

Atlantic Renewable Energy Environmental Studies Overview

Bureau of Ocean Energy Management, Regulation and Enforcement
Offshore Alternative Energy Program

Completed Studies

- Determining Night-time Distribution of Long-tailed Ducks Using Satellite Telemetry
- Seabed Scour Considerations for Offshore Wind Development on the Atlantic OCS
- Meeting on Birds and Offshore Wind Power Development in the Northeast and Mid-Atlantic: Identifying Priority Species and Developing Research and Partnering Strategies

<http://www.boemre.gov/offshore/RenewableEnergy/WorkshopBirdsOffshoreWindDevelopment.htm>

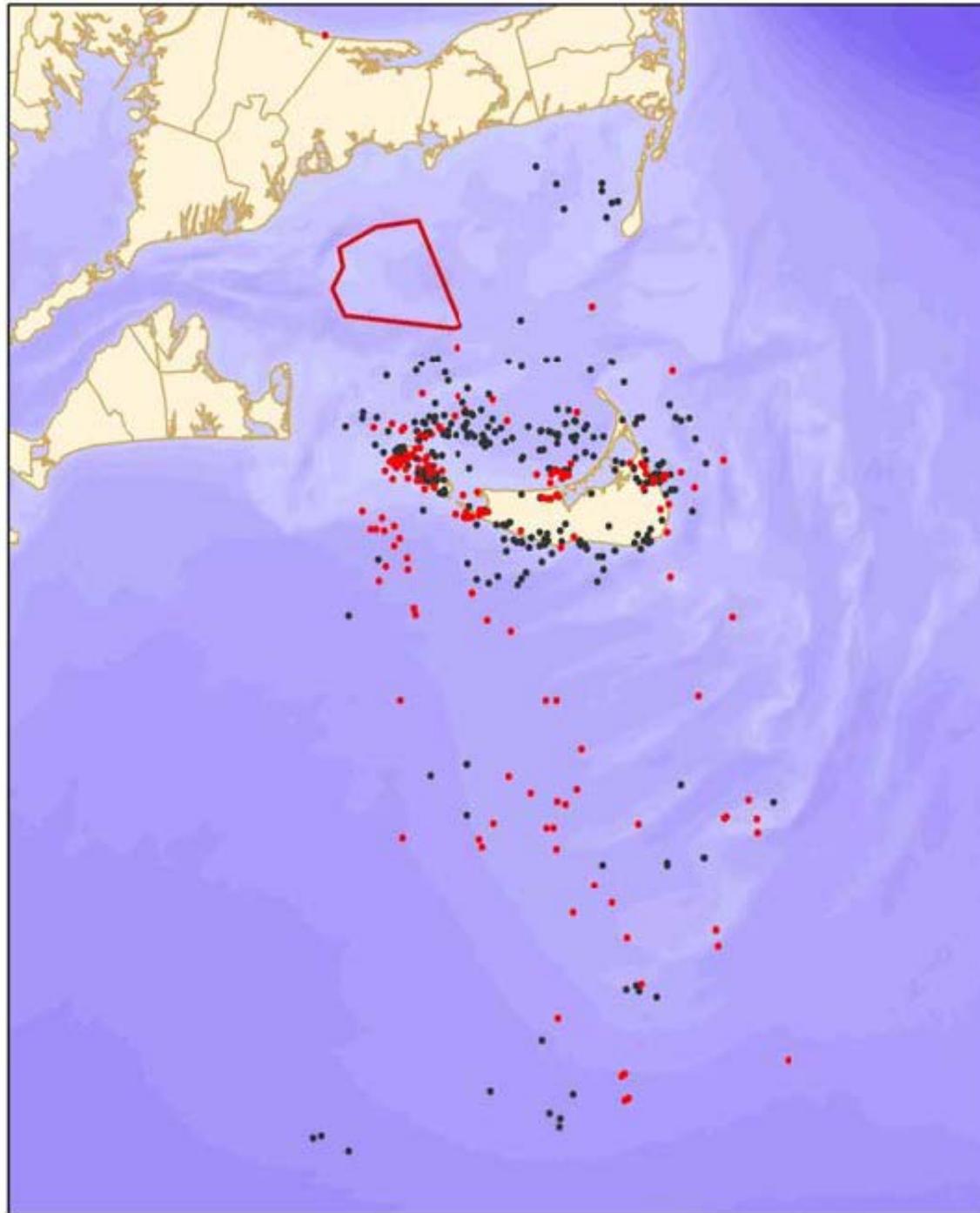
Night-time Distribution of Long-tailed Ducks

- Primarily looked at Nantucket Sound and Nantucket Shoals.
- 10 long-tailed ducks (LTDUs) surgically implanted with satellite telemetry.
- More than 650 satellite fixes were obtained.
- Data indicated that day-time commuting LTDUs did NOT utilize Nantucket Shoals as night-time roosting sites.

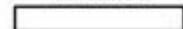
Long Tailed Duck Telemetry All Platforms

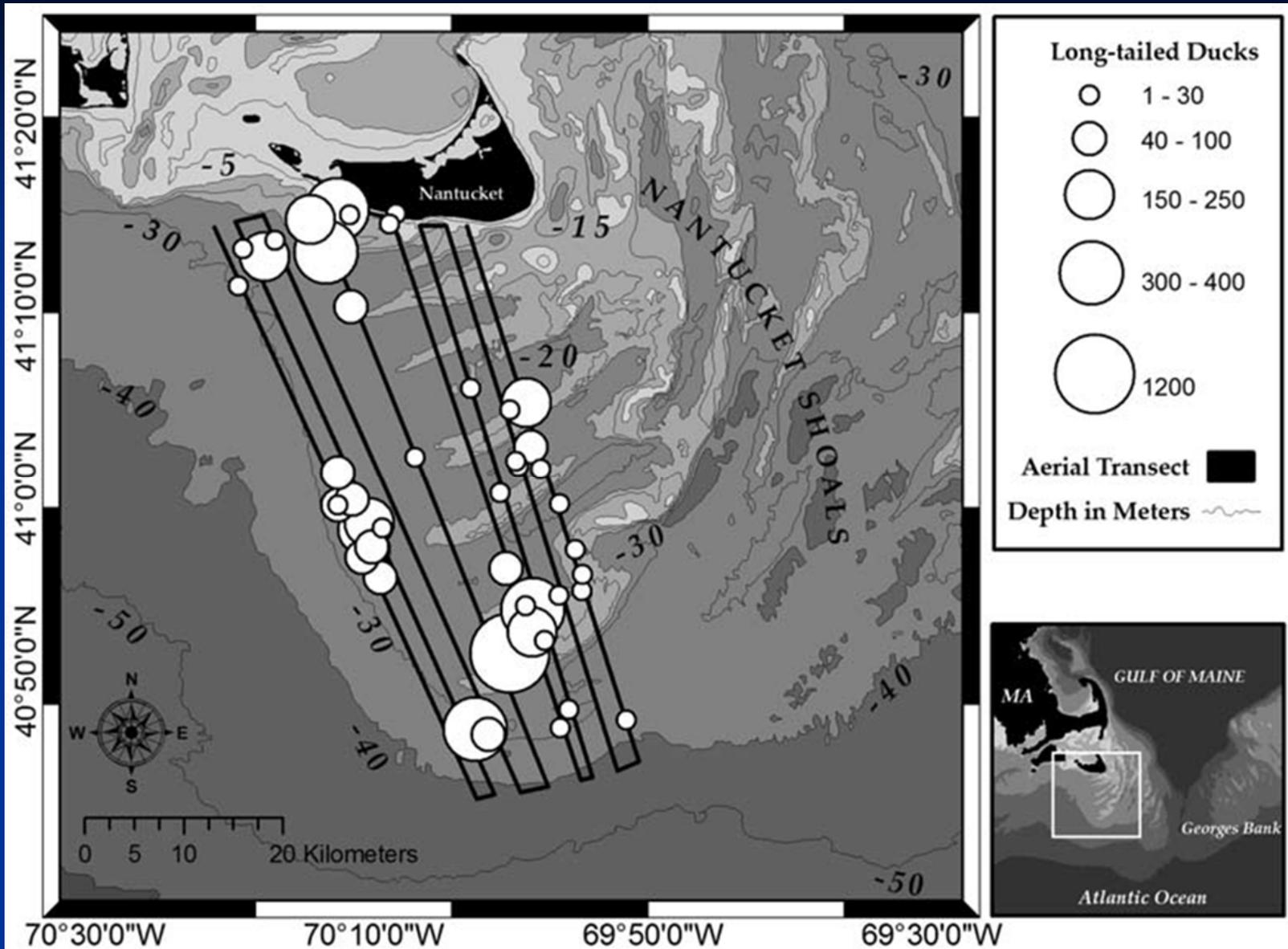
Through 19 May 2008
(N = 654)

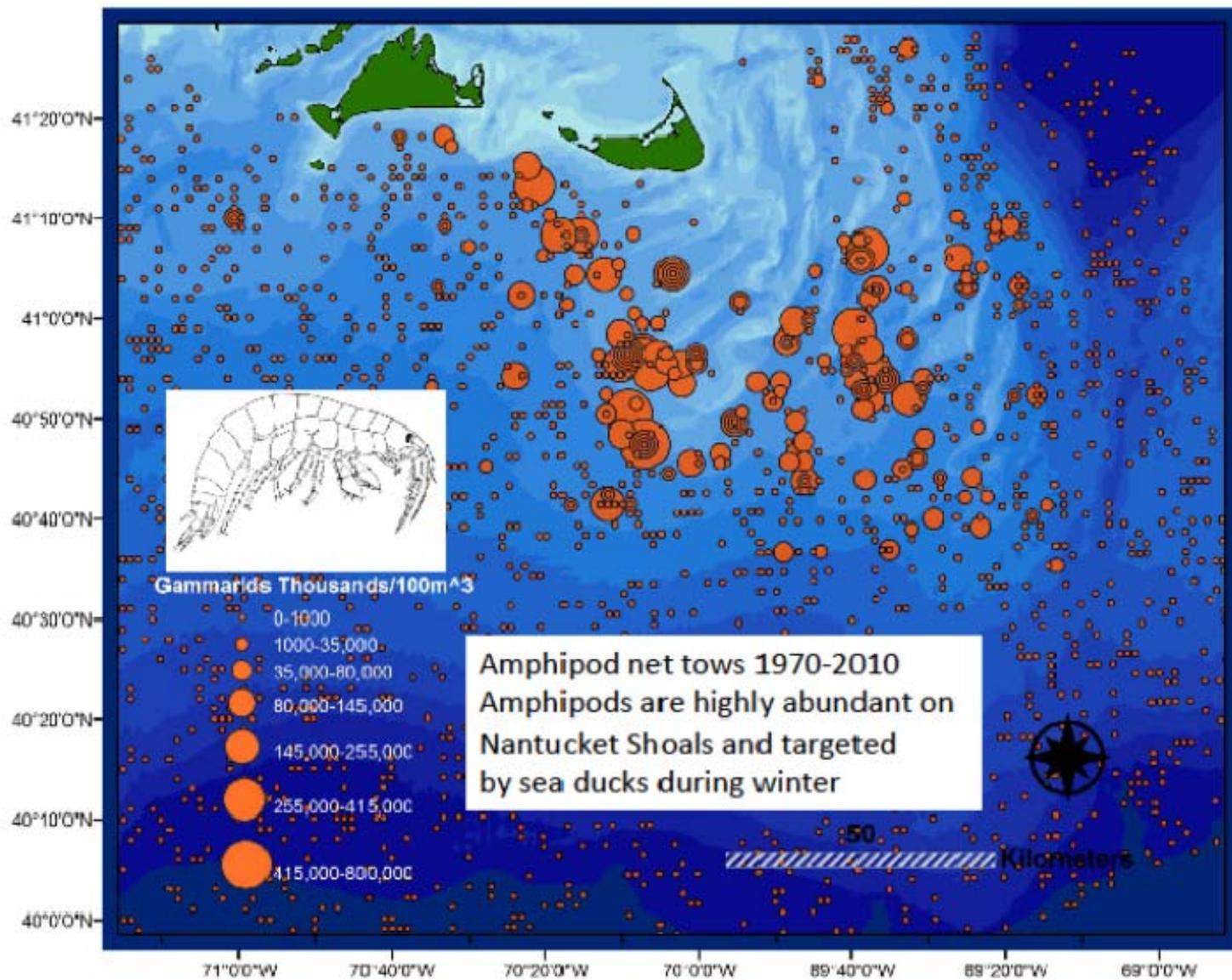
- Daytime Locations
- Nighttime Locations
- Proposed Windfarm Location



10 miles







Seabed Scour Considerations

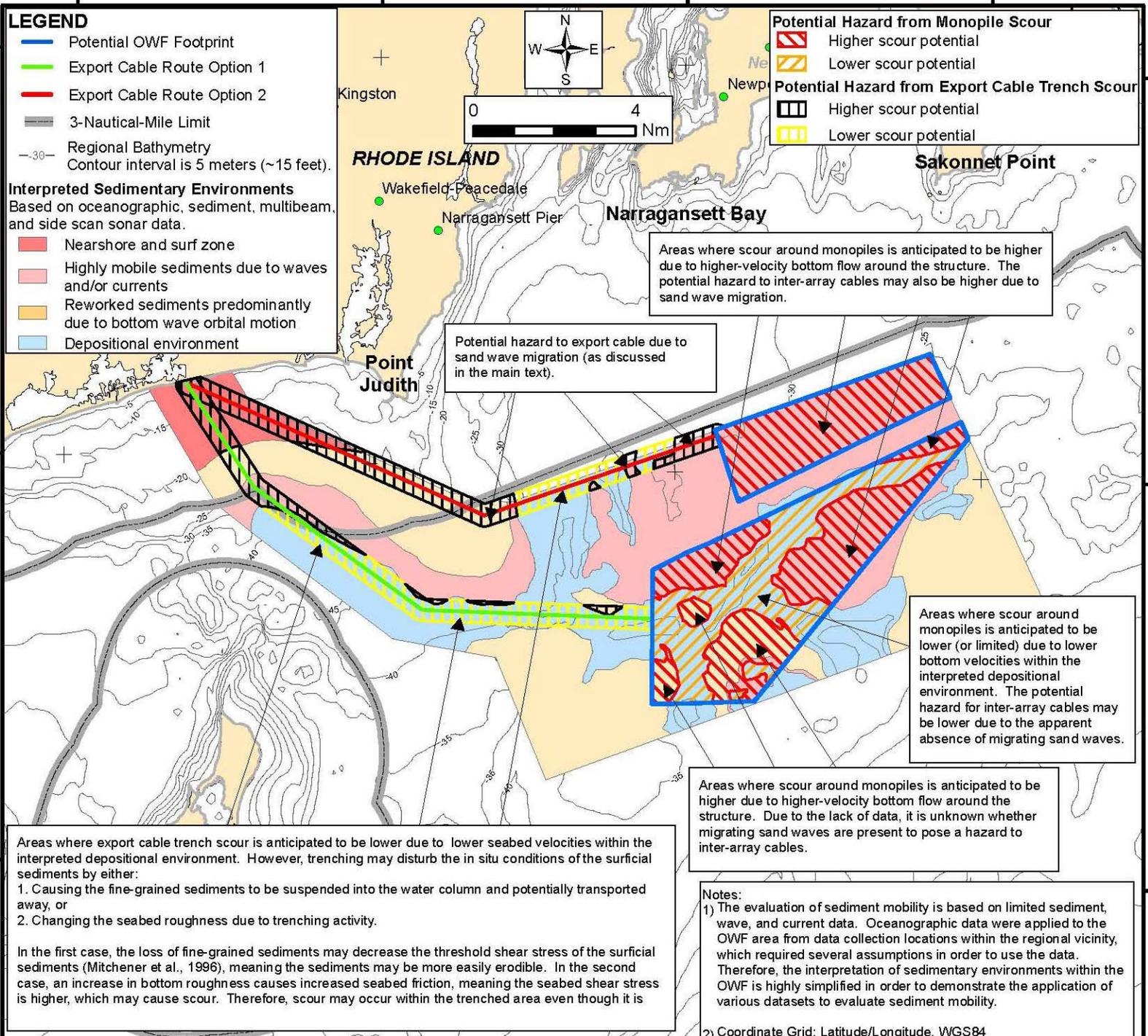
■ Objectives

- Review oceanographic and seabed data for Atlantic OCS
- Review readily available information from Europe
- Describe how offshore wind facility structure and cable installation may affect scour susceptibility of the seabed.

Seabed Scour Considerations (continued)

■ Conclusions

- Seabed scour is anticipated to be a potential hazard in the Atlantic OCS.
- Scour potential is related to oceanic and seabed conditions.
- Evaluation of scour hazards requires an integrated approach as part of siting and design.
- The development of scour avoidance and mitigation should be evaluated and chosen based on project and site-specific conditions and evaluations.



LEGEND

- Potential OWF Footprint
- Export Cable Route Option 1
- Export Cable Route Option 2
- 3-Nautical-Mile Limit
- Regional Bathymetry Contour interval is 5 meters (~15 feet).

Interpreted Sedimentary Environments
 Based on oceanographic, sediment, multibeam, and side scan sonar data.

- Nearshore and surf zone
- Highly mobile sediments due to waves and/or currents
- Reworked sediments predominantly due to bottom wave orbital motion
- Depositional environment

Potential Hazard from Monopile Scour

- Higher scour potential
- Lower scour potential

Potential Hazard from Export Cable Trench Scour

- Higher scour potential
- Lower scour potential

Areas where scour around monopiles is anticipated to be higher due to higher-velocity bottom flow around the structure. The potential hazard to inter-array cables may also be higher due to sand wave migration.

Potential hazard to export cable due to sand wave migration (as discussed in the main text).

Areas where scour around monopiles is anticipated to be lower (or limited) due to lower bottom velocities within the interpreted depositional environment. The potential hazard for inter-array cables may be lower due to the apparent absence of migrating sand waves.

Areas where scour around monopiles is anticipated to be higher due to higher-velocity bottom flow around the structure. Due to the lack of data, it is unknown whether migrating sand waves are present to pose a hazard to inter-array cables.

Areas where export cable trench scour is anticipated to be lower due to lower seabed velocities within the interpreted depositional environment. However, trenching may disturb the in situ conditions of the surficial sediments by either:

1. Causing the fine-grained sediments to be suspended into the water column and potentially transported away, or
2. Changing the seabed roughness due to trenching activity.

In the first case, the loss of fine-grained sediments may decrease the threshold shear stress of the surficial sediments (Mitchener et al., 1996), meaning the sediments may be more easily erodible. In the second case, an increase in bottom roughness causes increased seabed friction, meaning the seabed shear stress is higher, which may cause scour. Therefore, scour may occur within the trenched area even though it is

Notes:

- 1) The evaluation of sediment mobility is based on limited sediment, wave, and current data. Oceanographic data were applied to the OWF area from data collection locations within the regional vicinity, which required several assumptions in order to use the data. Therefore, the interpretation of sedimentary environments within the OWF is highly simplified in order to demonstrate the application of various datasets to evaluate sediment mobility.

Coordinate Grid: Latitude/Longitude, WGS84

OWF SCOUR SUSCEPTIBILITY
 Rhode Island Site
 TA&R Project #656
 Seabed Scour Considerations

Ongoing: Biological Effects Studies

Marine Mammal/Sea Turtle

- Marine Mammal and Sea Turtle Data Search and Literature Synthesis Including Stranding and Nesting Sites
- Underwater Hearing Sensitivity in the Leatherback Sea Turtle (*Dermochelys coriacea*): Assessing the Potential Effect of Anthropogenic Noise
- Atlantic Marine Mammal and Sea Turtle Data Search and Literature Synthesis Including Stranding and Nesting Sites
- Atlantic Marine Assessment Program for Protected Species (AMAPPS)
- Support for the Development of a Marine Mammal Data Archive
- Characterization and Potential Impacts of Noise Producing Construction and Operation Activities on the OCS (Part I)
- Characterization & Potential Impacts of Noise Producing Construction & Operations Activities on the OCS (Part II)
- Mitigation of Underwater Pile Driving Noise During Offshore Construction (TA&R)

Ongoing: Biological Effects Studies

Fish and Fish Habitat

- Effects of EMF From Transmission Lines on Elasmobranchs and Other Marine Species
- Effects of Pile Driving Sounds on Auditory and Non-Auditory Tissues of Fish
- Offshore Electrical Cable Burial for Wind Farms: State of the Art; Standards and Guidance; Acceptable Burial Depths and Separation Distances; and Sand Wave Effects (TA&R)

Ongoing: Biological Effects Studies

Avifauna

- Potential for Interactions between Endangered and Candidate Bird Species with Wind Facility Operations on the Atlantic OCS
- Surveying for Marine Birds in the Northwest Atlantic
- Determining Distributions and Movements of Long-tailed Ducks Using Satellite Telemetry
- Automated Analysis of Bird Vocalization Recordings
- Compendium of Avian Information and Comprehensive GIS Geodatabase
- Acoustic Monitoring of Temporal and Spatial Abundance of Birds Near Structures on the OCS of the Atlantic and Gulf of Mexico
- Pilot Study of Aerial High-Definition Video Surveys for Seabirds, Marine Mammals, and Sea Turtles on the Atlantic OCS

Ongoing: Environmental Monitoring Studies

- Support for National Oceanographic Partnership Program Project on Improving Cetacean Electronic Data Loggers
- Roadmap: Technologies for Cost Effective, Spatial Resource Assessments for Offshore Renewable Energy
- Evaluating Acoustic Technologies to Monitor Aquatic Organisms at Renewable Sites
- Developing Environmental Protocols and Modeling Tools to Support Ocean Renewable Energy and Stewardship
- Bayesian Integration for Marine Spatial Planning and Renewable Energy Siting

Ongoing: Social, Economic, and Cultural Resources Studies

- Evaluation of Visual Impacts on Historic Properties
- Renewable Energy Visual Evaluations
- OCS Renewable Energy and Space-Use Conflicts and Related Mitigation
- Battle of the Atlantic Expedition 2010, 2011
 - <http://sanctuaries.noaa.gov/missions/battleoftheatlantic/>
- Energy Market and Infrastructure Information for Evaluating Alternative Energy Projects for OCS Atlantic and Pacific Regions

New Starts for FY 2011 and 2012

- Synthesis, Analysis, & Integration of Air Quality and Meteorological Data for the Atlantic Region (FY 2011)
- Information Synthesis on the Potential for Bat Interactions with Offshore Wind Facilities (FY 2011)
- The Impact and Attitudes of OCS Wind Development on Recreation and Tourism in the Atlantic Region (FY 2011)
- Evaluation of Lighting Schemes for Offshore Wind Facilities & Impacts to Local Environments (FY 2011)
- The Economic Impact of OCS Wind Development on Fishing (FY 2012)

Proposed Studies FY 2012-2013

- Pilot Study: Tracking Offshore Occurrence of Common Terns and American Oystercatchers with VHF Arrays
- Determining Offshore Use by Diving Marine Birds Using Satellite Telemetry
- Potential Space-Use Conflicts between Commercial Shipping and Wind Facilities on the Atlantic OCS
- Offshore Wind Turbine Allision Impact Analysis and Modeling
- An Estimation of Criteria Pollutant Emissions on the Atlantic OCS
- Environmental and Social Consequences of Port Expansion and Operations Associated with Offshore Commercial Wind Energy on the Mid-Atlantic OCS
- Literature Review: Environmental Risks, Fate and Effects of Chemicals Associated with Wind Turbines on the Atlantic OCS
- Microclimatology Modeling near Offshore Wind Energy Facilities

Atlantic Wind Energy Workshop

July 12-14, 2011

Herndon, VA

- Builds on the Worldwide Synthesis and Analysis of Existing Information Regarding Environmental Effects of Alternative Energy Uses on the Outer Continental Shelf Workshop (2007)
- Goals:
- (1) Summary and synthesis of recent and ongoing environmental and social sciences research
- (2) Identifying and prioritizing data gaps
- (3) Developing partnerships and identifying potential synergies for future studies
- Topics:
- 1) Social Economics 3) Flying Animals
- 2) Environmental Studies 4) Technology & Safety Research

Questions?

Renewable Energy Research:

www.boemre.gov/eppd/sciences/esp/RenewableEnergyResearch.htm

Atlantic OCS Ongoing Studies:

www.boemre.gov/eppd/sciences/esp/AtlanticOngoingStudies.htm