Offshore Wind in North Carolina: Updates on the Kitty Hawk Wind and Carolina Long Bay Projects and Requirements for Decommissioning

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Kitty Hawk Wind

AVANGRID

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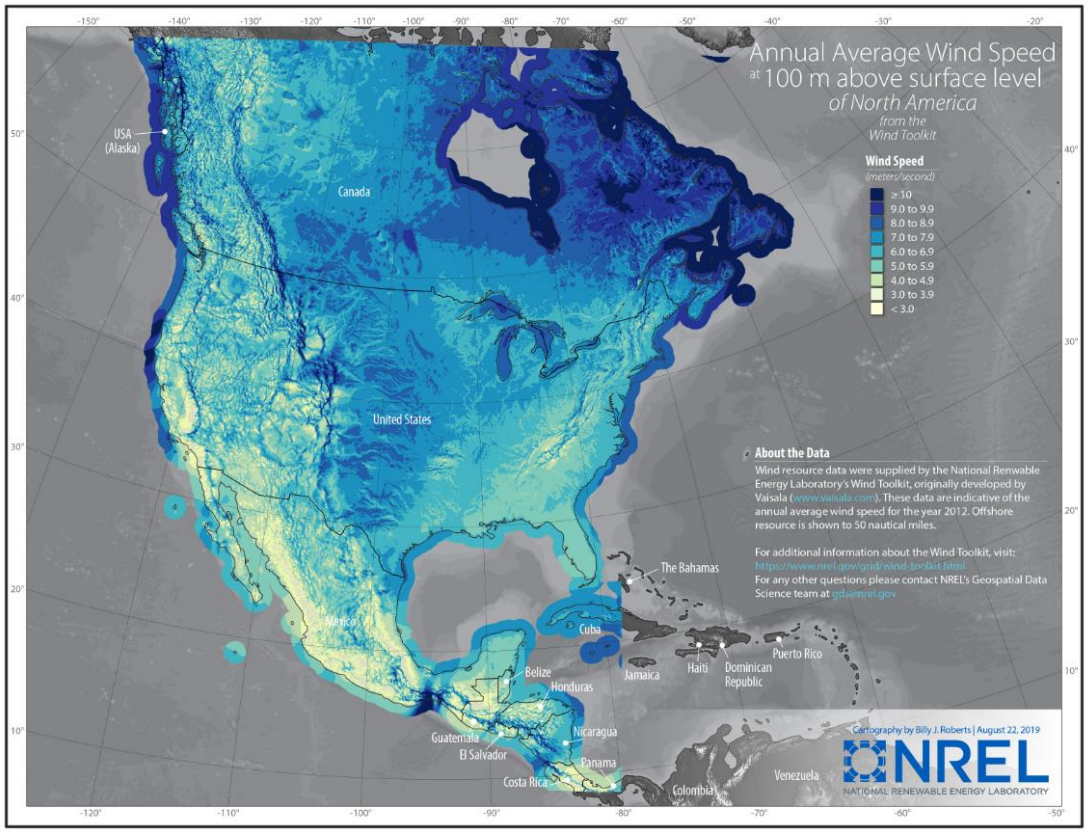
Presentation Overview

1) Offshore wind energy areas in North Carolina
2) Overview of Kitty Hawk Wind
3) Overview of Carolina Long Bay
4) Decommissioning requirements
5) Time for Questions

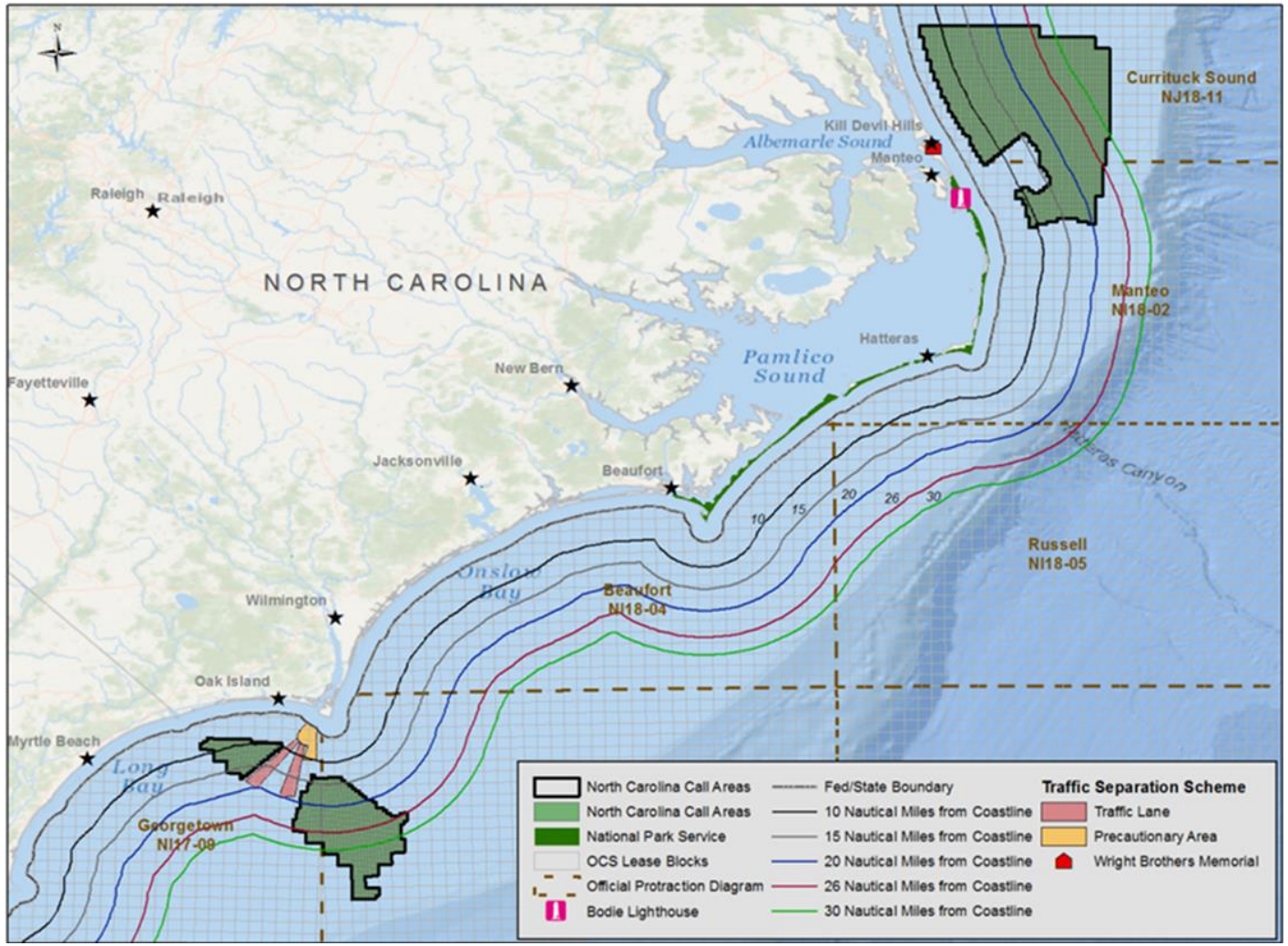
Why Offshore Wind?

- Develop domestic renewable energy to meet state and federal goals
- Support additional energy needs from population growth, data centers, electric vehicles
- Winds offshore have a more consistent speed than wind over land and can support growing coastal populations



Evolution of NC Lease Areas

Wind Energy Call Areas

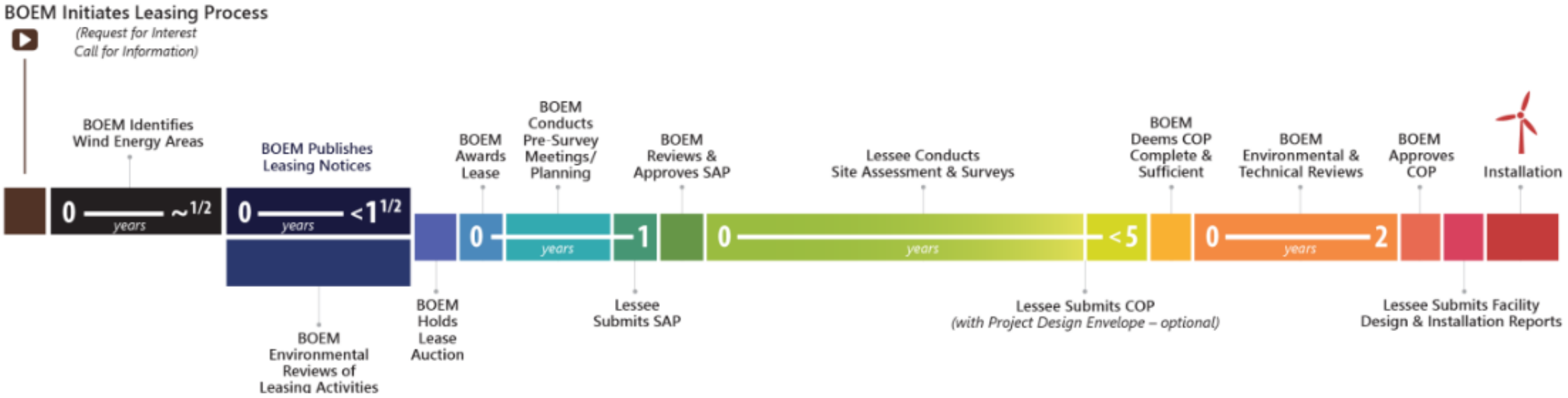


Wind Energy Areas

Overview of Offshore Wind

- Developers conduct surveys and studies to learn more about their lease areas
- Developers create project plans (site assessment plan, construction and operations plan) for offshore wind development and submit those plans to BOEM for approval
- BOEM conducts extensive environmental and technical reviews to determine possible impacts and how to mitigate them before approving, modifying, or disapproving plans

BOEM Renewable Energy Leasing Process



Kitty Hawk Wind

AVANGRID

John Harker, Lead Fisheries Coordinator
Lela Schlenker, Fisheries Liaison Kitty Hawk Wind

Kitty Hawk Wind Lease Area

Location: 27 miles offshore of Corolla, NC

Lease Area: 122,405 acres

Capacity: ~3500 megawatts (MW), ~1 million homes

Site Characteristics: Wind speed: 8-9 m/s
Water depth: 30-50 meters

Projects within Lease: **Kitty Hawk North**, Kitty Hawk North, LLC (OCS-A 0559)-
~33% of lease

Kitty Hawk South, Kitty Hawk Wind, LLC (OCS-A 0508)-
~ 67% of lease

Kitty Hawk Wind
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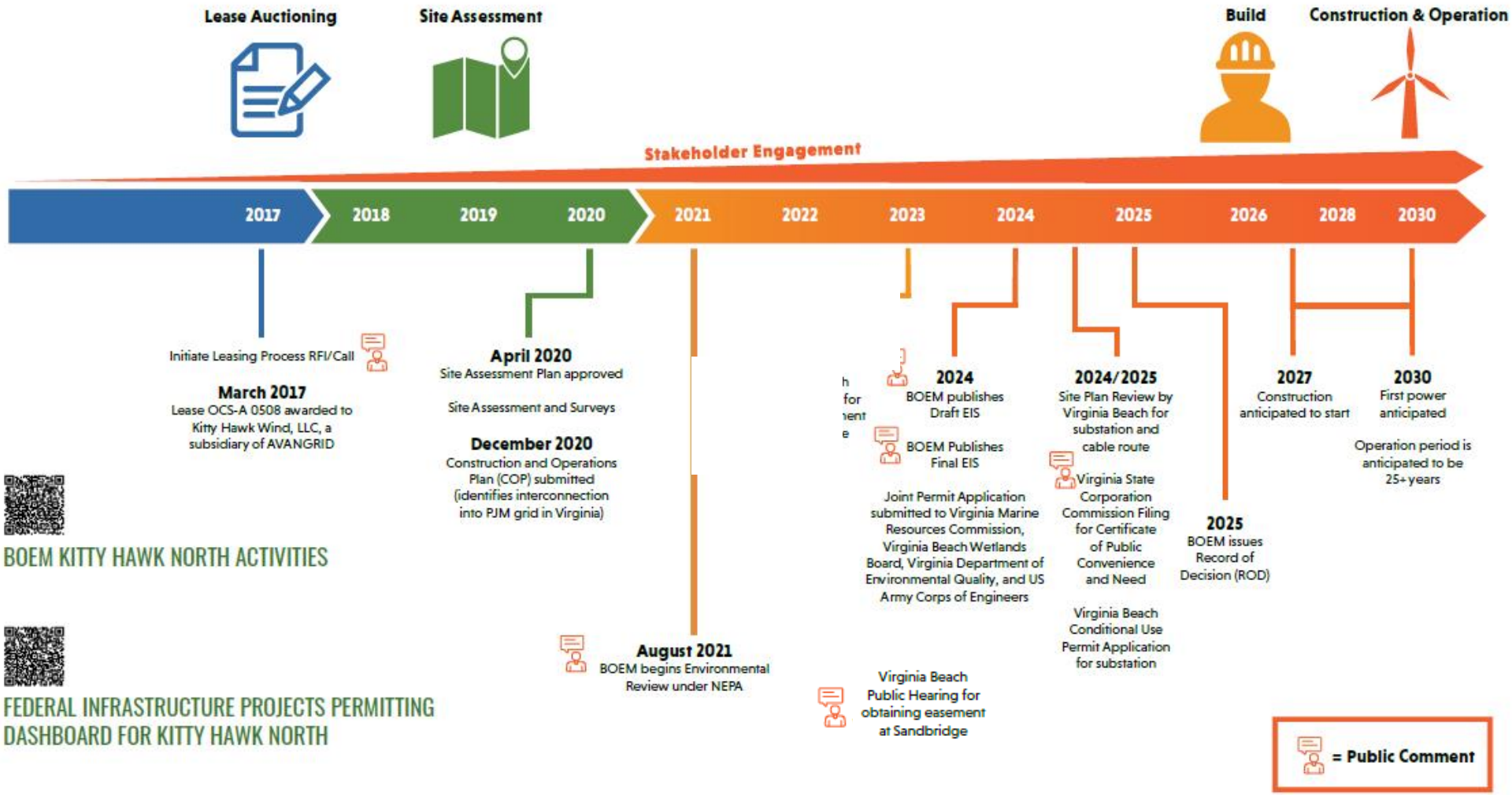
KITTY HAWK NORTH

ANTICIPATED PERMITTING & CONSTRUCTION SCHEDULE



BOEM KITTY HAWK NORTH ACTIVITIES

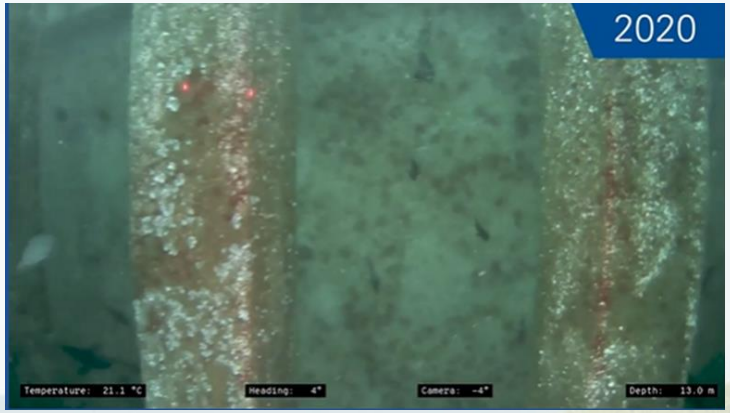
FEDERAL INFRASTRUCTURE PROJECTS PERMITTING DASHBOARD FOR KITTY HAWK NORTH

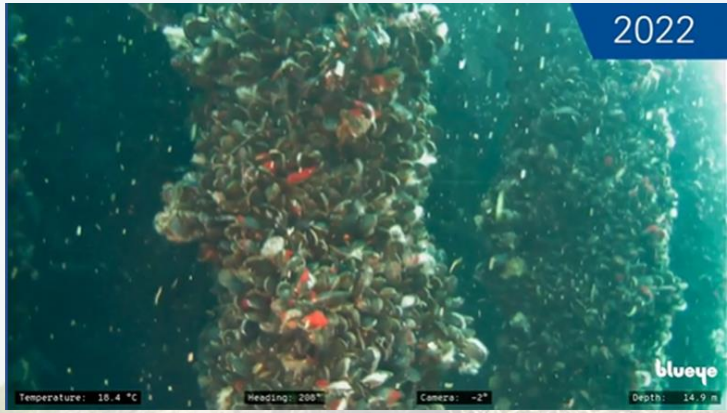
4.00 in

Fisheries Considerations

Utilizing Historical Fisheries Knowledge and Experience

- Captain interviews and landings data analysis to understand fishing activity
- Spacing to accommodate vessels (0.75 x 1.13 nm spacing of turbines)
- Cables buried 5-8ft in the **stable sea floor**
- Commercial and recreational fishing will not be restricted within the lease area
- Turbines will act as artificial reefs





Source: Dominion Energy | CVOW Mariners and Fisheries (coastalvawind.com)

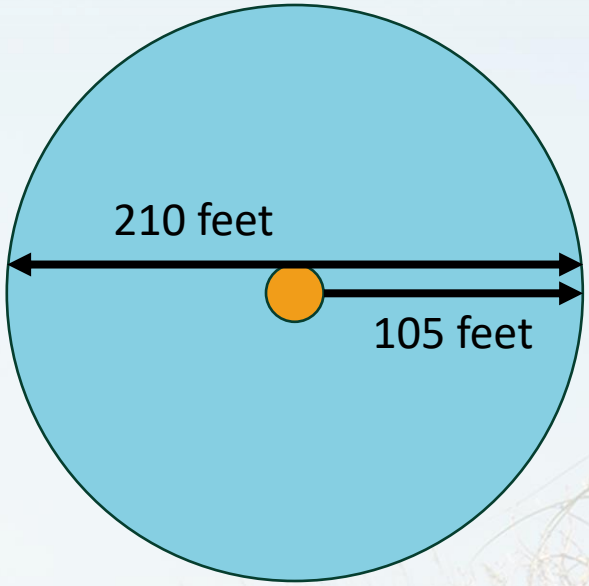
Kitty Hawk Wind and Scour Protection

- Decisions about what size turbine and therefore what size monopile and the radius of scour protection will not be made until just before construction

- In the publicly available Construction and Operations Plan, a scour protection radius of up to 105 feet is permittable

- Scour protection is comprised of natural stone

Monopile turbine with scour protection © INSPIRE Environmental



Example of a turbine with a monopile foundation and surrounding scour protection (left). Schematic diagram of Kitty Hawk Wind's plan for scour protection (blue) relative to monopiles (orange, right). Monopiles will be spaced 0.75 x 1.13 nm.

Fisheries Engagement

Fisheries Outreach

- Sponsored five fishing tournaments in 2023:
  - Big Rock, VB Tuna, Alice Kelly/ Pirates Cove, VB Billfish

Fisheries Representatives

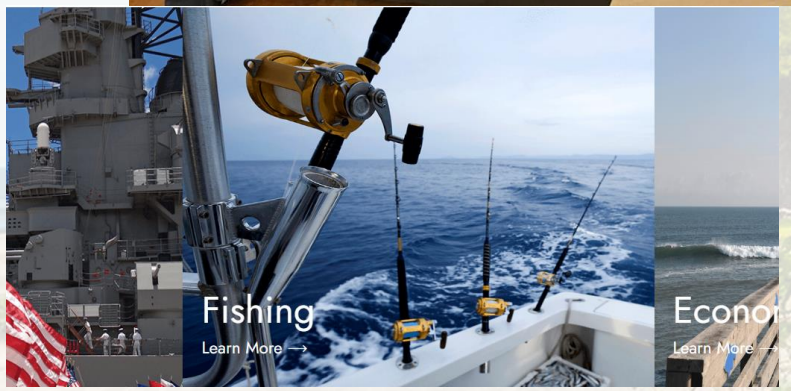
- NC: Dewey Hemilright (Commercial) and Hank Beasley (Rec Charter/Commercial)
- VA: Daniel LeGrande (Rec Charter)

Future Collaboration

- Scout and contractors- survey & safety
- Community outreach events
- Joint developer initiatives
  - Regional Compensation Program

Kitty Hawk Website (kittyhawkoffshore.com)

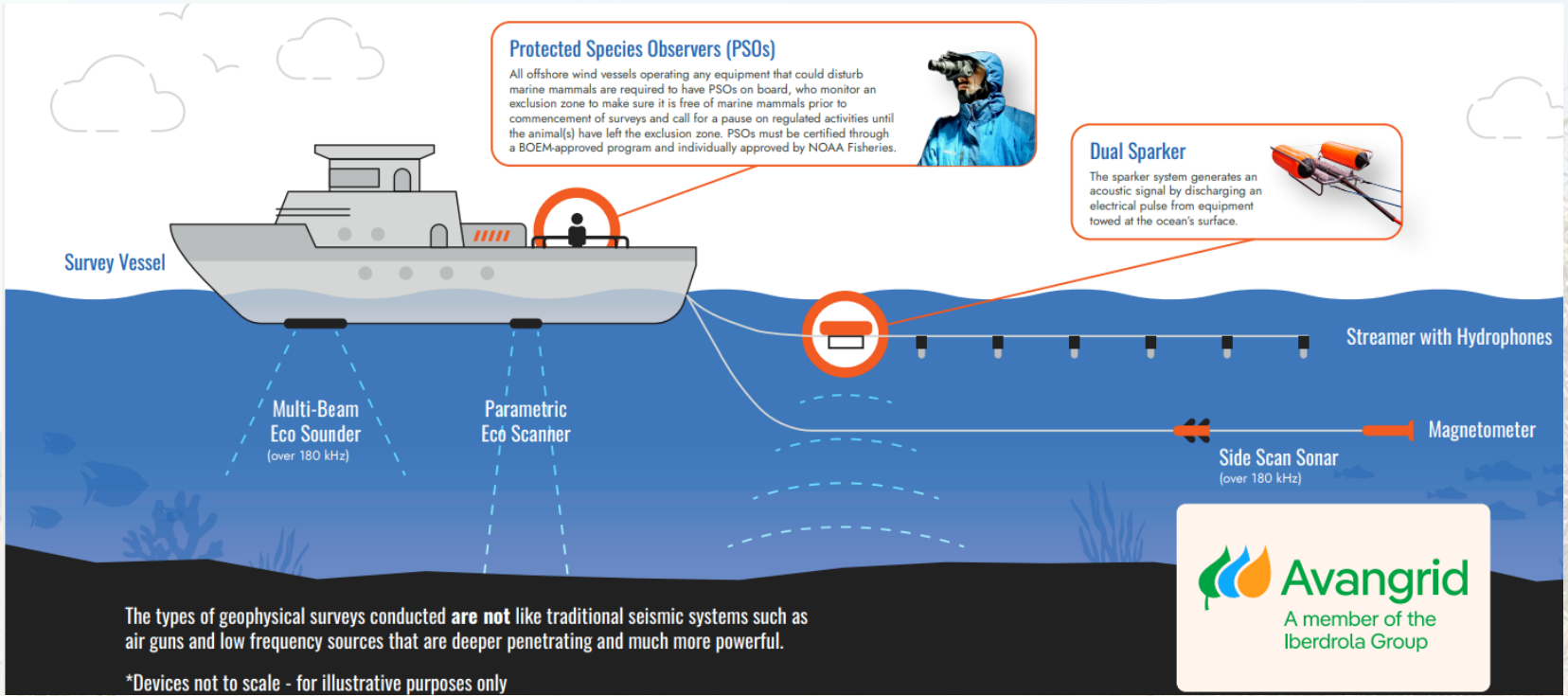
- Notice to mariners, fisheries notices, FAQs



Completed Research

Oceanographic and Bathymetric Research

- Wind, current, and wave data gathered from meteorological buoys
- Geophysical surveys (sonar to map sea floor)
- Geotechnical surveys (sediment cores)

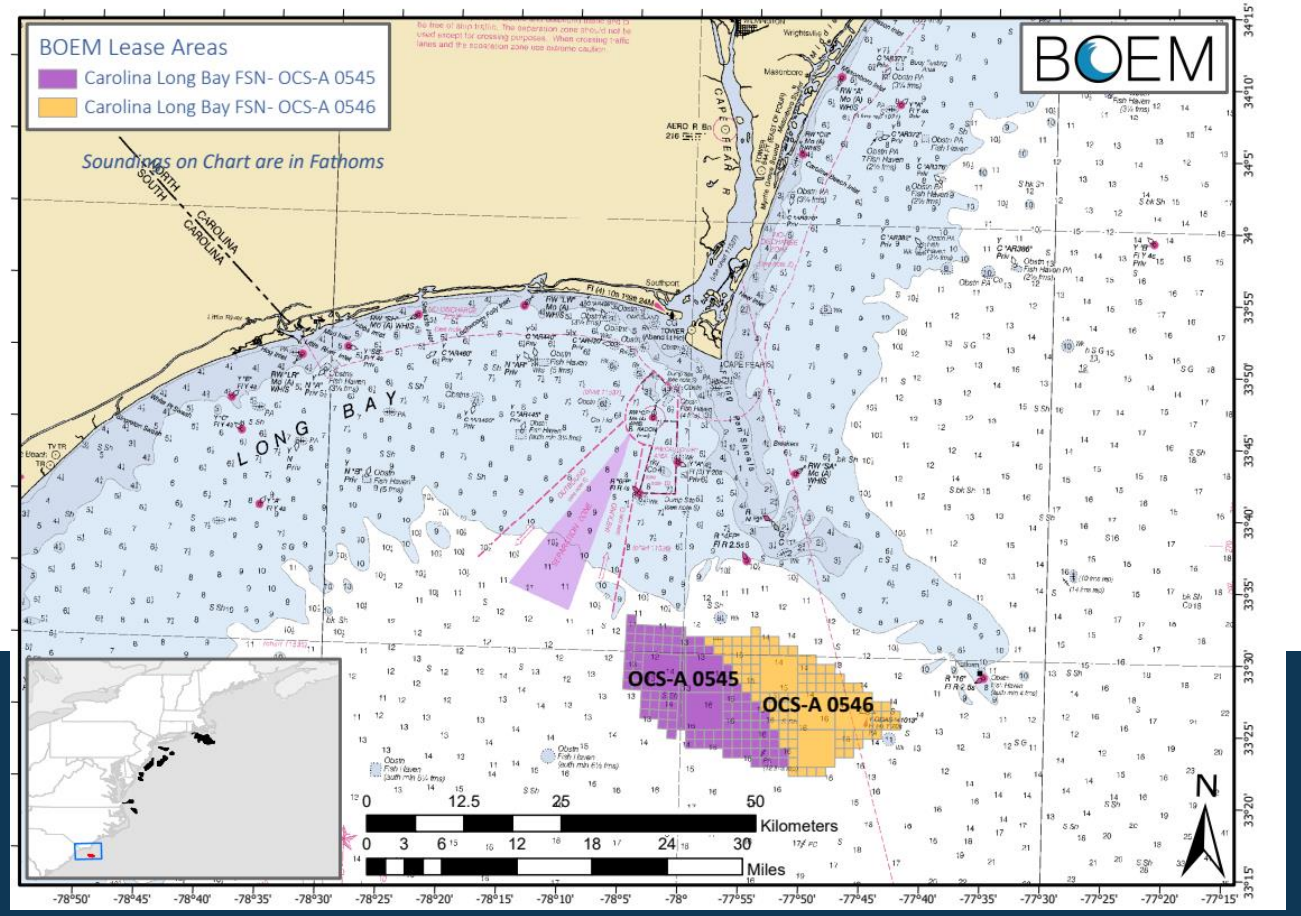


Upcoming Research

Fisheries Monitoring Plan

- December 2023 workshop to start identifying and ranking research questions
  - Participation from researchers at 5 Universities and 2 commercial/rec fishers
- Feedback from NOAA/state agencies (starting February 2024)
- Workshops with commercial and recreational fishermen in Wanchese and Virginia Beach April 2-3, 2024
- Fisheries monitoring research will be 6-8-year research commitments and will present opportunities to partner with fishers

Carolina Long Bay Offshore Wind Activities



Lease Area OCS-A 0545
TotalEnergies Renewables USA, LLC

Lease Area OCS-A 0546
Cinergy Corp., a direct non-regulated subsidiary of Duke Energy

CAROLINA LONG BAY

MAJOR PROJECT MILESTONES*

KEY

Public Comment Period

* This timeline indicates BOEM project milestones for the Carolina Long Bay Project

Offshore activities to assess buoy locations:
August 18, 2023 – August 21, 2023

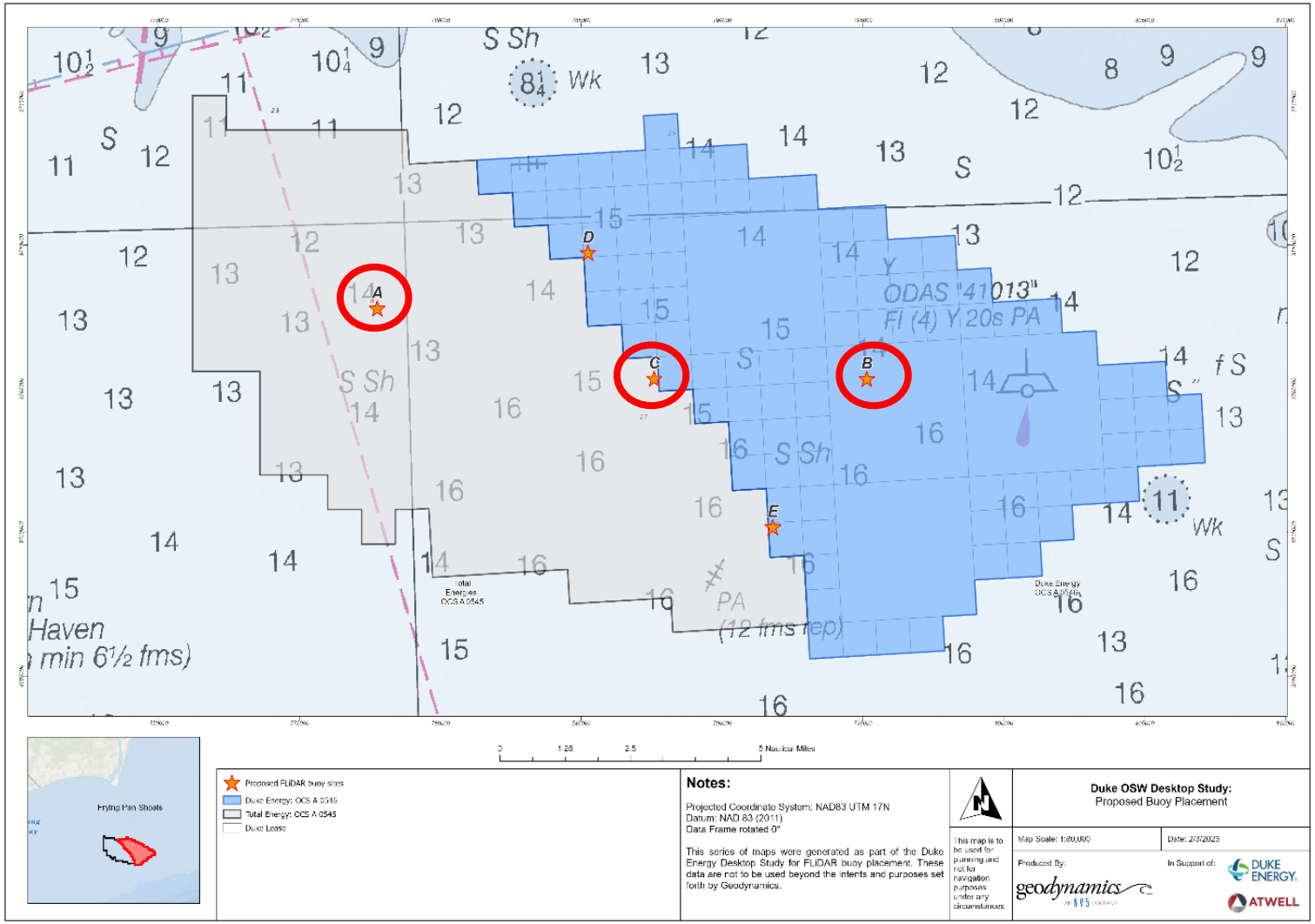
Survey Contractor:
Geodynamics, an NV5 Company

Protected Species Observer Contractor: RPS

Offshore Fisheries Liaison Contractor: RPS

Vessel: R/V Shackleford

Proposed Buoy Locations



Plan for Buoys

Meteorological Buoys: Two buoys (one within each lease area) equipped with floating light detection and ranging (LiDaR) and other sensors

Environmental Buoy: Wildlife monitoring; triangulation for locating whale and other marine mammal activity

*No more than 3 buoys are planned

*Based on real time review of data only locations A, B, and C were surveyed

Survey Locations

Survey Location	Latitude	Longitude
Location A	33.477819N	78.0119996W
Location B	33.447271N	77.830528W
Location C	33.442476N	77.913567W

Proposed Plan – Buoys

Floating LiDAR Buoy Data Collection Equipment (subject to change)

Floating LiDaR

- Meteorological data (wind speed & direction, relative humidity, air temperature, atmospheric pressure, precipitation)
- Wave sensor / buoy
- Current sensor
- Tide / Water Levels

MOTUS Station

Passive Acoustic Monitoring (PAM) System

- Monitoring of North Atlantic Right Whale
- C-POD Click Detector (toothed whales, dolphins and porpoises)

Fish Tag Acoustic Receivers (passive)

- InnovaSea – Underwater Receiver

Water Quality Sensors

- Dissolved oxygen, water temperature and pressure, conductivity, salinity, pH, turbidity, and chlorophyll-a

Environmental Buoy Data Collection Equipment (subject to change)

Bird Acoustic Sensor

- Record diurnal and nocturnal bird calls for species identification

Bat Ultrasonic Sensor

- Record migrating bat calls for species identification

Passive Acoustic Monitoring (PAM) System

- Monitoring of North Atlantic Right Whale
- C-POD Click Detector (toothed whales, dolphins and porpoises)

Fish Tag Acoustic Receivers (passive)

- InnovaSea – Underwater Receiver

Wave Sensor, if warranted

Upcoming Activities

Joint Site Assessment Plan (SAP)	Submitted mid-November 2023
	Held meeting with N. Carolina agencies as required by the NC Coastal Zone Consistency Determination
	BOEM is coordinating reviews with agencies and has completed its first round of reviews
	In process of addressing the first round of comments
Buoy Permits	USCG Private Aid to Navigation
	USACE Nationwide Permit 5
Mooring Design Review	U.S. Coast Guard to review mooring design
	Leaseholders will coordinate with selected buoy firm
MOTUS Coordination	Install Motus stations on meteorological buoys in coordination with USFWS's Offshore Motus network
	Leaseholders will coordinate with selected buoy firm and USFWS

Decommissioning Process

Source: https://www.bsee.gov/what-we-do/environmental-compliance/environmental-programs/rigs-to-reefs

Conceptual Decommissioning Plan

- Part of the Construction & Operations Plan
- Broad coverage of deconstruction and site clearance activities
- Includes methods of removal
- Evaluates potential impacts and mitigation measures

Financial Assurance

- Covers estimated cost of decommissioning
- Ensures funds are available to decommission

Process

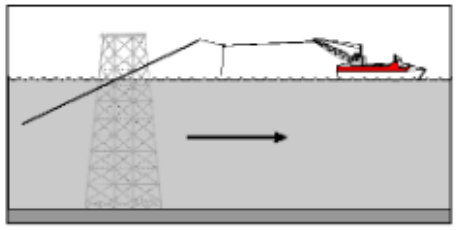
- Decommissioning Application (as early as 2 years before lease expiration)
- BSEE reviews application to determine what technical and environmental reviews are needed
- COP may be revised and appropriate NEPA analysis and agency consultation conducted
- Acquire necessary permits
- Decommissioning Notice

Decommissioning Options

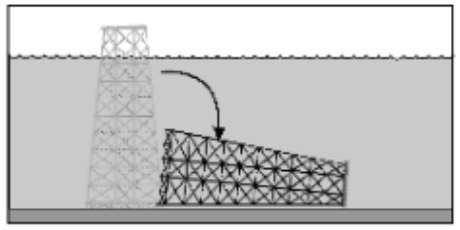
- Default is the removal to a depth of 15 feet below the mudline
- Lessee can request facilities to remain in place or be converted to an artificial reef

Precedent for Conversion into Artificial Reefs: Oil Industry Rigs-to-Reefs Program

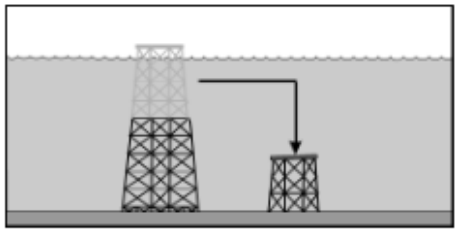
- Rigs-to-Reefs provides a precedent for what conversion to artificial reefs *could* look like for wind turbines
- Upon decommissioning, oil and gas developers apply to leave a portion of structures in place and a portion of the money saved by not removing the entire structure is redirected toward managing the artificial reef
- As of 2021, more than 600 platforms have been converted to permanent artificial reefs in the Gulf of Mexico (BSEE)



The tow-and-place platform reefing method

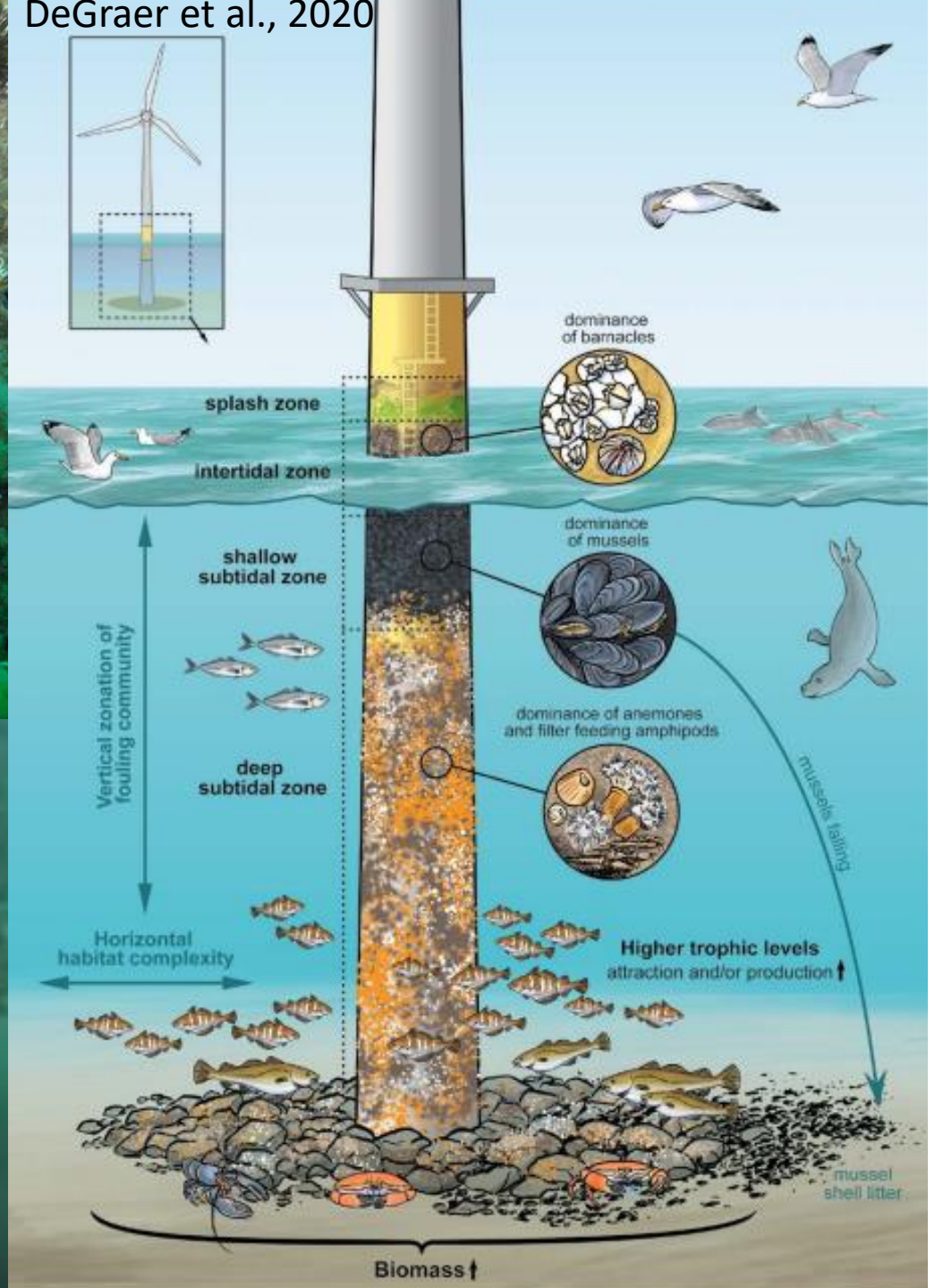


The topple-in-place platform reefing method



The partial removal platform reefing method

DeGraer et al., 2020



How does an artificial reef form?

- Foundations and scour protection provide substrate for settling organisms
- These organisms provide food for larger organisms and create micro-habitats
- Nature based designs may enhance habitat quality (See report from The Nature Conservancy)

Examples from Block Island Wind Farm and Coastal Virginia Offshore Wind Test-Turbines

Black sea bass at Block Island Wind Farm © Hutchison

Black sea bass at Block Island Wind Farm

Mahi-mahi caught at the CVOW turbines

Consideration of Nature Enhanced Designs

- Nature-based designs may be incorporated into offshore wind projects as scour material, scour enhancement, or cable protection (The Nature Conservancy)
- Vineyard Wind recently deployed ECOncrete mattress protection for cables
- These marine mattresses are designed for cable protection and are optimized to create habitats for a wide range of organisms

ECOncrete mattresses used to protect cables over hard-bottom habitat for Vineyard Wind

Table 3. Summary of Nature-Based Design Options Identified from U.S. Suppliers

NBD Product	Product Use	Supplier	Location
Wind Turbine Scour Protection Unit	Scour material	ECOncrete® USA	NY
Recycled Concrete	Scour material	Janus Materials	SC
Reef Cells	Scour enhancement	Reef Cells	FL
Reef Balls®	Scour enhancement	Reef Innovations, Roman Stone Construction Co.	FL
Layer Cakes®	Scour enhancement	Reef Innovations	FL
Cube Reefs	Scour enhancement	Reef Innovations	FL
ECO Mats®	Cable protection layer	ECOncrete® USA	NY
Fleximats®	Cable protection layer	Roman Stone Construction Co.	NY

Summary

- Offshore wind developers make decisions about turbine size (maximum size described in COP) close to the start of construction based on availability of turbines
- Turbine size determines amount of scour protection needed
- Default for scour protection is to use natural stone but other materials that may provide enhanced settling may be considered (e.g., ECOncrete)
- Artificial reef formation around wind turbines is expected to enhance biodiversity, biomass, and fishing opportunities for commercial and recreational fishers
- Fisheries monitoring plans provide an opportunity to assess this scientifically and evaluate how the fishery responds

Summary

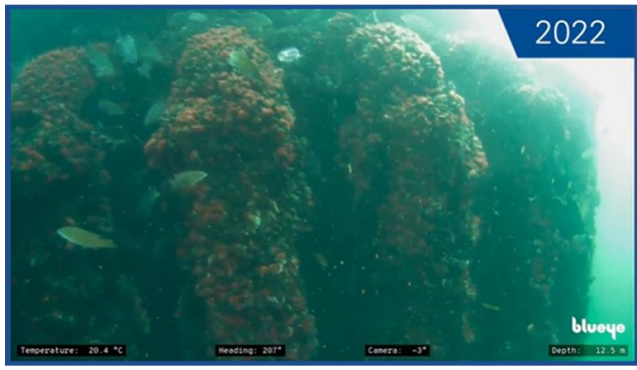
As developers we follow BOEMs requirements for decommissioning

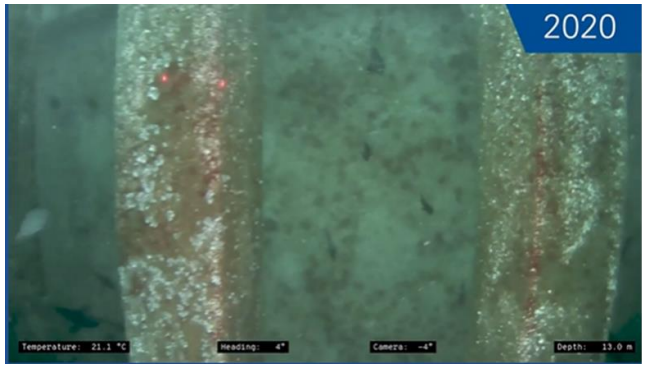
Current BOEM Decommissioning Options:

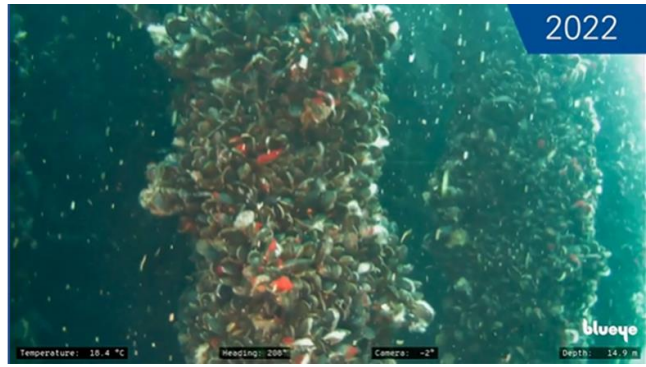
1. Renew lease agreement
2. Leave in place as an artificial reef
3. Remove everything down to 15-feet below the mudline

- Decisions about what option will be selected will not be determined until near the end of 30-year lease (i.e., ~2060)
- Potential for regulations and technology to change in the next several decades

Colonization of CVOW turbines after two years







Source: Dominion Energy | CVOW Mariners and Fisheries (coastalvawind.com)

Thank you!

Questions?

Carolina Long Bay

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