

# Ecological Baseline Studies on the Mid-Atlantic Outer Continental Shelf

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**Kate Williams and  
Iain Stenhouse**

**Biodiversity Research  
Institute**

**24 April 2013**



# Who is BRI?

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***Understand the effects of anthropogenic stressors on wildlife***



- Research
- Collaboration
- Outreach

# Mid-Atlantic Baseline Studies

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## Co-PIs and collaborators:

Biodiversity Research Institute (*Kate Williams, Evan Adams, David Evers, and Iain Stenhouse*)

North Carolina State University (*Beth Gardner*)

Duke University Marine Lab (*Ari Friedlaender and David Johnston*)

College of Staten Island (*Richard Veit*)

Memorial University of Newfoundland (*William Montevicchi*)

BOEM Division of Environmental Sciences

USFWS Region 5 Migratory Bird Program

Sea Duck Joint Venture

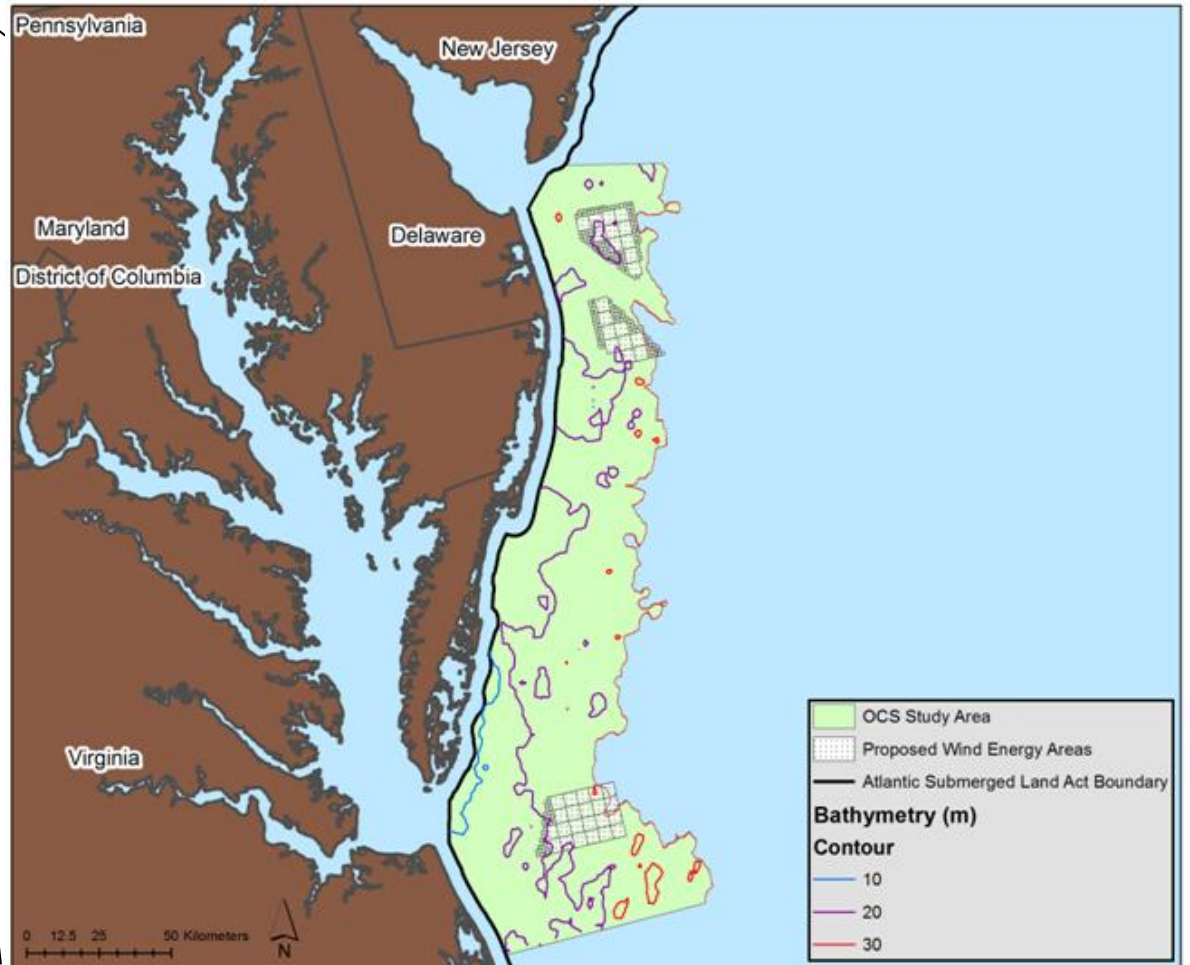
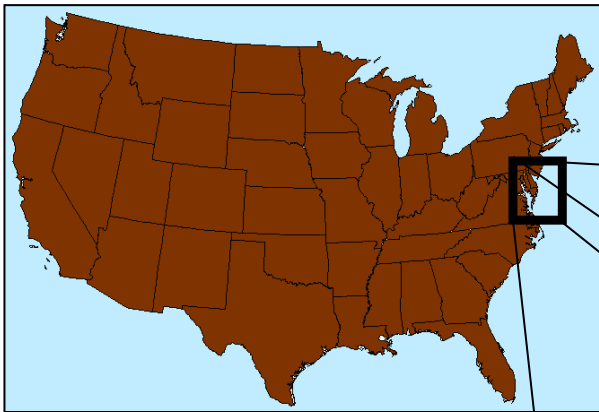


# Mid-Atlantic Baseline Studies

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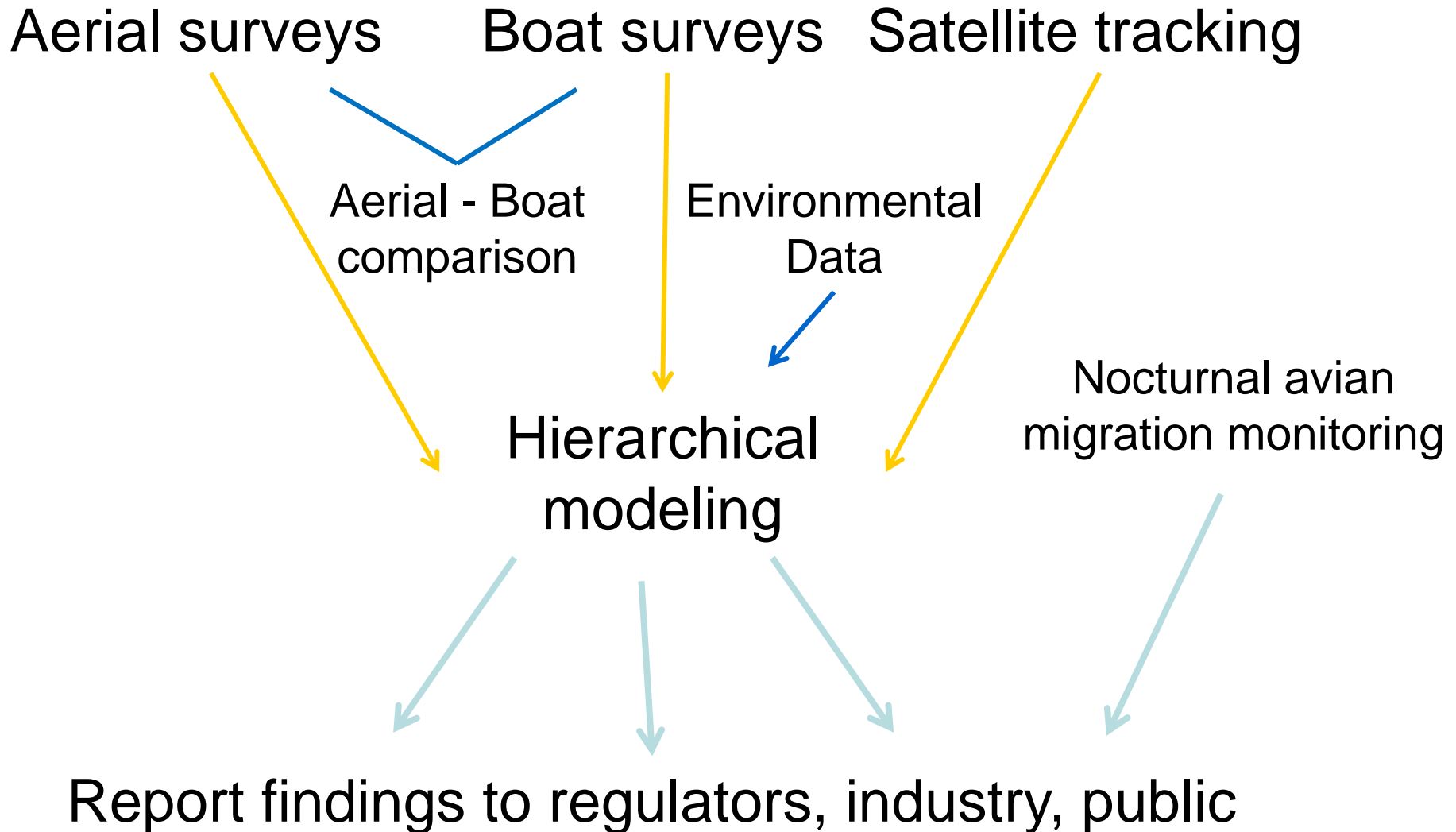
- **Broad scale ecological baseline studies (2012–2015)**
- **Project goal:** Facilitate the permitting and environmental review of offshore wind development on the mid-Atlantic outer continental shelf.
- **Primary objective:** Quantify bird, sea turtle, and marine mammal densities seasonally and annually throughout the study region and develop hierarchical models to examine spatial patterns and trends.





# Mid-Atlantic Baseline Studies

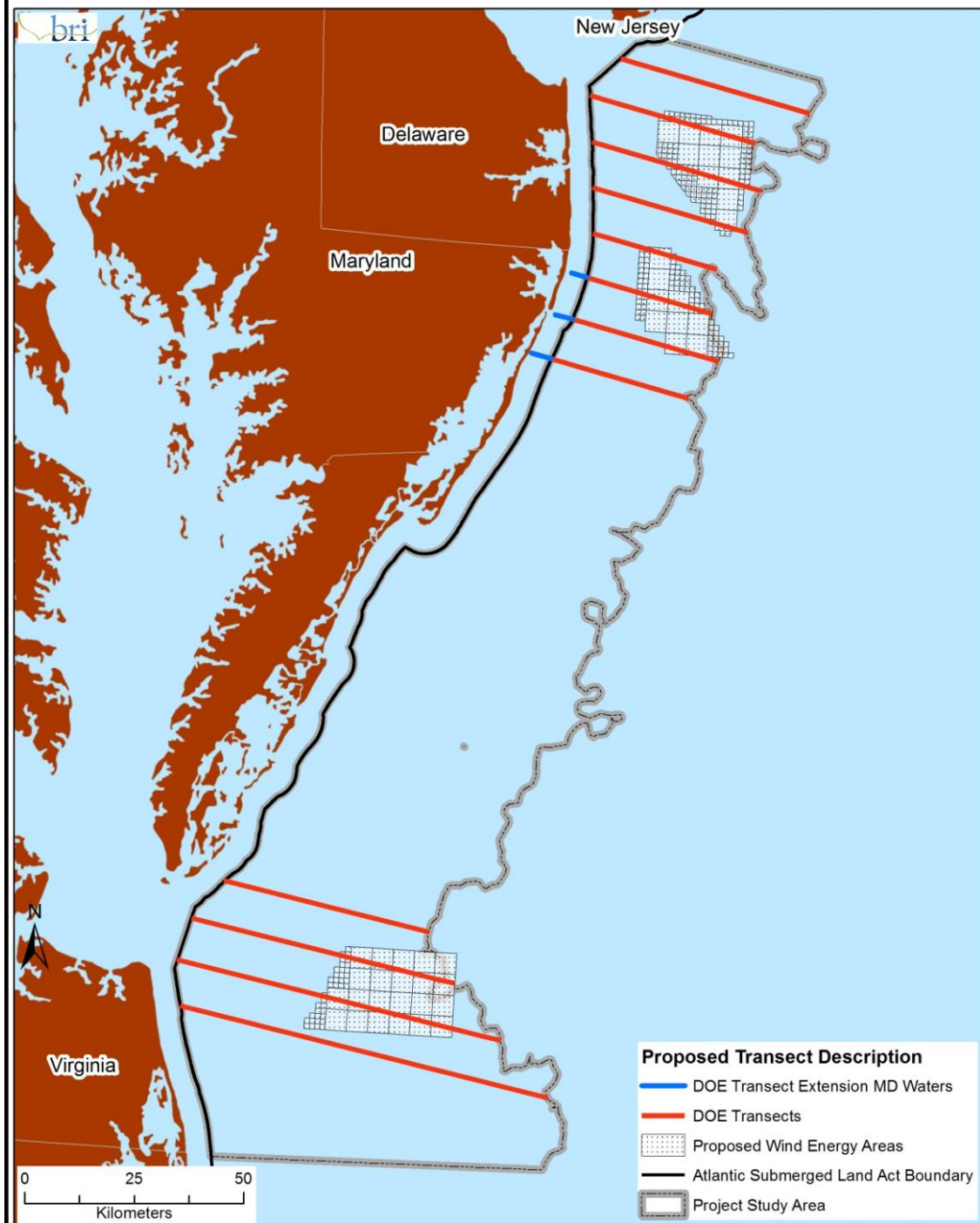
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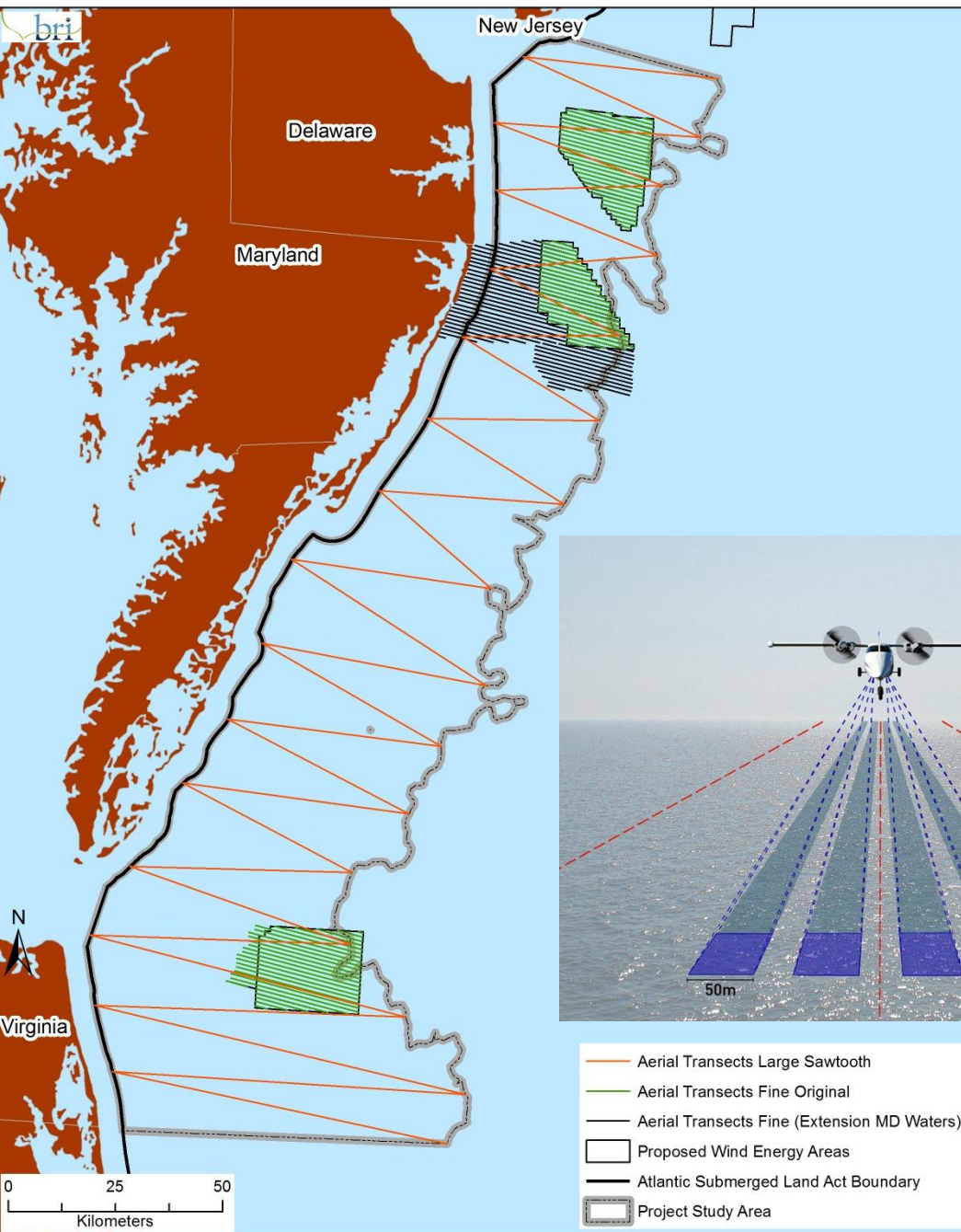




# Boat Surveys

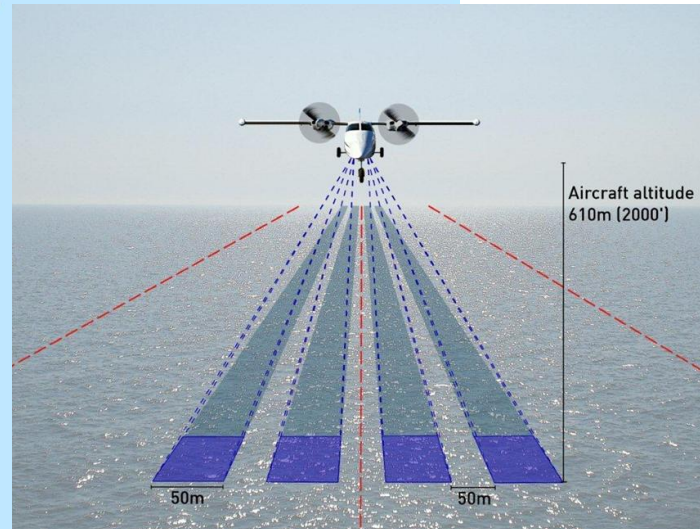
- 2 years
- 16 surveys
- 570 km/survey





# Aerial Surveys

- High-definition video
- 14 surveys over 2 years
- 2-3 cm ground spatial resolution
- Full QA process
- Flight height calculated from video images



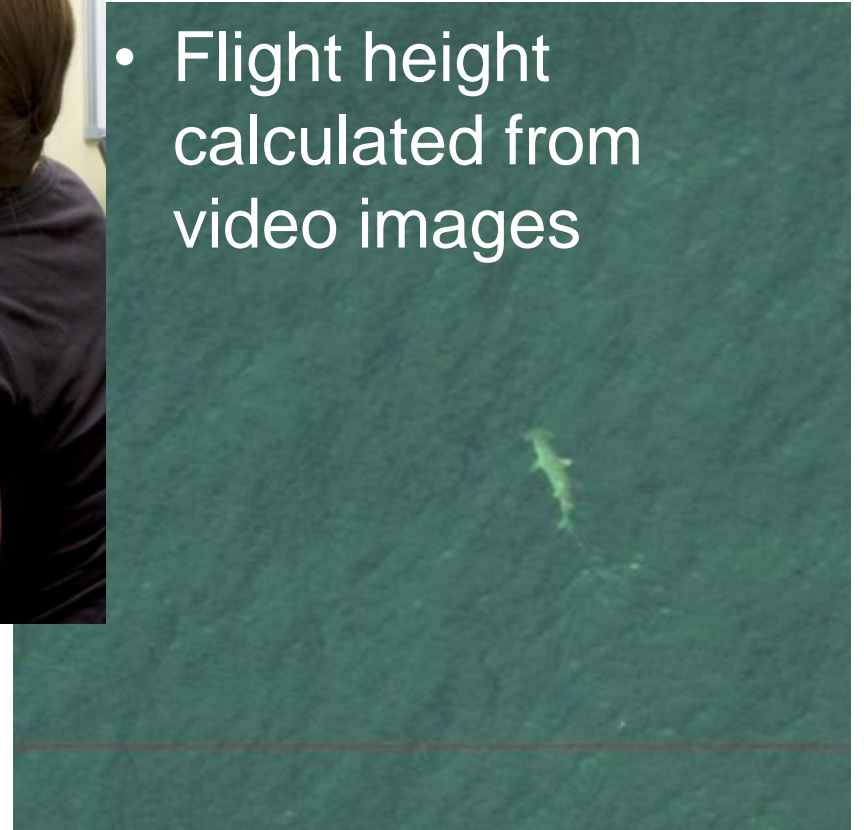


# Video Review

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- Full QA process
- Flight height calculated from video images



# Bottlenose Dolphins

from: 610 m  
at: 2 cm GSD

3 adults at surface

2 juveniles

5+ at depth



# Individual Tracking of Bird Species

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- Collaboration (BOEM, USFWS, BRI, DOE, Memorial Univ. of Newfoundland...)
- Focal species: Northern Gannets, Red-throated Loons, Surf Scoters, and Peregrine Falcons



Photo by BRI staff



# Individual Tracking

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# Modeling of Animal Abundance

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- Hierarchical Bayesian framework
- Understand factors that influence species distributions and relative abundance
- Occupancy modeling for species with infrequent encounters
- Incorporation of individual tracking data?

# Nocturnal Migration Monitoring

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- Nocturnal avian acoustic monitoring
- NEXRAD: Next Generation Radar

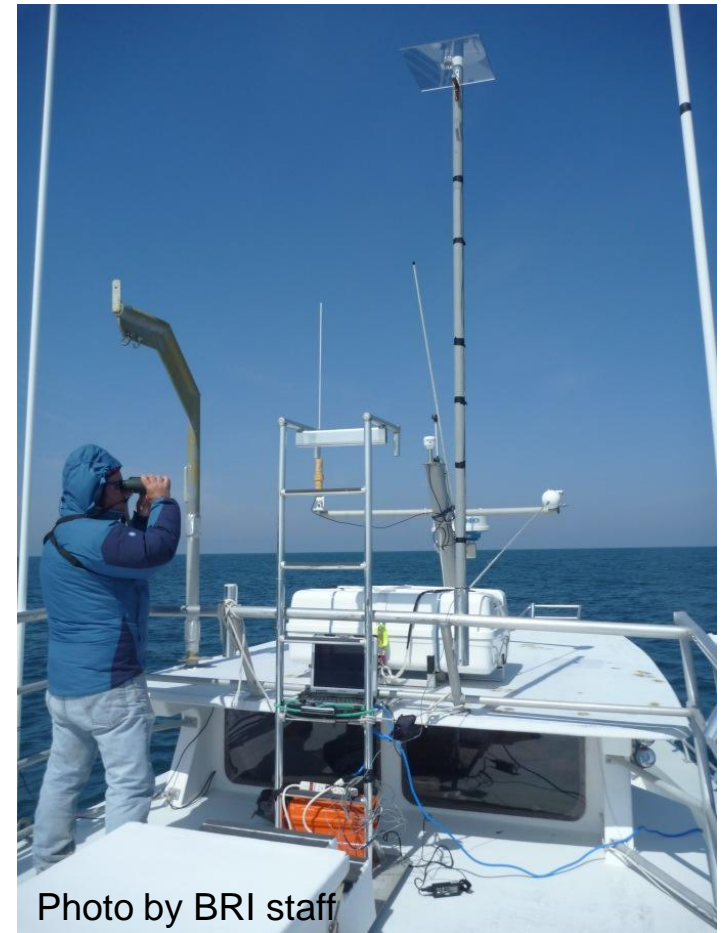
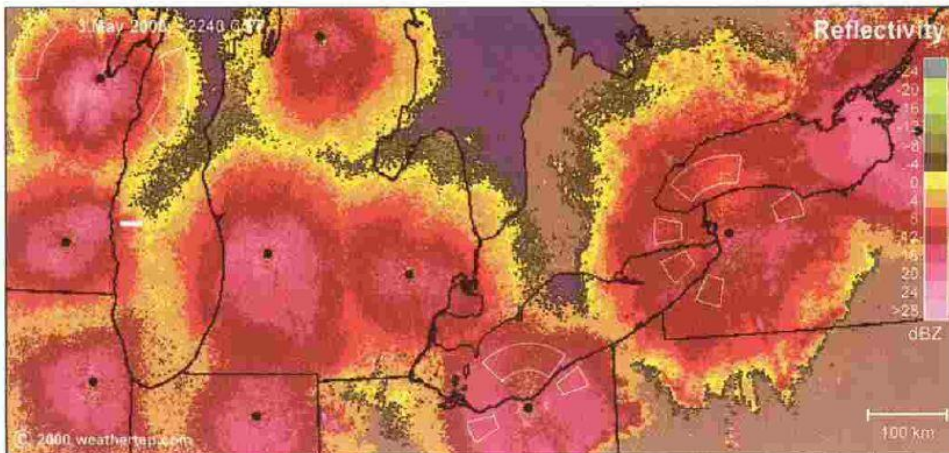
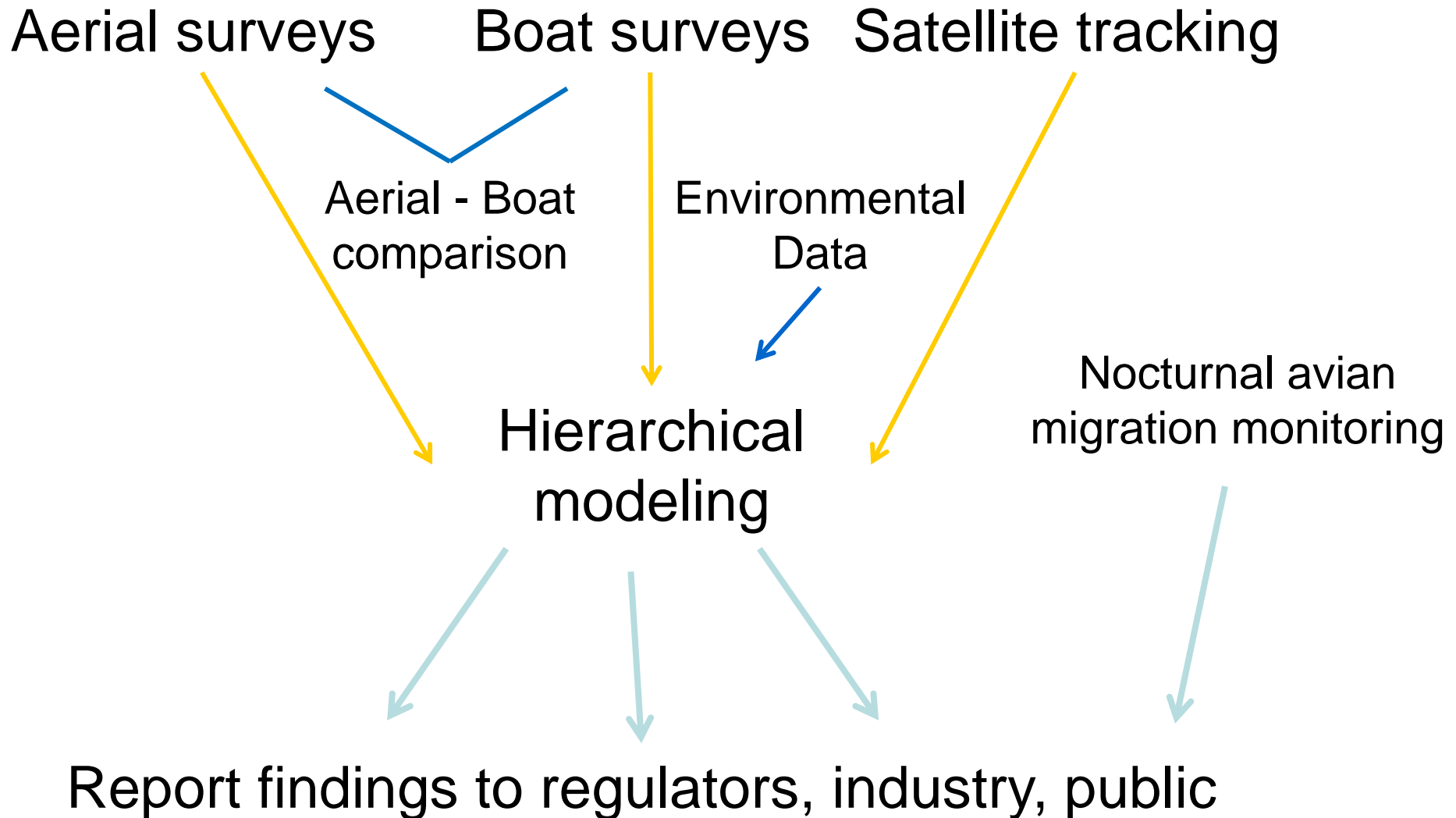


Photo by BRI staff

# Mid-Atlantic Baseline Studies

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# Preliminary Results to Date

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- Boat surveys: 8 completed
- Video aerial surveys: 8 completed
- Satellite telemetry: 87 individuals tracked
- Passive acoustics: passerines and shorebird species migrating offshore





# Boat Surveys

\*Data are preliminary



Cory's Shearwater

Species Group	April	June	Aug.	Sept.	Nov.	Total Count	% of Total Obs.
Gannets	486	2	0	0	2321	<b>2809</b>	32.9%
Gulls	209	67	145	213	978	<b>1612</b>	18.9%
Terns	108	99	332	395	56	<b>990</b>	11.6%
Loons	510	7	0	0	275	<b>792</b>	9.3%
Storm-Petrels	3	230	129	7	0	<b>369</b>	4.3%
Scoters	1	0	0	0	334	<b>335</b>	3.9%
Unidentified Birds	1	0	0	10	142	<b>153</b>	1.8%
Cormorants	10	5	0	3	128	<b>146</b>	1.7%
Passerines	12	2	48	49	14	<b>125</b>	1.5%
Ducks and Geese (excluding scoters)	0	0	0	30	61	<b>91</b>	1.1%
Wading birds and shorebirds	9	5	3	57	3	<b>77</b>	0.9%
Shearwaters	0	44	1	5	1	<b>51</b>	0.6%
Pelicans	0	4	1	18	2	<b>25</b>	0.3%
Jaegers and Skuas	11	2	0	1	2	<b>16</b>	0.2%
Raptors	0	2	0	1	0	<b>3</b>	0.0%
<b>All Birds</b>	<b>1360</b>	<b>469</b>	<b>659</b>	<b>789</b>	<b>4317</b>	<b>7594</b>	<b>88.9%</b>

# Boat Surveys

\*Data are preliminary



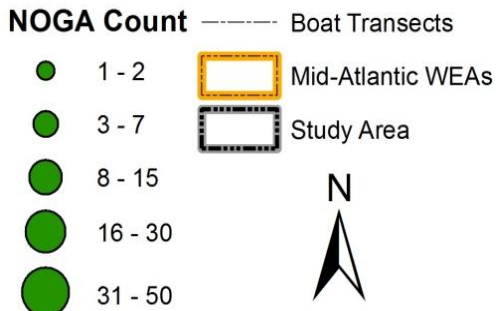
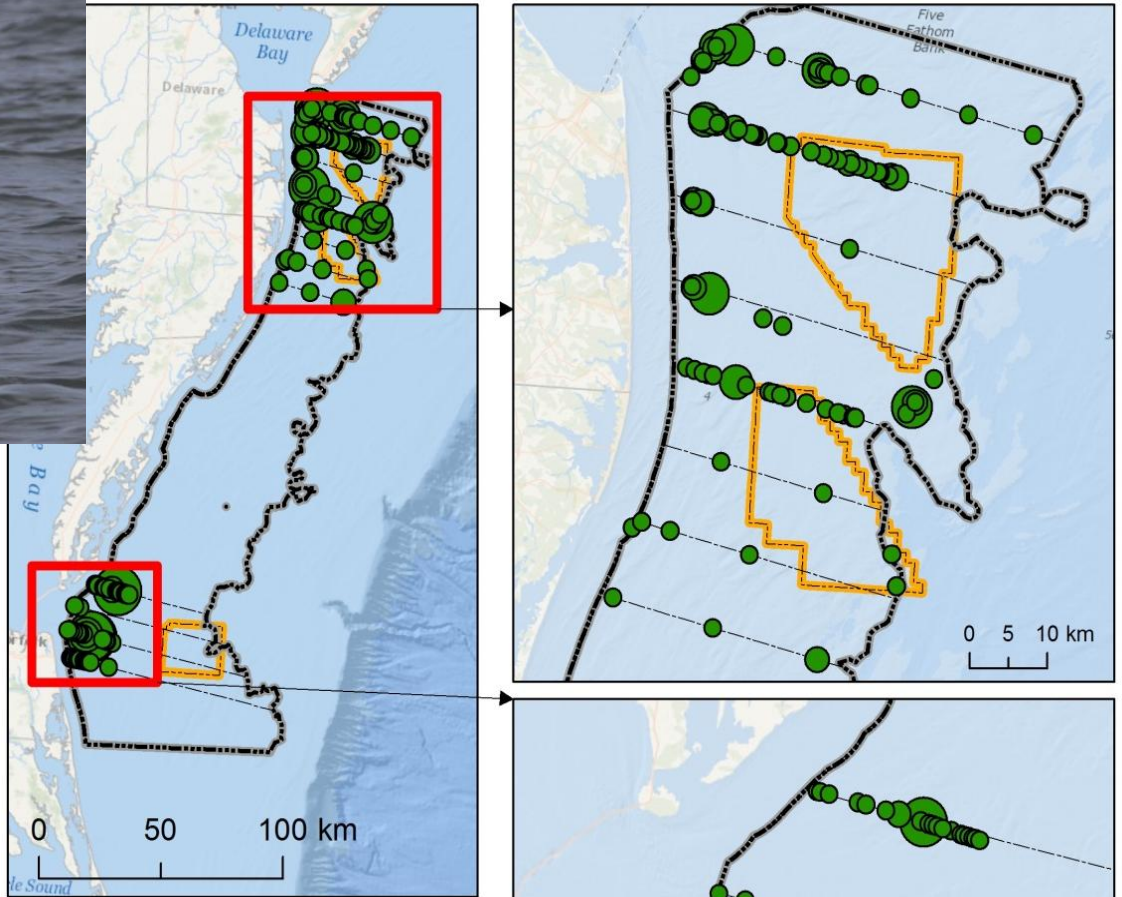
Species Group	April	June	Aug.	Sept.	Nov.	Total Count	% of Total Obs.
Marine Mammals	225	202	99	106	34	<b>666</b>	7.8%
Fish - individuals	1	70	0	61	9	<b>141</b>	1.7%
Sea Turtles	15	13	22	8	2	<b>60</b>	0.7%
Bait balls (many fish)	0	19	25	6	0	<b>50</b>	0.6%
Rays	0	3	14	1	0	<b>18</b>	0.2%
Jellyfish	0	5	0	1	3	<b>9</b>	0.1%
Bats	0	0	0	1	0	<b>1</b>	0.0%
<b>All Non-avian Animals</b>	<b>241</b>	<b>312</b>	<b>160</b>	<b>184</b>	<b>48</b>	<b>945</b>	<b>11.1%</b>

# Observations of Northern Gannets During Boat Surveys Conducted in April, 2012



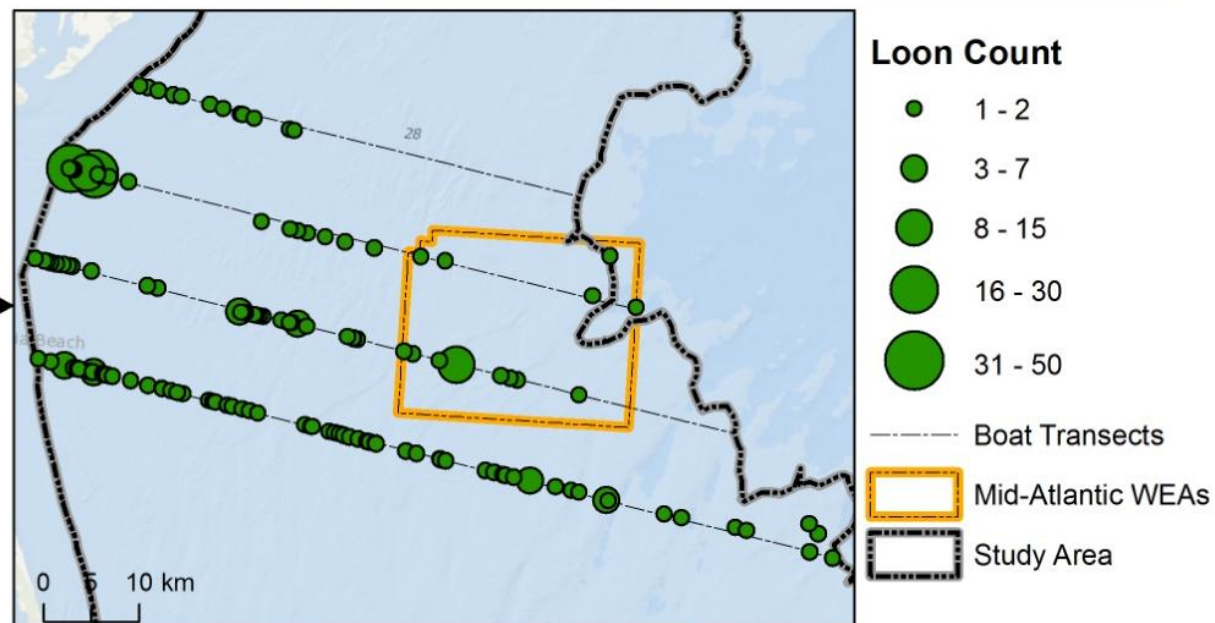
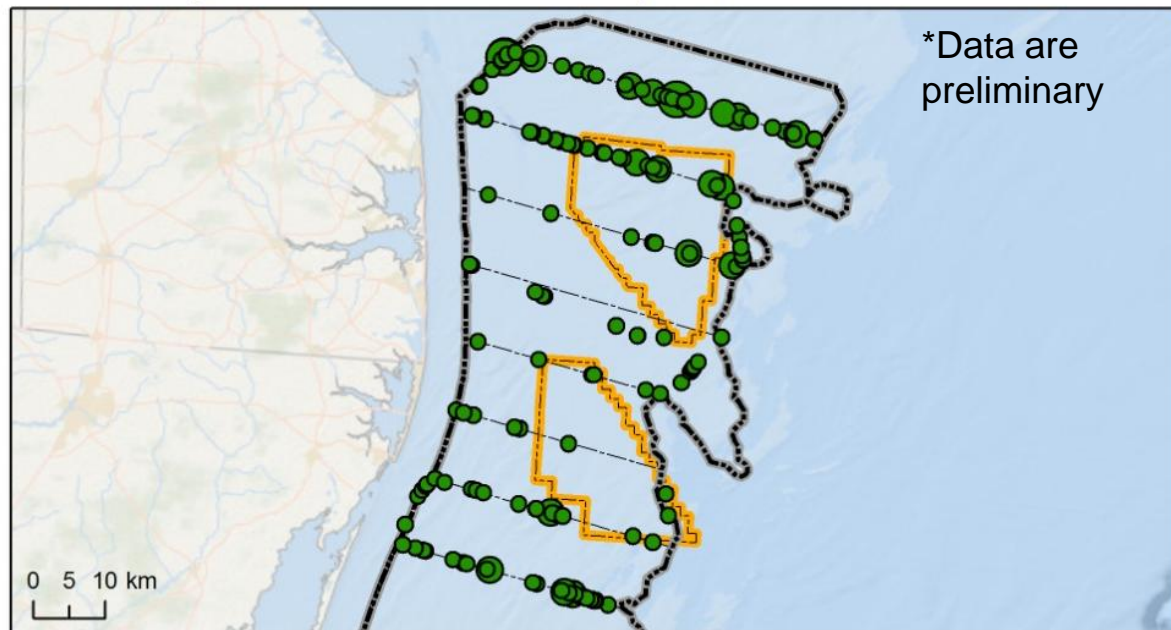
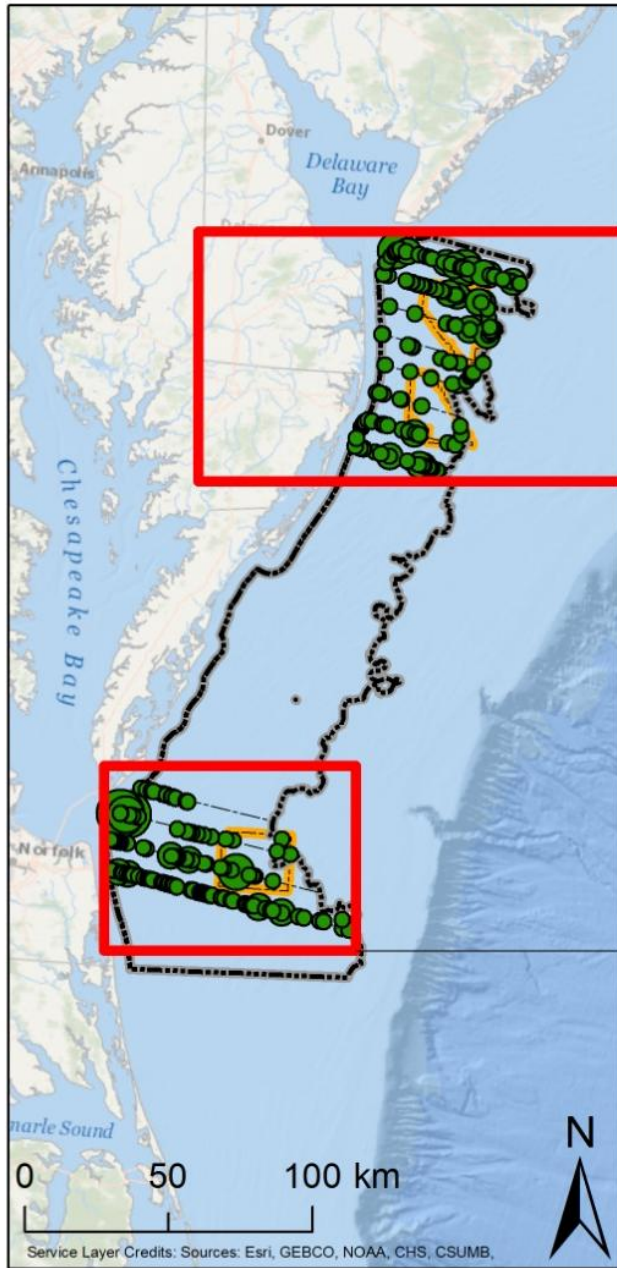
© Dan Poleschook

\*Data are preliminary





# Observations of Red-throated and Common Loons During Boat Surveys Conducted in April, 2012





# Aerial Surveys

\*Data are preliminary

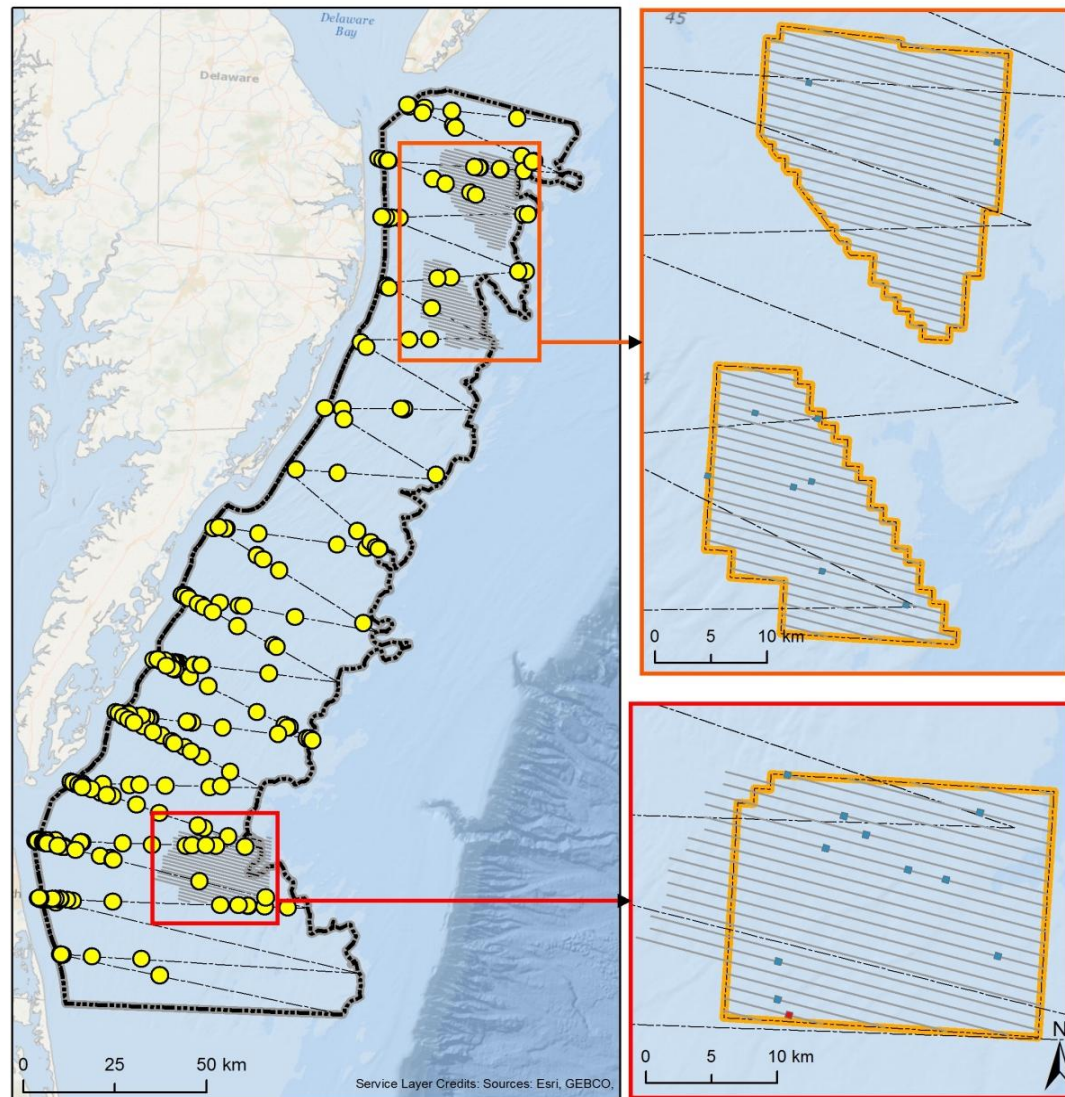
Area	% of total transect length	Birds	Marine Mammals	Sea Turtles	Sharks and Rays	Fish (individuals)	Totals
Sawtooth	53%	11,925	258	270	2,574	320	15,347
DE WEA	16%	373	24	7	15	2,614	3,033
MD WEA	12%	207	15	18	10	40	290
VA WEA	19%	386	12	224	3,058	31	3,711
	<b>Totals:</b>	<b>12,891</b>	<b>309</b>	<b>519</b>	<b>5,657</b>	<b>3,005</b>	<b>22,381</b>





\*Data are preliminary

## Observations of Northern Gannets During Aerial Surveys Conducted in March, 2012



● Individual NOGA Observations

Sum of Observations of Northern Gannets  
by 500m Grid within WEA Areas

■ 1 ■ 2

— Fine-scale Aerial Transects

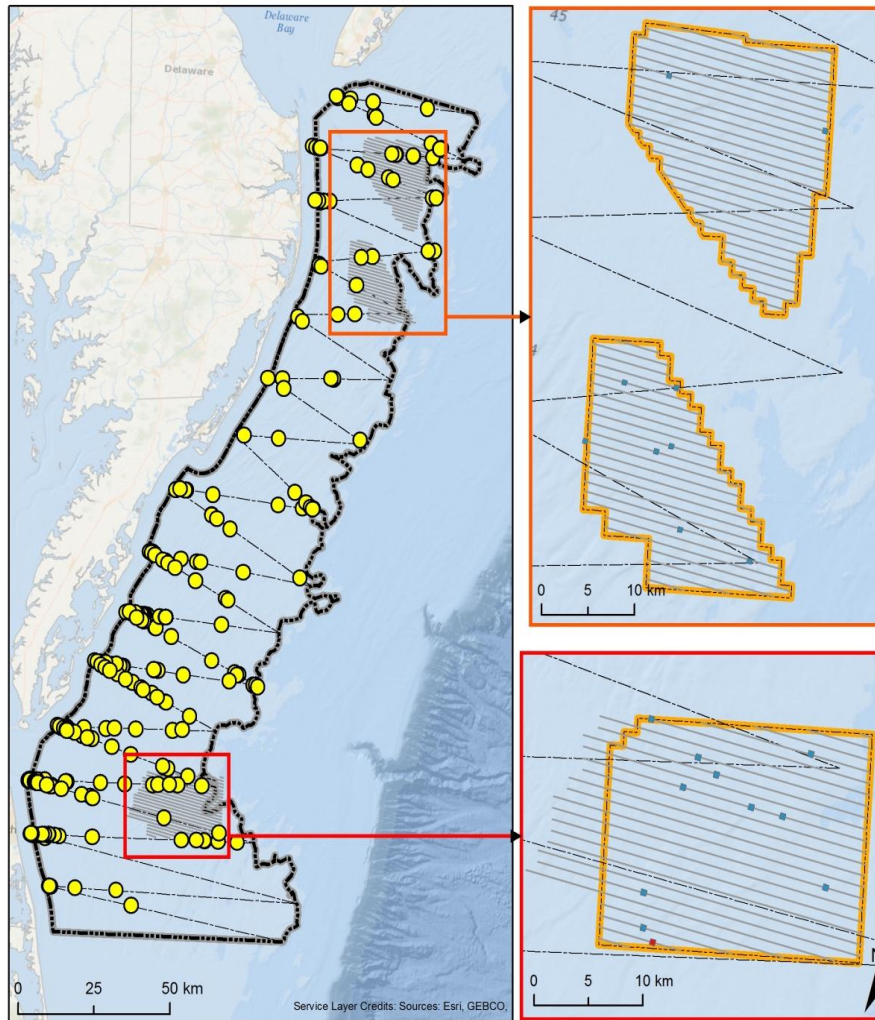
--- Broad-scale Aerial Transects

▭ Mid-Atlantic WEAs

▭ Study Area



## Observations of Northern Gannets During Aerial Surveys Conducted in March, 2012



● Individual NOGA Observations

Sum of Observations of Northern Gannets by 500m Grid within WEA Areas

■ 1 ■ 2

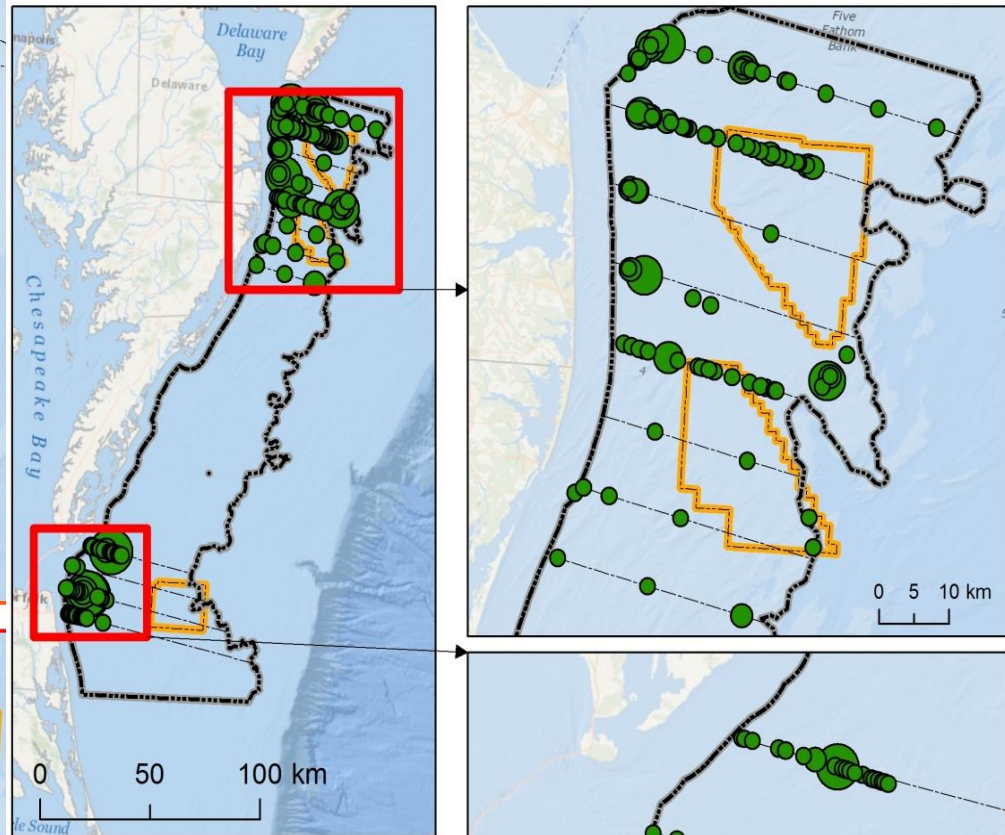
— Fine-scale Aerial Transects

--- Broad-scale Aerial Transects

▭ Mid-Atlantic WEAs

▭ Study Area

## Observations of Northern Gannets During Boat Surveys Conducted in April, 2012



NOGA Count

● 1 - 2

● 3 - 7

● 8 - 15

● 16 - 30

● 31 - 50

--- Boat Transects

▭ Mid-Atlantic WEAs

▭ Study Area

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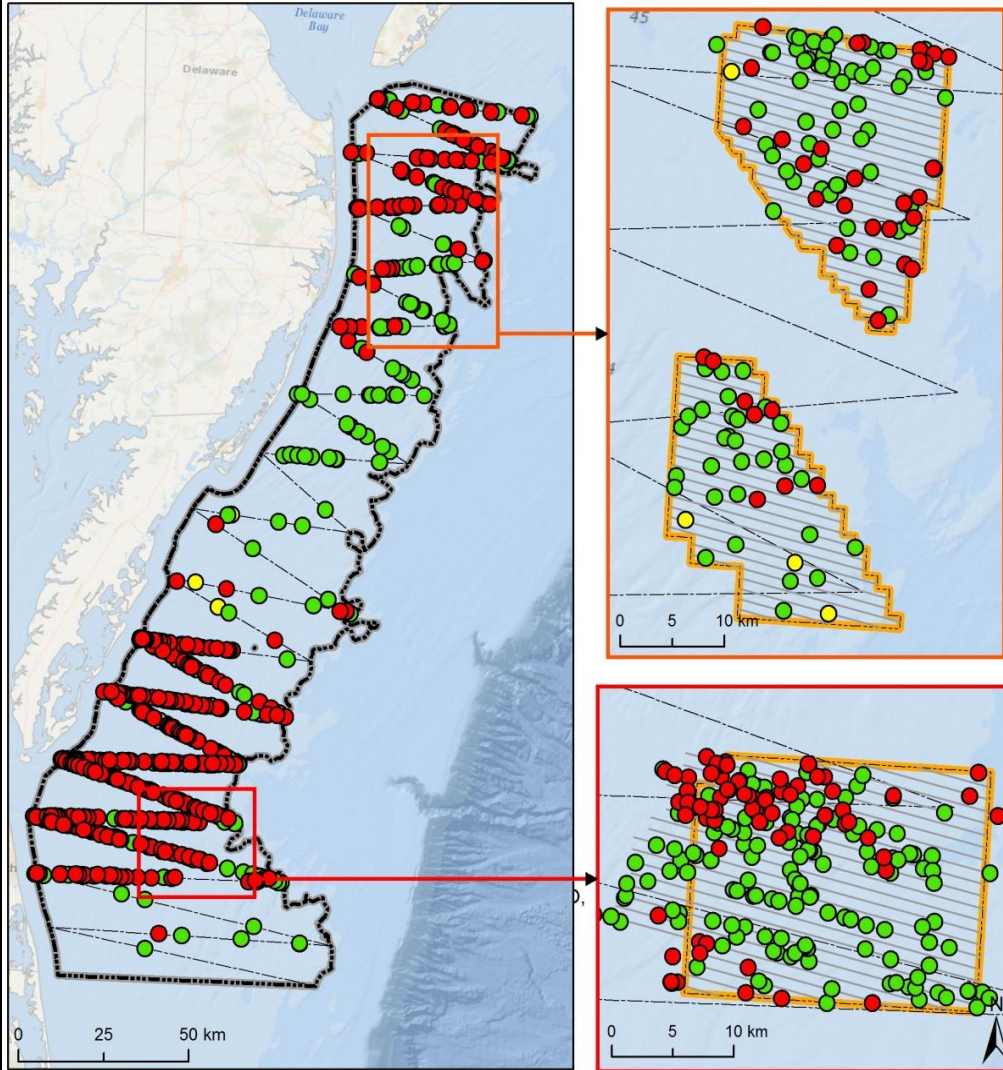
Service Layer Credits: Sources: Esri, GEBCO, NOAA, CHS, CSUMB.

\*Data are preliminary

# Observations of Loons During Aerial Surveys Conducted in March, May, and June 2012



\*Data are preliminary



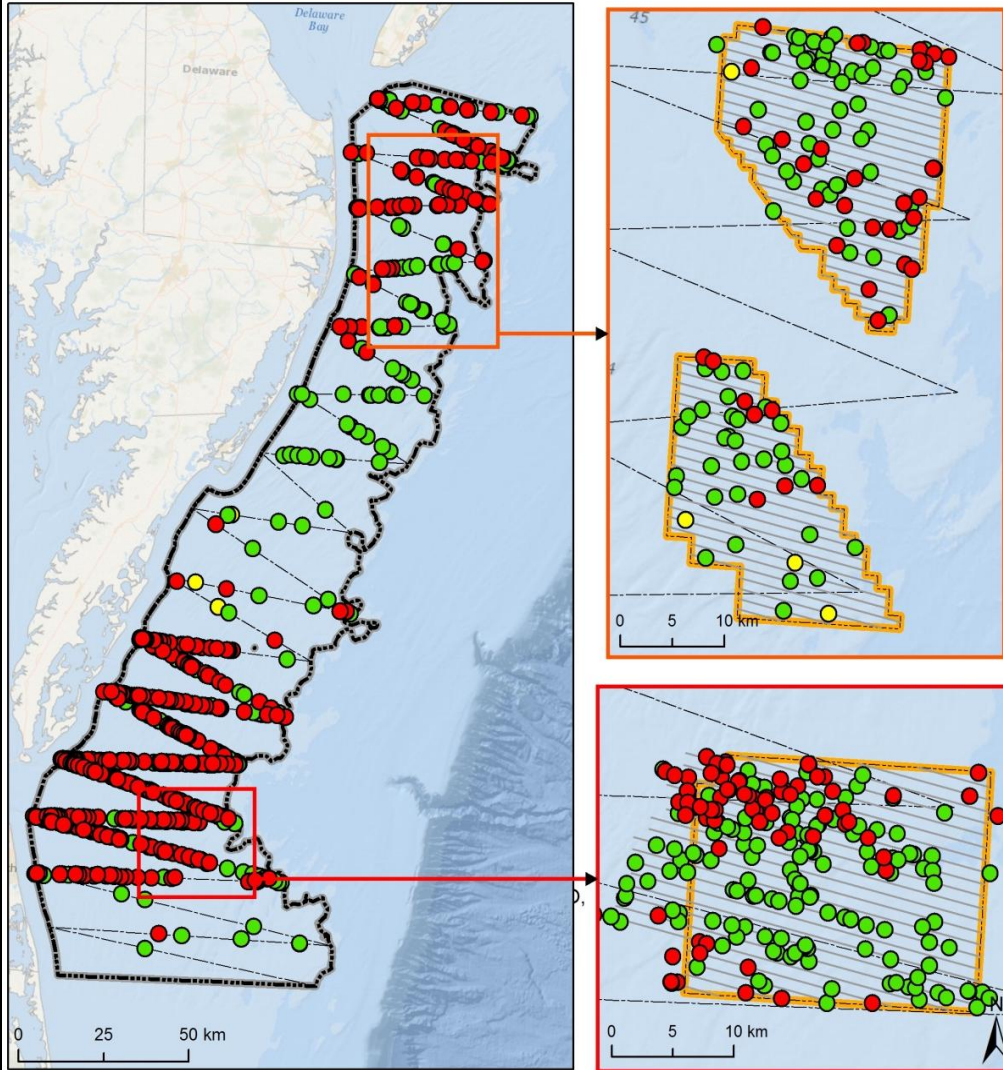
**Observations of Loons (RTLO, COLO, UNLO)  
By Observation Month**

● March ● May ● June

- Fine-scale Aerial Transects
- - - Broad-scale Aerial Transects
- ▭ Mid-Atlantic WEAs
- ▭ Study Area

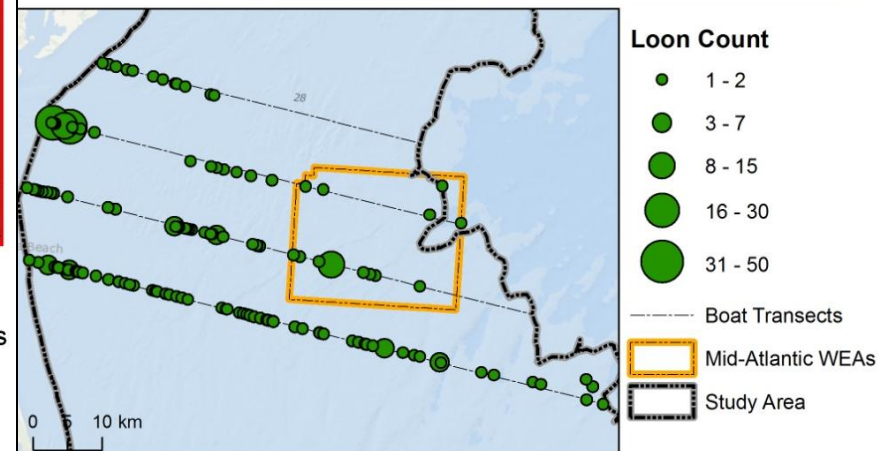
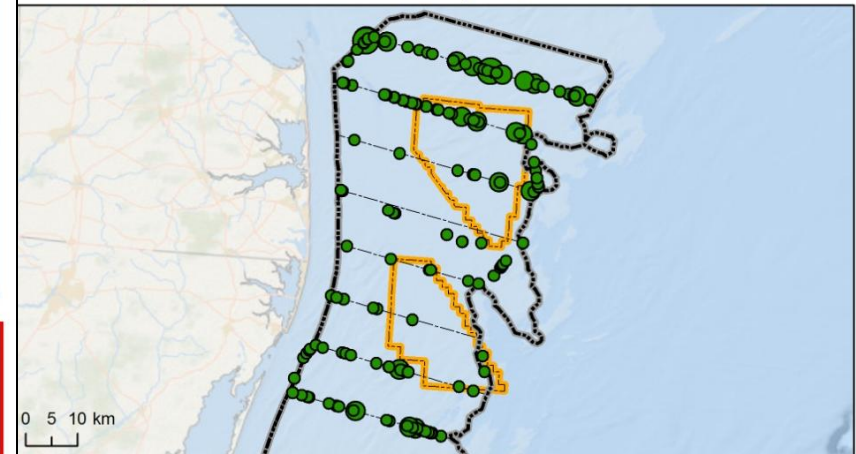


# Observations of Loons During Aerial Surveys Conducted in March, May, and June 2012



\*Data are preliminary

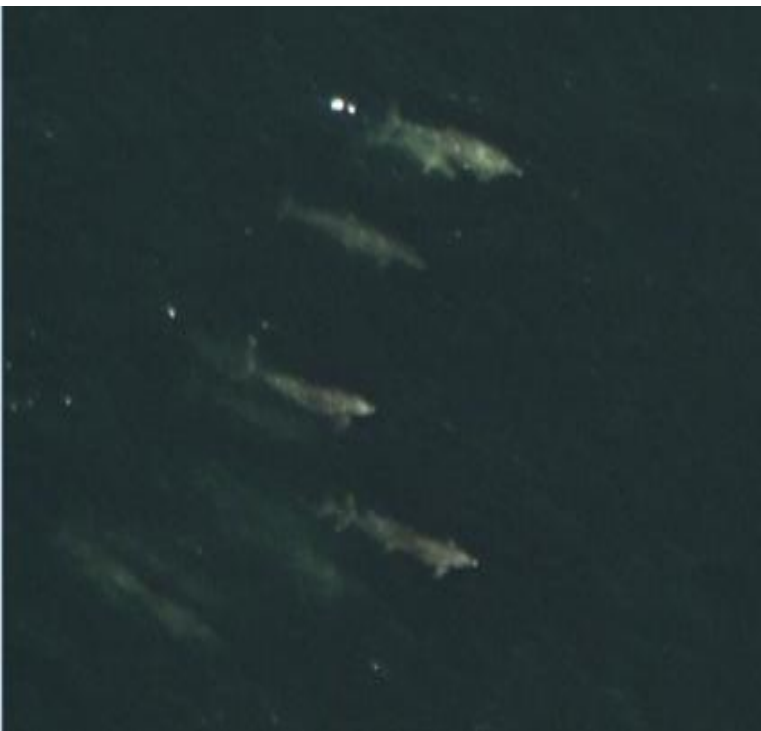
## Observations of Red-throated and Common Loons During Boat Surveys Conducted in April, 2012



### Observations of Loons (RTLO, COLO, UNLO) By Observation Month

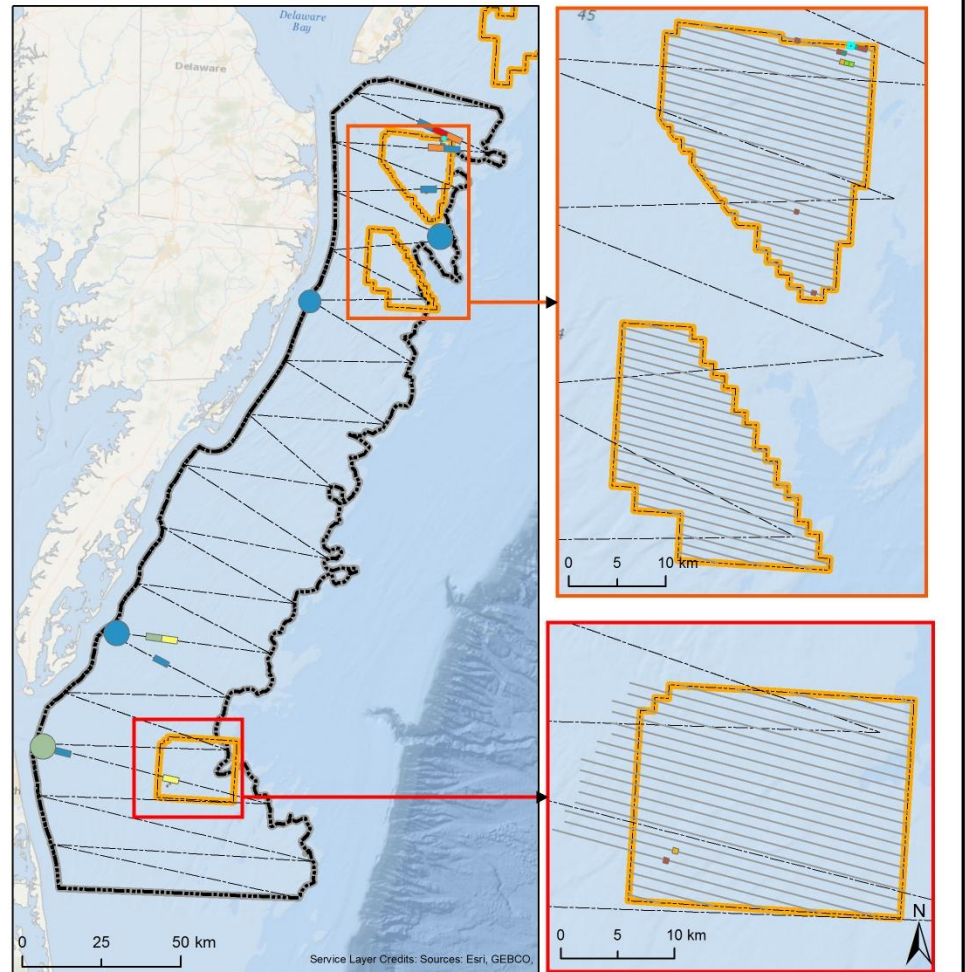
● March ● May ● June

— Fine-scale Aerial Transects  
 - - - Broad-scale Aerial Transects  
 — Mid-Atlantic WEAs  
 — Study Area



\*Data are preliminary

## Observations of Marine Mammals During Aerial Surveys Conducted in March, 2012



Marine Mammals per square kilometer along broad-scale transects



--- Broad-scale Aerial Transects

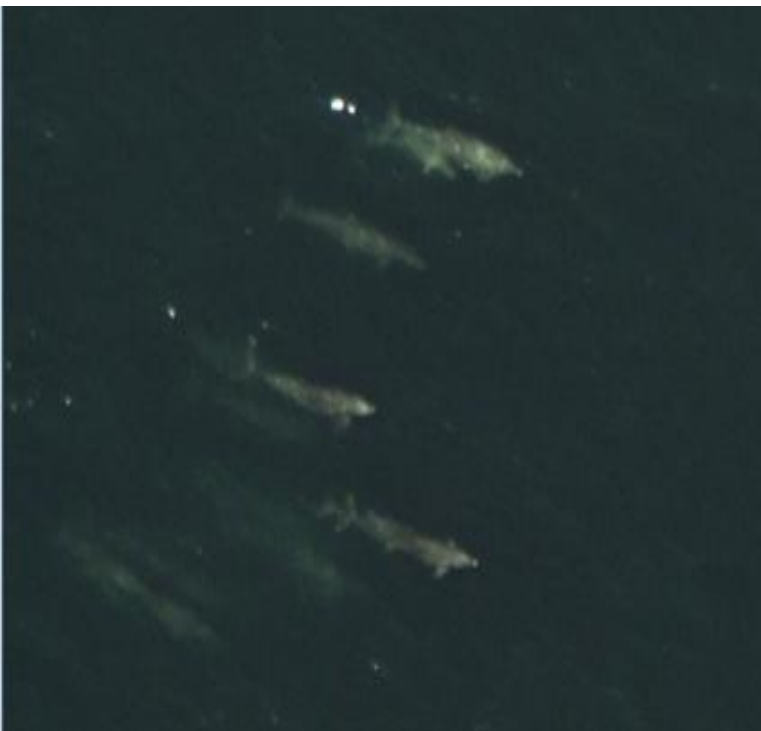
Mid-Atlantic WEAs

Study Area

Sum of Observations of Marine Mammals by 500m Grid within WEA Areas

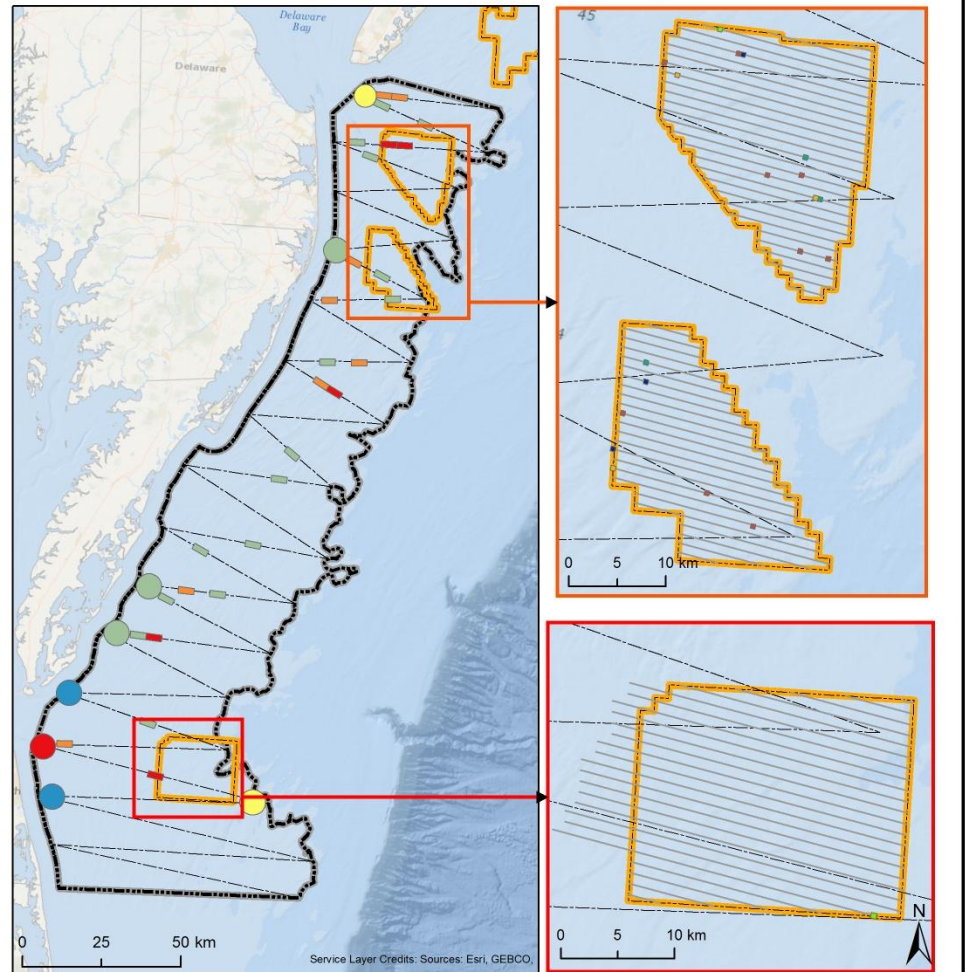




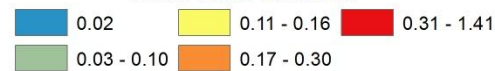


\*Data are preliminary

## Observations of Marine Mammals During Aerial Surveys Conducted in May, 2012



Marine Mammals per square kilometer along broad-scale transects



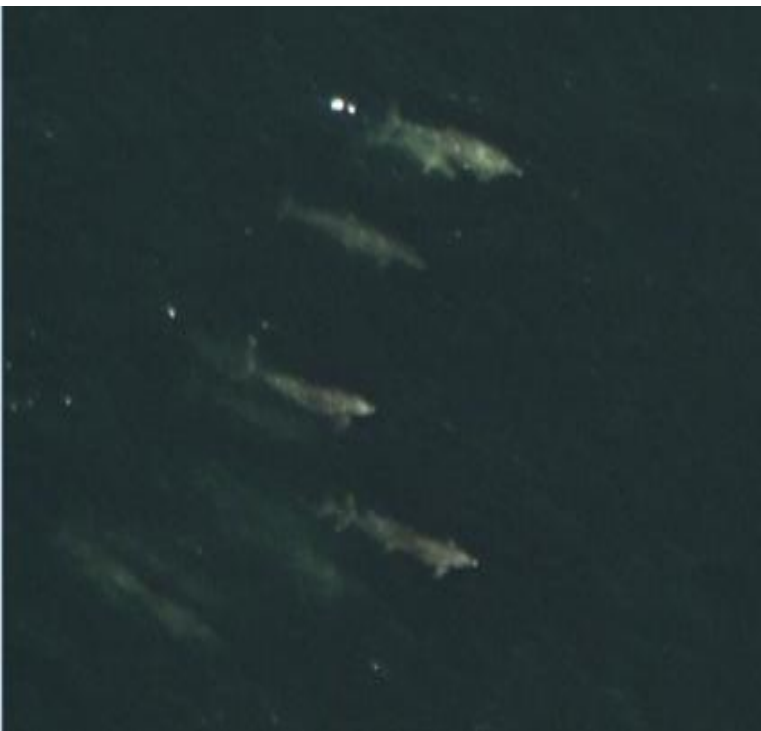
--- Broad-scale Aerial Transects

Mid-Atlantic WEAs

Study Area

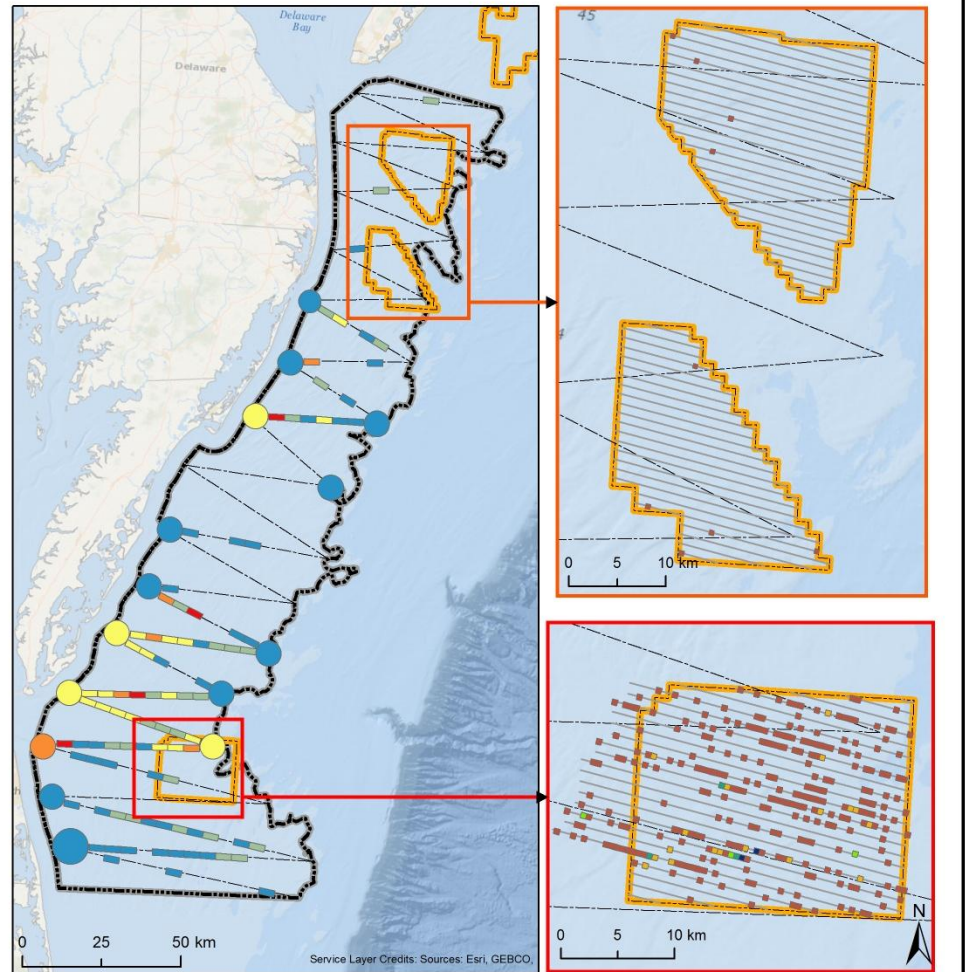
Sum of Observations of Marine Mammals by 500m Grid within WEA Areas



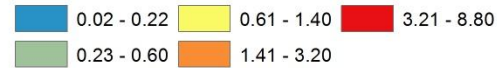


\*Data are preliminary

## Observations of Marine Mammals During Aerial Surveys Conducted in June, 2012



Marine Mammals per square kilometer along broad-scale transects



--- Broad-scale Aerial Transects

Mid-Atlantic WEAs

Study Area

Sum of Observations of Marine Mammals by 500m Grid within WEA Areas



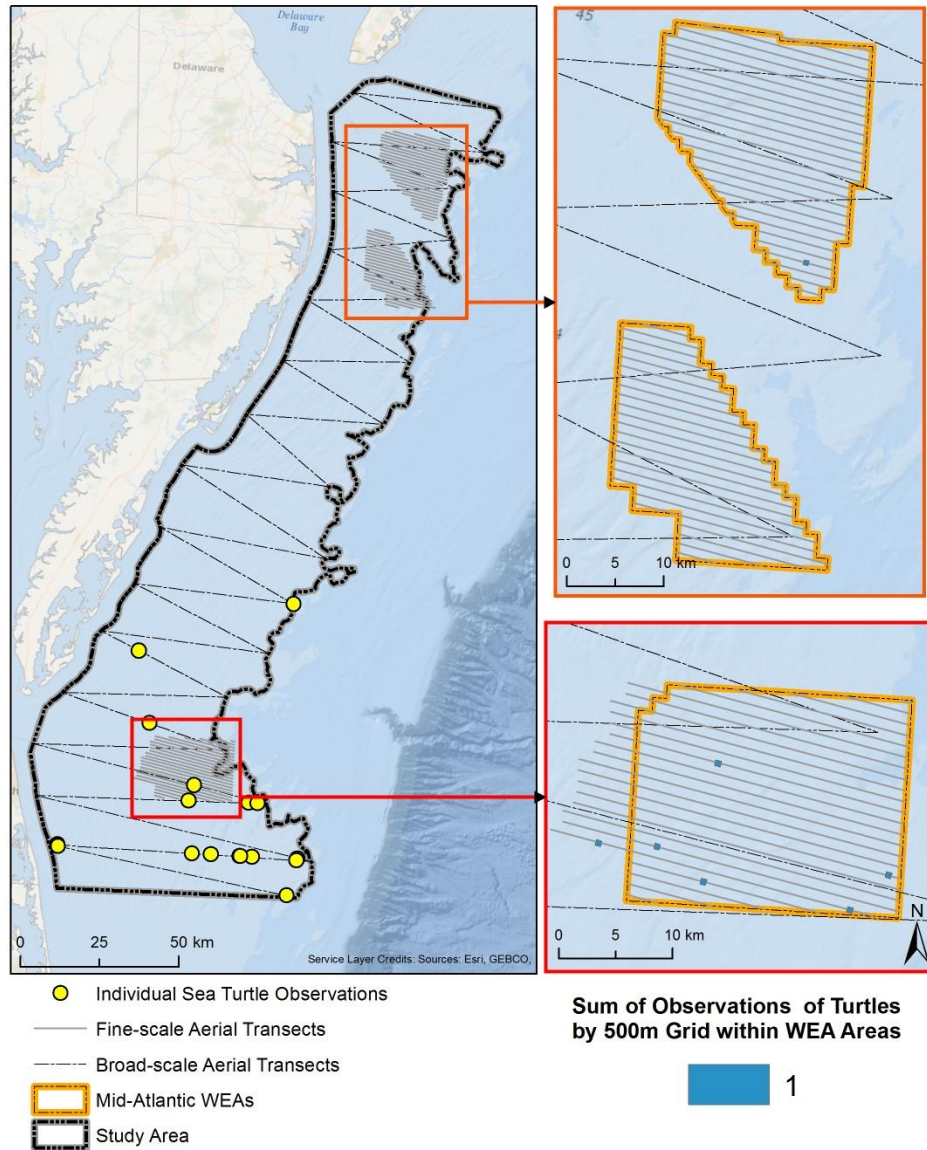




\*Data are preliminary



## Observations of Sea Turtles During Aerial Surveys Conducted in March, 2012



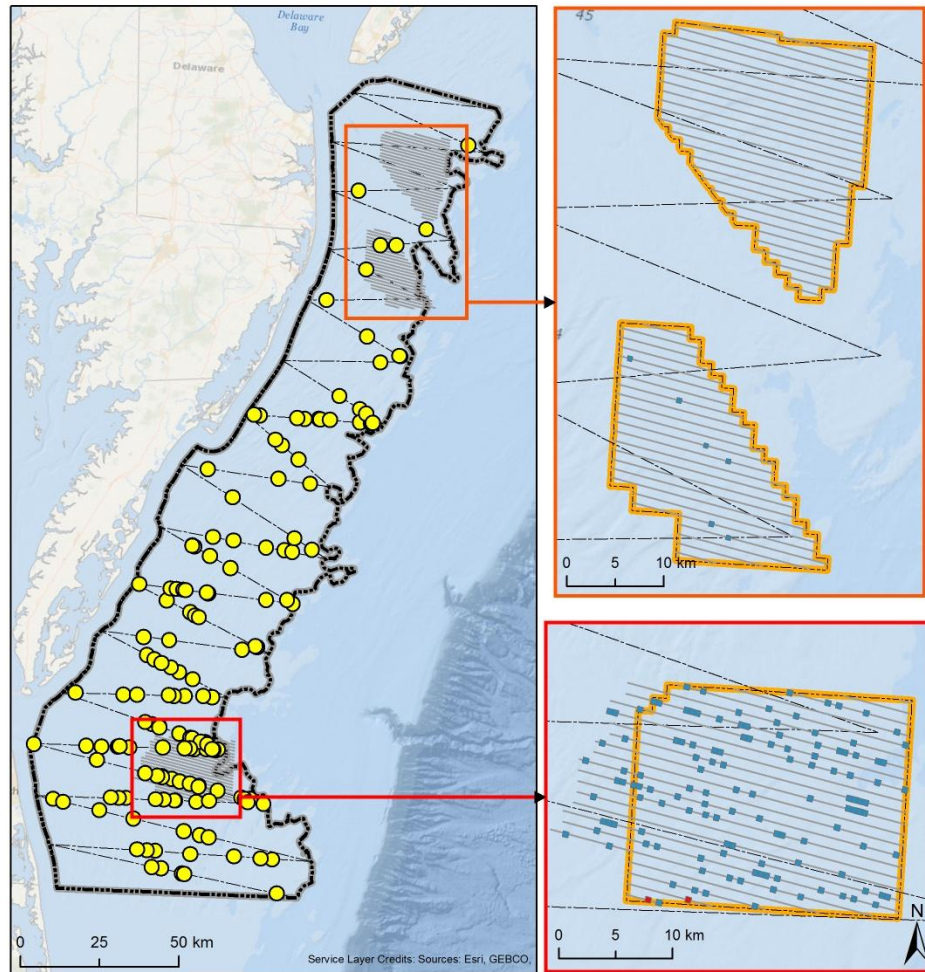




\*Data are preliminary



## Observations of Sea Turtles During Aerial Surveys Conducted in May, 2012



● Individual Sea Turtle Observations

— Fine-scale Aerial Transects

**Sum of Observations of Turtles  
by 500m Grid within WEA Areas**

--- Broad-scale Aerial Transects

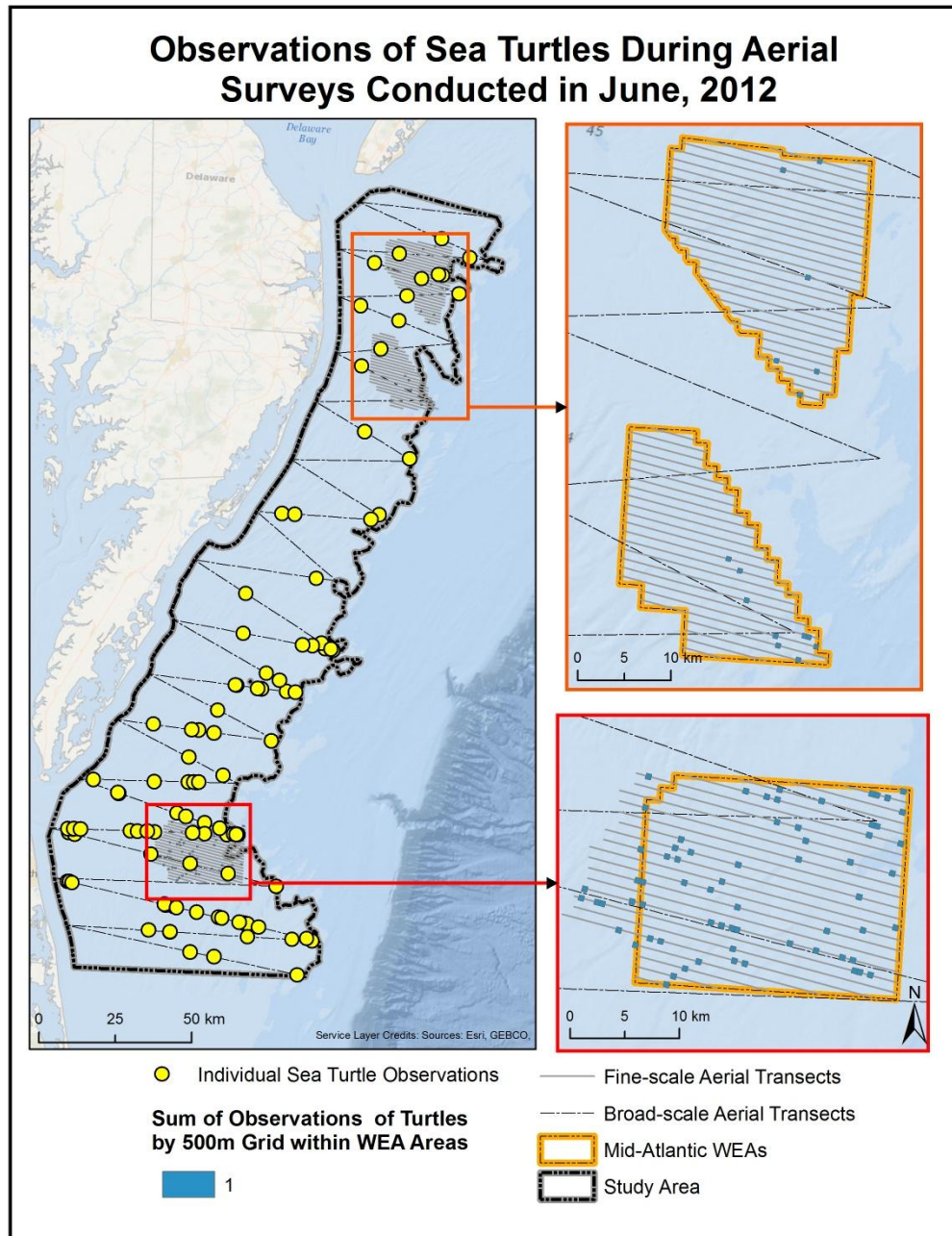
■ 1 ■ 2

▭ Mid-Atlantic WEAs

▭ Study Area



\*Data are preliminary

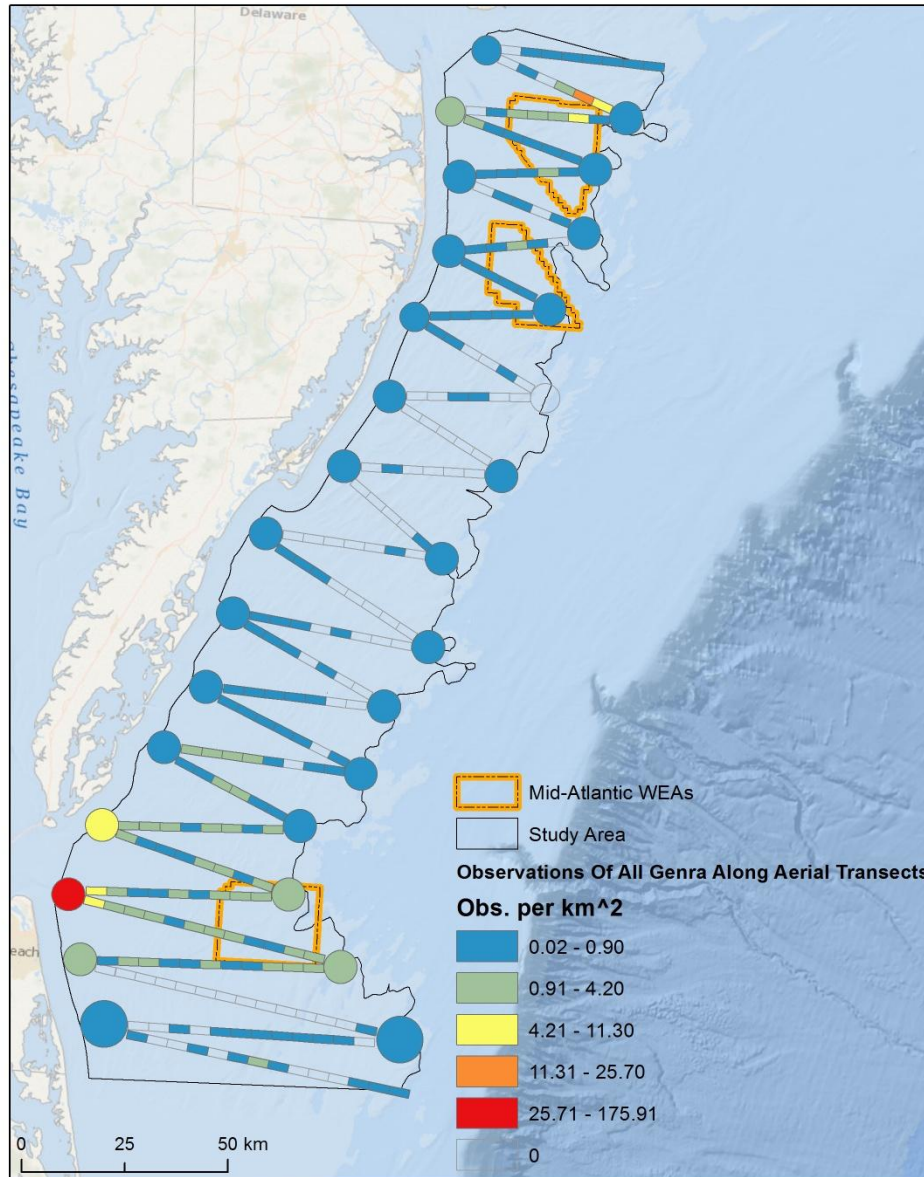




\*Data are preliminary



## Observations of Birds, Mammals and Sea Turtles During Aerial Surveys Conducted in March, 2012

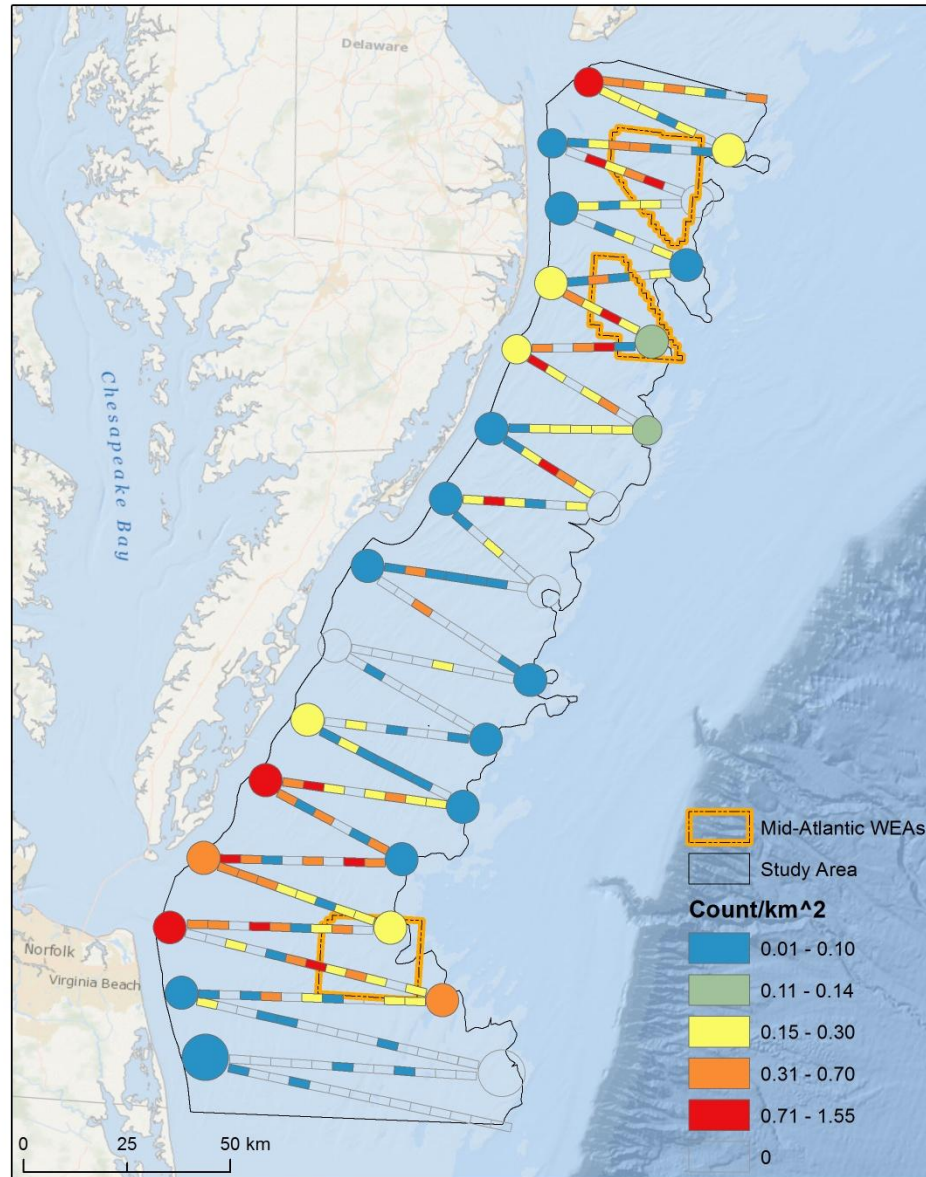


Service Layer Credits: Sources: Esri, GEBCO, NOAA, CHS, CSUMB,

\*Data are preliminary



## Observations of Birds, Mammals and Sea Turtles During Aerial Surveys Conducted in May, 2012



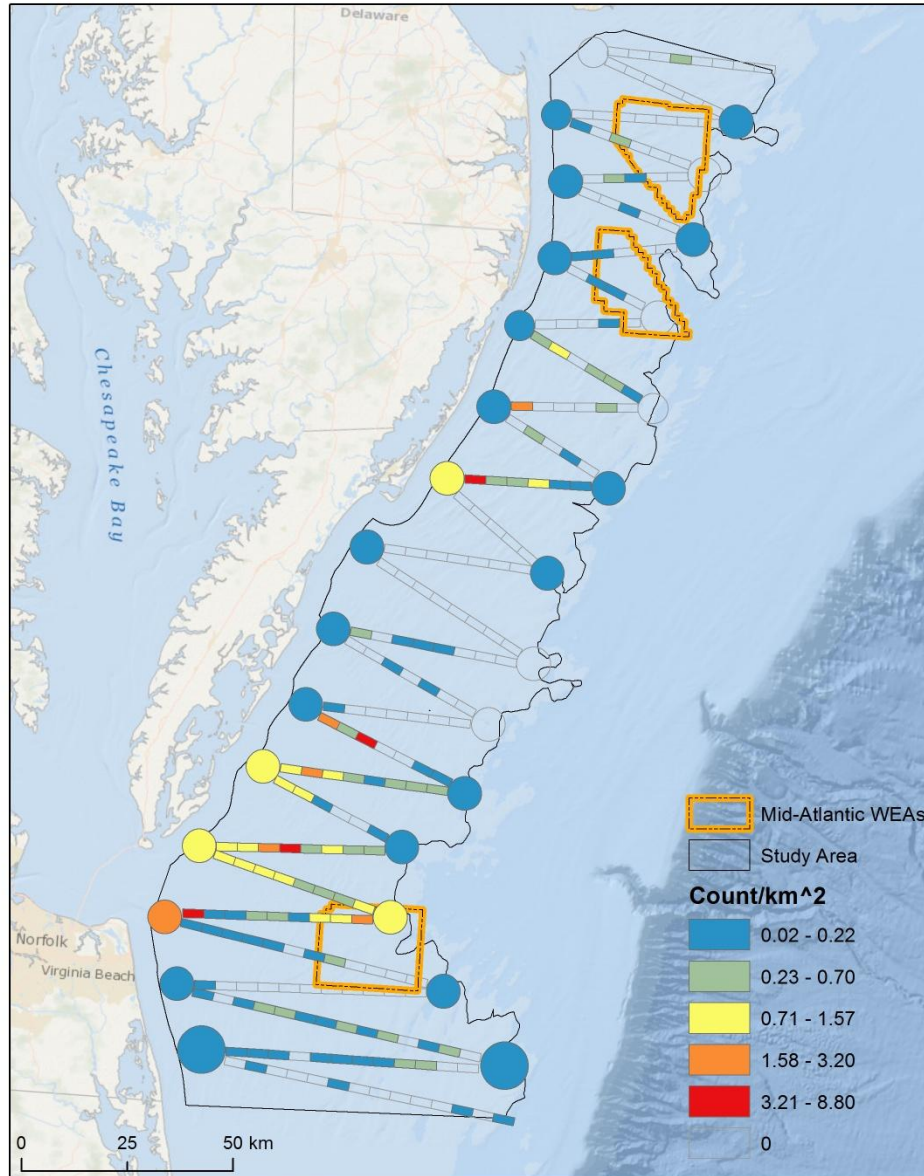
Service Layer Credits: Sources: Esri, GEBCO, NOAA, CHS, CSUMB,



\*Data are preliminary

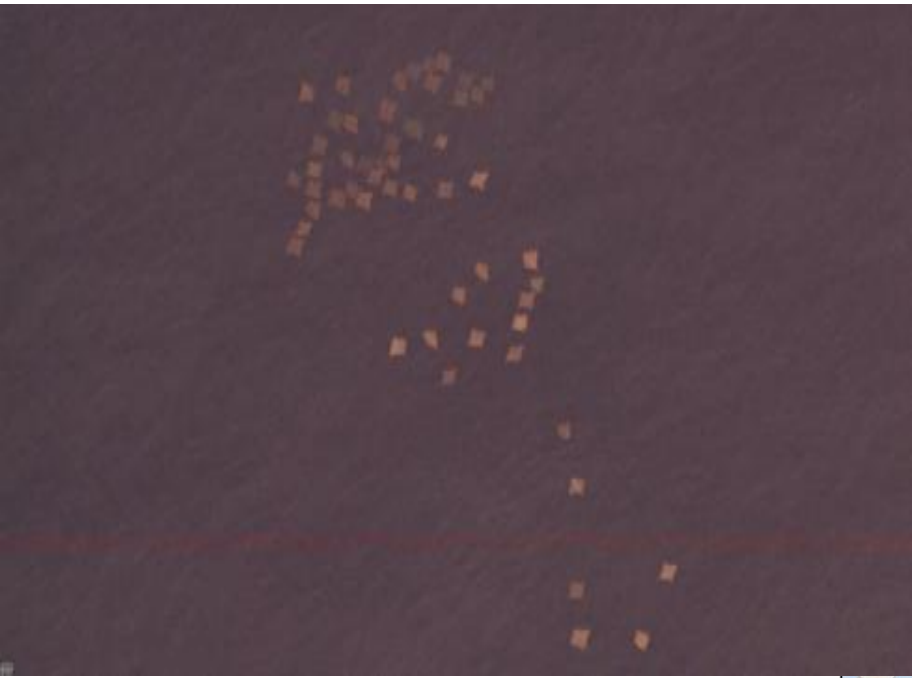


# Observations of Birds, Mammals and Sea Turtles During Aerial Surveys Conducted in June, 2012

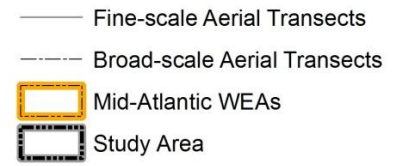
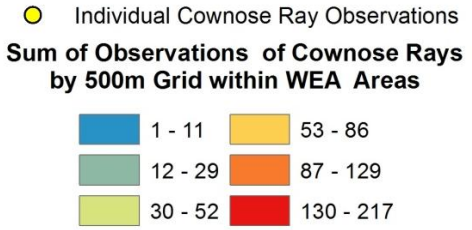
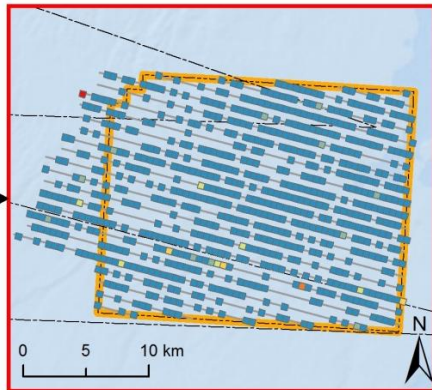
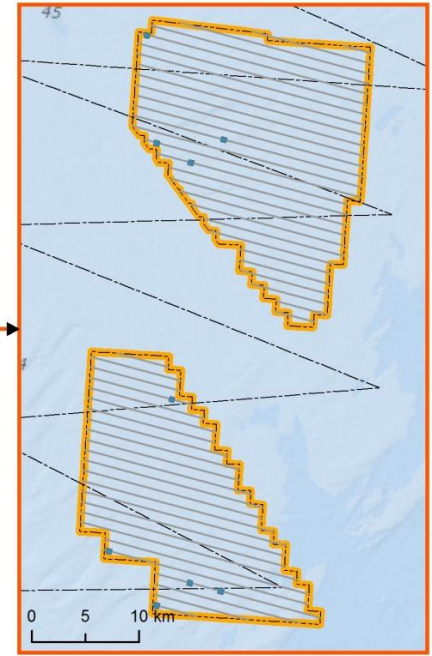
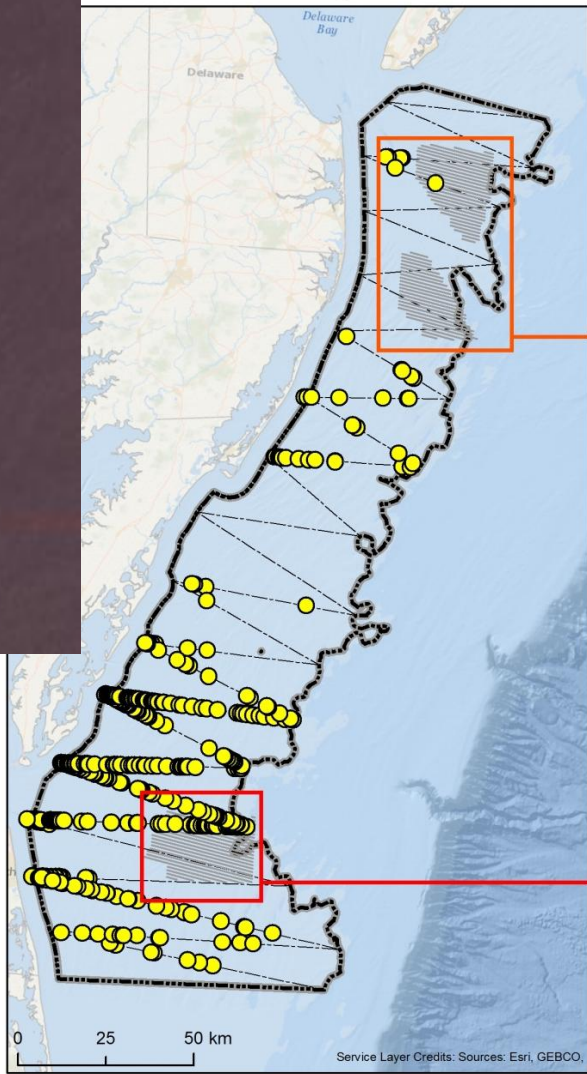


Service Layer Credits: Sources: Esri, GEBCO, NOAA, CHS, CSUMB,

# Observations of Cownose Rays During Aerial Surveys Conducted in June, 2012



\*Data are preliminary

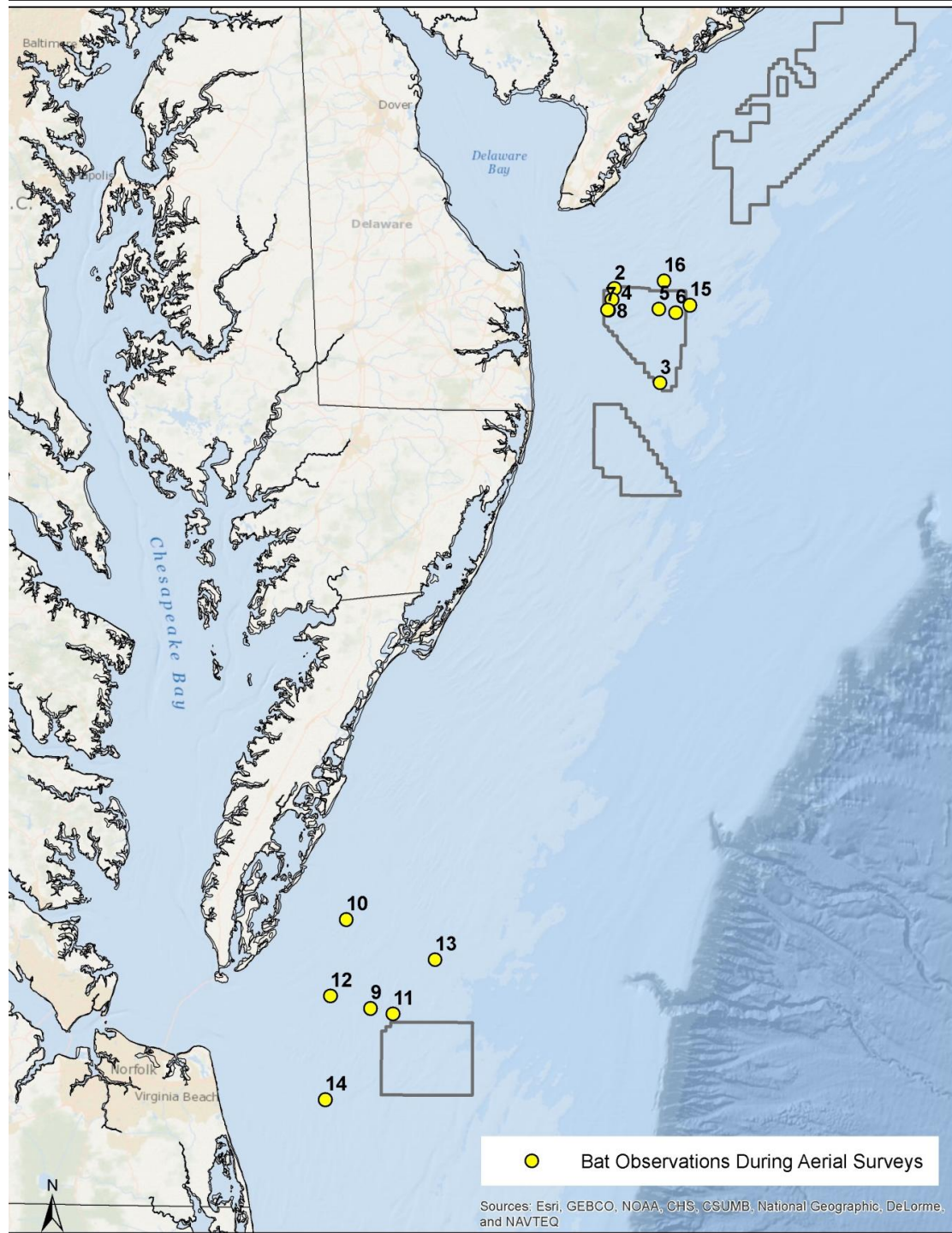




# Eastern Red Bats



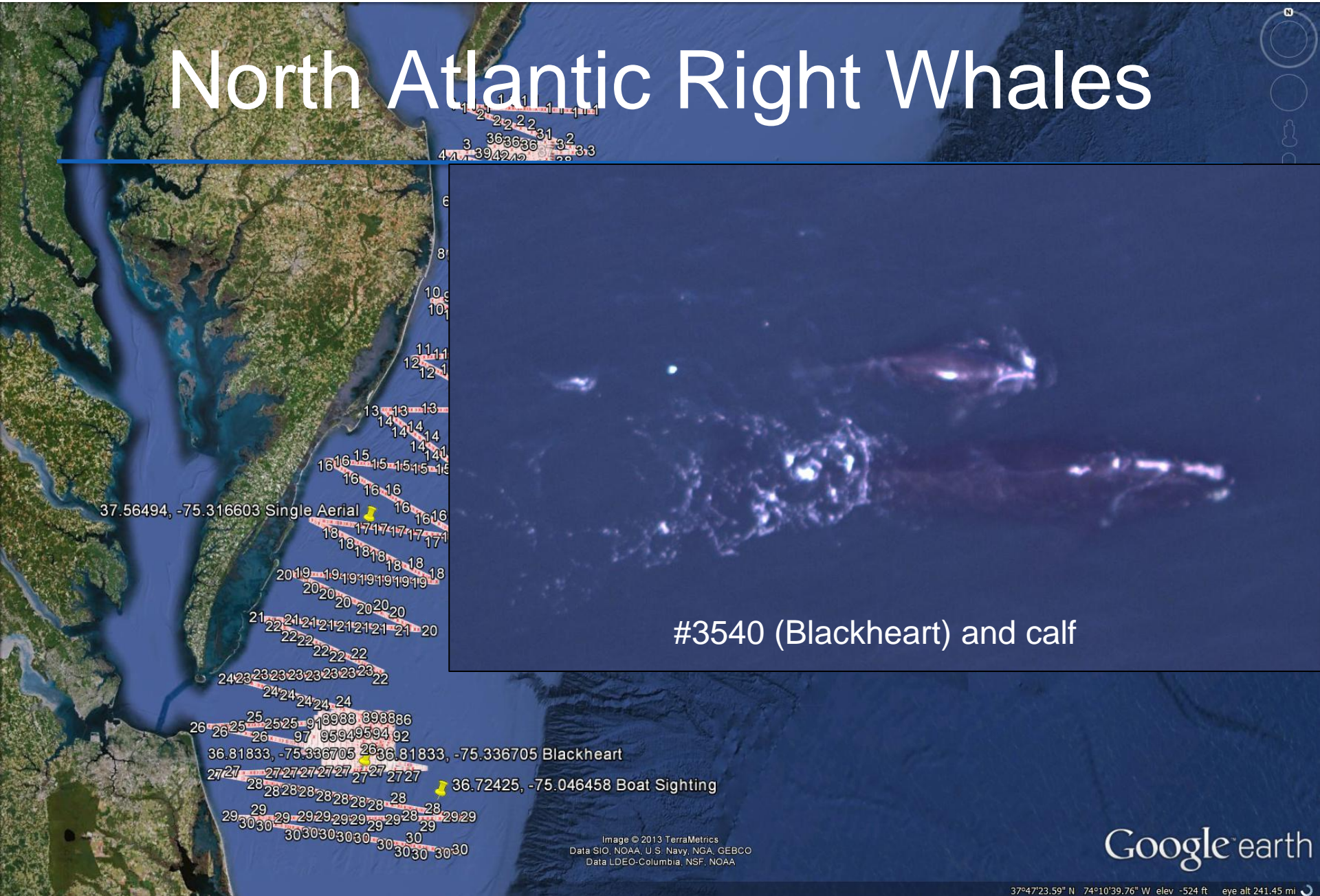
\*Data are preliminary



Sources: Esri, GEBCO, NOAA, CHS, CSUMB, National Geographic, DeLorme, and NAVTEQ



# North Atlantic Right Whales



#3540 (Blackheart) and calf

Image © 2013 TerraMetrics  
Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
Data LDEO-Columbia, NSF, NOAA

Google earth

37°47'23.59" N 74°10'39.76" W elev -524 ft eye alt 241.45 mi

\*Data are preliminary



# Individual tracking

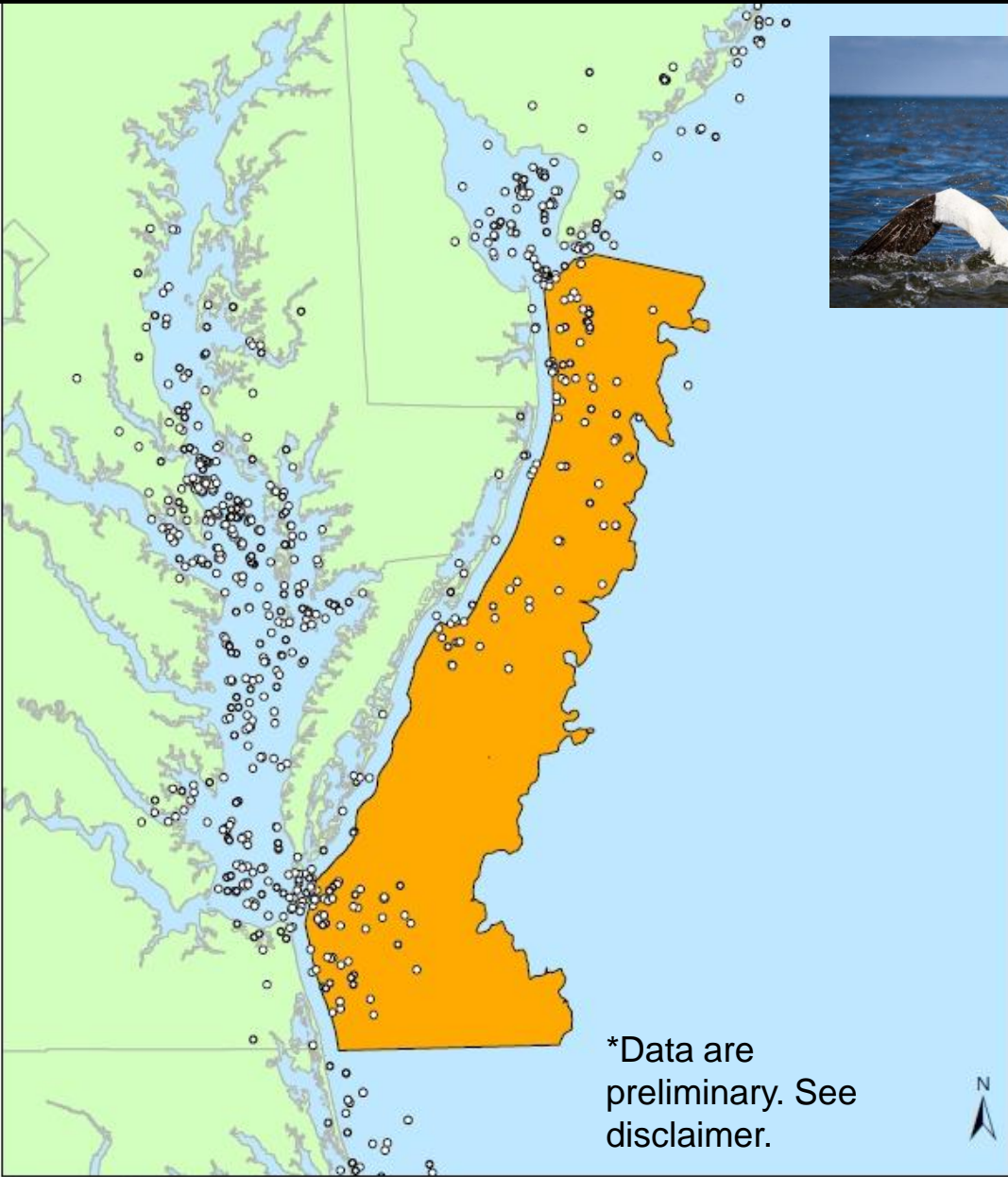
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- Transmitters deployed on 41 RTLO, 35 NOGA, 4 SUSC, and 7 PEFA
- Disclaimer: Caution should be used in identifying patterns or drawing conclusions from maps. Locations and movement tracks have not been proofed or analyzed. Track lines are shortest distances between points, and not necessarily flight paths taken. More formal data interpretation will be conducted for the Department of Energy, the Bureau of Ocean Energy Management, and in peer reviewed manuscripts.
- Questions on RTLO/NOGA: contact Caleb Spiegel, [caleb\\_spiegel@fws.gov](mailto:caleb_spiegel@fws.gov) or Carrie Gray, [carrie.osborne@briloon.org](mailto:carrie.osborne@briloon.org)
- Questions on SUSC: contact: Lucas Savoy, [lucas.savoy@briloon.org](mailto:lucas.savoy@briloon.org)
- Questions on PEFA: contact Chris DeSorbo, [chris.desorbo@briloon.org](mailto:chris.desorbo@briloon.org)



# Locations for Northern Gannets in the Mid-Atlantic March 2012 - January 2013

# Large-scale movements March 2012 - January 2013



\*Data are preliminary. See disclaimer.

○ NOGA Locations Quality 0,1,2,3



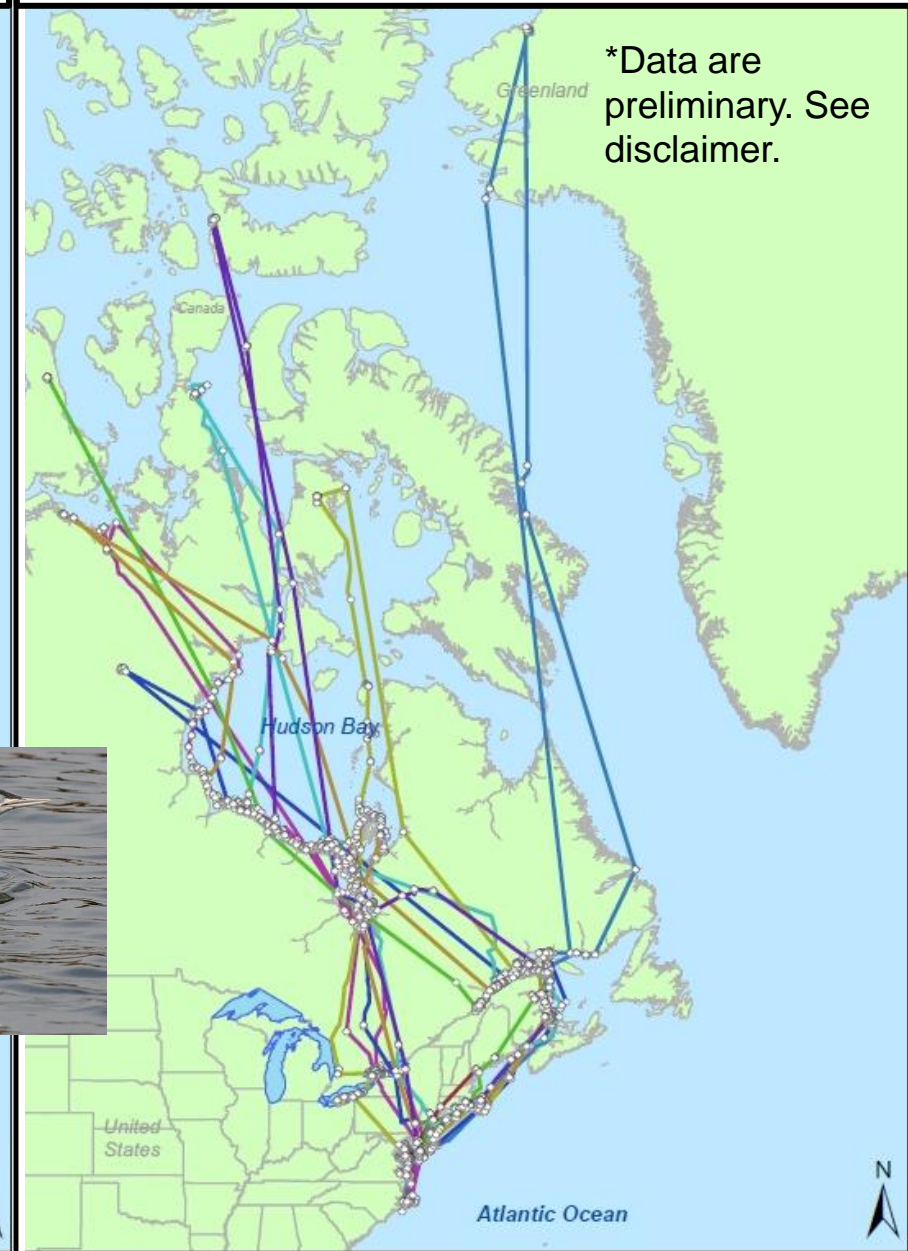
\*Data are preliminary. See disclaimer.

○ NOGA Locations Quality 2,3

# Locations for Red-throated Loons in the Mid-Atlantic March 2012 - January 2013



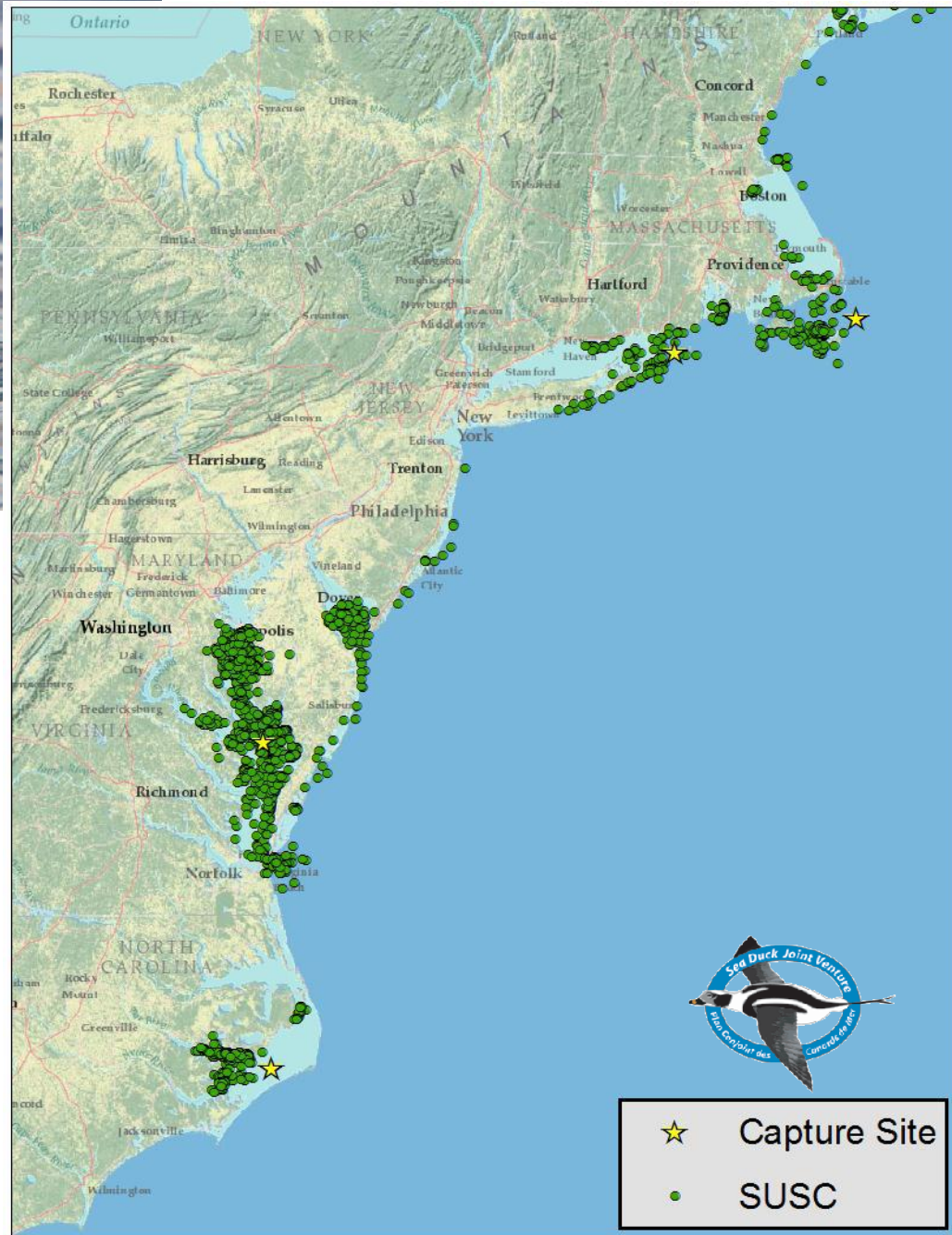
# Large-scale movements March 2012 - January 2013

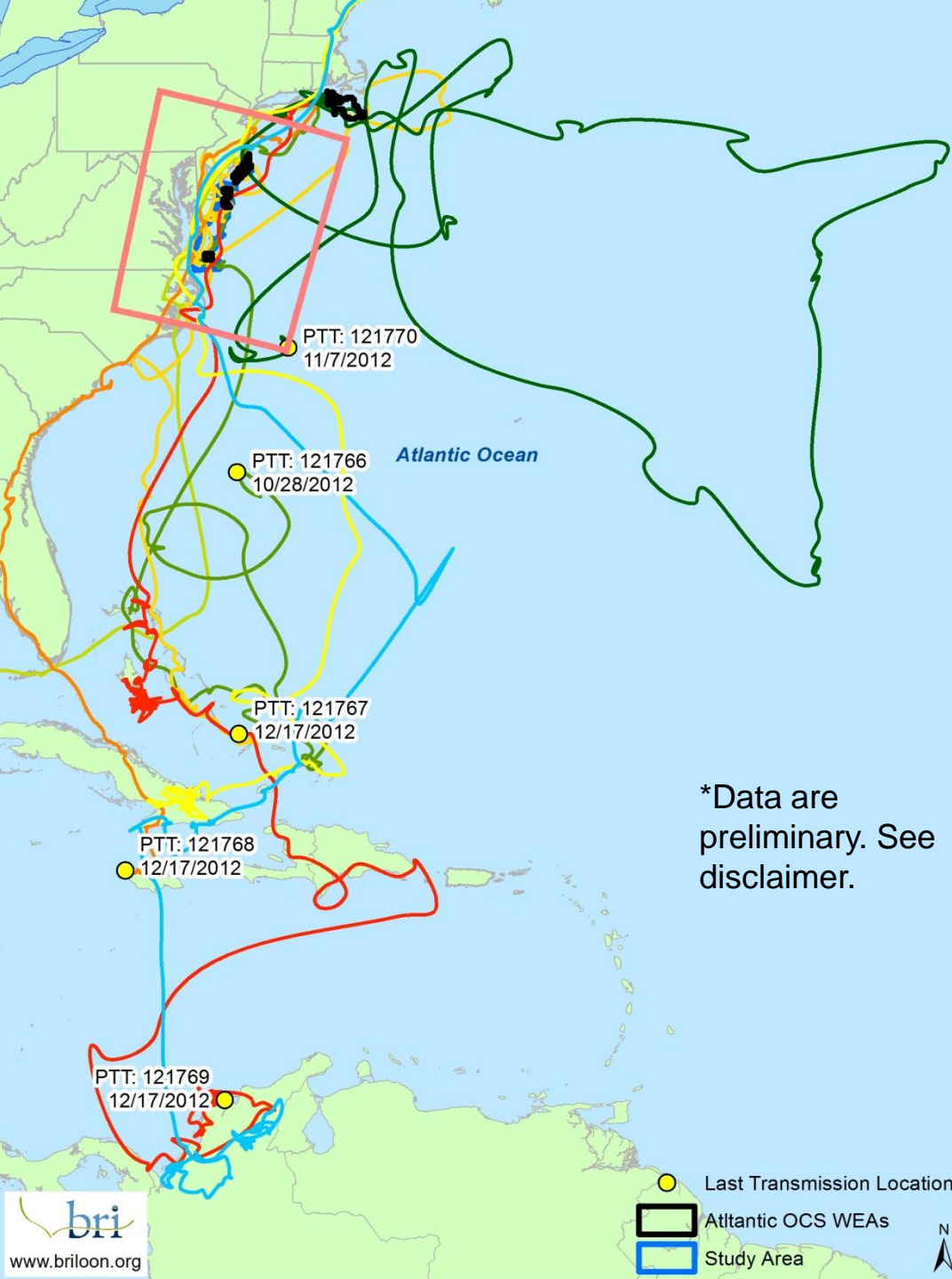


○ RTLO Locations (Quality 0,1,2,3)  Study Area

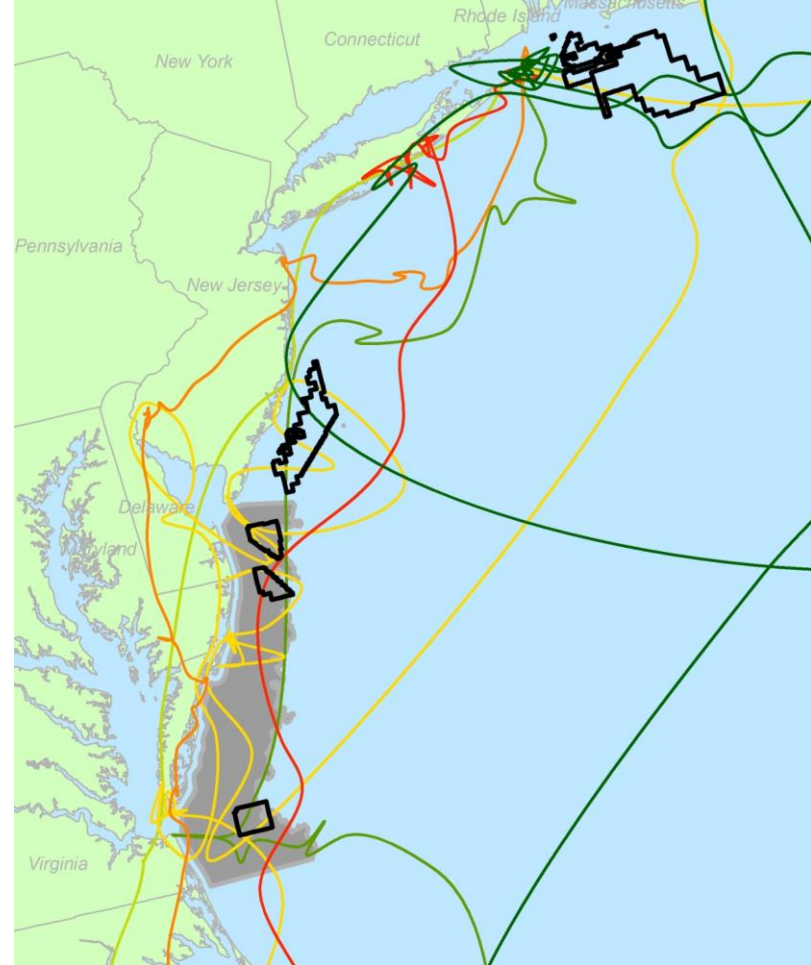
○ RTLO Locations (Quality 2,3)





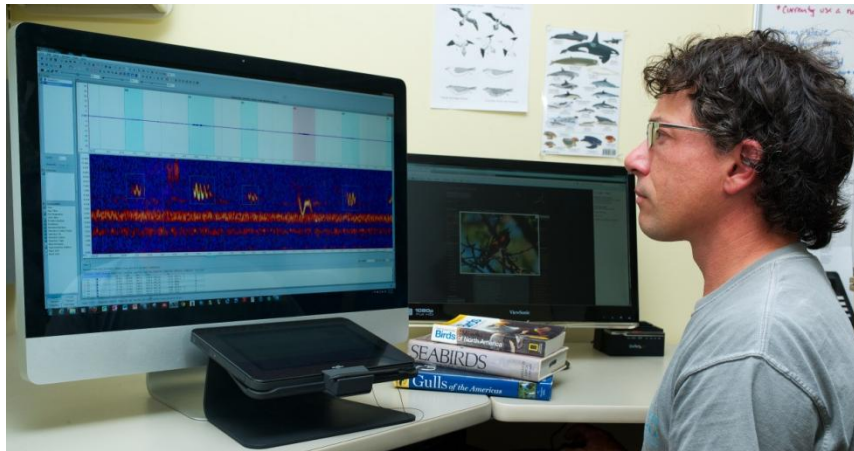


\*Data are preliminary. See disclaimer.





# Nocturnal Migration Studies



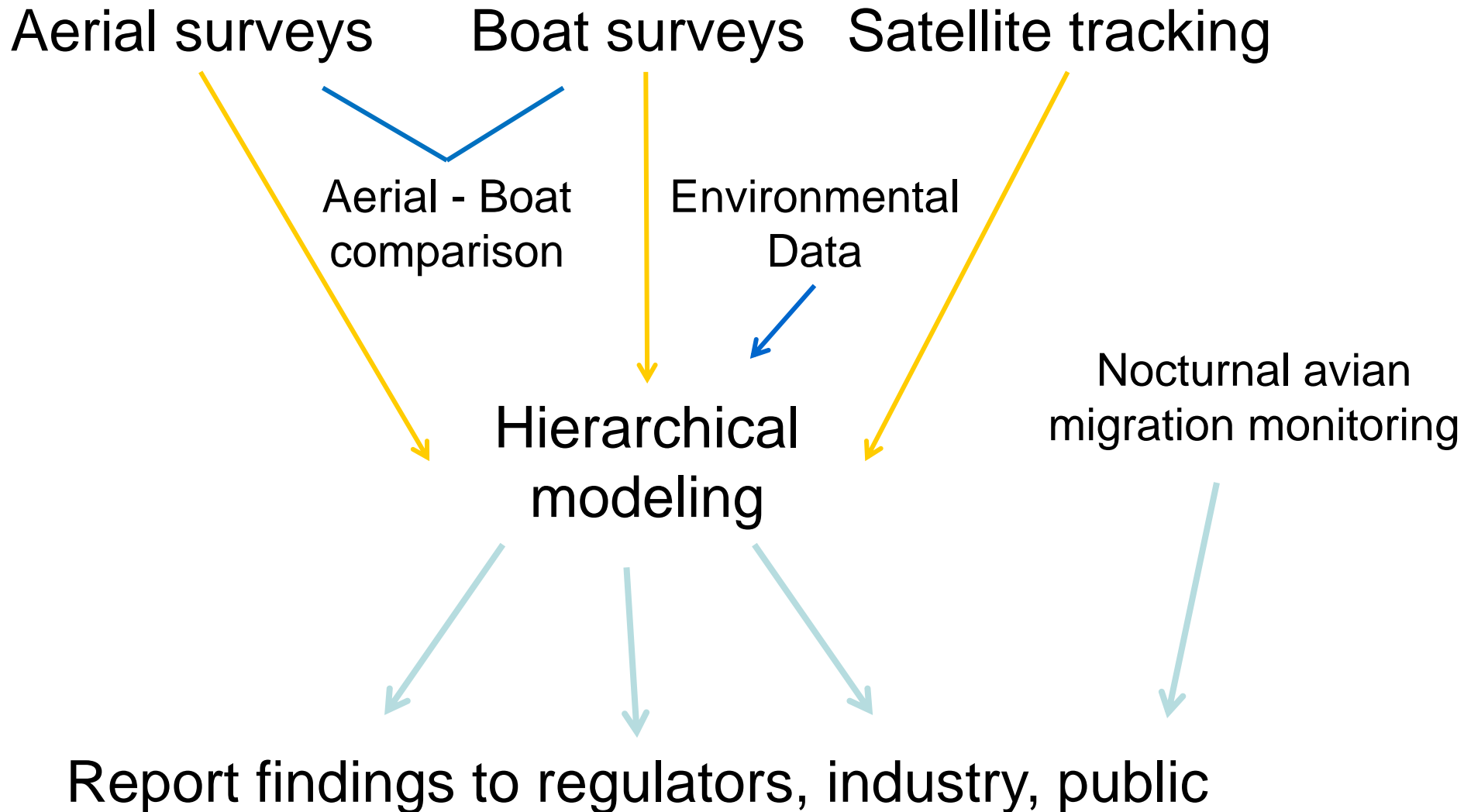
\*Data are preliminary

Species or Group	Flight Calls Detected
American Redstart	8
Canada Warbler	1
Cape May Warbler	1
Common Yellowthroat	2
Northern Waterthrush	3
Yellow-rumped Warbler	14
Ovenbird	2
Warbler spp.	1
Song Sparrow	2
Chipping Sparrow	1
Sparrow spp.	6
Least Sandpiper	7
Semipalmated Sandpiper	3
Shorebird spp.	1
American Goldfinch	1
Finch spp.	28
Thrush spp.	14
Unknown	28
<b>Total flight calls detected:</b>	<b>123</b>



# Mid-Atlantic Baseline Studies

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# Deliverables

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- Relative abundance maps
- Manuscripts and reports
- Outreach documents
- Data → Compendium
- Informed decision making



# This material is based upon work supported by:

- Department of Energy (award DE-EE0005362)
- Bureau of Ocean Energy Management
- Maryland Dept. of Natural Resources
- US Fish and Wildlife Service
- Bailey Foundation



## Thank you!

[Kate.williams@briloon.org](mailto:Kate.williams@briloon.org)



<http://www.briloon.org/research/research-programs/wildlife-renewable-energy-program/mabs>