

Learning from the Experts Webinar Series

Research and Regulations for Marine Mammal Interactions with Offshore Wind



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August 23, 2023

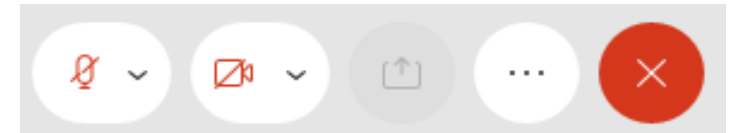



Meeting Procedures

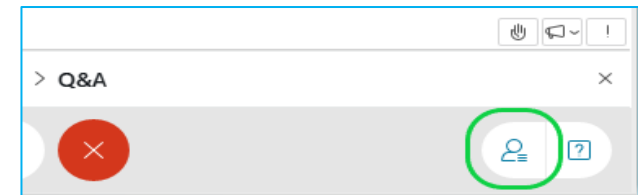
Webinar recordings and presentations will be available at:
www.nyserda.ny.gov/osw-webinar-series

Participation for Members of the Public:

- > Members of the public will be muted upon entry.
- > Questions and comments may be submitted in writing through the Q&A feature at any time during the event.
- > If technical problems arise, please contact John.Campagna@nyserda.ny.gov



You'll see  when your microphone is muted



Learning from the Experts

This webinar series is hosted by NYSERDA's offshore wind team and features experts in offshore wind technologies, development practices, and related research.

DISCLAIMER:

The views and opinions expressed in this presentation are those of the presenter and do not represent the views or opinions of NYSERDA or New York State.



OFFSHORE WIND ENERGY DEVELOPMENT AND ITS POTENTIAL THREATS TO MARINE MAMMALS

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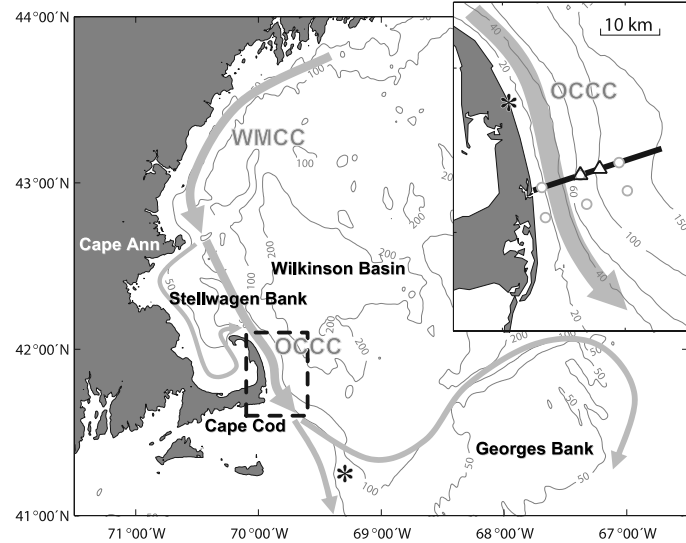


**BIOACOUSTICS
& ENGINEERING**
NOWACEK LAB

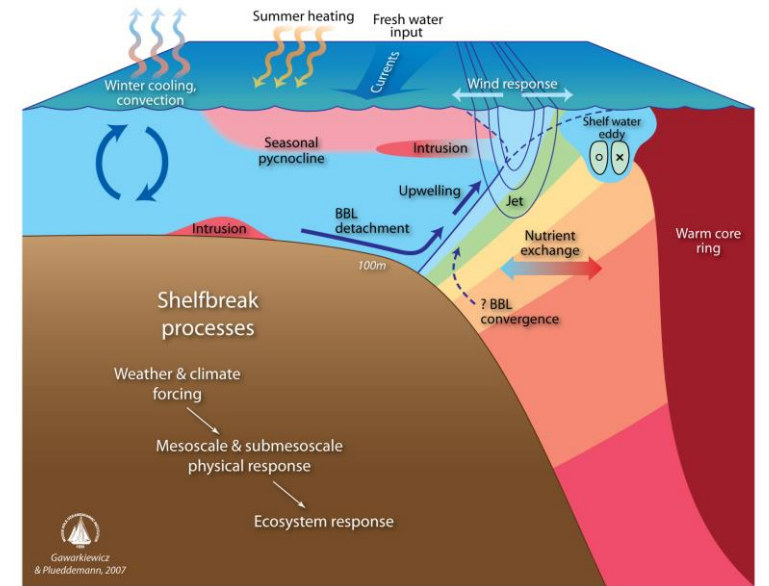
Duke

PRATT SCHOOL of
ENGINEERING

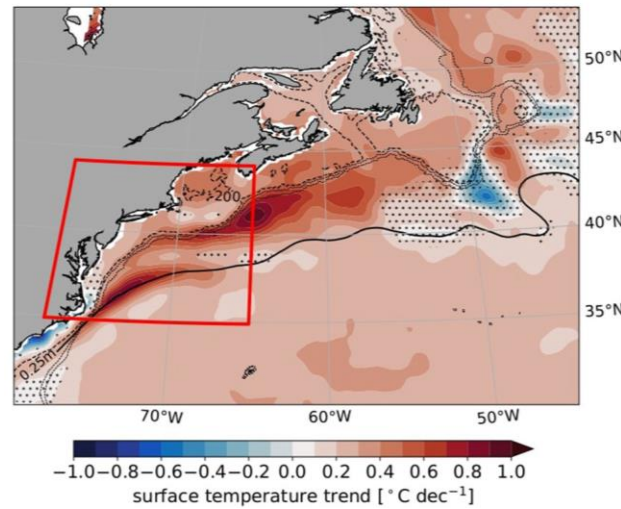
ASSESSING THREATS IN A DYNAMIC AND DRAMATICALLY CHANGING OCEAN



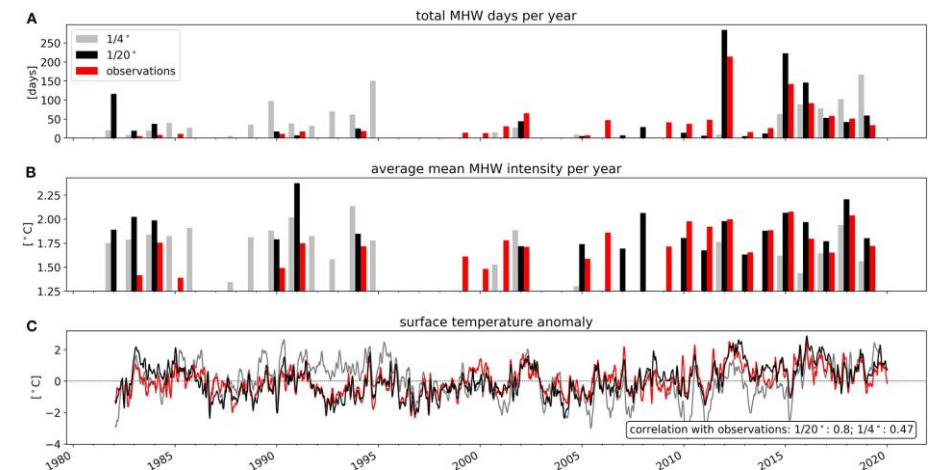
General Circulation – Outer Cape Coastal Current
From Shcherbina and Gawarkiewicz 2008



Shelfbreak processes
Chen et al. 2021



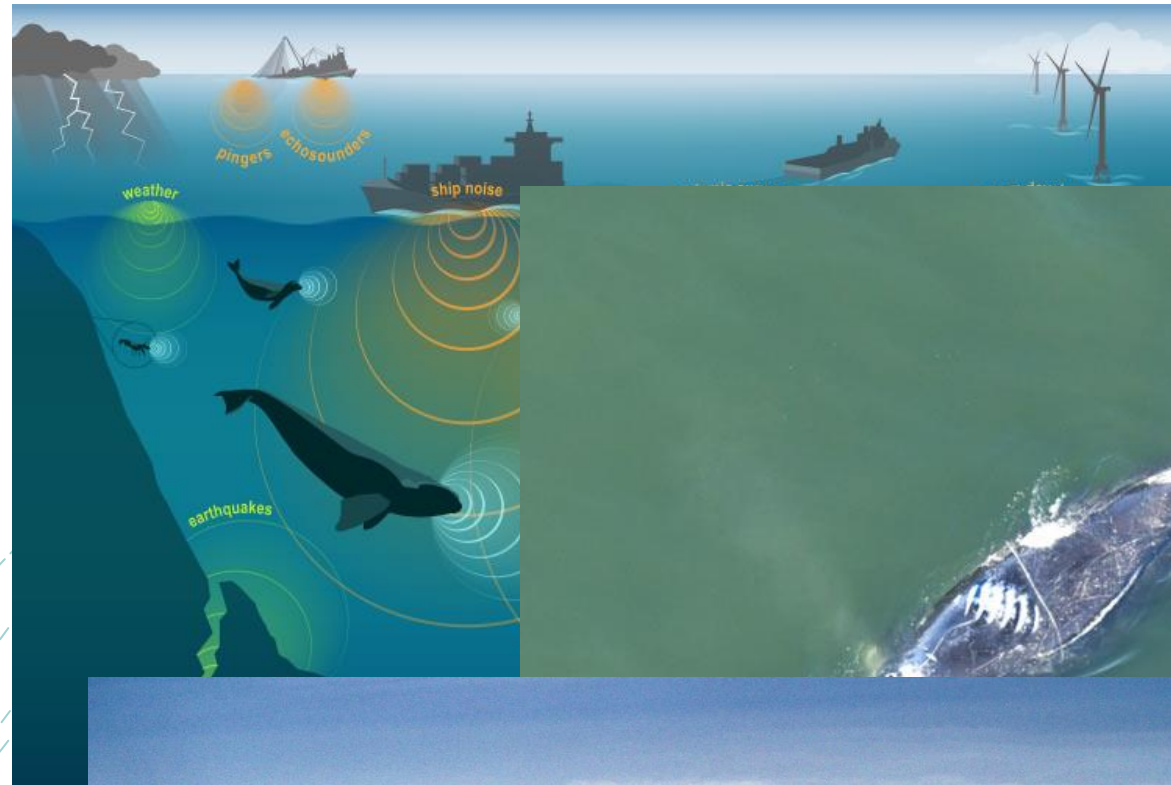
Marine heatwaves
NOAA OISST



Increases in MHW days and intensity
Grosselindemann et al. 2021

POTENTIAL THREATS

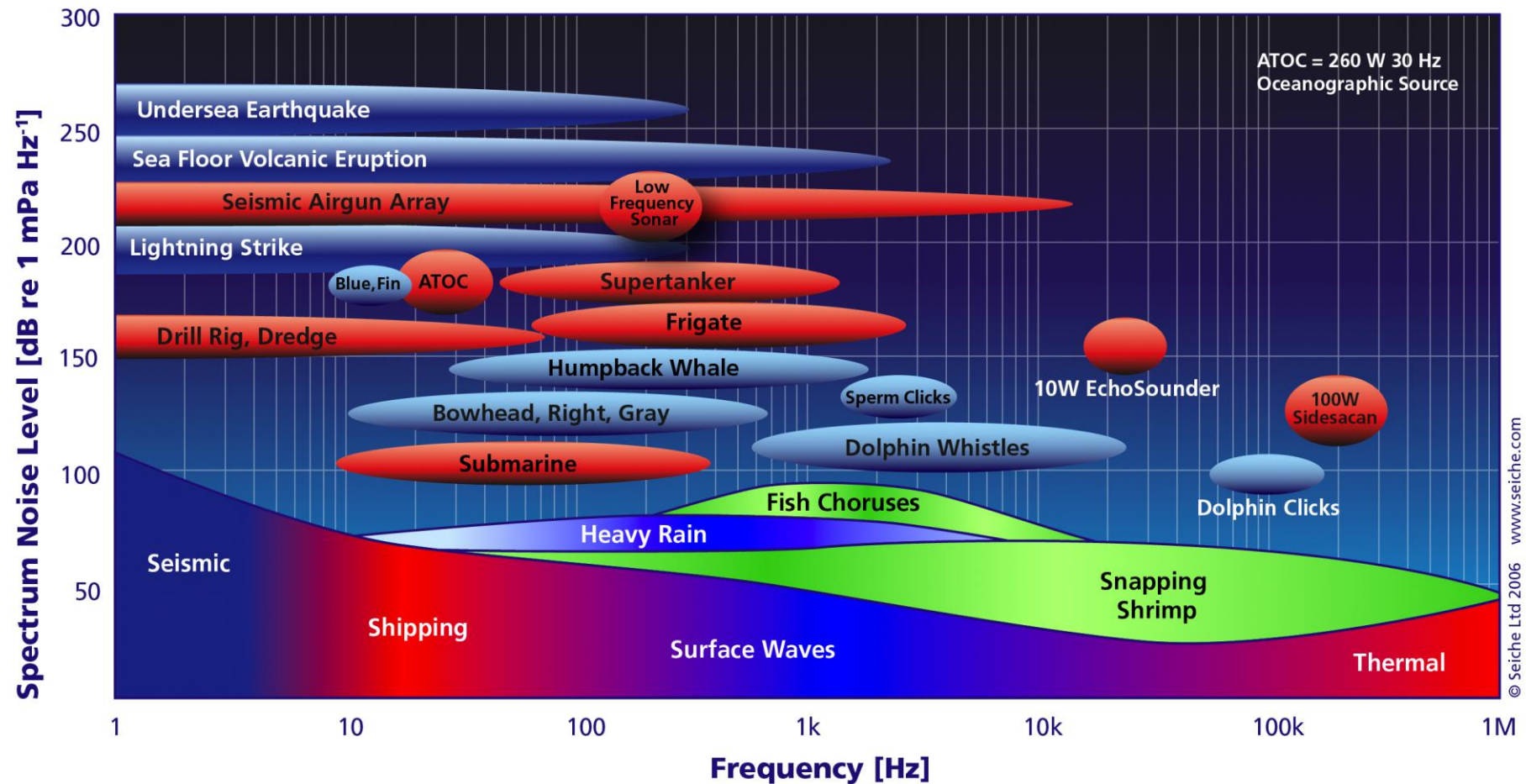
- Noise
 - Site characterization
 - Sediment type for foundations and cable corridors
 - Pile driving
 - Operation
- Increased vessel traffic
 - Ship strike risk
 - Noise
- Wake effects - air and water
 - NASEM Panel report pending



THE OCEAN – NOT THE ‘SILENT WORLD’ OF COUSTEAU

- Airguns
- ‘Boomers’ and ‘Sparkers’
- Multi-beam echosounders
- Side-scan sonar
- ADCP
- Split-beam sonars

Ambient and Localised Noise Sources in the Ocean



Marine Mammal Noise

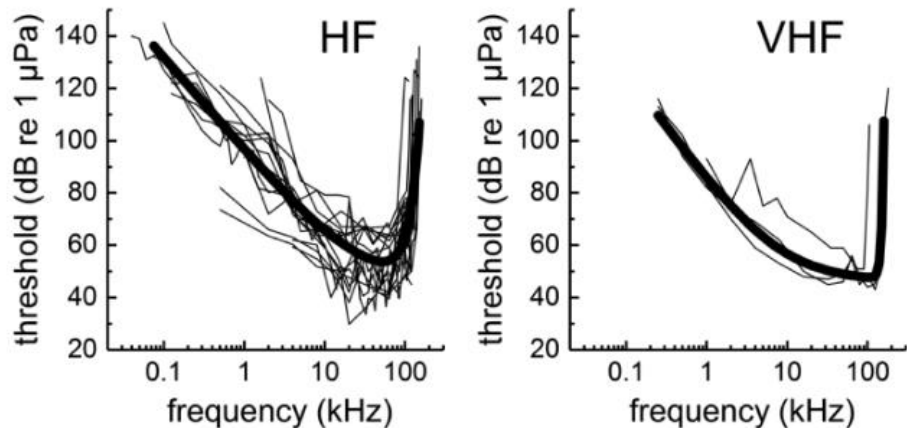


Figure 1. Estimated group audiograms based on original behavioral threshold data for high-frequency (HF) cetaceans (left) and very high-frequency (VHF) cetaceans (right)

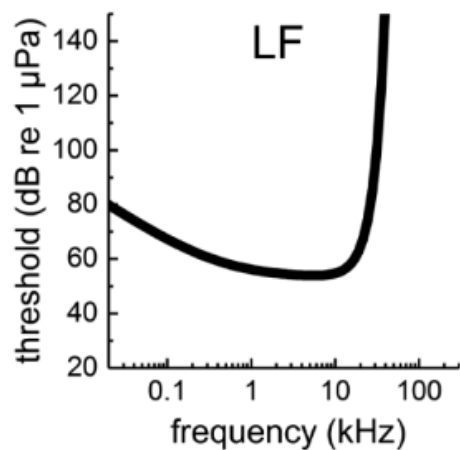


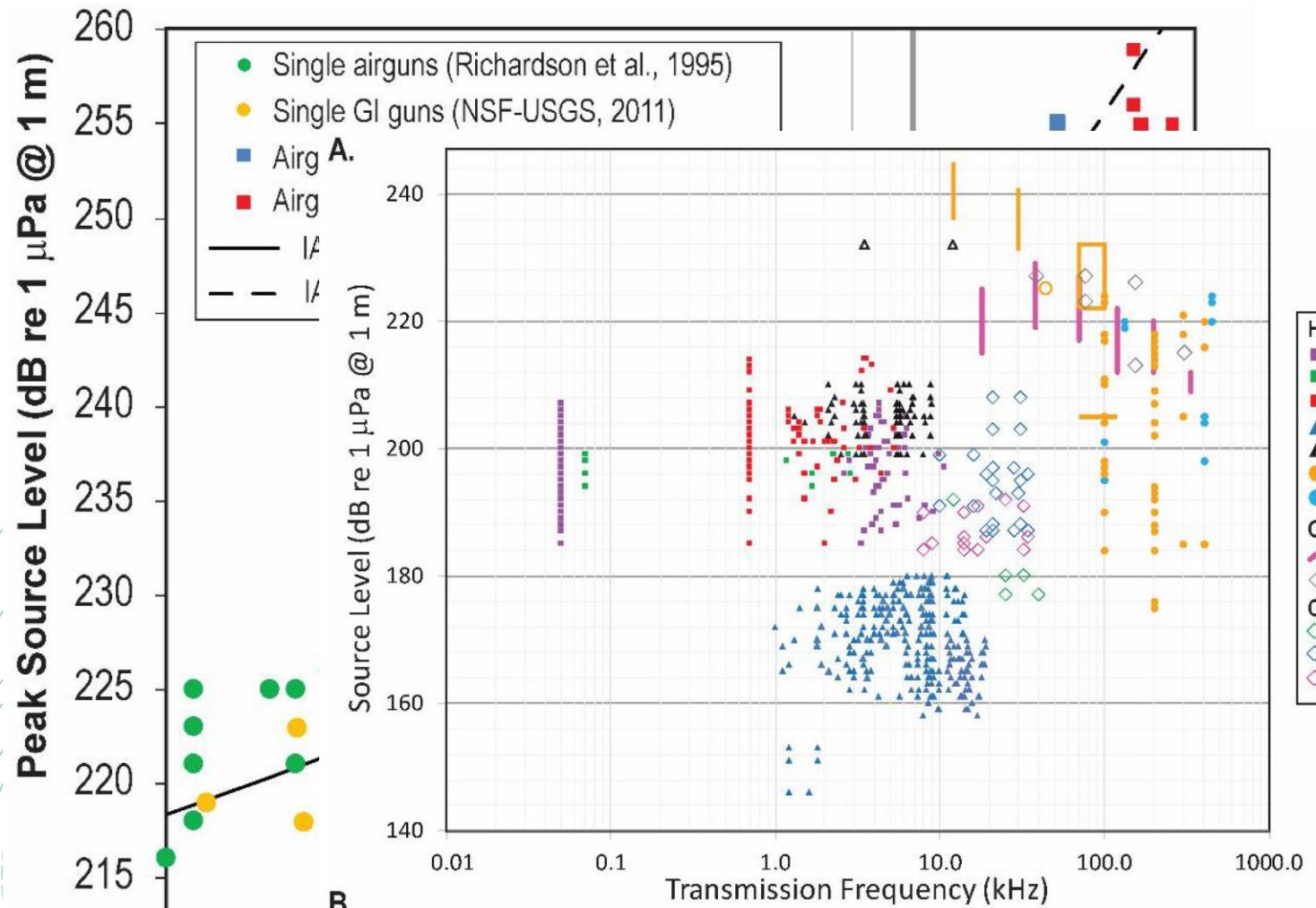
Figure 9. Estimated group audiogram for low-frequency (LF) cetaceans proposed with extensive assumptions, extrapolations, and caveats (see text for details)

Marine mammal hearing group	Auditory weighting function	Genera (or species) included	Group-specific appendix
Low-frequency cetaceans	LF	Balaenidae (<i>Balaena</i> , Eubalaenidae spp.); Balaenopteridae (<i>Balaenoptera physalus</i> , <i>B. musculus</i>)	1
		Balaenopteridae (<i>Balaenoptera acutorostrata</i> , <i>B. bonaerensis</i> , <i>B. borealis</i> , <i>B. edeni</i> , <i>B. omurai</i> ; <i>Megaptera novaeangliae</i>); Neobalenidae (<i>Caperea</i>); Eschrichtiidae (<i>Eschrichtius</i>)	
High-frequency cetaceans	HF	Physeteridae (<i>Physeter</i>); Ziphiidae (<i>Berardius</i> spp., <i>Hyperoodon</i> spp., <i>Indopacetus</i> , <i>Mesoplodon</i> spp., <i>Tasmacetus</i> , <i>Ziphius</i>); Delphinidae (<i>Orcinus</i>)	2
		Delphinidae (<i>Delphinus</i> , <i>Feresa</i> , <i>Globicephala</i> spp., <i>Grampus</i> , <i>Lagenodelphis</i> , <i>Lagenorhynchus acutus</i> , <i>L. albirostris</i> , <i>L. obliquidens</i> , <i>L. obscurus</i> , <i>Lissodelphis</i> spp., <i>Orcaella</i> spp., <i>Peponocephala</i> , <i>Pseudorca</i> , <i>Sotalia</i> spp., <i>Sousa</i> spp., <i>Stenella</i> spp., <i>Steno</i> , <i>Tursiops</i> spp.); Montodontidae (<i>Delphinapterus</i> , <i>Monodon</i>); Plantanistidae (<i>Plantanista</i>)	
Very high-frequency cetaceans	VHF	Delphinidae (<i>Cephalorhynchus</i> spp.; <i>Lagenorhynchus cruciger</i> , <i>L. australis</i>); Phocoenidae (<i>Neophocaena</i> spp., <i>Phocoena</i> spp., <i>Phocoenoides</i>); Iniidae (<i>Inia</i>); Kogiidae (<i>Kogia</i>); Lipotidae (<i>Lipotes</i>); Pontoporiidae (<i>Pontoporia</i>)	3
Sirenians	SI	Trichechidae (<i>Trichechus</i> spp.); Dugongidae (<i>Dugong</i>)	4
Phocid carnivores in water	PCW	Phocidae (<i>Cystophora</i> , <i>Erignathus</i> , <i>Halichoerus</i> , <i>Histriophoca</i> , <i>Hydrurga</i> , <i>Leptonychotes</i> , <i>Lobodon</i> , <i>Mirounga</i> spp., <i>Monachus</i> , <i>Neomonachus</i> , <i>Ommatophoca</i> , <i>Pagophilus</i> , <i>Phoca</i> spp., <i>Pusa</i> spp.)	5
Phocid carnivores in air	PCA		
Other marine carnivores in water	OCW	Odobenidae (<i>Odobenus</i>); Otariidae (<i>Arctocephalus</i> spp., <i>Callorhinus</i> , <i>Eumetopias</i> , <i>Neophoca</i> , <i>Otaria</i> , <i>Phocarcos</i> , <i>Zalophus</i> spp.); Ursidae (<i>Ursus maritimus</i>); Mustelidae (<i>Enhydra</i> , <i>Lontra feline</i>)	6
Other marine carnivores in air	OCA		

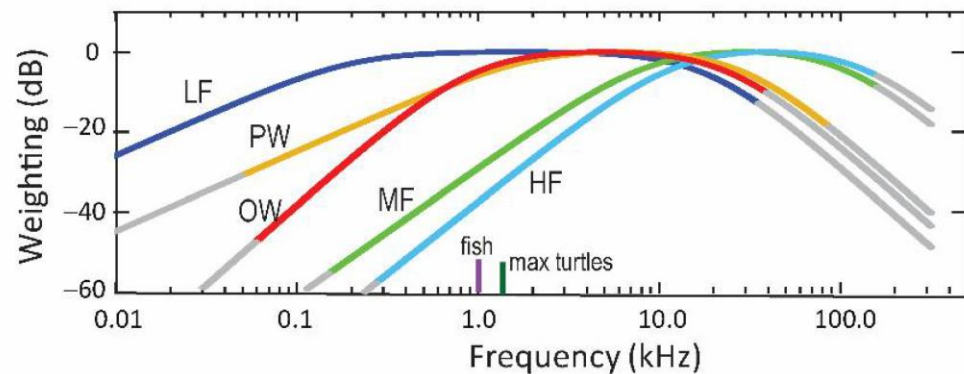
ANTHROPOGENIC ACOUSTIC SOURCES

Ruppel et al. 2022

<https://doi.org/10.3390/jmse10091278>



B.

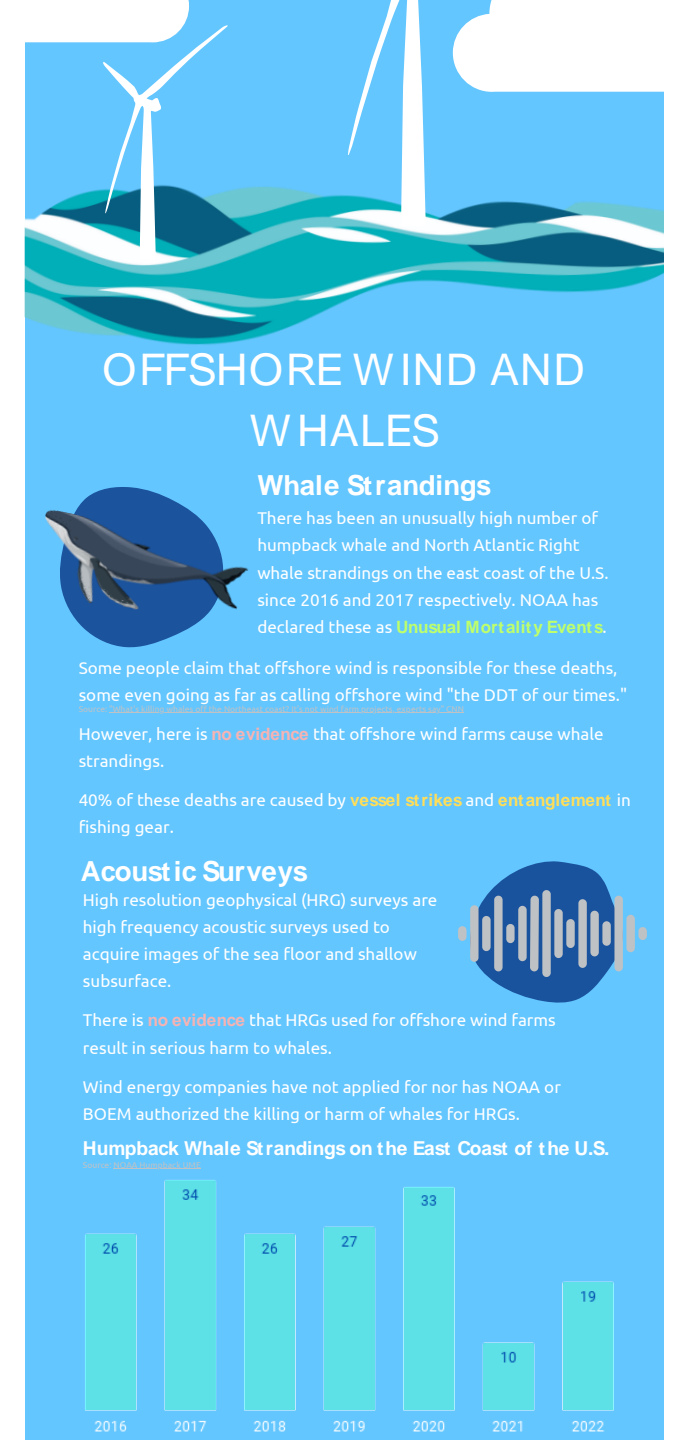


WHAT DO WE KNOW ABOUT RESPONSES OF WHALES TO ANTHROPOGENIC NOISE SOURCES?

- MMPA manages 'takes' of marine mammals - more from Nick! though blanket 'step-function' thresholds are outdated...
- Behavioral responses documented in several species
- Some species, e.g., humpbacks, are less responsive than others though do, in some cases, show mild behavioral responses to seismic (e.g., Dunlop et al. 2015)
- Some species, e.g., harbor porpoises & beaked whales, can be more sensitive than others
- Right whales do respond to some signals (e.g., alarm signal) but not to others, (e.g., ship noise - Nowacek et al. 2004)
- We have no data on right whale responses to impulsive noise, though we have insights from their cousin, the bowhead whale...

LARGE WHALES AND WIND...

- What do we know about the strandings of humpback or other whales along the mid-Atlantic coast...
 - ...there is no evidence that any activities associated with offshore wind cause nor have any connection to whale strandings
 - We are actively working to better understand the potential response(s) and any associated consequences



RIGHT WHALE MORTALITIES

If you remove neo-natal mortalities - 100% of documented right whale deaths in the last 25 years have been caused by humans - ship strikes and entanglement



included multiple spinal fractures and separations that would have resulted in death shortly after the injury.

A large white offshore wind turbine stands in the ocean. In the foreground, a green and white fishing boat is moving across the water. The sky is blue with light clouds.

NOAA Fisheries Protected Species Management Work Related to Offshore Wind Development

**Nick Sisson, NOAA
Greater Atlantic Regional Fisheries Office
Protected Resources Division**

NYSERDA Webinar - August 2023



**NOAA
FISHERIES**

NOAA Fisheries Offshore Wind Roles + Responsibilities

Technical Assistance, Comments, Recommendations

- **National Environmental Policy Act (NEPA)**
- **Fish and Wildlife Coordination Act (FWCA)**

Section 7 Consultation/Biological Opinion/Incidental Take Statement

- **Endangered Species Act (ESA)**

Incidental Take Authorization

- **Marine Mammal Protection Act (MMPA)**

Essential Fish Habitat Conservation Recommendations

- **Magnuson-Stevens Fishery Conservation and Management Act (MSA)**

Scientific Support

- **Ensure informed management decisions based on best available science**
- **Address impacts on scientific surveys and advice**
- **Research on the interactions with NOAA trust resources and coastal communities**

ESA Responsibilities

- **Related to offshore wind development, two primary components of the ESA apply:**
 - **Section 7**
 - **7(a)(1): all agencies shall aid in the conservation of listed species**
 - **7(a)(2): all agencies shall ensure their actions are not likely to jeopardize species or destroy/adversely modify critical habitat**
 - **Section 9 – “take” is prohibited (harass, harm, pursue, hunt, shoot, wound, kill trap, capture, or collect, or to attempt to...)**
- **Section 7(a)(2) provides a means to obtain an exemption from the section 9 prohibitions on take through section 7 consultation and issuance of a Biological Opinion**

ESA Responsibilities

- **Section 7 consultation is initiated following a request from the lead Action Agency (i.e. BOEM)**
- **The lead federal action agency prepares a Biological Assessment (BA) describing the effects of the proposed action, including measures to minimize or monitor impacts of the activity**
- **NMFS issues a Biological Opinion and appropriate Incidental Take Statement which exempts an identified amount and type (e.g., injury) of take and includes measures to minimize and monitor that take**
- **The Biological Opinion for offshore wind energy projects is comprehensive:**
 - **Covers entire life of project (construction/operation/decommissioning)**
 - **All federal actions associated with a single project are considered, (e.g., BOEM authorization, NMFS MMPA, Army Corps permit)**
- **If the project changes or new information indicates the project is having effects that were not anticipated, reinitiation may be required**

MMPA Responsibilities

- **The MMPA prohibits the take of marine mammals unless certain exceptions are made**
- **Upon request, the Secretary (delegated to NMFS) shall allow the incidental take (but not intentional take) of small numbers of marine mammals pursuant to a specified activity (other than commercial fishing) within a specific geographic area if:**
 - **After opportunity for public comment, NMFS finds the total taking will 1) have a negligible impact on the affected species (or stock) and 2) will not have an unmitigable adverse impact on the availability of the affected species or stocks for subsistence uses;**
- **In an Incidental Take Authorization (ITA), NMFS must prescribe:**
 - **Means of effecting the least practicable adverse impact on the affected species or stock and its habitat are set forth (mitigation measures), paying particular attention to rookeries, mating grounds, and areas of similar significance; and**
 - **Requirements pertaining to the monitoring and reporting**

Opportunities for Mitigation Measures

NEPA: Recommend alternatives for consideration in the EIS; suggest measures to avoid, minimize, monitor effects through our cooperating and adopting agency role

ESA: In the development of the action; required terms and conditions of Incidental Take Statement to minimize and monitor incidental take of ESA listed species

MMPA: Application development, proposed ITA, final ITA

Mitigation + Monitoring Measures

- **Mitigation (i.e., avoidance and minimization) and monitoring measures evolve over the evaluation of a project and between projects**
- **Measures are project specific and are informed by the best available science to effectively minimize and to monitor the effects of the proposed activities on protected species**
 - **Carefully consider each project individually how to minimize impacts to the greatest extent possible**
 - **Manner and degree to which measures are expected to minimize probability or severity of impacts**
- **Mitigation and monitoring measures have been required for multiple offshore wind projects to date - both for site assessment surveys and construction, operations, and decommissioning activities of projects**

Offshore Wind Energy Development in New England/Mid-Atlantic Waters

Offshore wind development is rapidly expanding along the Atlantic coast of the United States, especially from Massachusetts to North Carolina. This is a new use of our marine waters, requiring substantial scientific and regulatory review by NOAA Fisheries.

New England/Mid-Atlantic



NOAA's Role

The [Bureau of Ocean Energy Management](#) (BOEM) is the lead federal agency for offshore exploration and development. NOAA Fisheries is the lead federal agency charged with marine life. Building, operating, and decommissioning offshore wind power plants affects our key mission areas, including: fisheries, protected animals (such as sea turtles and seabirds), and marine habitats. We provide information to help the Bureau of Ocean Energy Management make informed decisions about offshore wind energy development and operations. Specifically, we:

- Provide data and analyses related to fishing activities, ocean conditions, and affected resources.
- Provide input and review throughout the regulatory process, working as a cooperating agency to assist BOEM in their development of an environmental impact statement under the National Environmental Policy Act.
- Conduct research and monitoring to better understand the potential effects of offshore development on marine habitats, fisheries, protected resources, and their ecosystem.
- Providing BOEM, other federal agencies, states, tribes, and stakeholders with information on fisheries operations and the potential socioeconomic impacts of offshore wind project communities.
- Foster management decisions that promote coexistence among competing uses while minimizing adverse impacts to our trust resources.

More Information

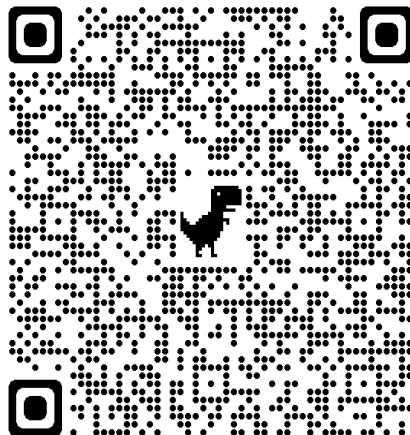
- > Bureau of Ocean Energy Management
- > Northeast Fishery Management and Offshore Wind [↗](#)
- > Responsible Offshore Development Alliance [↗](#)
- > ICES Offshore Wind Working Group [↗](#)
- > Northeast Wind Team Staff
- > Socioeconomic Impacts of Atlantic Offshore Wind Development
- > Offshore Wind Energy Overview

Recent News

FEATURE STORY

Chesapeake Bay Partners Have Restored 1,220 Acres of Oyster Reef

New England/Mid-Atlantic



Resources

- **Technical resources to assist in the analysis of the effects of proposed offshore wind projects**
- **Framework for regional passive acoustic monitoring (Van Paris *et al.* 2021)**
 - **Created several acoustic-related resources for use by offshore wind developers**
- **BOEM/NOAA Fisheries North Atlantic Right Whale and Offshore Wind Strategy**
 - **Appendix B**

Management x Science Collaboration

- **Collaborating within NOAA and with external partners to evaluate impacts to protected species and identifying research needs**
- **Ensuring research and data collection efforts is done in a way to maximize utility for management:**
 - **NOAA's Northeast Fisheries Science Center**
 - **Close coordination ensuring research meets management needs**
 - **Regional Wildlife Science Collaborative for Offshore Wind (RWSC)**
 - **Steering Committee and Subcommittee participation**
 - **Department of Energy funded Duke project 'Wildlife and Offshore Wind'**
 - **External Advisory Board member**
 - **Marine Mammal Commission funded PSO data utility project with NEAq**

Relevant Links

NMFS Greater Atlantic Offshore Wind Webpage:

<https://www.fisheries.noaa.gov/new-england-mid-atlantic/science-data/offshore-wind-energy-development-new-england-mid-atlantic-waters>

GARFO ESA Section 7 Overview:

<https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-consultations-greater-atlantic-region>

ESA Section 7 Biological Opinions in the Greater Atlantic Region:

<https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-biological-opinions-greater-atlantic-region>

MMPA Incidental Take Authorizations:

<https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-other-energy-activities-renewable>

NMFS Consultations for Offshore Wind Presentation:

<https://www.permits.performance.gov/sites/permits.dot.gov/files/2022-05/NMFS%20Consultations%20for%20Offshore%20Wind.pdf>

WILDLIFE AND OFFSHORE WIND

WOW

A Systems Approach to Research and Risk
Assessment for Offshore Wind Development



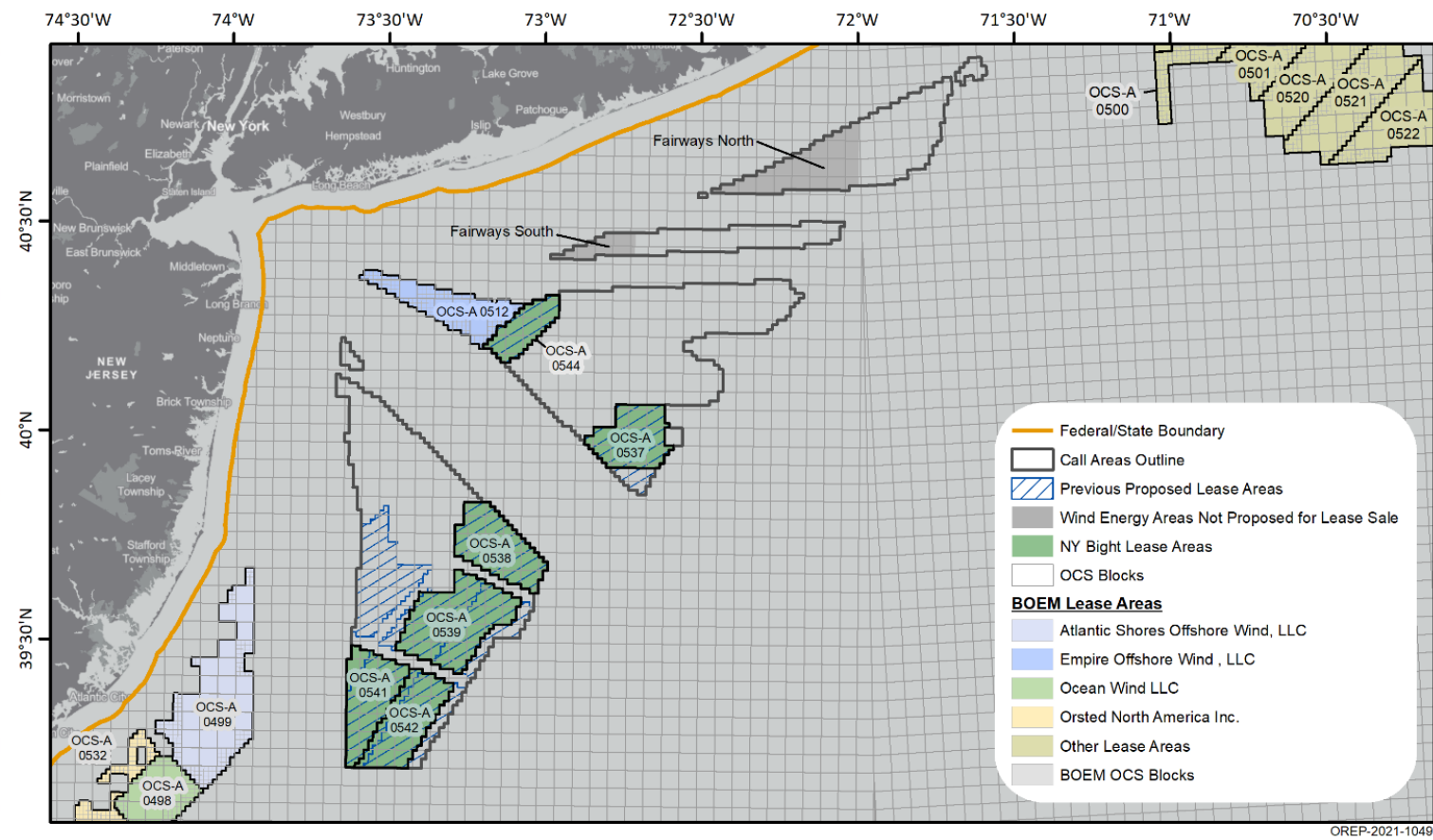
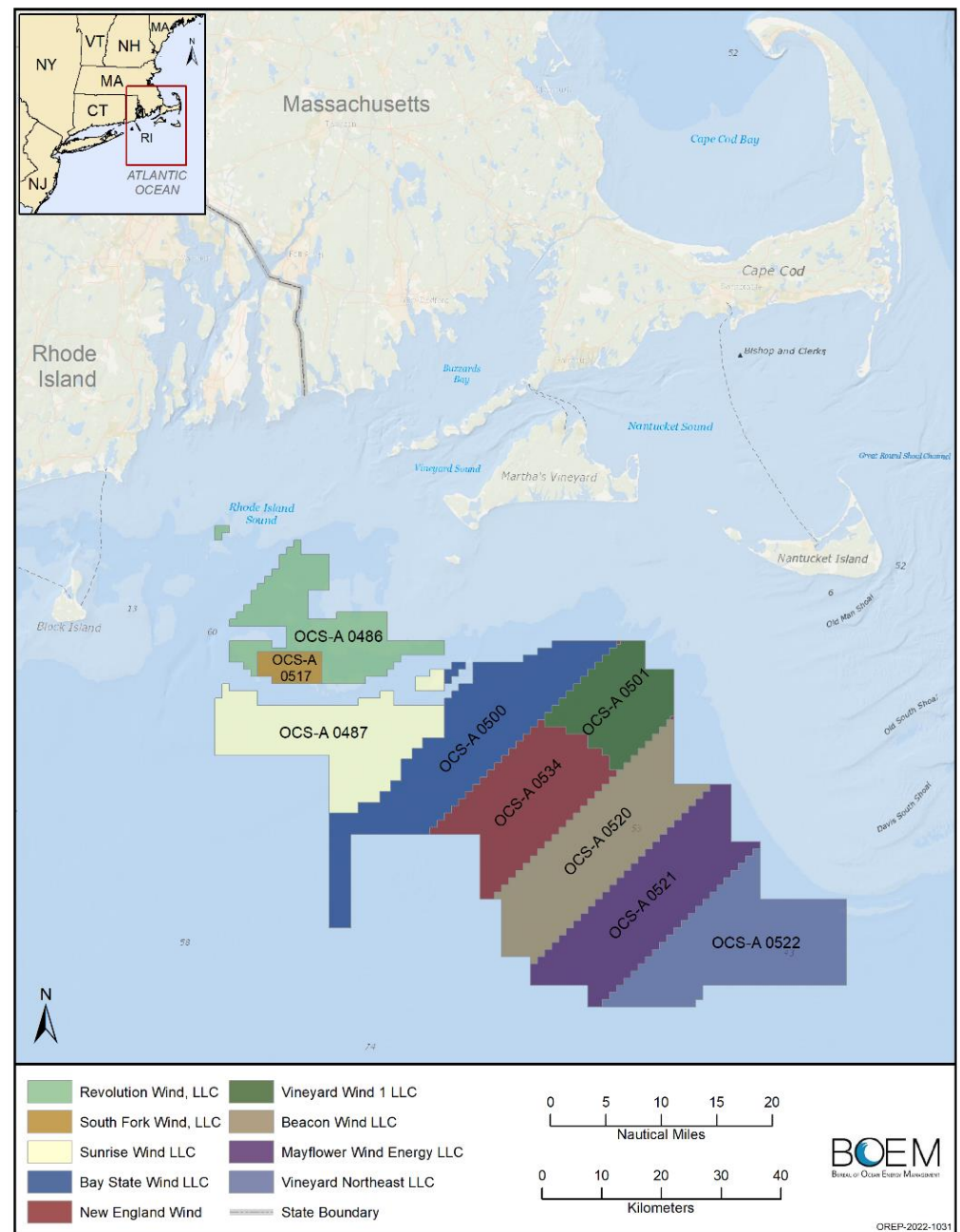
U.S. DEPARTMENT OF
ENERGY

**Award DE-EE0010287, Offshore Wind Energy
Environmental Research and Instrumentation Validation**

BOEM

Bureau of Ocean Energy
Management





WOW STUDY SITES

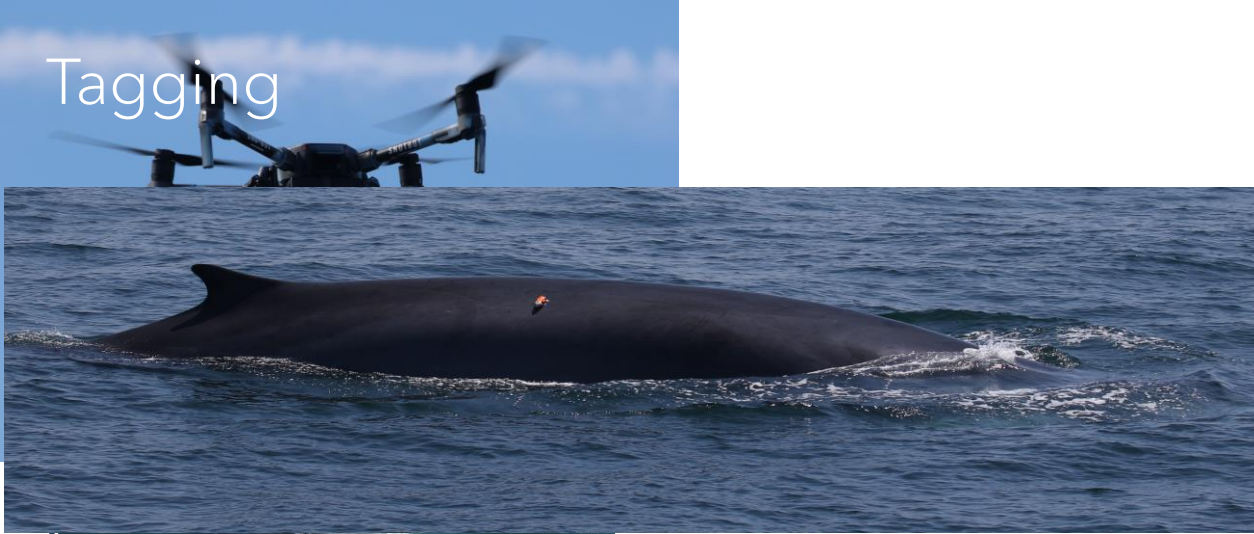
Integrated Regional Ecosystem Studies (IRES)

OFFSHORE WIND AND MARINE MAMMAL RESEARCH

- The Team - Duke, WCS, SEA, Syracuse, Stonybrook, NEAq, WHOI, Cornell, Rutgers
- Areas of research focus:
 1. Responses of marine mammals to construction noise
 2. Changes in habitat use



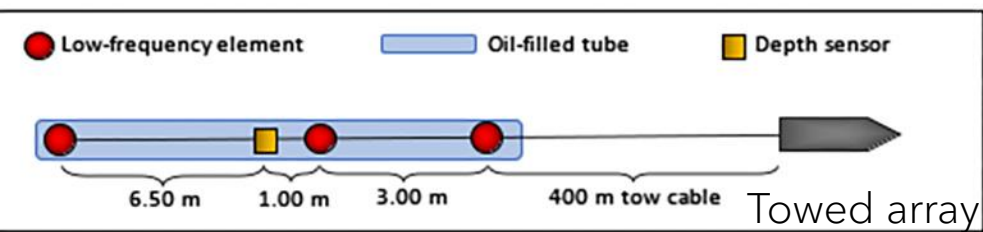
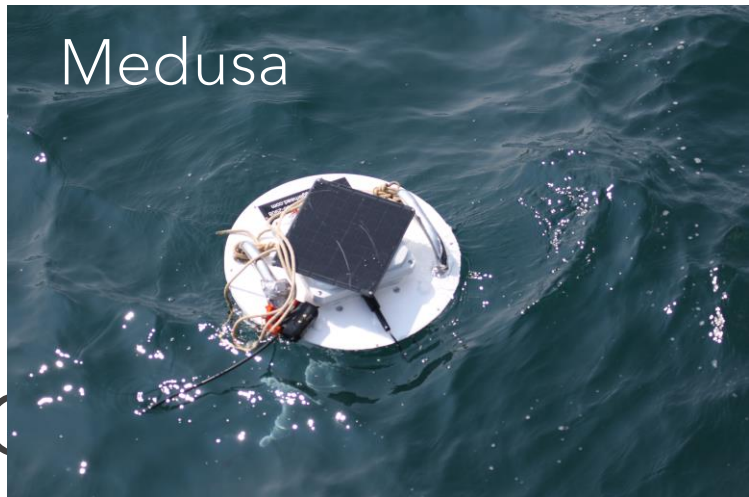
Tagging



Photogrammetry



Medusa



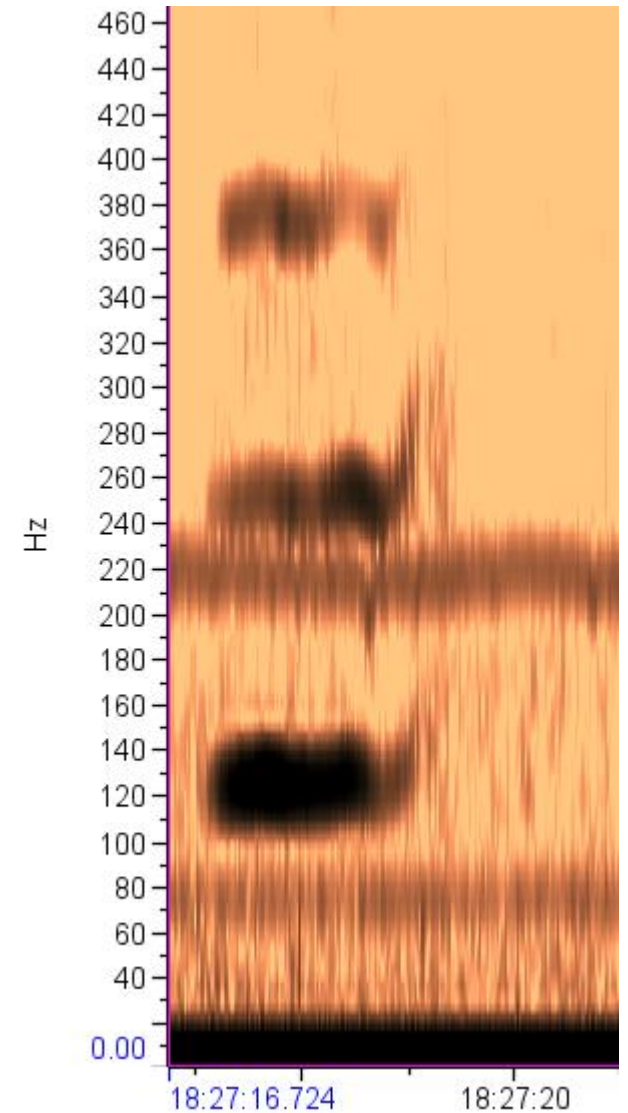
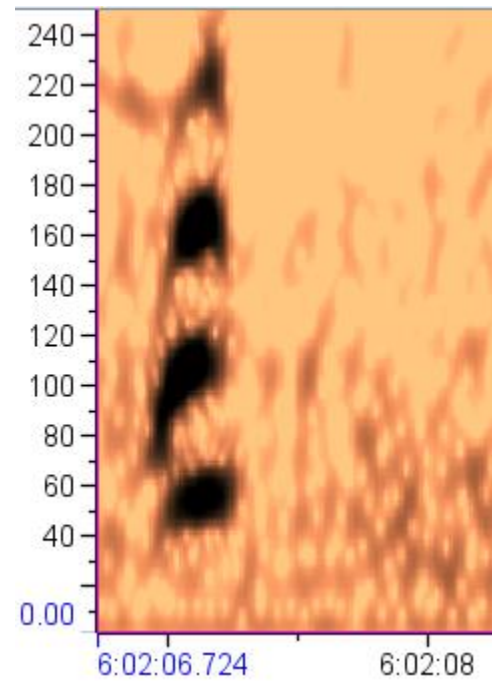
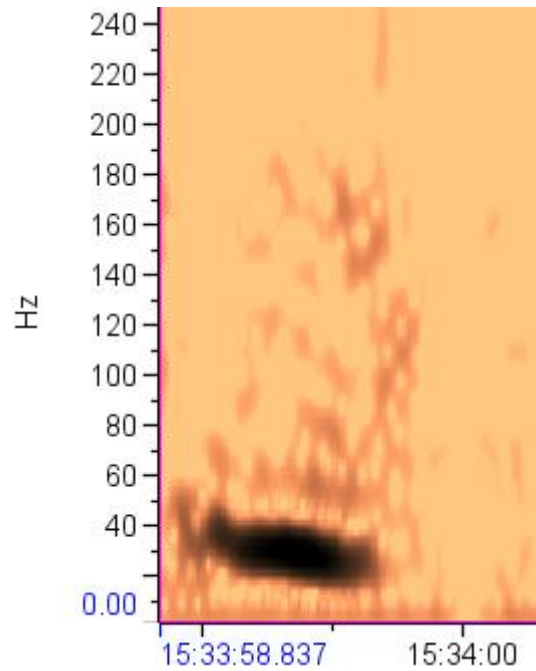
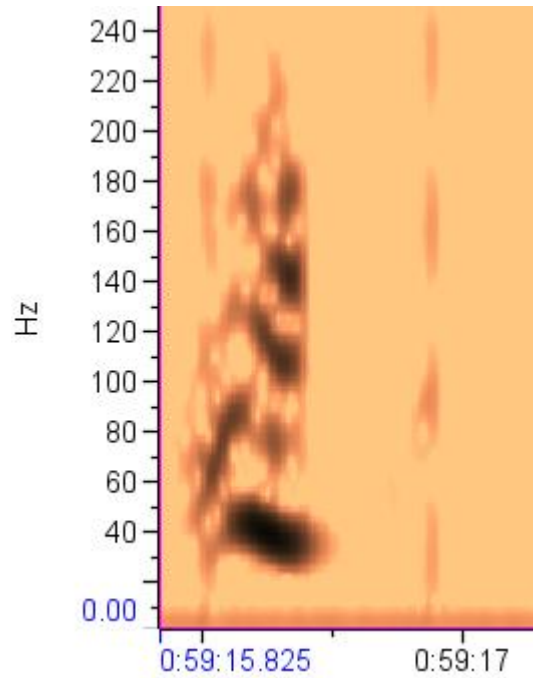
ANIMAL DATA COLLECTED

WOW 2023: WHALE CRUISE

- Tag Attempts: 34
- Tag Deployments: 28
- Blow Samples: 17
- Photogrammetry Samples: 14
- Skin Samples: 48
- Biopsy: 1

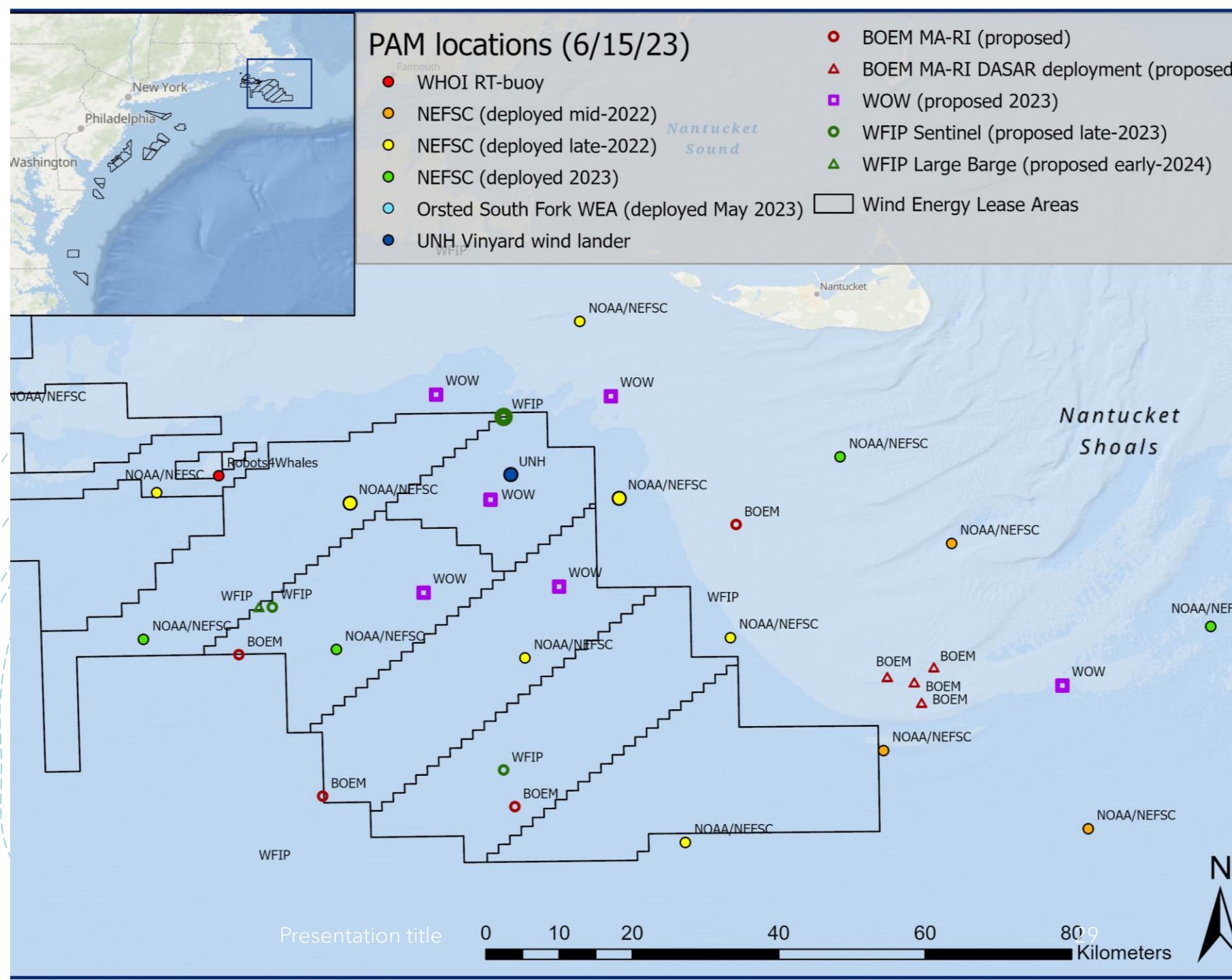


FIN WHALE CALLS RECORDED ON TAGS NEAR THE SOUTHERN NE WIND ENERGY AREAS



USING PASSIVE ACOUSTIC MONITORING (PAM) FOR MITIGATION/MONITORING

- Can be effective - though not a panacea
 - Need cue rates
 - Presence only
- Localizations possible though tricky on large scale



SATELLITE TAGGING IN THE NYB

Establish baseline data for large whales in the area of wind energy development

Positional-only and position+dive behavior tags

Accounting for uncertainty in argos positions

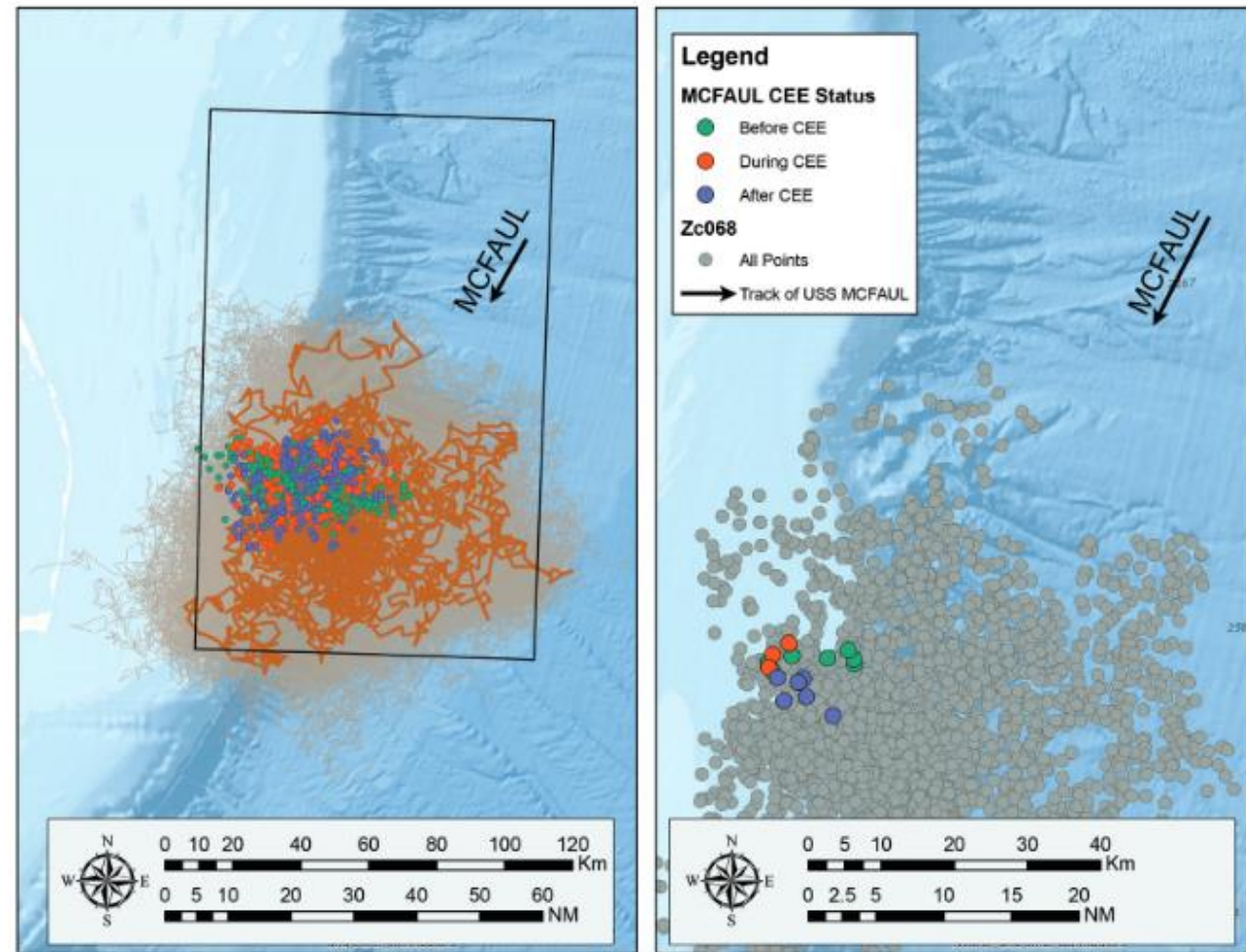
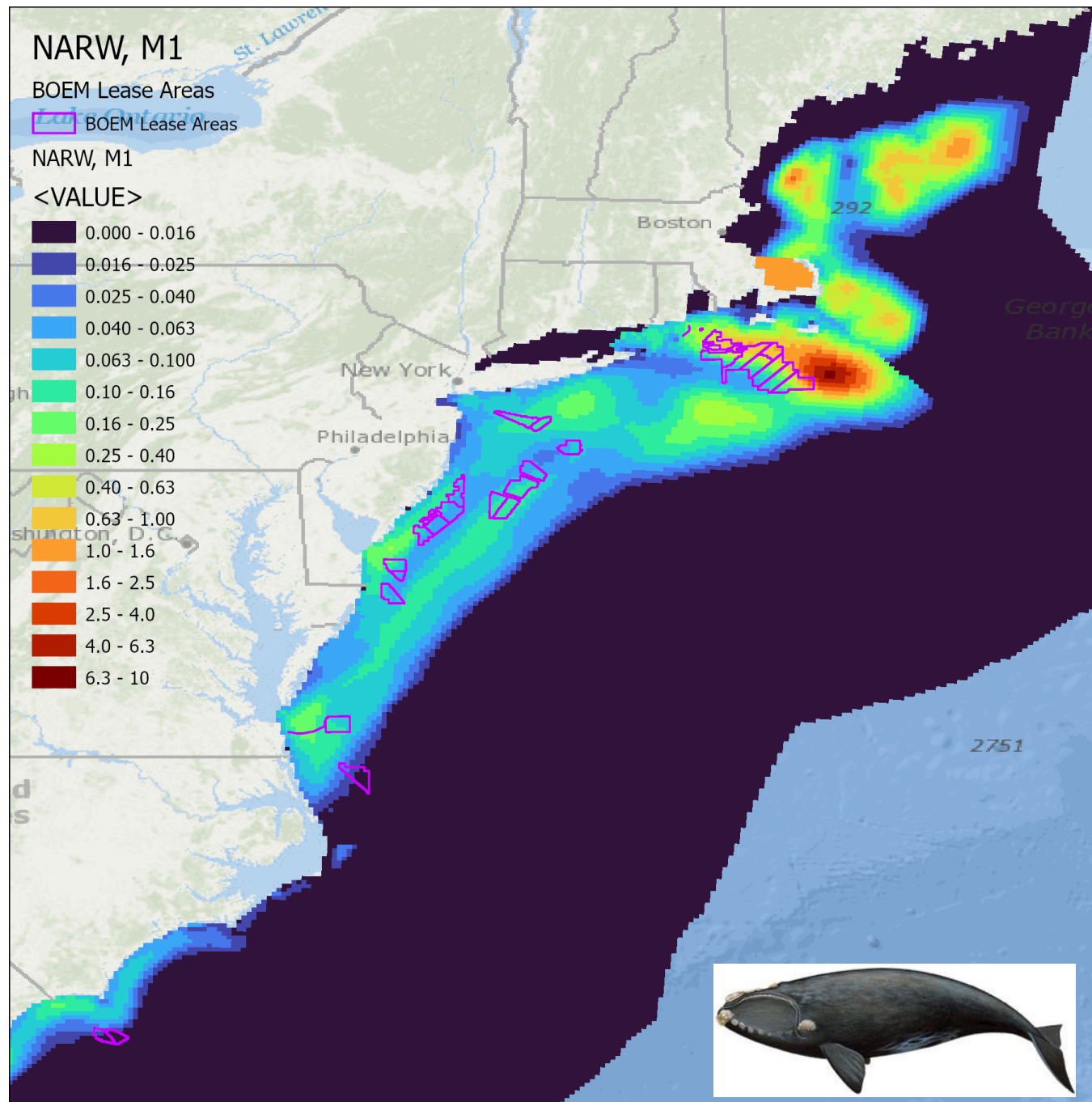
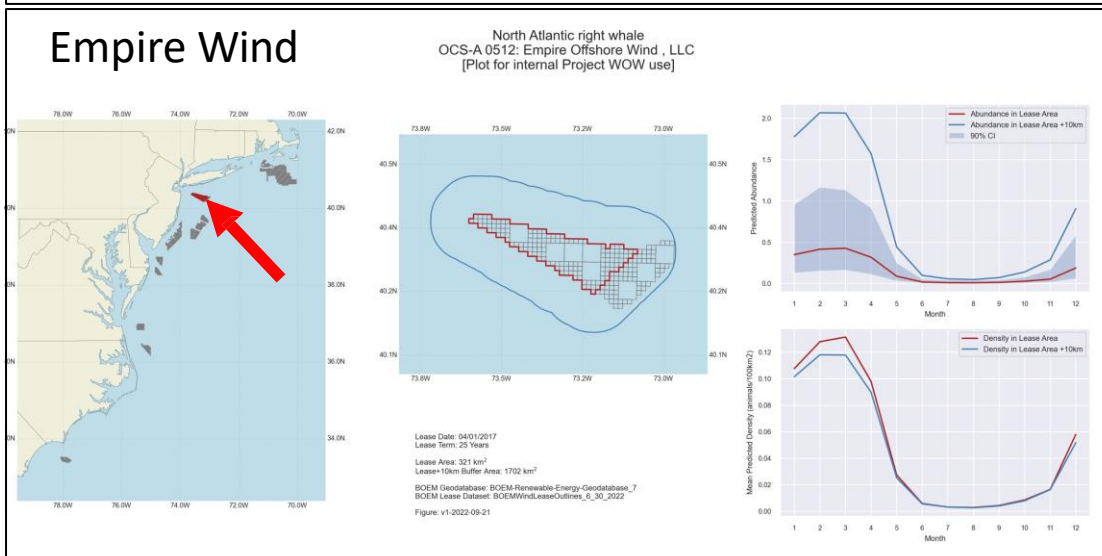
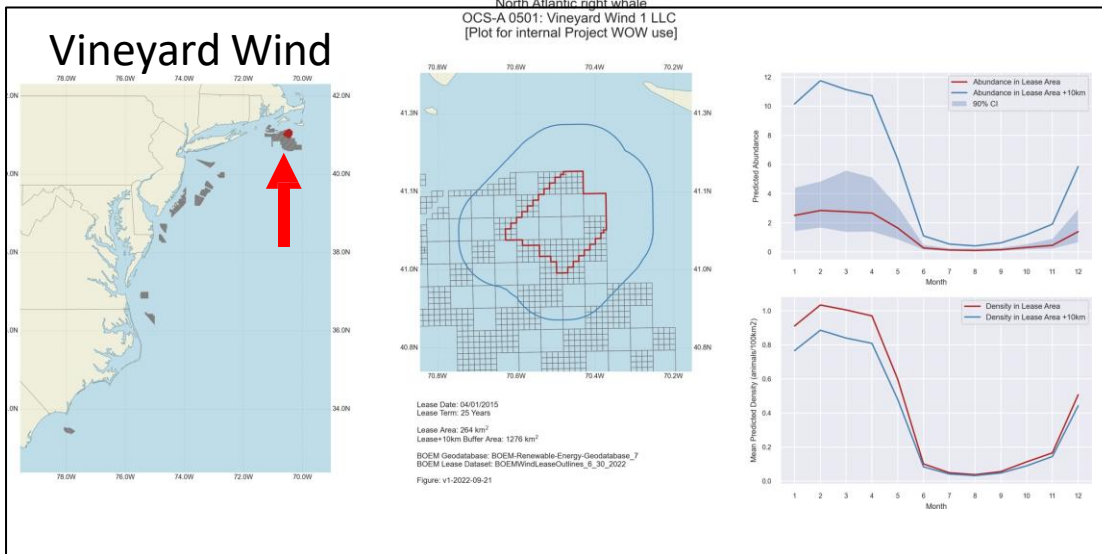


Figure 1. Movements of Zc068 in conjunction with the CEE from the *U.S.S. McFaul* (hereafter *McFaul*). Left panel shows 100 estimated tracks in light orange, with one example track highlighted in dark orange. These tracks represent the entire track; colored points correspond to imputed positions from each of 100 tracks for the hour before (green), during (orange), and after (purple) the CEE. Right panel zooms in on the area of the exposure and shows points from the highlighted track. In the right panel, the gray color indicates all the positions from one estimated track; colors of positions before, during, and after the CEE are as in the left panel.



NORTH ATLANTIC RIGHT WHALE



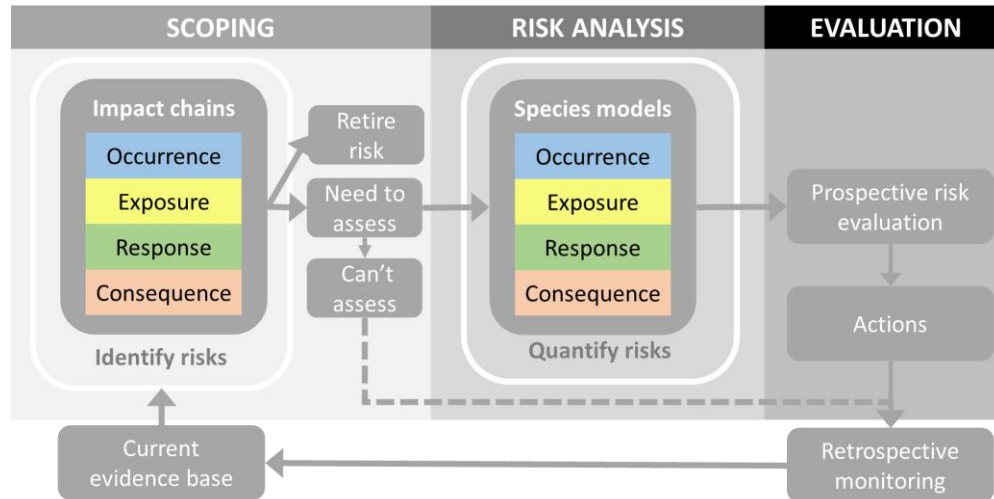
WHAT WE MEAN BY:



assessment frameworks



and analytical tools



Concept models can:

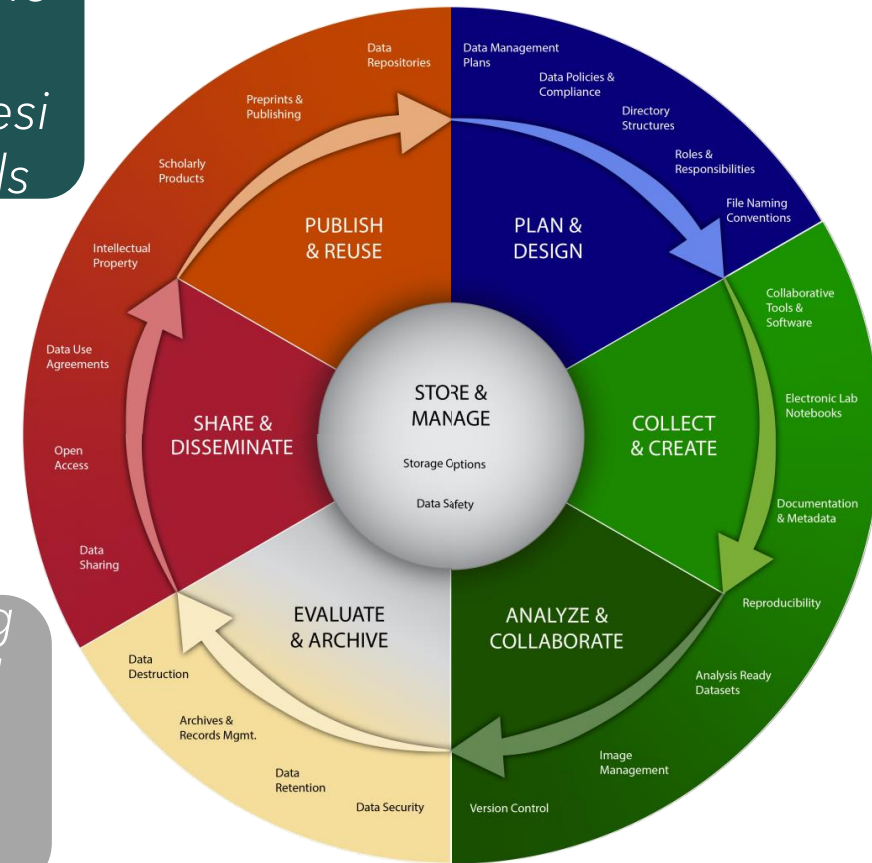
- Provide consistent terminology
- Help define scope, objectives
- Identify key steps to objectives

Evidence synthesis tools

Survey design

Evaluating tools and advising on their use

Impact analysis tools



IMPACT ANALYSIS TOOLS



Population Consequences of Disturbance & Multiple Stressors

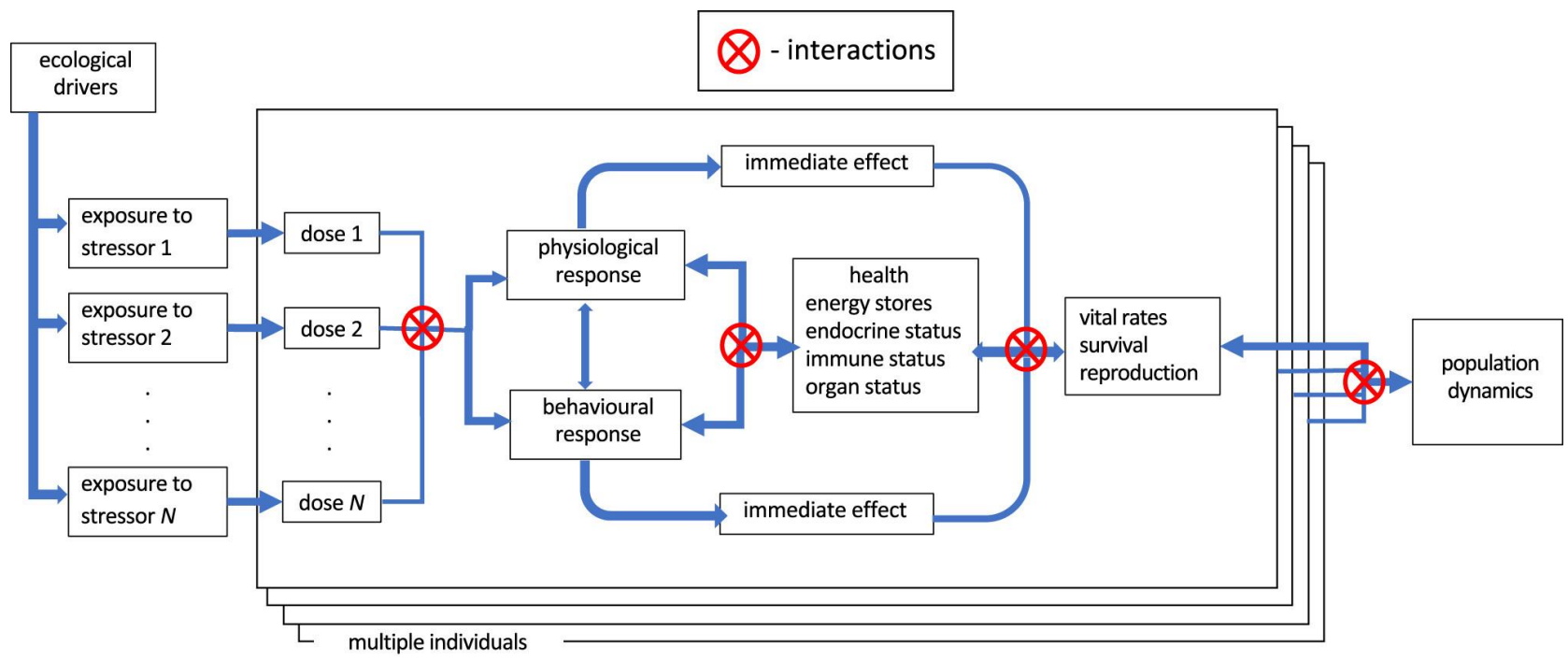


PROCEEDINGS B
royalsocietypublishing.org/journal/rspb

Managing the effects of multiple stressors on wildlife populations in their ecosystems: developing a cumulative risk approach

Peter L. Tyack¹, Len Thomas², Daniel P. Costa^{4,5}, Ailsa J. Hall¹,
 Catriona M. Harris², John Harwood², Scott D. Kraus⁶, Patrick J. O. Miller¹,
 Michael Moore⁷, Theoni Photopoulou², Enrico Pirotta², Rosalind M. Rolland⁶,
 Lori H. Schwacke⁸, Samantha E. Simmons³ and Brandon L. Southall^{4,9}

¹Sea Mammal Research Unit, School of Biology, Scottish Oceans Institute, ²Centre for Research into Ecological and Environmental Modelling, and ³SMRU Consulting, Scottish Oceans Institute, University of St Andrews, St Andrews, UK



QUESTIONS?



This material is based upon work supported by the Bureau of Ocean Energy Management and the Department of Energy under Award Number DE-EE0010287

NMFS Permits: Photogrammetry and Snot - Ocean Alliance 23644-02; Drone tagging - D Wiley 27272-01; Biopsy and acoustics - D Nowacek 22516-04

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of the ENVIRONMENT
Duke University Marine Lab



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ENGINEERING**



THANK YOU!

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Acknowledgements: This material is based upon work supported by the Bureau of Ocean Energy Management and the Department of Energy under Award Number DE-EE0010287

Permits: Photogrammetry and Snot - Ocean Alliance permit 23644-02; Drone tagging -



A Systems Approach to Research and Risk Assessment for Offshore Wind Development

Coming Soon

September 20, 1:00 p.m. ET

How to Tap into the Offshore Wind Supply Chain

Kristian Ravn (Green Ducklings) and Andreas Schönbeck (Horten)

Visit wind.ny.gov to register

Wildlife and OSW Resources

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