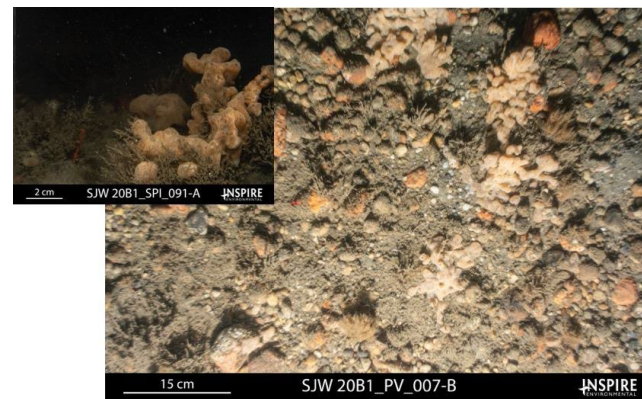
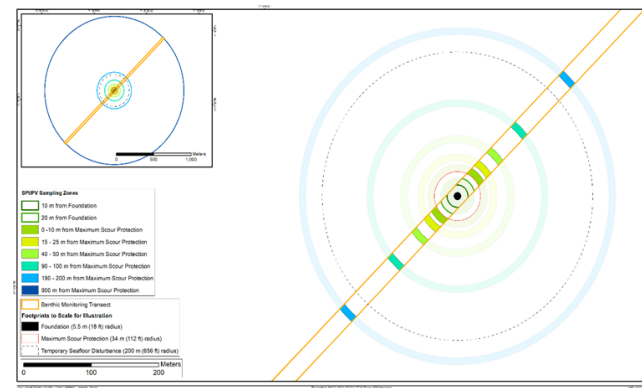
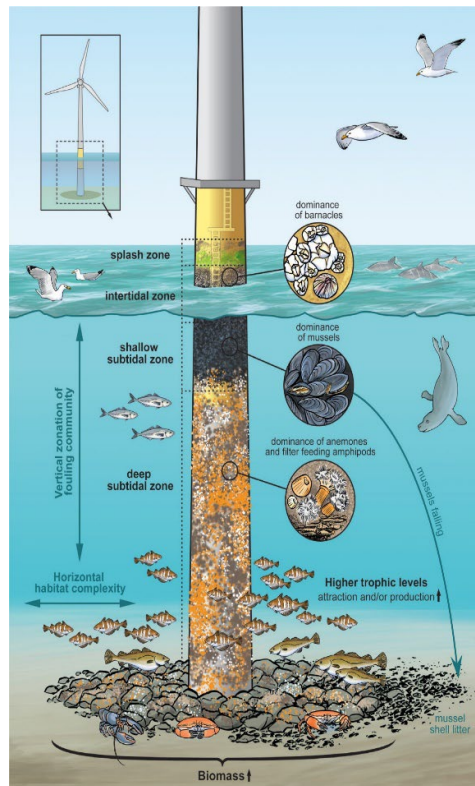
Benthic Monitoring

Turbine Foundations and Scour Protection

Layers – Remotely Operated Vehicle with high definition video camera. Stratified random selection of foundations within each habitat strata. Use imagery to quantify percent cover, understand species composition, estimate epifaunal biomass, and evaluate ecological succession.

Sediments Around Turbine Foundations – Using a SPI/PV camera system to evaluate changes in benthic function overtime, and along a distance gradient from the foundations.

Export cable routes – Using SPI/PV to evaluate changes in benthic function and habitat recovery overtime and along a distance gradient from the cable route. Stratified random design based on habitat.



Lessons Learned



Disparate expectations amongst stakeholders and agencies



Permitting challenges and timelines



Trade-offs between innovation and continuity



Conflicts associated with fixed-gear surveys



Fishing industry involvement

Acknowledgements

Research and Monitoring Partners



University of Massachusetts Dartmouth

Fishing Industry Partners

- F/V Darana R
- F/V Dana Christine II
- F/V Joey D
- F/V Cailyn and Maren
- F/V Gabrielle Elizabeth
- F/V Mister G
- F/V More Misery
- F/V Harvest Moon
- F/V Amelia Ann
- F/V Ashley Ann II
- F/V Erica Knight
- F/V Kathy Marie
- F/V Bulldog

Greg DeCelles PhD | GREDE@orsted.com