

Keeping Right Whales Safe While Establishing a Sustainable Offshore Wind Industry



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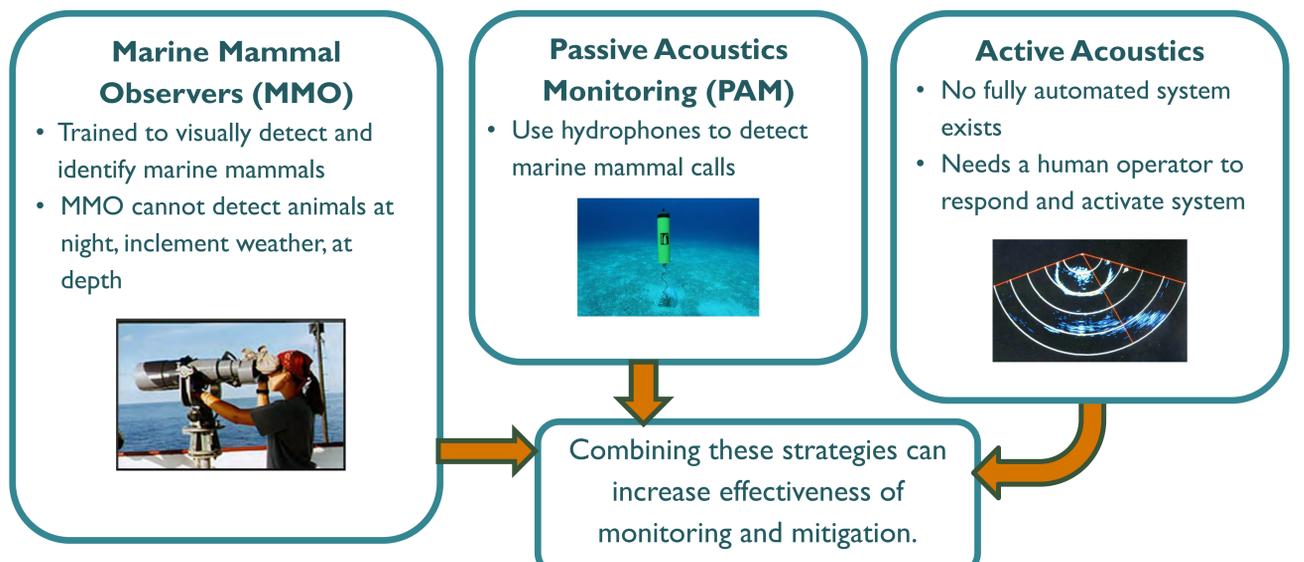
Summary

The U.S. Department of the Interior's Bureau of Ocean Energy Management (BOEM) has recently proposed potential sites for offshore wind (OSW) development along the Atlantic Coast. The North Atlantic Right Whale (NARW) ranges along the Atlantic coast and the population is highly endangered, with only about 300 left. Since 1980, the North Atlantic Right Whale (NARW) population has been declining rapidly mainly due to collisions with shipping vessels and fishing gear entanglements. Studies from the oil and construction industries have shown that underwater sound puts these and other marine animals at risk. Ensuring the safety of the NARW will require real time monitoring and mitigation, which must be integrated into construction planning. Monitoring can be done in one or a combination of three ways: Marine Mammal Observation, Passive Acoustics Monitoring, and Active Acoustics Monitoring. In addition to further developing monitoring techniques, designing monitoring and mitigation for NARW during offshore wind installation includes: 1) understanding the distribution of the animals throughout the year to mitigate the intersection of the NARW and construction activities; 2) developing performance specifications for marine mammal monitoring system; and 3) deploying those systems at a cost that is acceptable to the industry.

The offshore wind industry has cited permitting issues around North Atlantic Right Whales (NARWs) as one of their greatest concerns for moving forward with development. Researchers at Pacific Northwest National Laboratory (PNNL) are investigating the potential impacts of noise from pile driving during OSW construction on the NARW during OSW construction. This research focuses on our ability to detect NARWs at sea, understanding whale behavior due to noise, and measures to mitigate the impact of that noise, while supporting the development of the offshore wind industry in the US.

Risk Management for NARW

Three ways of detecting whales in areas where OSW construction is occurring



Steps to Implement Monitoring and Mitigation

- 1** Integrate Monitoring and Mitigation into overall construction planning
- 2** Identify the appropriate mix of visual, acoustic and other monitoring
- 3** Evaluate likelihood that marine mammals will occur near construction site and identify likely behavior in the area
- 4** Create integrated plan, including schedules, monitoring capabilities, and NARW occurrence



Pile Diameter (m)	3	3.2	3.4	3.6	3.8	4
Lnormalized (dB) @ 500m	171.67	174.6	176.14	177.68	179.22	180.76
SL (dB) when TL=15logr	212.15	215.08	216.62	218.16	219.7	221.24
Harassment Range (km)	3.00	4.70	5.95	7.54	9.55	12.10

Future Work by PNNL

- ▶ Further describe the acoustic risk of OSW construction activities to NARWs
- ▶ Work directly with a marine construction (pile driving) contractor to test integration of monitoring and mitigation into construction schedules and activities
- ▶ Check in with regulatory agencies to ensure needs are met

NARW Response to Sound

Sound travels farther and faster underwater than in air, making the construction noise a large threat to NARW. Marine mammals such as NARWs depend on sound for navigation and communication underwater, much as land animals depend on sight. Underwater sound propagation in seawater is dependent upon many different factors such as temperature, density, depth, and salinity. NARW hear in a broad range of frequencies and at great distance NARW behavioral response to sound could include changing course; altering the frequency or type of calls; and other stress-related behavior like changes in surfacing, respiration, or diving cycles. The Marine Mammal Protection Act (MMPA) regulates effects of underwater noise on marine mammals. The MMPA sets harassment levels as either Level A - which may cause physical harm to animals - or Level B which may change animal behavior. Sound exposure such as that expected from pile driving (around 133-148 dB re 1 μPa) would likely disrupt feeding behavior, but the animal would be expected to resume normal behavior (Level B harassment). The table above describes the level of sound and harassment range for a variety of pile diameters that are commonly used for installing offshore wind turbines in Europe.



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