

**Consideration of Underwater Sound During Offshore Wind Development**  
**DOSITS Webinar by the Bureau of Ocean Energy Management's (BOEM's)**  
**Center for Marine Acoustics**

**September 14, 2022**

- All three of BOEM's program areas (oil and gas, renewables, marine minerals) involve the use of underwater sound sources.
- The [Center for Marine Acoustics \(https://www.boem.gov/center-marine-acoustics\)](https://www.boem.gov/center-marine-acoustics) is a centralized group within BOEM that services all of BOEM's acoustics needs.
- Different sounds are introduced at different stages of the offshore wind development cycle:
  - Site assessment phase: High Resolution Geophysical (HRG) Survey sources and vessel noise, potentially explosives if unexploded ordnances (UXOs) are found
  - Construction phase: vessels, cable-laying/trenching, pile-driving (vibratory or impact)
  - Operational phase; vessels, turbine operations, possibly aircraft
  - Decommissioning: cutting, vessels, possibly explosives
- HRG sources
  - Recent analysis by BOEM and USGS (paper in press) analyzes specific characteristics of the sources and finds most of them are unlikely to result in incidental take of marine mammals, because of their source level, frequency, beamwidth, duty cycle, and pulse length.
  - Video explaining the paper soon to be published on this [site \(https://www.boem.gov/environment/center-marine-acoustics-recent-work\)](https://www.boem.gov/environment/center-marine-acoustics-recent-work).
- Unexploded Ordnance
  - Potential for high impacts, but unknown how many will be discovered on each lease area
  - Lessons learned from North Sea especially with new low-order deflagration methods
- Pile-driving
  - Turbines are getting bigger, so not a direct analog to what we saw in European waters over the last decade.
  - Several noise abatement methods are expected to be used, and hopefully more yet to be developed.
  - BOEM plans to put out a performance target for pile-driving noise; industry would likely have to measure sounds from each pile in order to show they met the performance target.

- The CMA produced [a document outlining what we expect to see with COP modeling and sound field measurements](https://www.boem.gov/sites/default/files/documents/renewable-energy/BOEMOffshoreWindPileDrivingSoundModelingGuidance.pdf) (<https://www.boem.gov/sites/default/files/documents/renewable-energy/BOEMOffshoreWindPileDrivingSoundModelingGuidance.pdf>) soon to be published as official BOEM Guidance.
- Operational noise
  - Some lessons learned from Europe, but measurements of large monopiles are scarce.
- BOEM's approach to underwater impact assessment modeling
  - [Video describing general framework here](https://www.youtube.com/watch?v=ubgmZ6iTz80) (<https://www.youtube.com/watch?v=ubgmZ6iTz80>)
  - BOEM plans to build in-house impact modeling capability (still in the works)
- [BOEM's environmental studies program](https://www.boem.gov/environmental-studies) (<https://www.boem.gov/environmental-studies>)
  - As an academic, best time to provide suggestions to BOEM is November-December each year
  - In June, we release the Studies Development Plan. See FY23-24 plan [here](https://www.boem.gov/sites/default/files/documents/environment/environmental-studies/Studies-Development-Plan-2023-2024.pdf) (<https://www.boem.gov/sites/default/files/documents/environment/environmental-studies/Studies-Development-Plan-2023-2024.pdf>).
  - Ongoing studies can be found [here](https://www.boem.gov/environmental-studies/ongoing-environmental-studies-region) (<https://www.boem.gov/environmental-studies/ongoing-environmental-studies-region>).
- Mitigation and monitoring
  - Acoustics expected to be used as a monitoring tool during both construction and operations. Paper describing potential uses of Passive Acoustic Listening (PAM) can be found [here](https://www.frontiersin.org/articles/10.3389/fmars.2021.760840/full) (<https://www.frontiersin.org/articles/10.3389/fmars.2021.760840/full>).
  - Range of monitoring methods are expected during construction
  - There is an effort underway to stand up a large-scale baleen whale monitoring network using archival passive acoustic recorders, by working with the [Regional Wildlife Science Collaborative](https://neoceanplanning.org/rwse/) (<https://neoceanplanning.org/rwse/>). BOEM co-hosted several workshops about this and reports can be found [here](https://www.boem.gov/sites/default/files/documents/BOEM_PAM_Workshop1_2_021_078.pdf) ([https://www.boem.gov/sites/default/files/documents/BOEM\\_PAM\\_Workshop1\\_2\\_021\\_078.pdf](https://www.boem.gov/sites/default/files/documents/BOEM_PAM_Workshop1_2_021_078.pdf)) and [here](https://www.boem.gov/sites/default/files/documents/renewable-energy/studies/PAM2-Workshop-BOE-2022-055.pdf) (<https://www.boem.gov/sites/default/files/documents/renewable-energy/studies/PAM2-Workshop-BOE-2022-055.pdf>).
- North Atlantic Right Whale Strategy
  - Ongoing effort between the National Marine Fisheries Service (NMFS or NOAA Fisheries) and BOEM
  - Expected to go out for public comment by soon

## **DOSITS Links**

Science of Sound/Sound Measurement/How is sound measured?

<https://dosits.org/science/measurement/how-is-sound-measured/>

Science of Sound/Sound Measurement/What units are used to measure sound?

<https://dosits.org/science/measurement/what-units-are-used-to-measure-sound/>

Science of Sound/Sound/How do you characterize sounds?

<https://dosits.org/science/sound/characterize-sounds/>

Science of Sound/Sound/How do you characterize sounds?/Frequency

<https://dosits.org/science/sound/characterize-sounds/frequency/>

Science of Sound/Sound/How do you characterize sounds?/Wavelength

<https://dosits.org/science/sound/characterize-sounds/wavelength/>

Science of Sound/Sound Measurement/How are sounds viewed and analyzed?

<https://dosits.org/science/measurement/how-are-sounds-viewed-and-analyzed/>

Home/Science of Sound/Advanced Topics in Sound/SONAR Equation

<https://dosits.org/science/advanced-topics/sonar-equation/>

Home/Animals and Sound/Effects of Sound/Anthropogenic Sound Sources/Commercial Vessel Traffic

<https://dosits.org/animals/effects-of-sound/anthropogenic-sources/commercial-vessel-traffic/>

Home/Animals and Sound/Effects of Sound/Anthropogenic Sound Sources/Pile Driving

<https://dosits.org/animals/effects-of-sound/anthropogenic-sources/pile-driving/>

Home/Animals and Sound/Effects of Sound/Anthropogenic Sound Sources/Wind Turbine

<https://dosits.org/animals/effects-of-sound/anthropogenic-sources/wind-turbine/>