



**ThayerMahan**

# Marine Mammal Monitoring

**Maritime Risk Symposium**

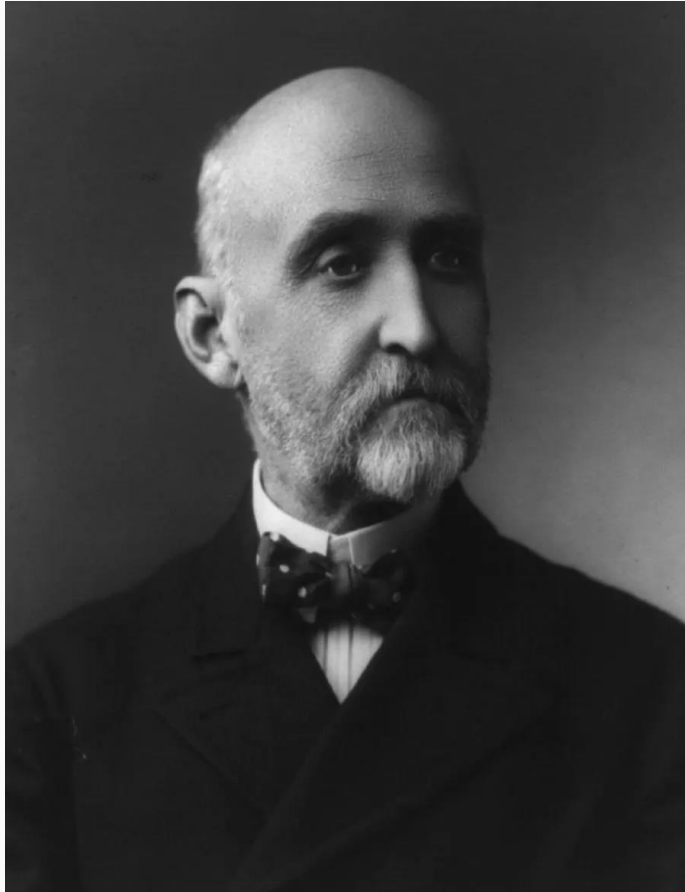
**November 15, 2023**

**Michael Connor**

**Vice Admiral, Retired**

**US Navy**

# Alfred and the Whale



# Wind Farms and the Whale



# Shipping and the Whale



# Ports and the Whale

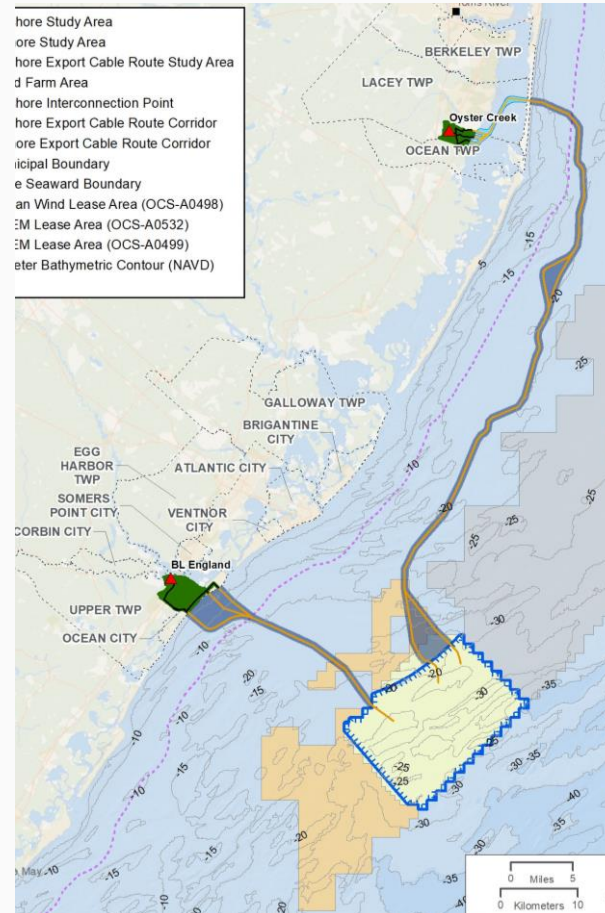


# Your Job and the Whale



# Many industries will need to coexist on the ocean

- Energy
- Shipping
- Fishing
- Recreation
- Mining



# Political Science





# Key Point

The ongoing public debate about the impact of US Offshore Wind construction on protected marine mammal species also affects the oil, fishing, and shipping industries.

Animals | Energy | Environment

## Offshore Wind Farms Have A Whale Of A Problem

*Building undersea windmill platforms may hurt whales, dividing environmentalists over priorities — sea life or climate change?*

## Meet the whale that may upend the offshore oil industry

With only about 50 left, a newly discovered whale in the Gulf of Mexico has led to a big legal battle between the oil industry and the Biden administration.

# The Offshore Wind Challenge – 30GW by 2030

- 2500 installations @12kW/turbine
- 357 piles/year
- 2 piles/day during May – October construction season
- Piles completed in 2023: ~45 +/- (of 74 planned)

# Restrictions

## Weather

## Marine mammal

- Migration season
  - Pile Driving can only be done from May-October
- Ability to monitor
- Visual
- Acoustic



# Regulatory Landscape



# Objective

Enable customers to comply with Marine Mammal Protection Act  
and Endangered Species Act.

# Technology

- **Advanced Technology**
- **High End EO/IR Cameras**
- **Integrated Data Streams**
- **Effective monitoring for Marine Mammal Protection**

Visual Systems

Acoustics

**Passive Array**

**Low-Power Sensor**

**Technical Specifications**

- Frequency Coverage: 10-630HZ
- Frequency Resolution: <math>\lt; 0.5\text{HZ}</math>
- Number of Hydrophones: 32 Channel Array
- Array Gain: 15db
- Acoustic Aperture: 240 meters per array
- Sensitivity -199 dB/r re 1Pa; Pre-amp gain 10 dB
- Total System Power Draw: 25 W

**Outpost Array Advantages**

- Sea floor Mounted
- Low power digital sensor
- Identical configuration for deep and shallow water
- Designed for use with USVs and UUVs and Seafloor
- Low cost, wide area, passive acoustic surveillance
- Autonomous classification and tracking

**Details**

Item	Description
A	600 Buoy
B	Switch Host
C	Gravity Anchors
D	3000m Reel
E	Acoustic Array
F	Mooring

Visual

Acoustics

**Avon/Bristol Classifier Detect**  
20220413T1624Z

**KMC Details**

Kernel Type: North Atlantic right whale  
Frequency: 94.746  
Signal Level: 65.592616  
SNR: -4.724136  
Score: 5.405265  
Nearby Count: 6  
Cumulative Nearby Score: 32.989697

Integration

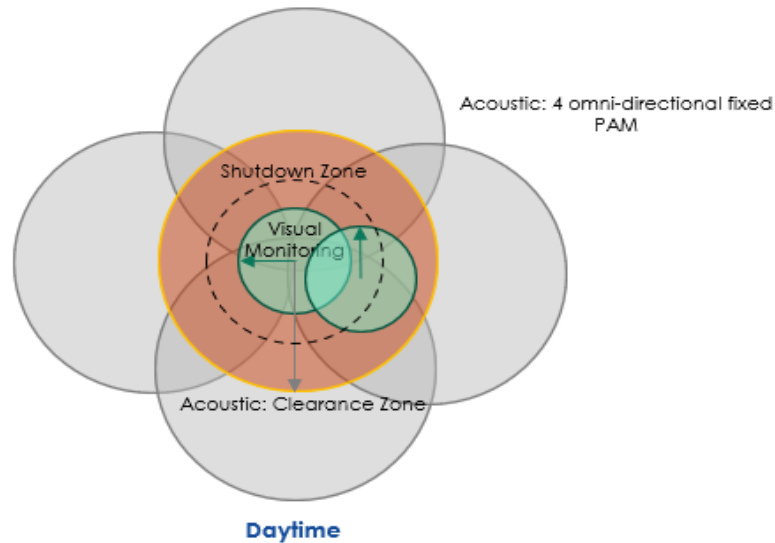
Acoustic and Visual systems informing potential location of marine mammals to PSO's

# Impact: Long range detection to maximize awareness



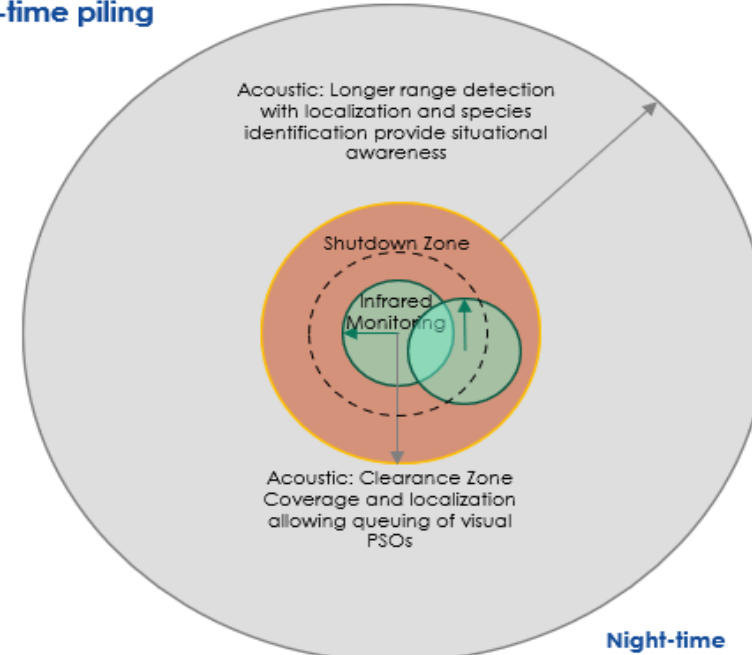
# Improved monitoring may expand construction day

## Daytime Monitoring Approach with Legacy Technology No Night-time Piling



- PSOs conduct visual observations with unaided eyes and binoculars from the pile driving vessel and monitoring vessel to effectively monitor the shutdown zone during daylight.
- 4 omni-directional hydrophones that provide detection capabilities within the acoustic clearance zone, but no localization.

## Advanced technologies enable more effective monitoring to allow Night-time piling

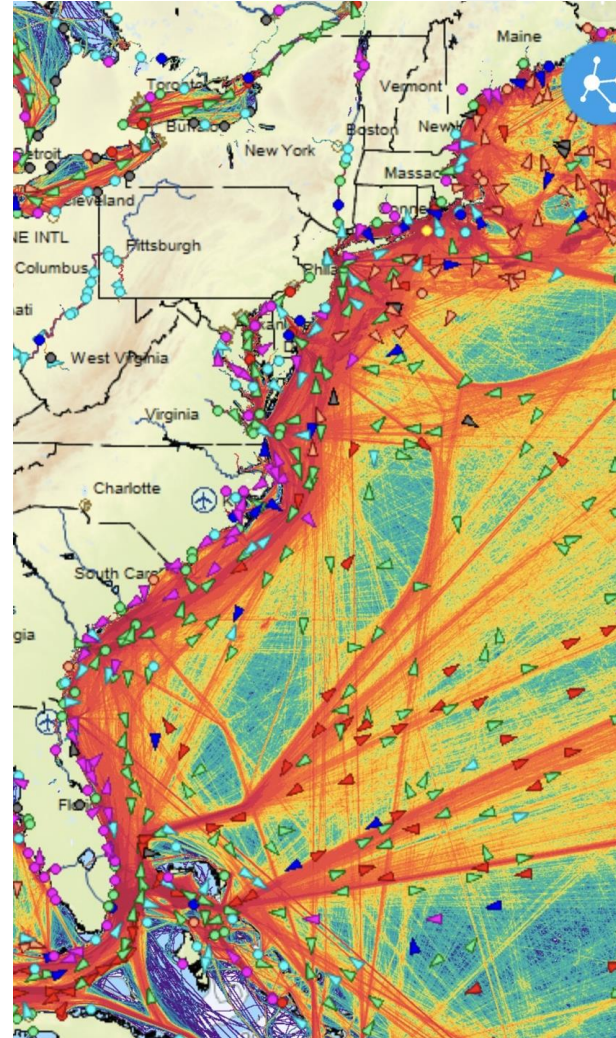


- PSOs use advanced mounted thermal imaging systems, which can reliably detect large whales at longer distances than handheld systems, from the pile driving vessel and monitoring vessel to effectively monitor the shutdown zone during nighttime.
- Advanced acoustic technology provides significantly greater range as well as an ability to auto-detect and localize marine mammals in near real time. The long-range localization capability provides an improved understanding of marine mammal presence and movement in the area.



# Sectors that need to stay ahead of marine mammal protection requirements

- Energy
- Military
- Cruise ship
- Container ship
- Port operators





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