



BOEM BUREAU OF OCEAN
ENERGY MANAGEMENT

Offshore Wind Energy Facilities' Impact on Hydrodynamics and Primary Production in the Gulf of Mexico

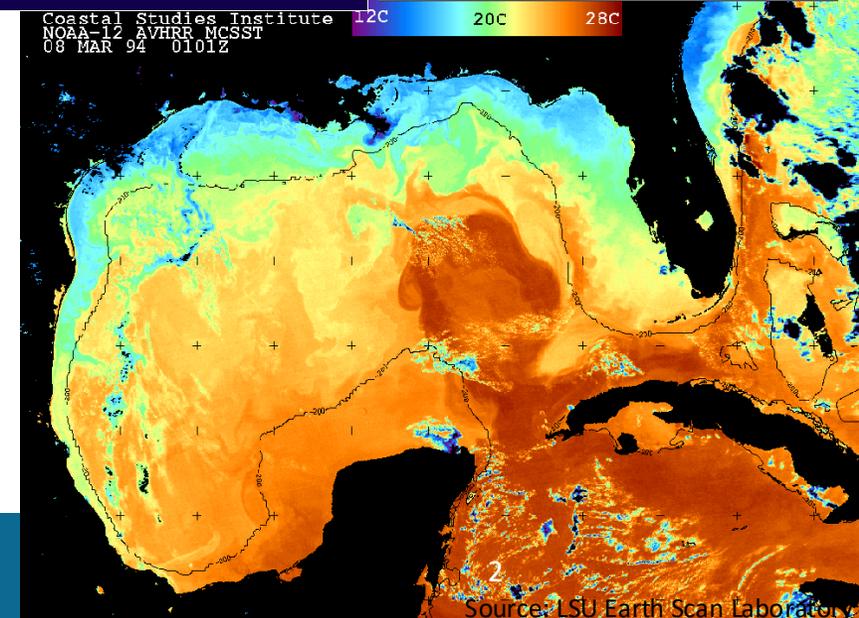
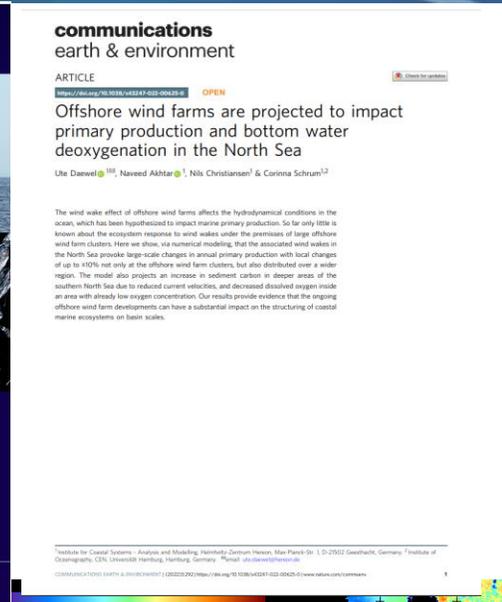
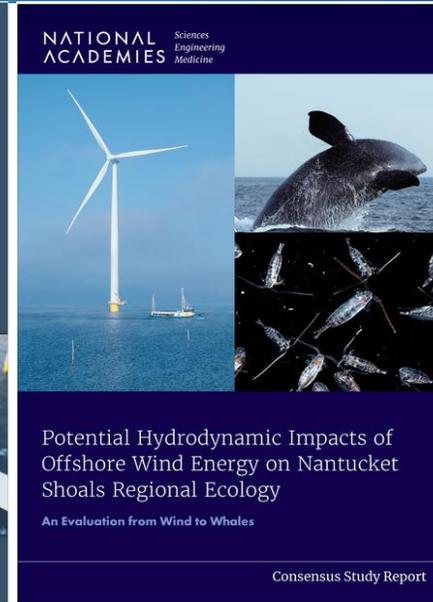
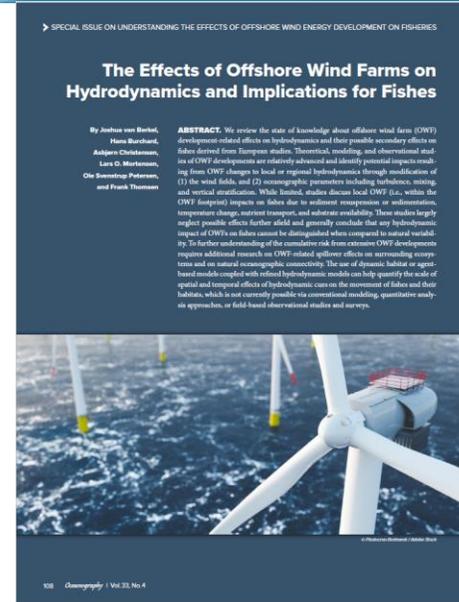
26th Meeting of the Standing
Committee on Offshore Science and Assessment

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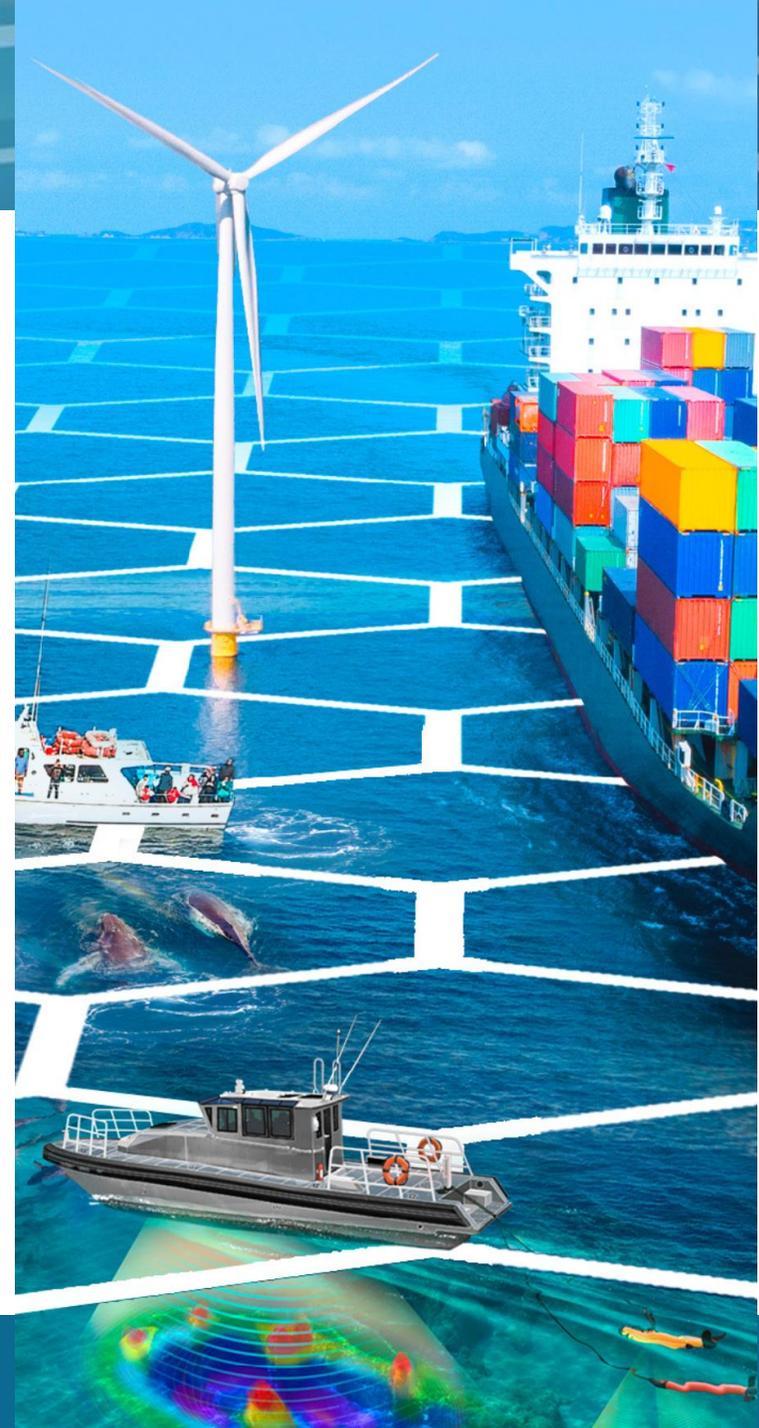
Background

- Studies from other regions indicate that offshore energy development can potentially impact hydrodynamics and alter various physical and chemical dynamics.
- Gulf of Mexico is dynamic
 - Productivity
 - Broad shelf circulation
 - Loop Current
 - Low oxygen potential



BOEM Information Need

- Assess offshore wind impact on GOM hydrodynamics, water quality, and primary productivity
 - Evaluate construction and operation scenarios
- Ensure responsible development of renewable energy on the Outer Continental Shelf (OCS) including comprehensive environmental analysis
- Inform
 - Stakeholders
 - Impact assessments
 - Mitigation measures
- Support open-source modeling



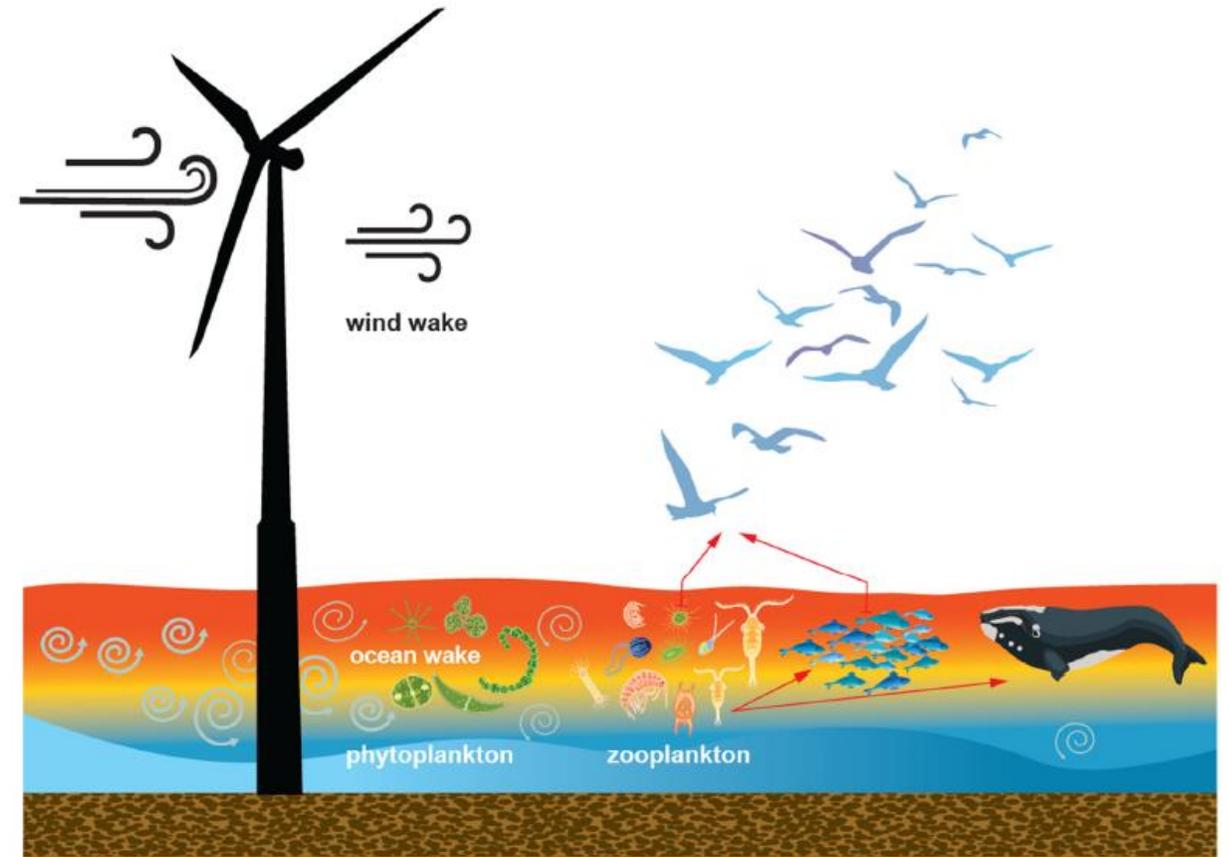
Source:
<https://storymaps.arcgis.com/stories/01b8c848d9bc4defa891e6864652d74e>



Study Objectives

- Use model simulations to determine potential impacts of offshore wind energy facilities on hydrodynamics, water quality, and primary production by leveraging available data
- Support open-source modeling

Example Schematic from U.S. Atlantic



Source: NASEM, 2023.

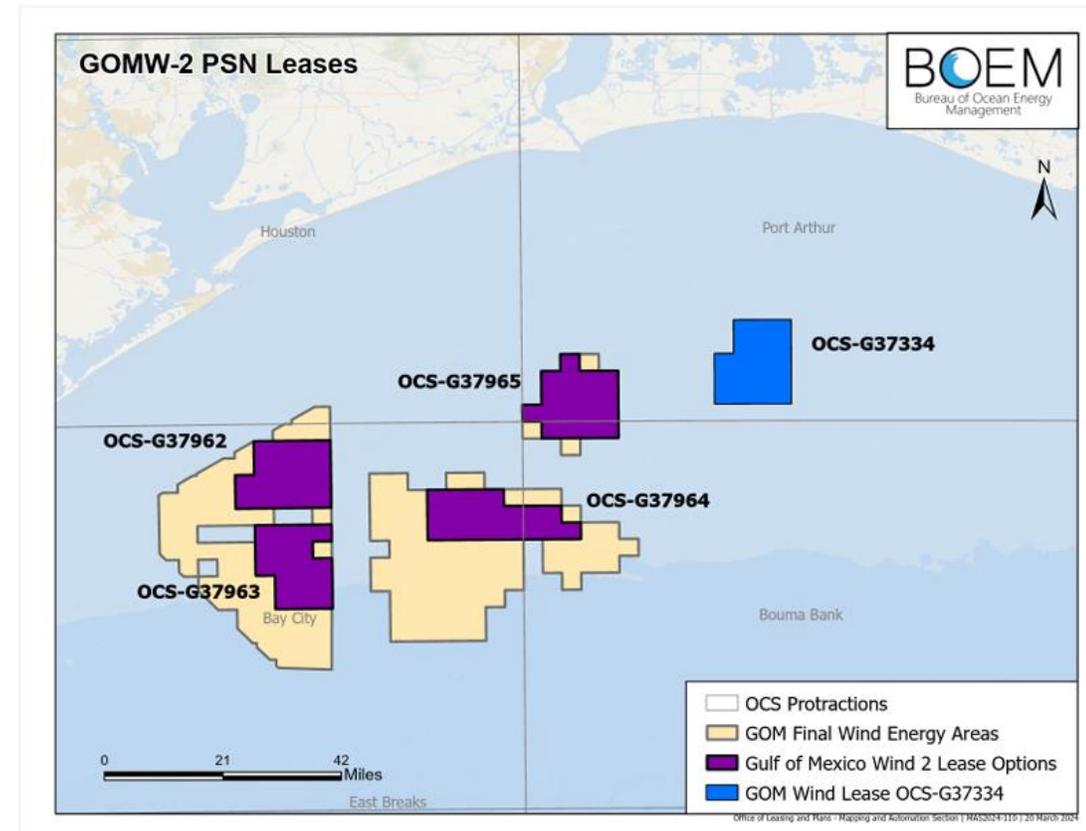
Methods

A Gulf of Mexico regional modeling approach

1. Synthesis of existing data
2. Data integration for coupled hydrodynamic Nutrient-Phytoplankton-Zooplankton-Detritus (NPZD) model enhancement
3. Simulate various scenarios
 - i. Current baseline conditions
 - ii. Routine operations
 - i. Turbine configurations (e.g., size and spacing)
 - iii. Decommissioning phase
4. First steps to forecast climatic impacts

Research Questions

1. How could potential offshore wind energy facilities alter local and regional hydrodynamic processes?
2. How might changes in hydrodynamic processes impact water quality and subsequent primary production throughout the area?
3. How might these impacts change after decommissioning?





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