Wildlife distributions and habitat use on the mid-Atlantic Outer Continental Shelf

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Biodiversity Research Institute

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University of Oklahoma

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Memorial University of Newfoundland

Canadian Wildlife Service

VA Dept of Game and Fisheries

DE Division of Fish and Wildlife

RI Division of Fish and Wildlife

University of Rhode Island

NC Wildlife Resource Commission

Inform offshore wind development

- Provide baseline ecological data and analyses
  - Wildlife distribution patterns
  - Understand causes of these patterns
  - Movements (site fidelity, population connectivity)
- Develop technological resources for future monitoring and assessments

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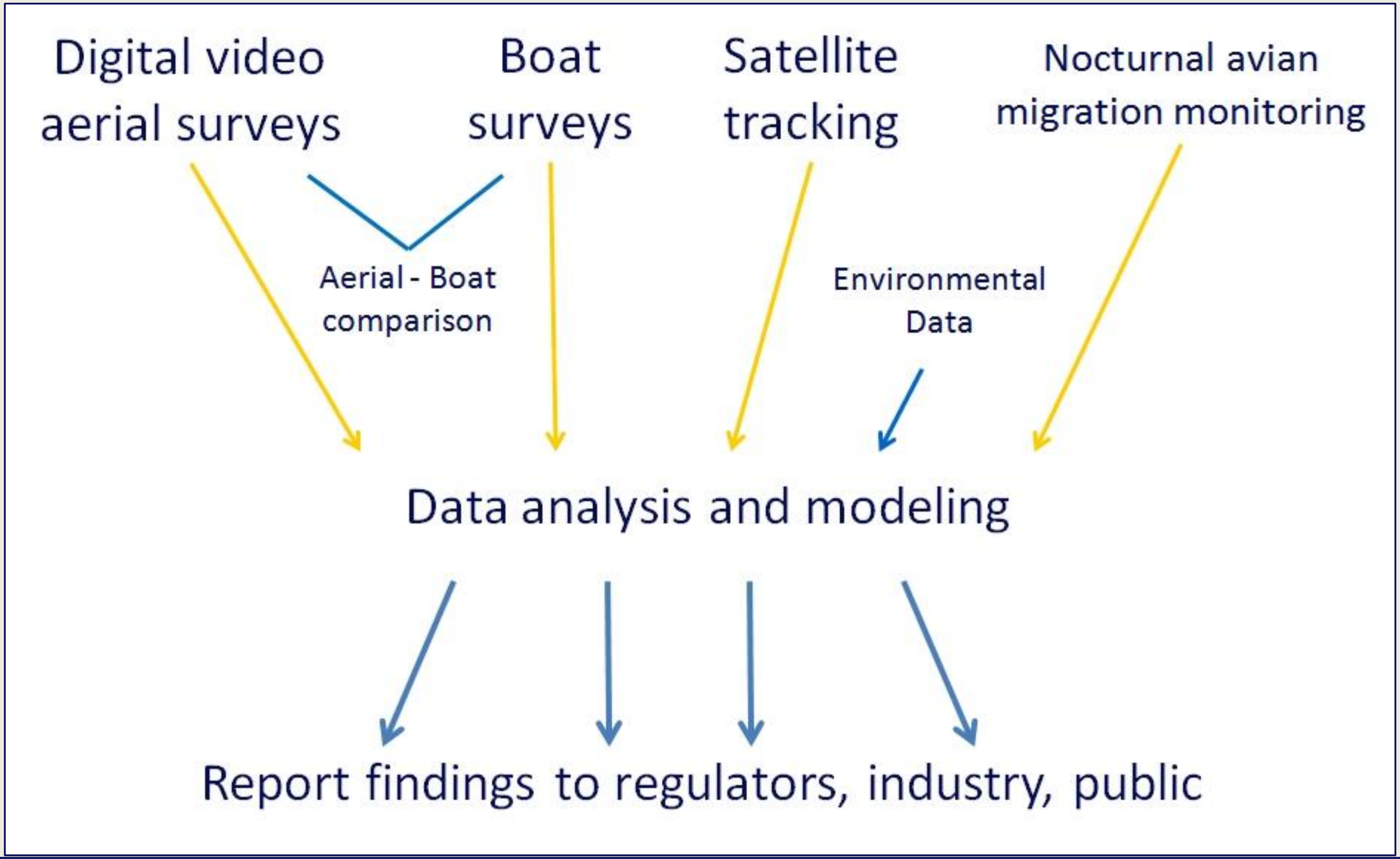
Photo courtesy Nysted HavmØllepark

What makes this study important?

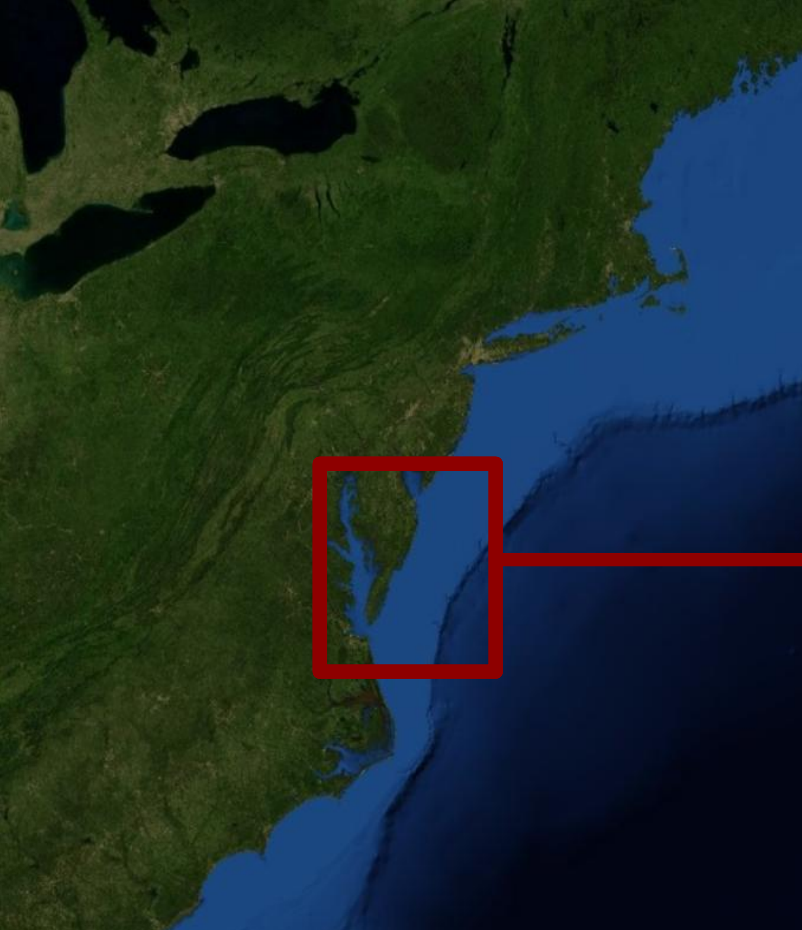
- 2+ years of baseline data for wind energy stakeholders
- Use of new technologies and approaches
- Scale of the study
  - Study area, number of species observed, mix of tech
- Improved understanding of species composition and use →→ more sustainable offshore wind development

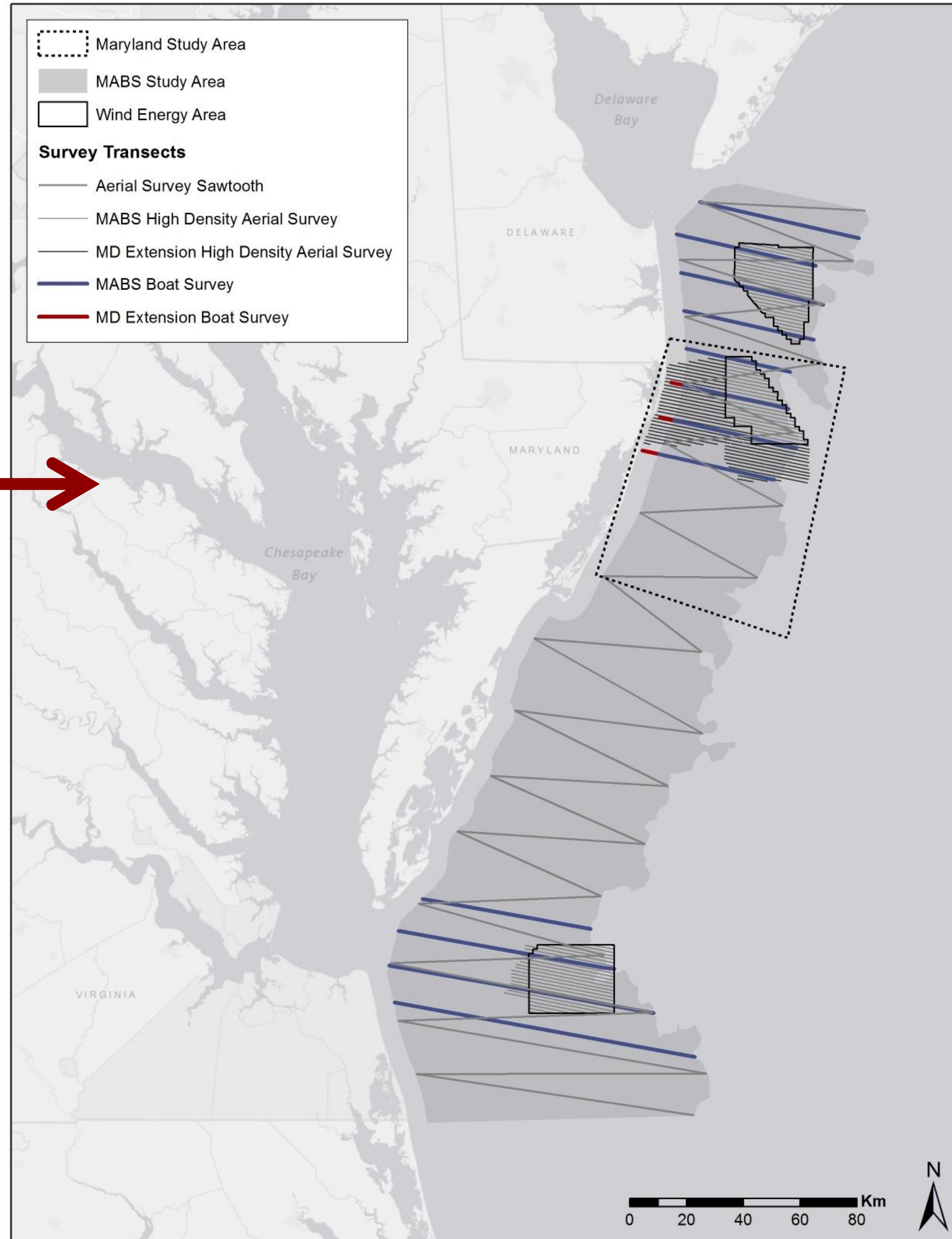
Methods summary



Key findings

1. Boat-based and digital video aerial surveys each had specific advantages
2. Substantial variation in species composition and spatial patterns by season and year
3. Waters within ~30-40 km of shore, particularly offshore of Chesapeake and Delaware Bays, were important to a wide range of species





1. Boat-based and high resolution digital video aerial surveys

Boat-based and digital video aerial surveys

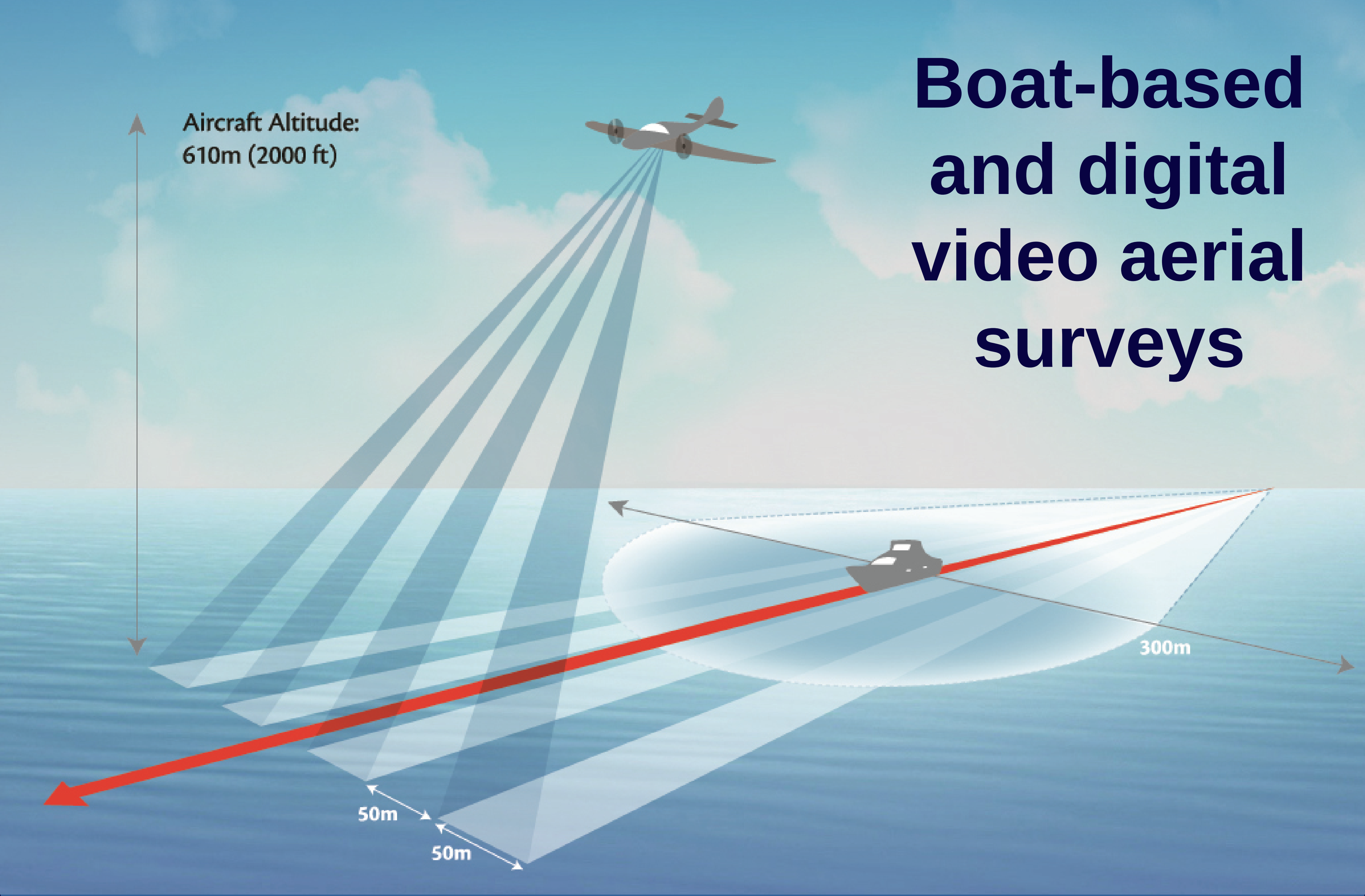


Image Credit: Linda Mirabile/Glen Halliday

Summary: Boat-based and digital video aerial surveys

- Digital video aerial surveys covered large areas quickly, did not disturb wildlife, and provided archivable data
- Boat surveys provided more detailed data on species identities and behaviors
- Potential to integrate data and take advantage of the strengths of both survey types?

	Video Aerial Survey	Boat Survey
Geographic Coverage	good	good
Temporal Coverage	poor	poor
Population Distributions	good	good
Abundance*	good	good
Detection (marine mammals)	good	good
Detection (sea turtles)	good	poor
Detection (birds)	fair	good
Species Identification	fair	good
Behaviors	fair	good
Movements	poor	poor
Diurnal Activities	good	good
Nocturnal Activities	—	—

Table 1: Methods for studying offshore wildlife that were incorporated into this study.

Relative strengths and weaknesses of each approach are indicated by depth of color (■ = good, ■ = fair, ■ = poor). A dash indicates that data were not available from this survey method.

Values are subjective; for example, while detection bias was not quantified for aerial surveys, detection of avian species in our boat surveys appeared to be better than digital video aerial surveys in many cases, at least after correction for distance bias in boat data. Thus, boat surveys were categorized as "good" for this type of data, while digital video aerial surveys were considered "fair."

Either absolute or relative abundance.

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2. Seasonal and species-specific variation

- Wide variation in distribution and abundance patterns (seasonally and between species groups)



© from left: HiDef Aerial Surveying, Ltd., Michael O'Neill/Oceans-Image/Photoshot, Jonathan Fiely-BRI

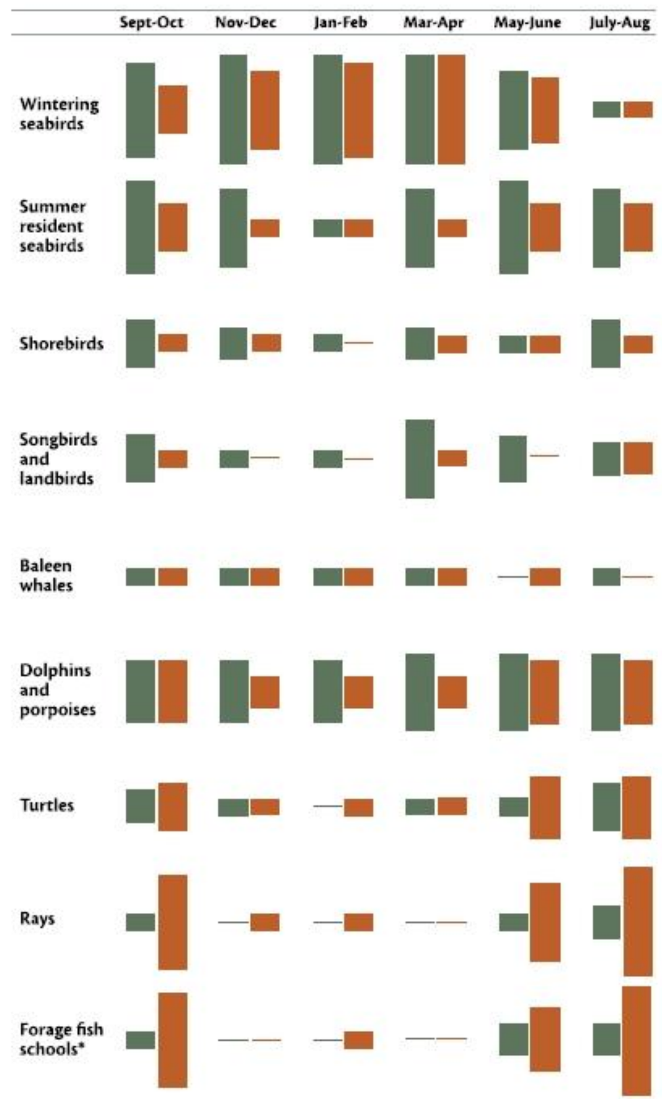
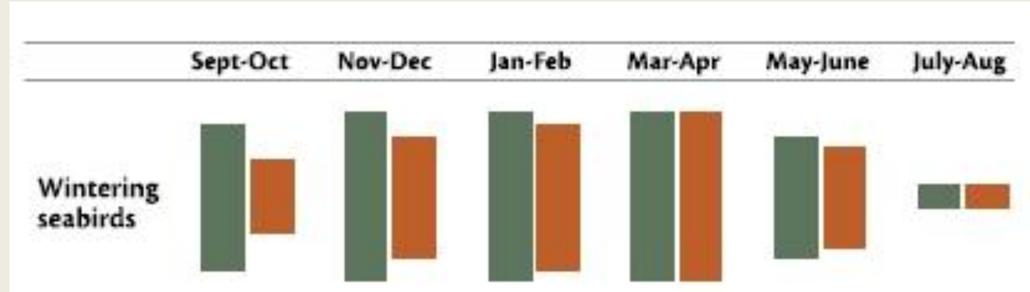
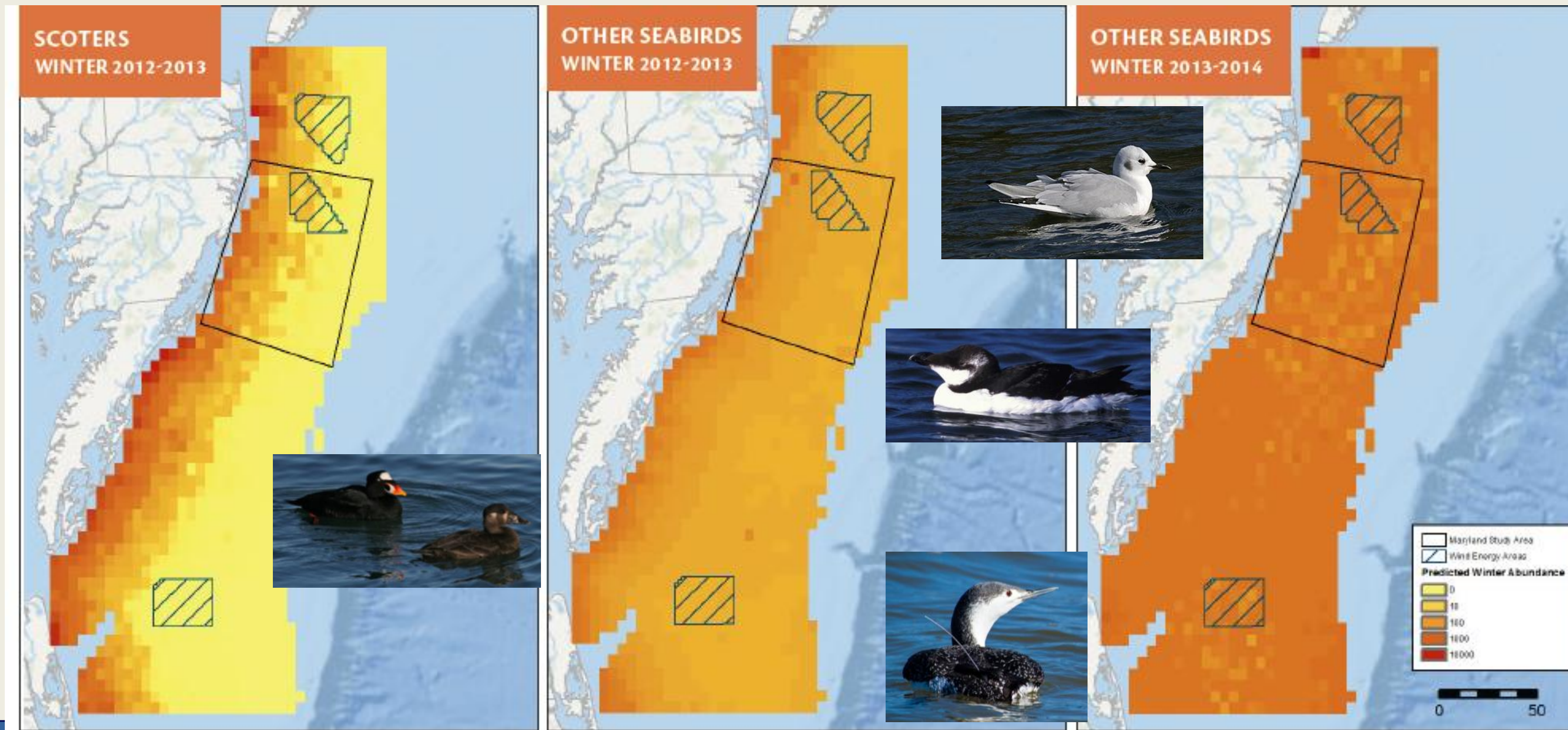


Figure 6: Temporal changes in relative abundance for major taxonomic groups. Data are from the boat-based surveys (■ *left*) and high resolution digital video aerial surveys (■ *right*) conducted in 2012-2014. Species included in each category are listed in Williams et al. (2015). Labels refer to seasons in the Northern Hemisphere.

**Forage fish were counted as schools, not as individuals, unlike the other animal groups.*

Variation between years
(example: wintering seabirds)





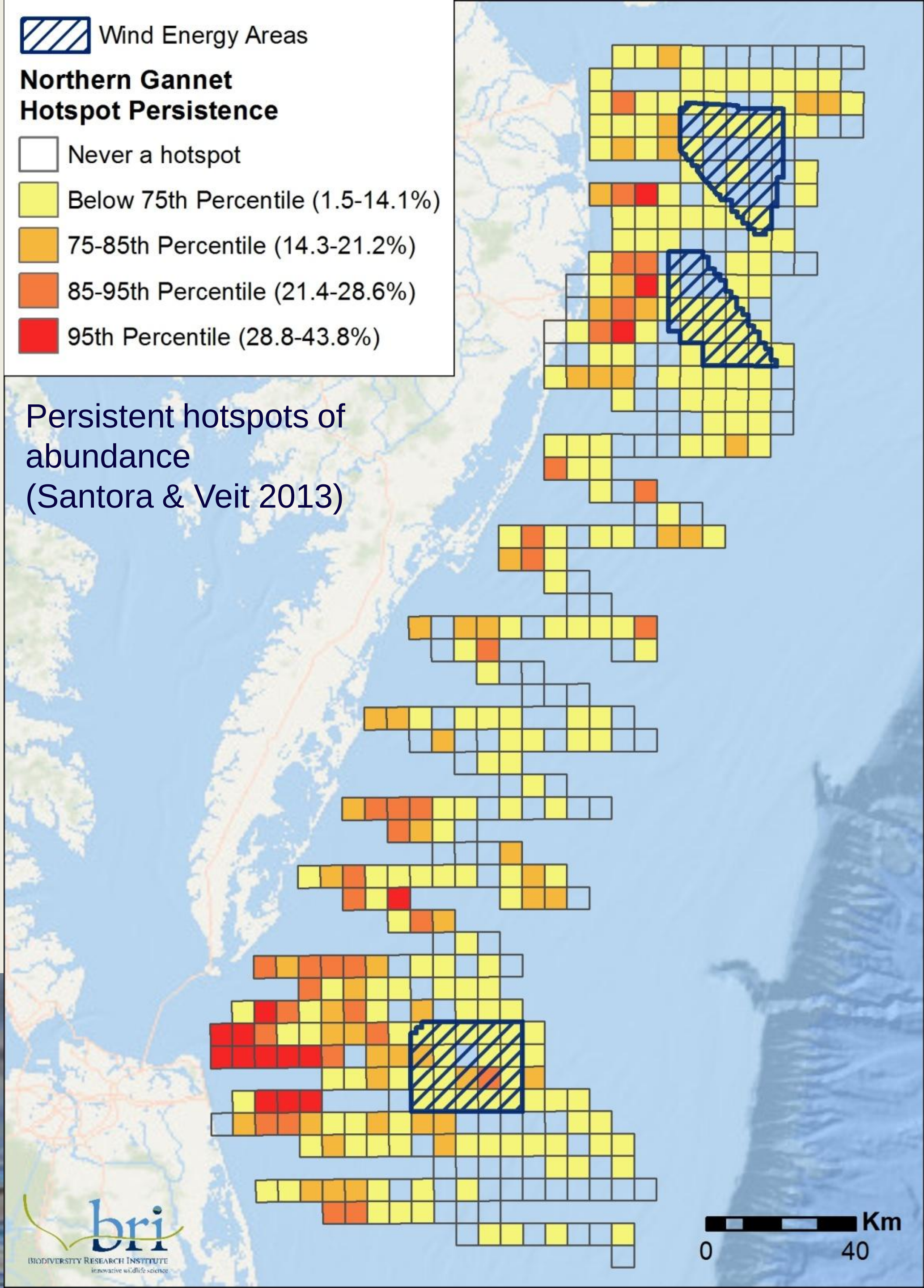
Photos: Surf Scoters, Jonathan Fiely-BRI; Bonaparte's Gull, Deborah Tracy-Kral; Razorbill, John Brian Patrick Patteson/VIREO; Red-throated Loon, Jonathan Fiely-BRI

3. Persistent hotspots of relative abundance (or species richness)

- Goal: identify spatial patterns of species abundance (or species richness) that persist over time and may indicate the locations of important habitat areas
  - Identify locations where animals consistently observed in numbers > standardized baseline
- Step 1: identify survey-specific hotspots
  - Boat and aerial data handled independently
  - Survey effort and observation data binned by BOEM lease block (4.8 x 4.8 km grid cells)
  - Gamma distribution fitted to non-zero counts from each survey; top quartile = survey-specific hotspots
- Step 2: across all times surveyed, what % of time is each block a hotspot?
  - In locations surveyed by both survey methods, results weighted by effort-corrected total abundance (or species richness) for each dataset

Example: Northern Gannets

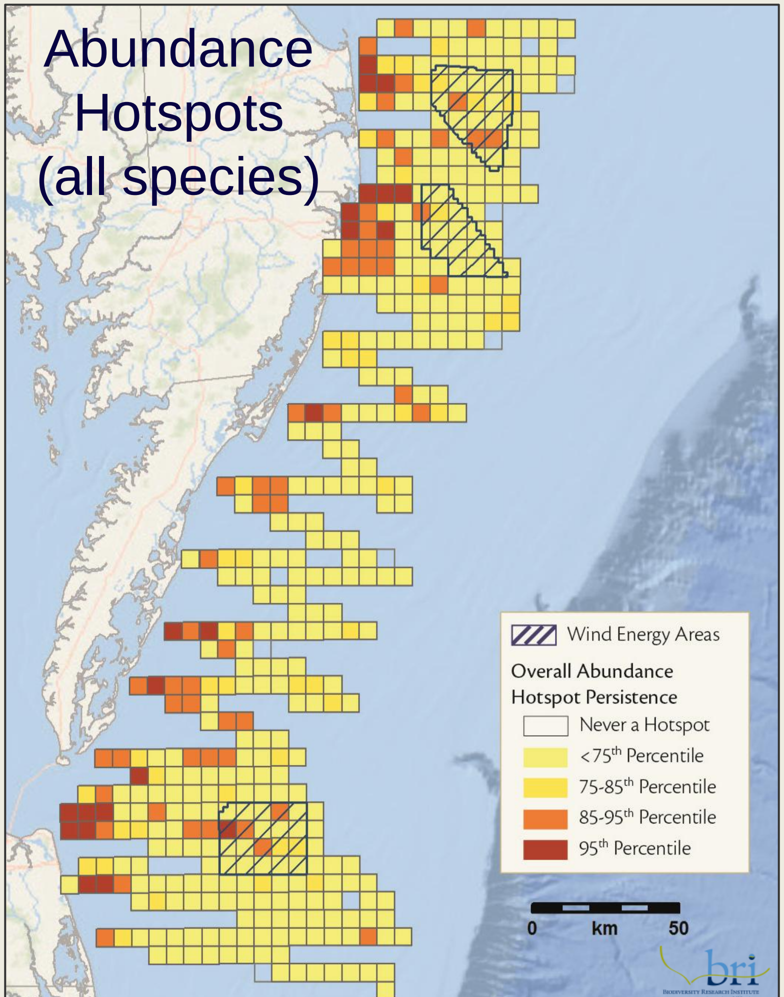
- Abundance hotspots = areas of consistently higher numbers of individuals across surveys
- 95th percentile = locations with high effort-corrected counts of gannets in >29% of surveys

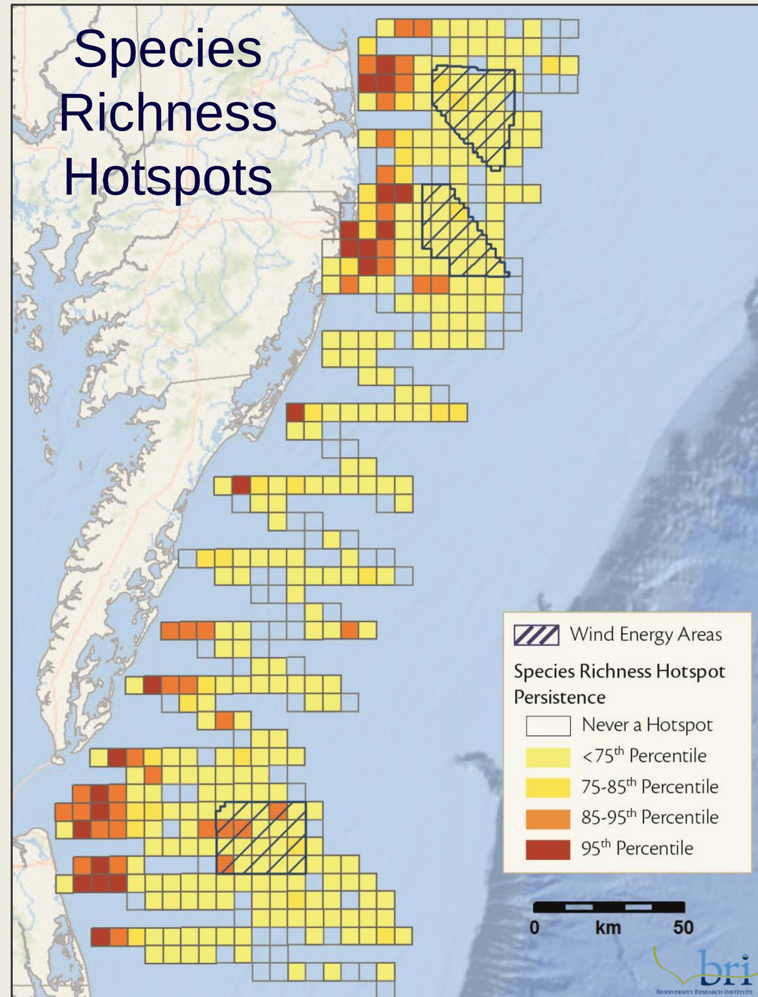


Persistent hotspots of abundance (Santora & Veit 2013)

Persistent patterns (all species)

Persistent hotspots of abundance and species richness





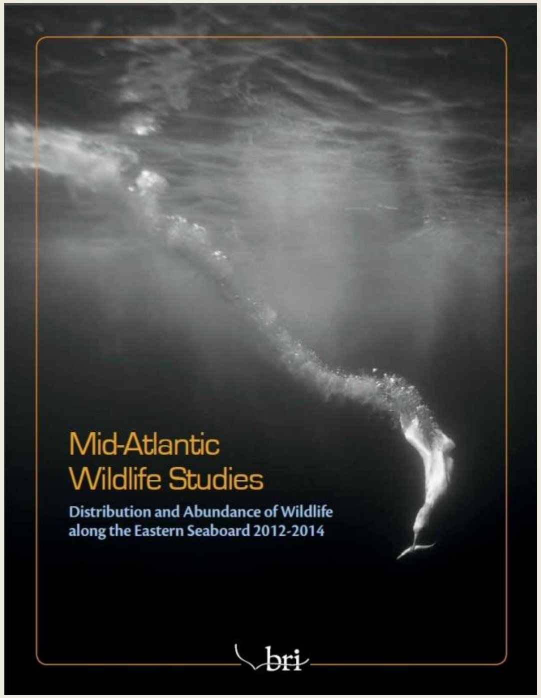
Summary: Persistent patterns

- Bays have strong influence on distribution patterns in the mid-Atlantic
- Generally nearshore (~30-40 km from shore) distribution of overall abundance and species richness, though there are notable exceptions


Photo © Kate Sutherland

Implications

- More informed siting decisions for future development
- Regulators and developers can more easily navigate the environmental permitting process
  - Baseline data available to create and evaluate development proposals
- Inform some potential mitigation approaches



Project summary and reports: www.briloon.org/MABS/reports

- Next step: focus on species most likely to be affected (due to their predicted exposure from this study, or their behavior, conservation status, or other factors)

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