

**Learning from the Experts** Webinar Series

# Digital Aerial Surveys to Inform Offshore Wind Development



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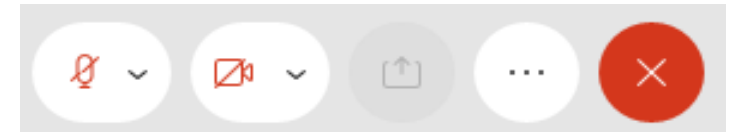
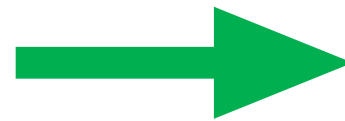
**June 9, 2021**


# Meeting Procedures

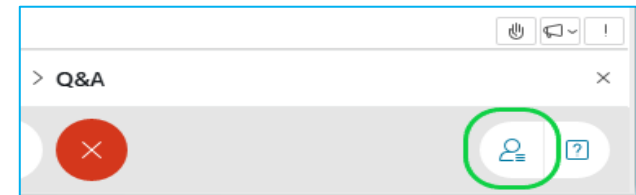
Webinar recordings and presentations will be available at:  
[www.nyserda.ny.gov/osw-webinar-series](http://www.nyserda.ny.gov/osw-webinar-series)

## Participation for Members of the Public:

- > Members of the public will be muted upon entry.
- > Questions and comments may be submitted in writing through the Q&A feature at any time during the event.
- > If technical problems arise, please contact [Sal.Graven@nyserda.ny.gov](mailto:Sal.Graven@nyserda.ny.gov)



**You'll see  when your microphone is muted**



# Learning from the Experts

This webinar series is hosted by NYSERDA's offshore wind team and features experts in offshore wind technologies, development practices, and related research.

**DISCLAIMER:**

The views and opinions expressed in this presentation are those of the presenter and do not represent the views or opinions of NYSERDA or New York State.



# How Aerial Digital Surveys Inform Offshore Wind Development

Julia Robinson Willmott

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## Outline

- ▶ History of the use of technology
- ▶ Normandeau experience and visual survey comparison tests
- ▶ Study designs and why different designs suit different purposes
- ▶ What aerial digital surveys can provide
- ▶ What aerial digital surveys cannot provide
- ▶ Ways of filling the gaps



- ★ **Europe 2007:** Aerial digital surveys are used for collecting offshore biological data
- ★ **USA 2011:** Normandeau completed a comparison of three offshore survey methodologies
  - Boat-based visual
  - Low-altitude aerial visual
  - High-altitude aerial digital



## Turtle Density Estimates

- ▶ Digital aerial survey estimates 10x higher than boat survey
- ▶ Digital aerial survey estimates 4x higher than visual aerial

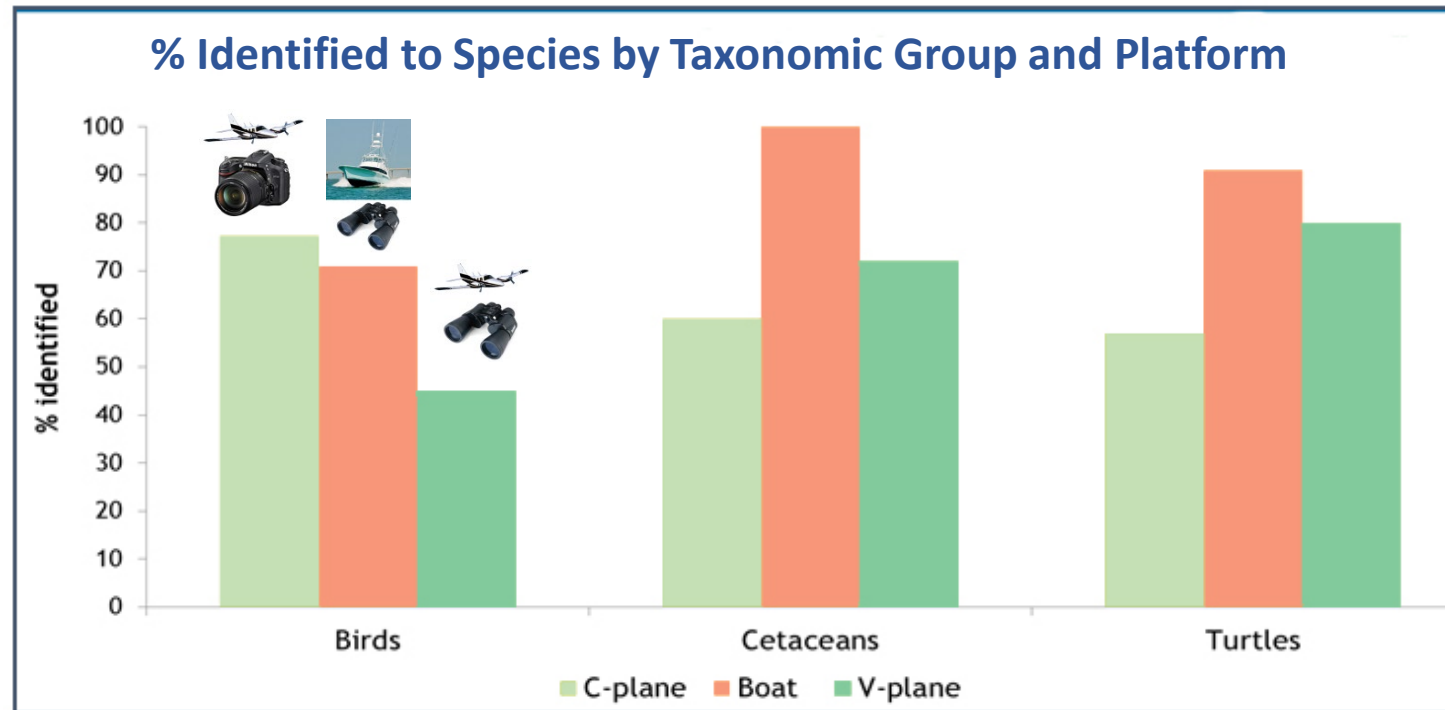
## Reasons

- ▶ Low visibility of turtles from boats at sea-level and from aircraft given short observation time
- ▶ Disturbance by both boat and aerial visual survey platforms



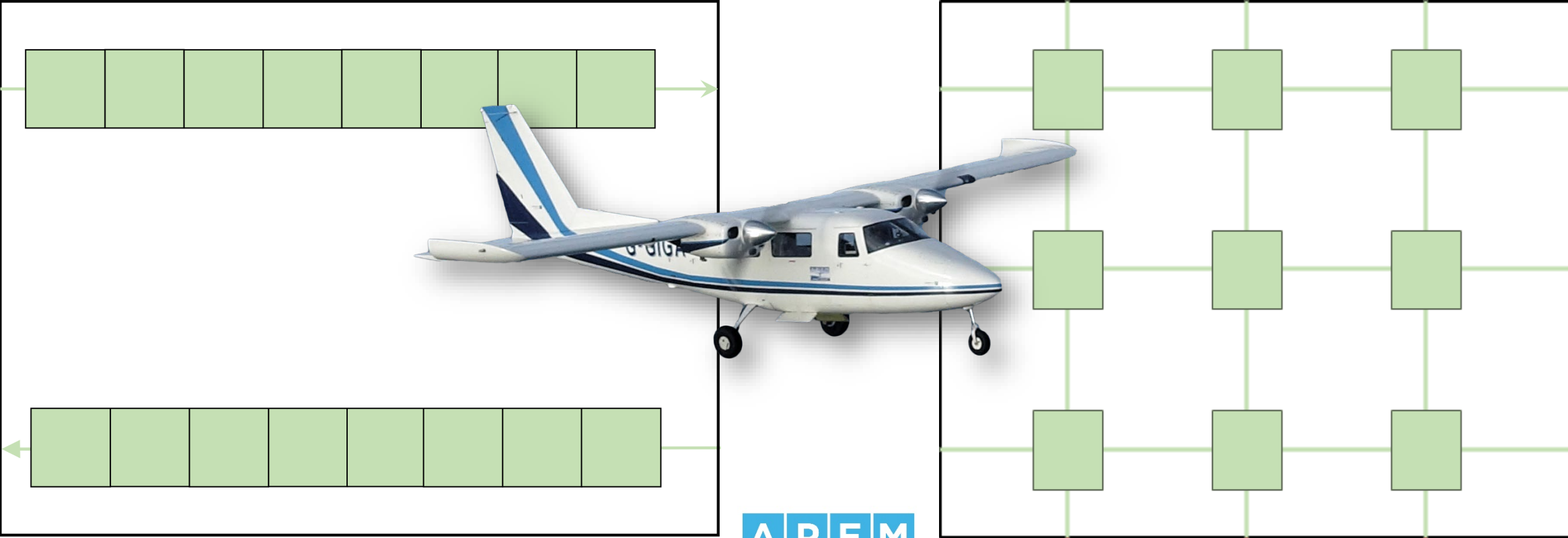
## Identification

- ✦ **Birds:** digital aerial surveys and boat-based surveys achieved higher success than visual aerial surveys
- ✦ **Turtles and Cetaceans:** boat-based surveys had highest success

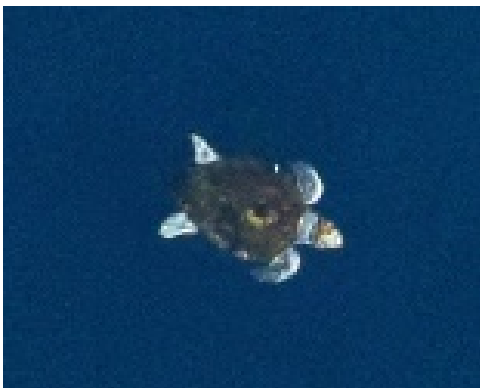




# Transect and Grid Flight Height 1360 ft

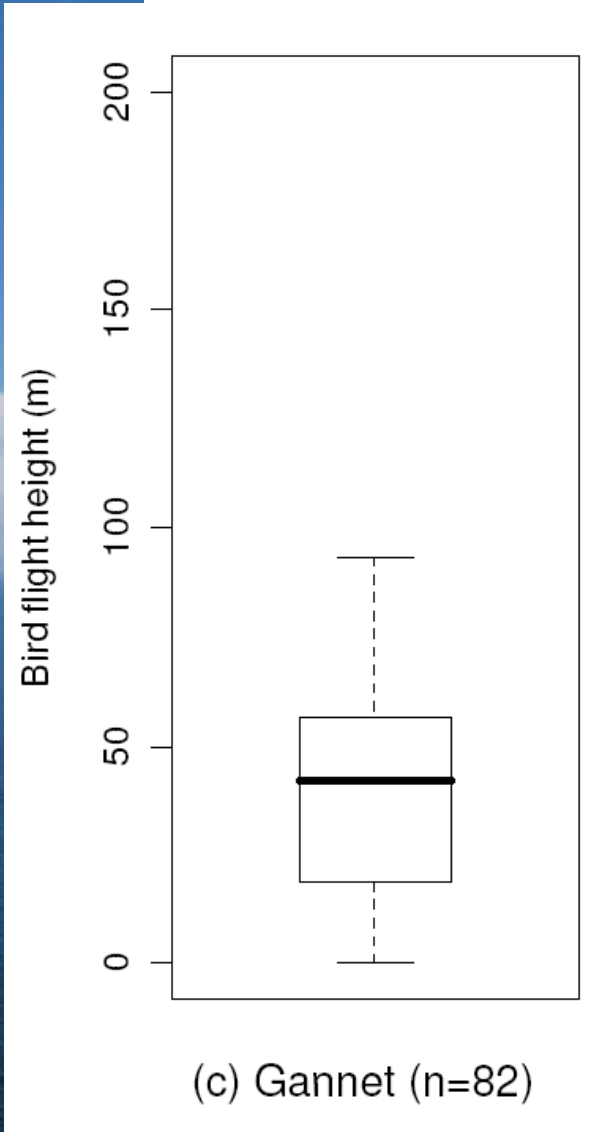
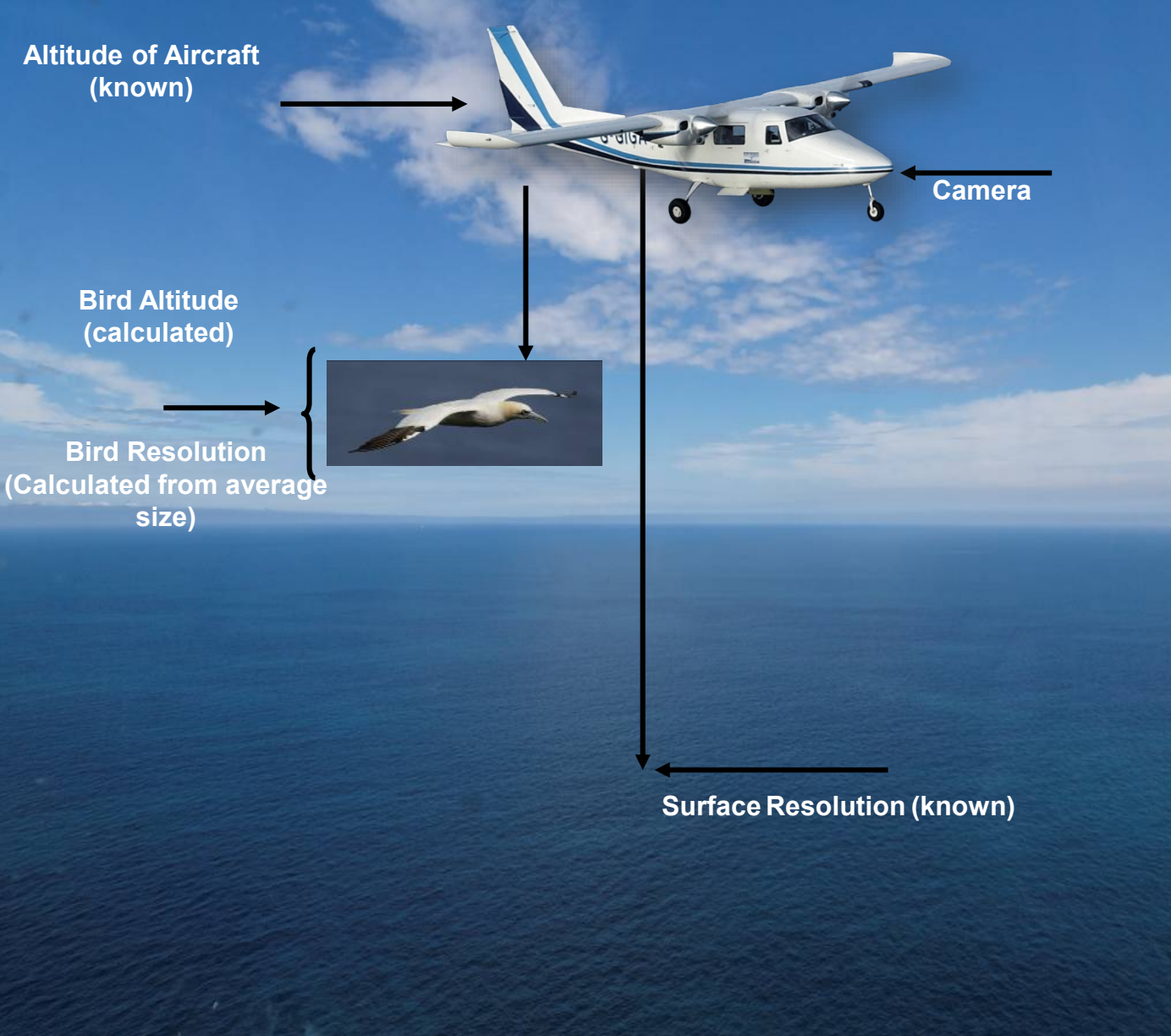


**Resolution 1.5 cm at sea surface**



Good light. Good weather.  
Snapshot of any one day


**Flight Height**



# Identifications

Images shared between taxonomists for ID and QC

ReMOTe interface updates central database with added information


ReMOTe  
Remote Marine and Onshore Technology  
BOEM

Hello jwillmott! [Logout](#)

[Data](#)
[Id/QC](#)
[Gallery](#)
[Admin](#)

**Snag QC**

[Back to ID/QC Summary](#)

Show only :

- ID/QC disagree
- species unknown
- Needs ID or QC
- ID/QC disagree: species, confidence

**2018-06-17**

000A412680d0b7c8d412

-- end of list (1) --

Type: **Turtle**    If not Turtle: Select One

**Species (Common name):** Green Turtle Hawksbill Turtle Kemp's Ridley Turtle Leatherback Turtle

Loggerhead Turtle Loggerhead/Kemp's Turtle Cannot Id to Species

**Confidence in your species id:** 1 - Possible 2 - Probable 3 - Definite

**Notes:**   Persist Note

Enter  Persist Id

Depth Rating: 1 - breaching 2 - near surface 3 - significantly submerged diagnostic features not obscured by depth

- type 'x' to show/hide enlarged image

Additional measurements:

- click in image to start measurement
- click again to end measurement
- type 'c' to clear measurement

★☆☆☆☆ Poor

has sargassum

**Full Image:** 384634-0617181830573-Cam1

[Cropped Full Image \(object circled\)](#)

[Cropped Full Image](#)

[Full Image \(this is a very large image and may be slow to load\)](#)

**Other Id's in this full image:** none

**ID:**  
Turtle(-)>Loggerhead Turtle(Probable)

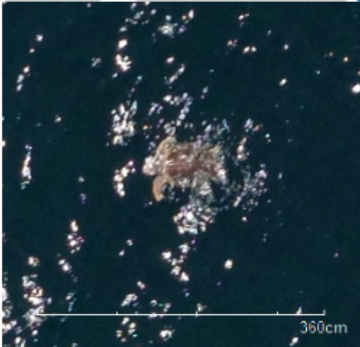
**Image Info:**  
 Snag Id: 000A412680d0b7c8d412  
 Taken: **2018-06-17** 13:30:56  
 Lat., Long.: 33.129622, -78.795015  
 Depth Rating: near surface


**Original Measurements:**  
 Length (cm):  
 Wing span (cm):  
 Heading (deg): 220  
 Altitude (m):

**Additional Measurements:**  
 carapace (cm): 74.27

**ID History:**  
 11-21-18 Turtle(-)>Loggerhead Turtle(Probable)  
 Robert Kenney

cm    what was measured? Save







# Visualizing Data

To explore data visit:  
**remote.normandeau.com**

**NORMANDEAU ASSOCIATES** ENVIRONMENTAL CONSULTANTS

**ReMOTe**  
Remote Marine and Onshore Technology  
NYSERDA

Hello jwillmott! Logout

Data Id/QC Gallery Admin

**NYSERDA Data**

RELOAD MAP POINTS  
Update

- fetch/reload map data for the checked Surveys and Objects

Survey:  
Summer:  2016  2017  2018  
Fall:  2016  2017  2018  
Winter:  2016-17  2017-18  2018-19  
Spring:  2017  2018  2019

Animal/Object:  All

DISPLAY/TOGGLE Map Points:  
(toggle on/off map points)

Map Type:  
 Icons by Animal/Object  
 Icons by Survey  
 Heat

Survey:  
Summer:  
Fall:  
Winter:  
Spring:  2019

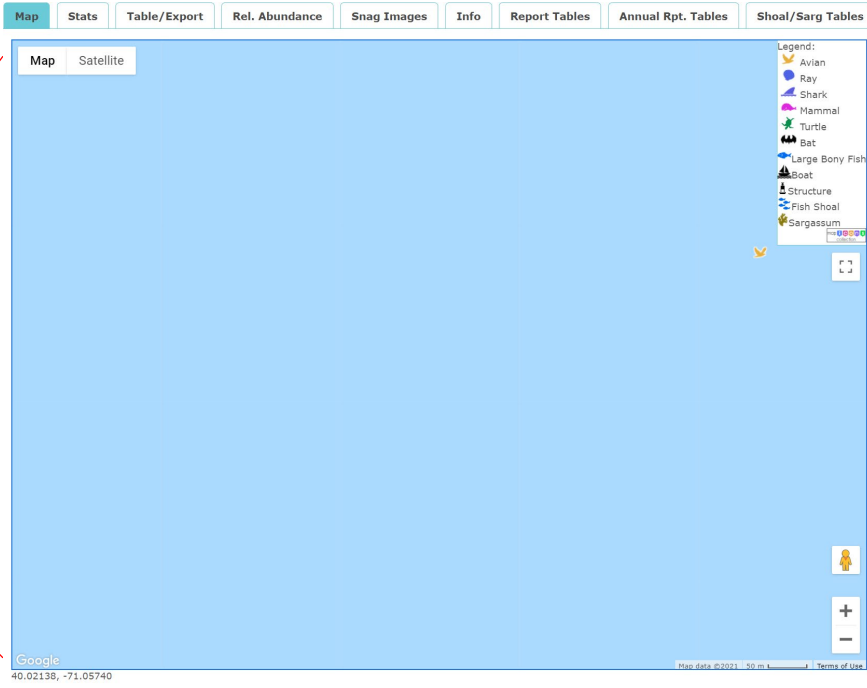
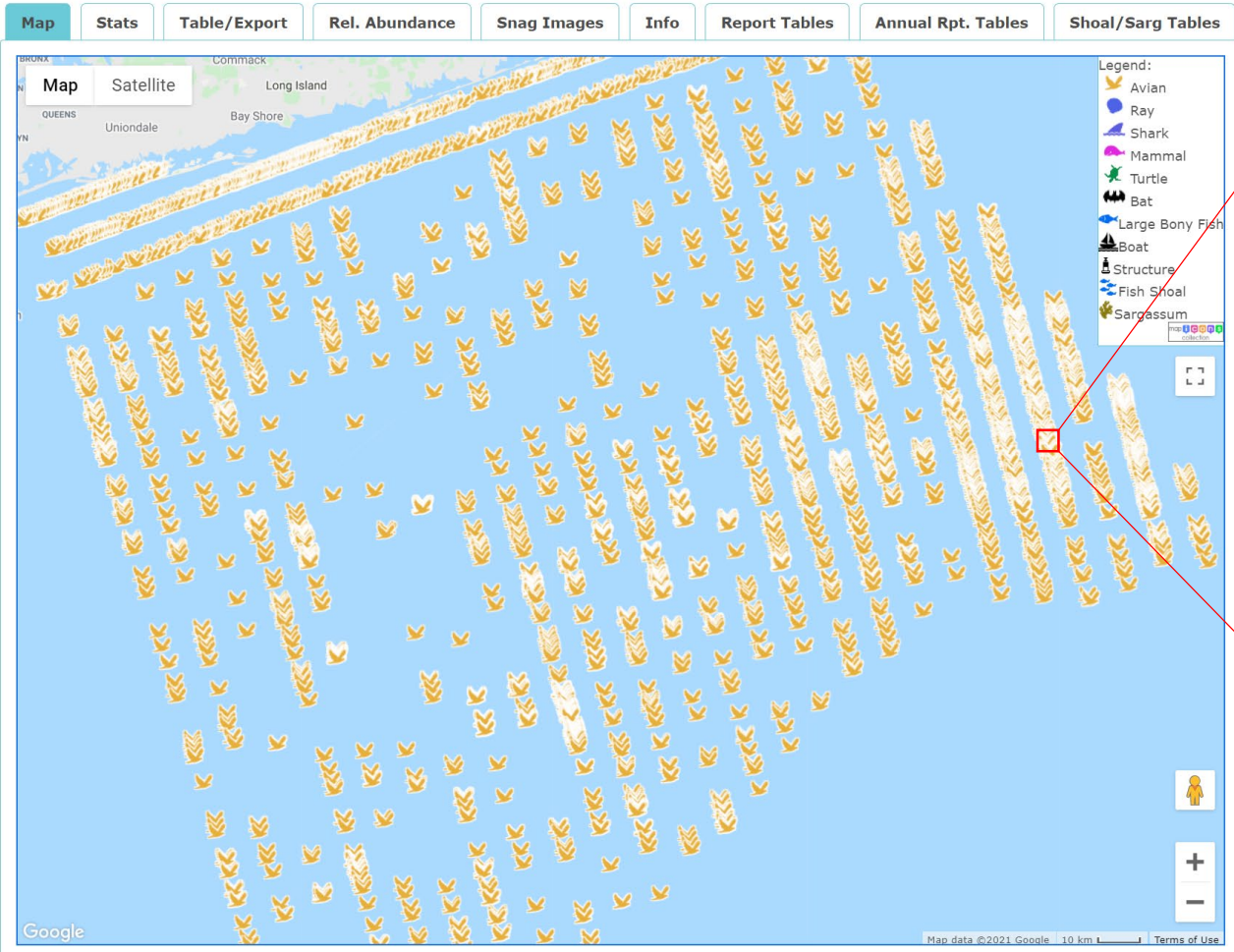
Animal/Object:  
 Avian  
 Ray  
 Shark  
 Mammal  
 Turtle  
 Large Bony Fish  
 Boat  
 Structure  
 Other

Altitude:  
 all  range

Carapace(cm) (Turtles only):  
 all  range

Area:  
 OPA points

Geographical Info:  
 OPA transect lines  
 Calls Areas Hudson & Fairways  
 WEAs Hudson Primary  
 WEAs Hudson Secondary  
 Contour lines

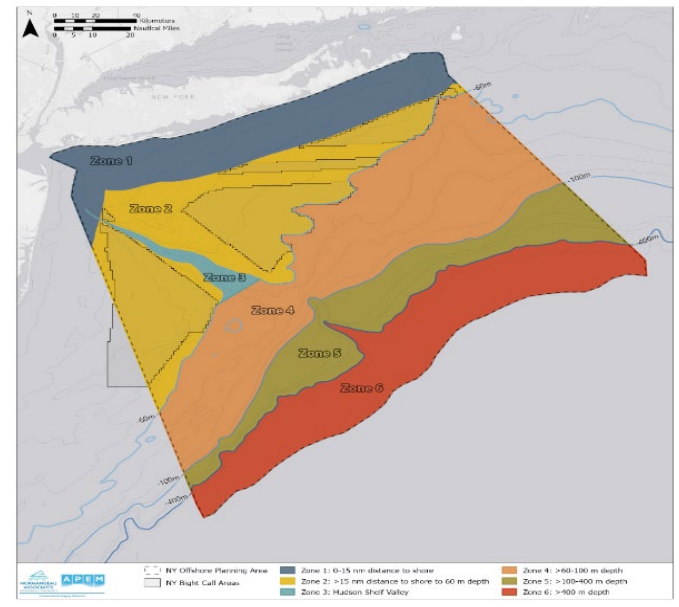
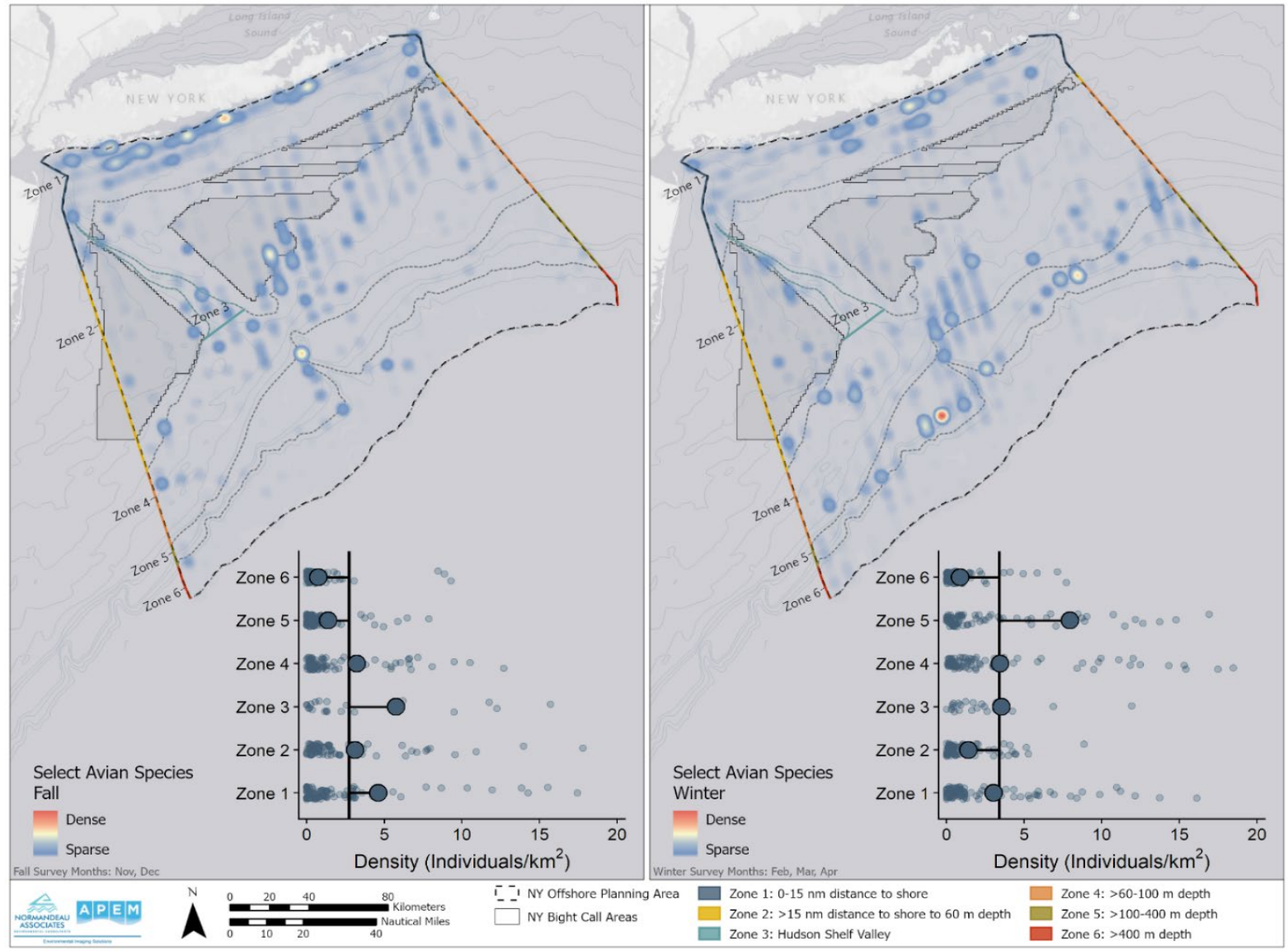


~98% of imagery  
contains **NO** visible animals



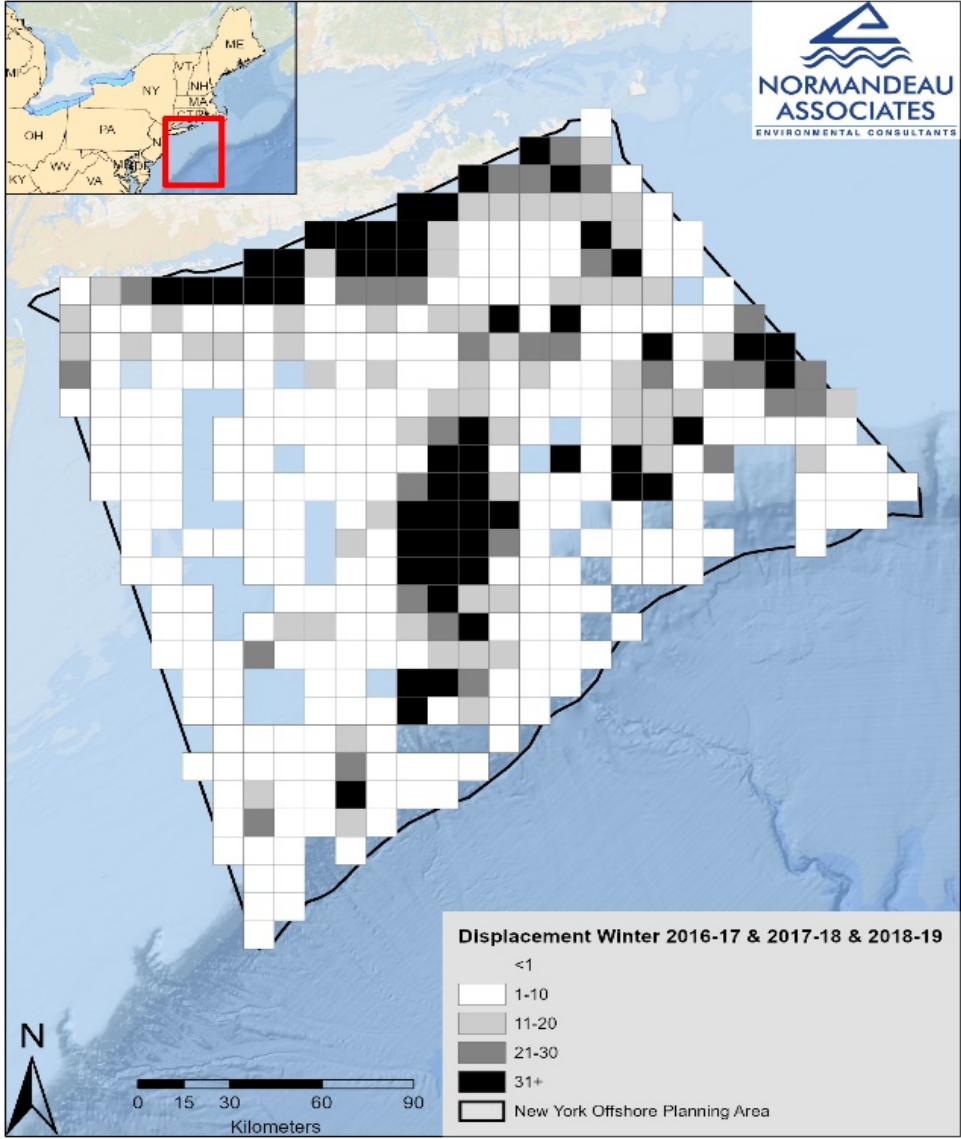
# Distributions and Densities

Heat Map showing spatial distributions of birds in **Fall** and **Winter**



Lollipop plots show higher density relative to mean density for Zones 1 and 3 in Fall, and Zone 5 in Winter

## Sensitivity to Offshore Wind



Many of the species present in Zones 4 and 5 in the Winter represent displacement-sensitive species

Displacement-sensitive species include loons, ducks and auks

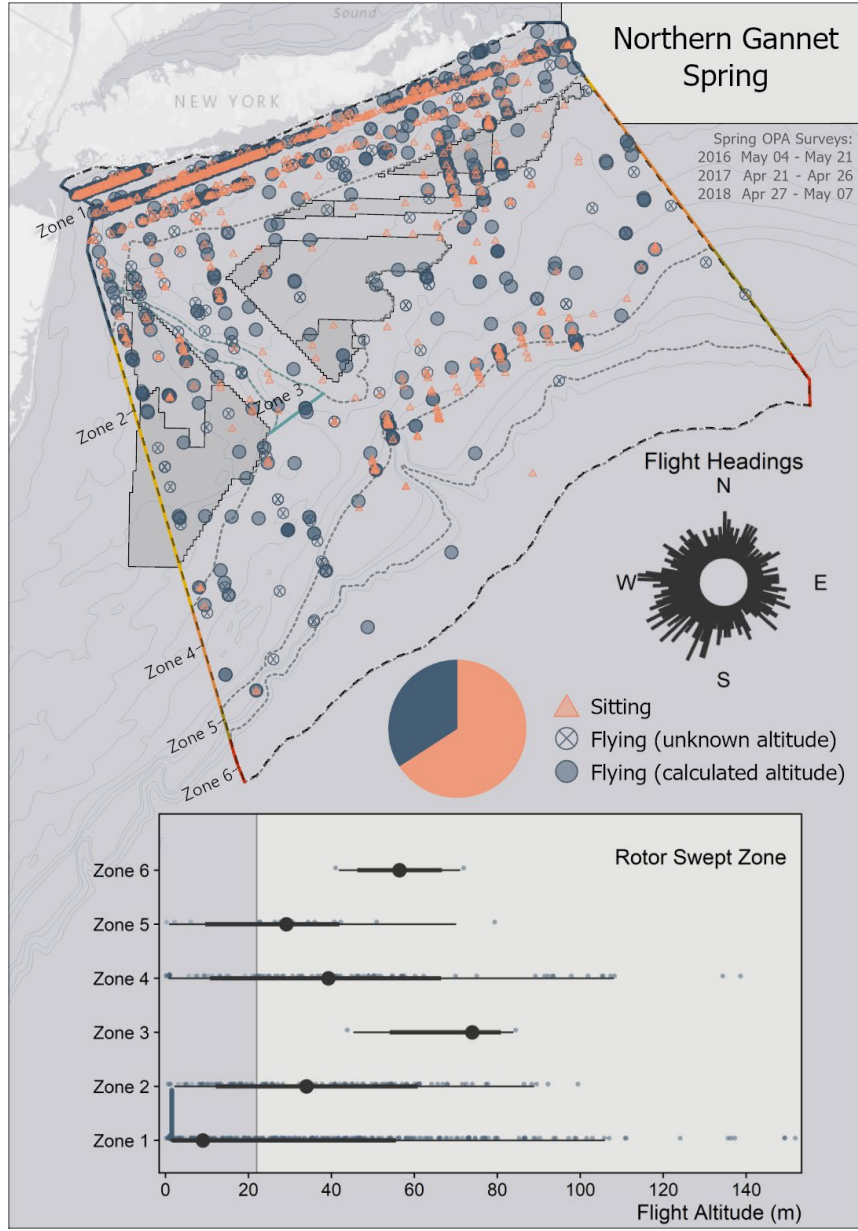
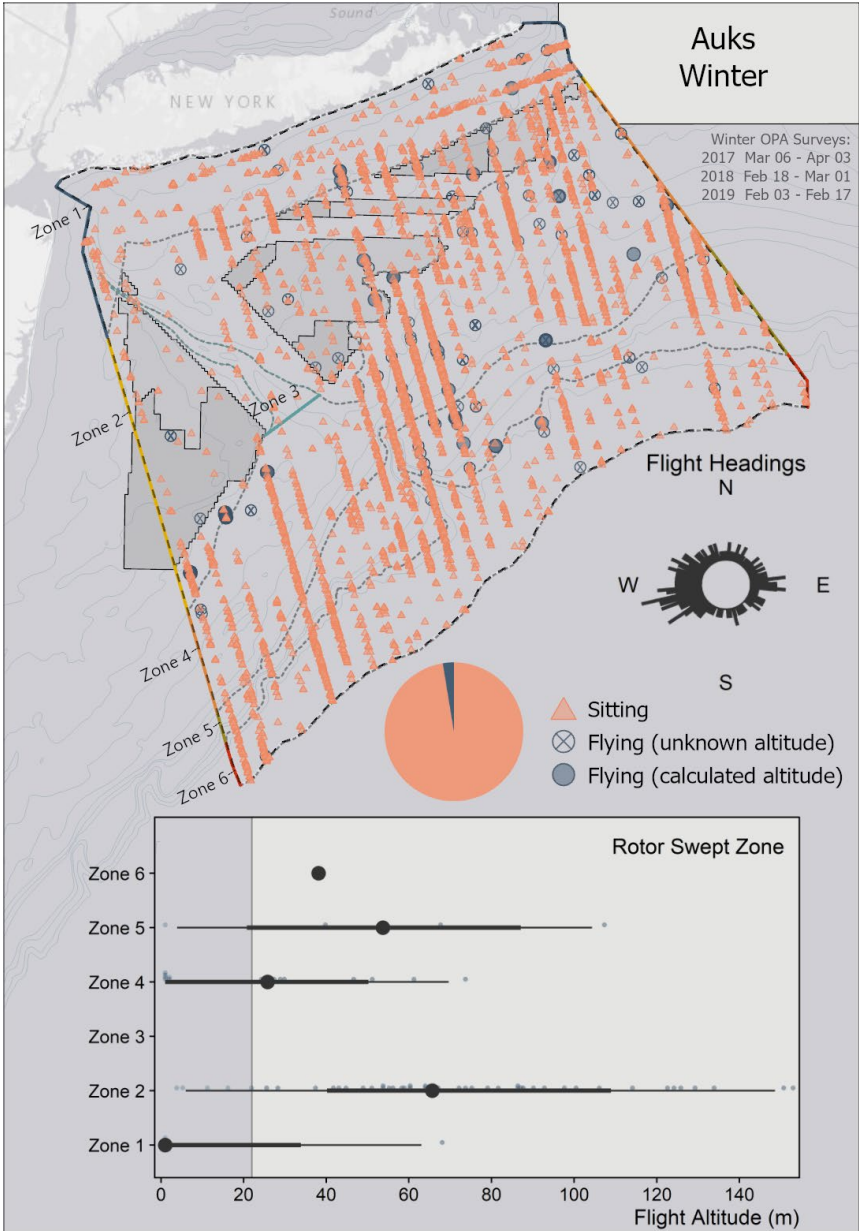


Using grid design:  
Aerial digital is robust for Before-After Control-Impact (BACI) studies assessing displacement





**Using Associated Data**

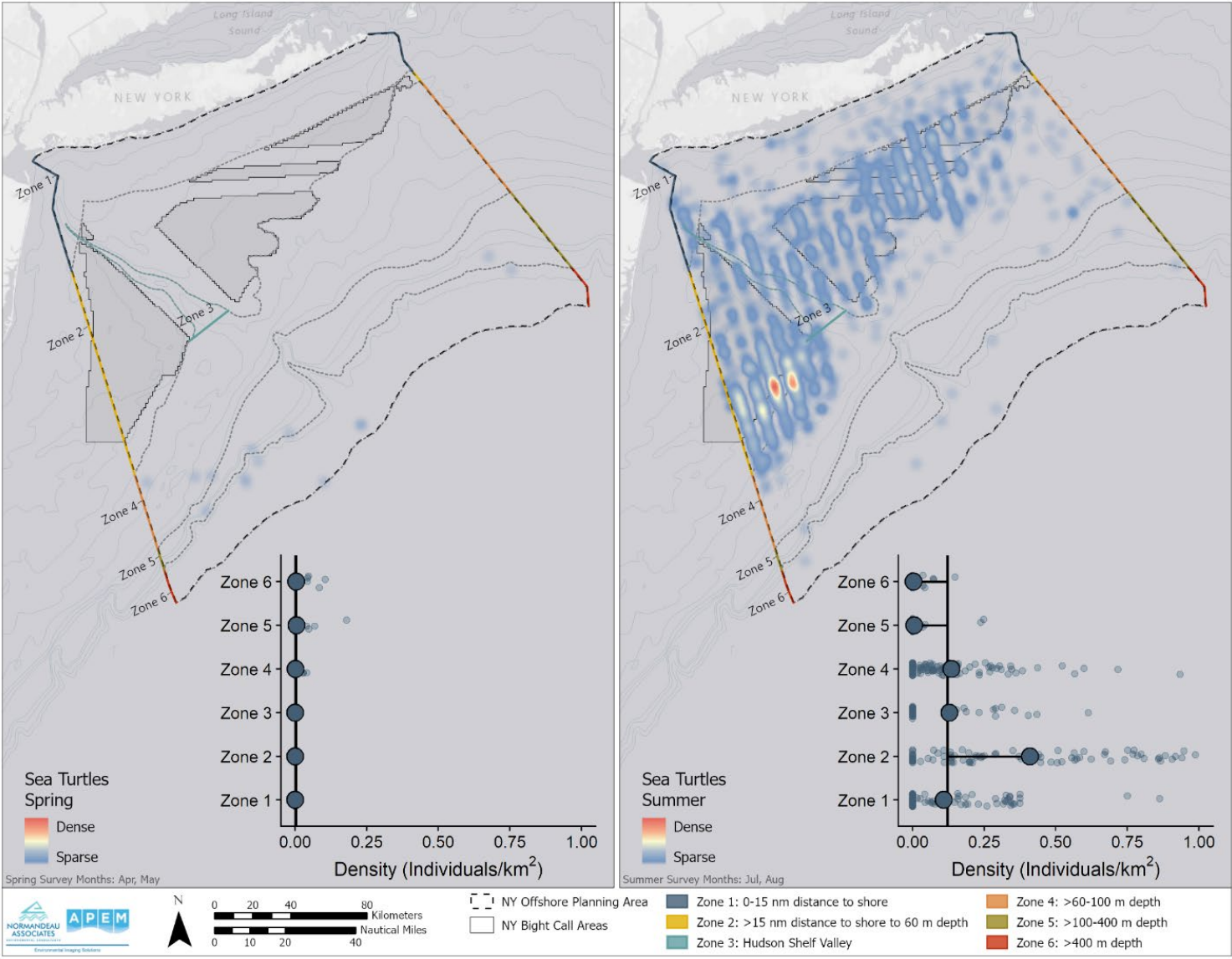


Looking at flight activity

Caveat-  
 Daytime in good weather

Pale area represents 23 m - 320 m

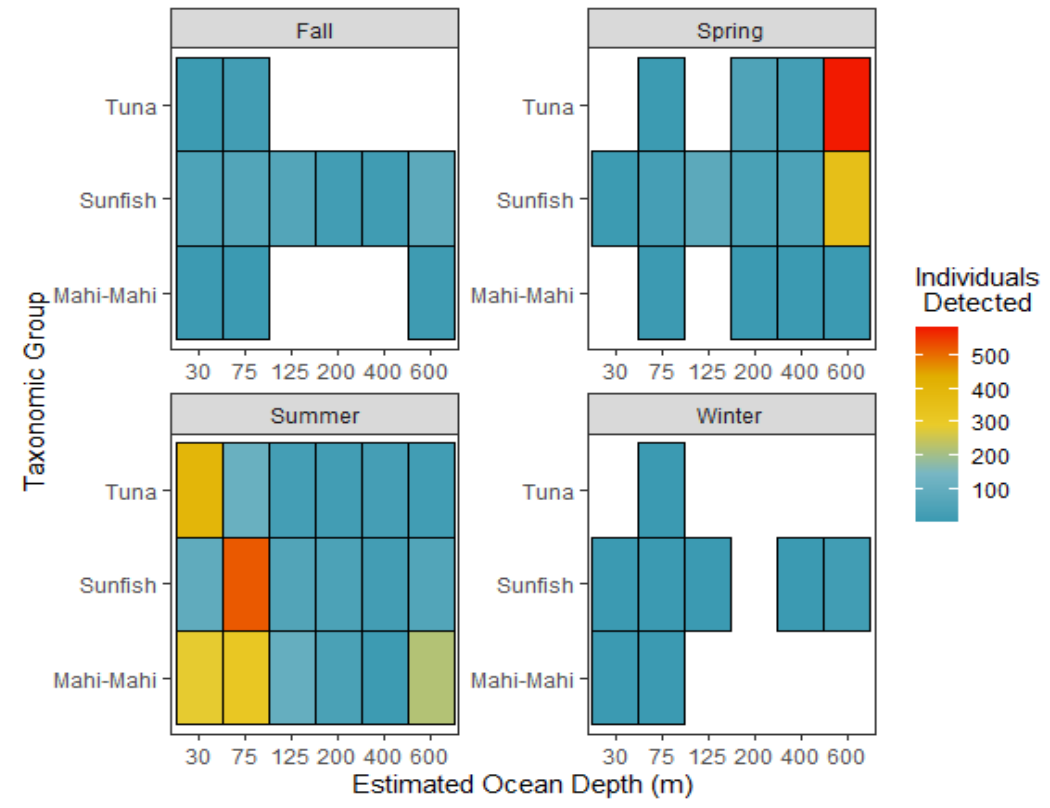
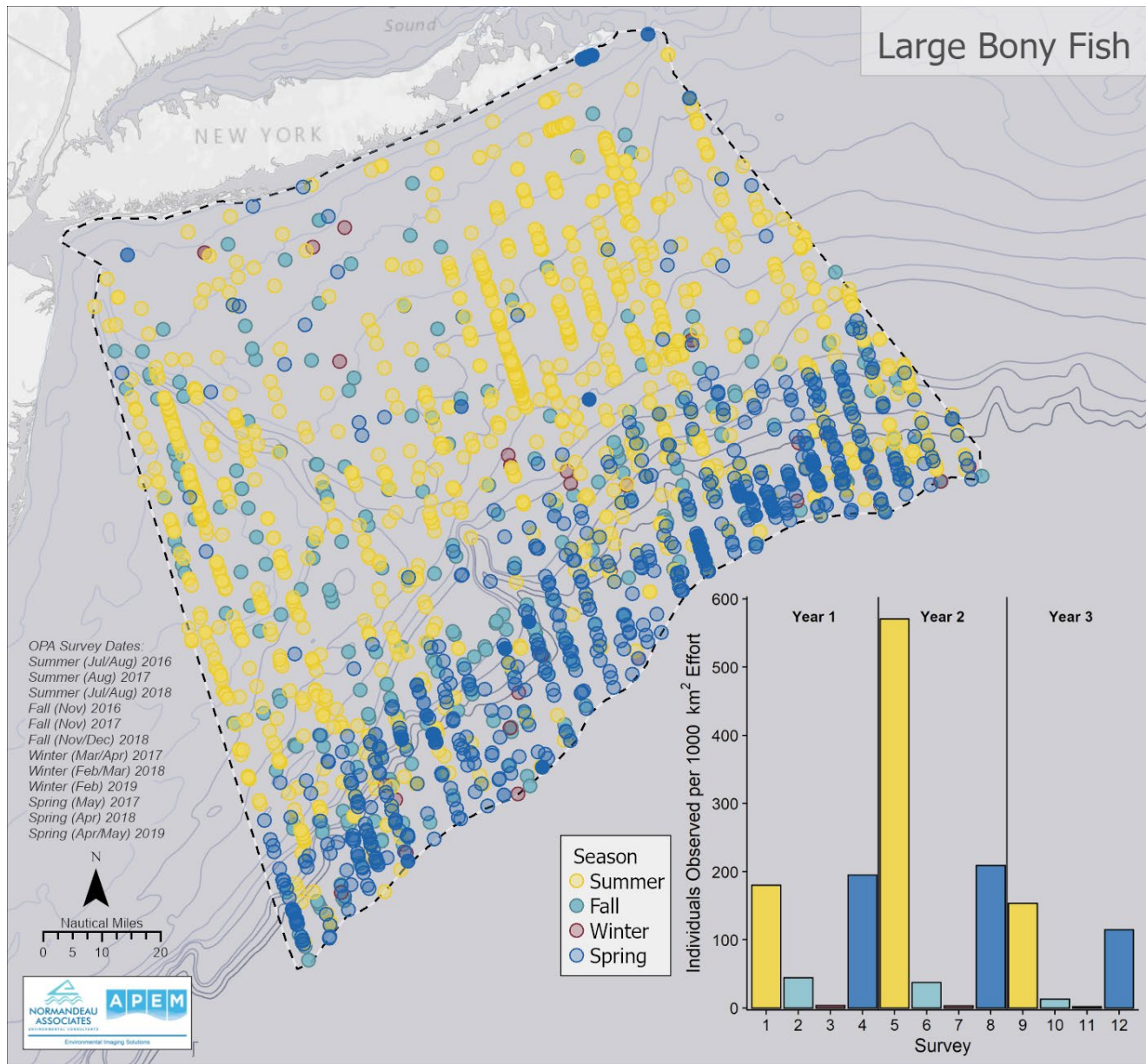
**Turtles**



- ▶ Turtles show a strong association with water depth
- ▶ Summer Zone 2 mean individuals per km<sup>2</sup> = 0.41
- ▶ Summer OPA mean individuals per km<sup>2</sup> = 0.12

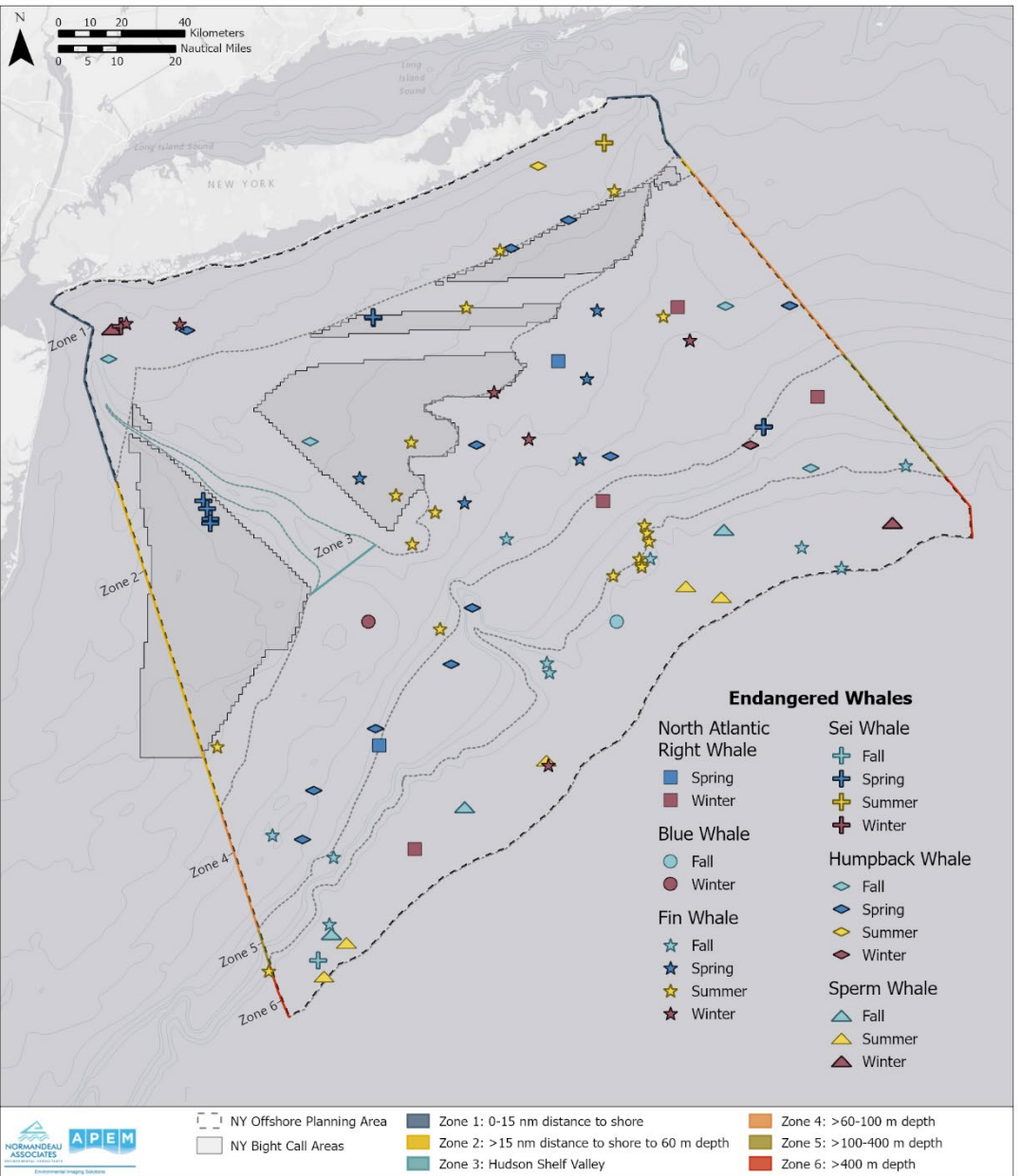


# Fish: Annual and seasonal variation





**Rare Species**



Sperm Whale



Fin Whale



NARW



Sei Whale

## Surveys provide...

- ▶ A snapshot in time; speed minimizes double counting
- ▶ Data unbiased by observer effects or survey platform effect of attraction or repulsion
- ▶ More representative density information for turtle species
- ▶ Data that do not require distance sampling; more accurate distribution and density information
- ▶ Insight into naturally occurring interannual and interseasonal variation
- ▶ Data may be revisited by others, and everything is traceable (e.g., large rays and review of flight height calculations)

### **Post-construction:**

- ▶ Same survey design may be used pre- and post-construction
- ▶ Robust data for assessing displacement effects



## Surveys do not provide...

- ✦ Information is collected quickly, so species with discrete temporal movements could be missed
- ✦ Rarer species and those that dive might be overlooked (few data on deeply submerged animals)
- ✦ Information associating activity with weather variables
- ✦ Information on activity in poor weather
  - Distribution and density
  - Flight activity including flight height
- ✦ Information on smaller animals
  - Even at 1.5 cm resolution smaller shorebirds and songbirds remain unidentified
- ✦ Information on nocturnal activity including migratory species
  - Songbirds
  - Shorebirds



### Post-construction:

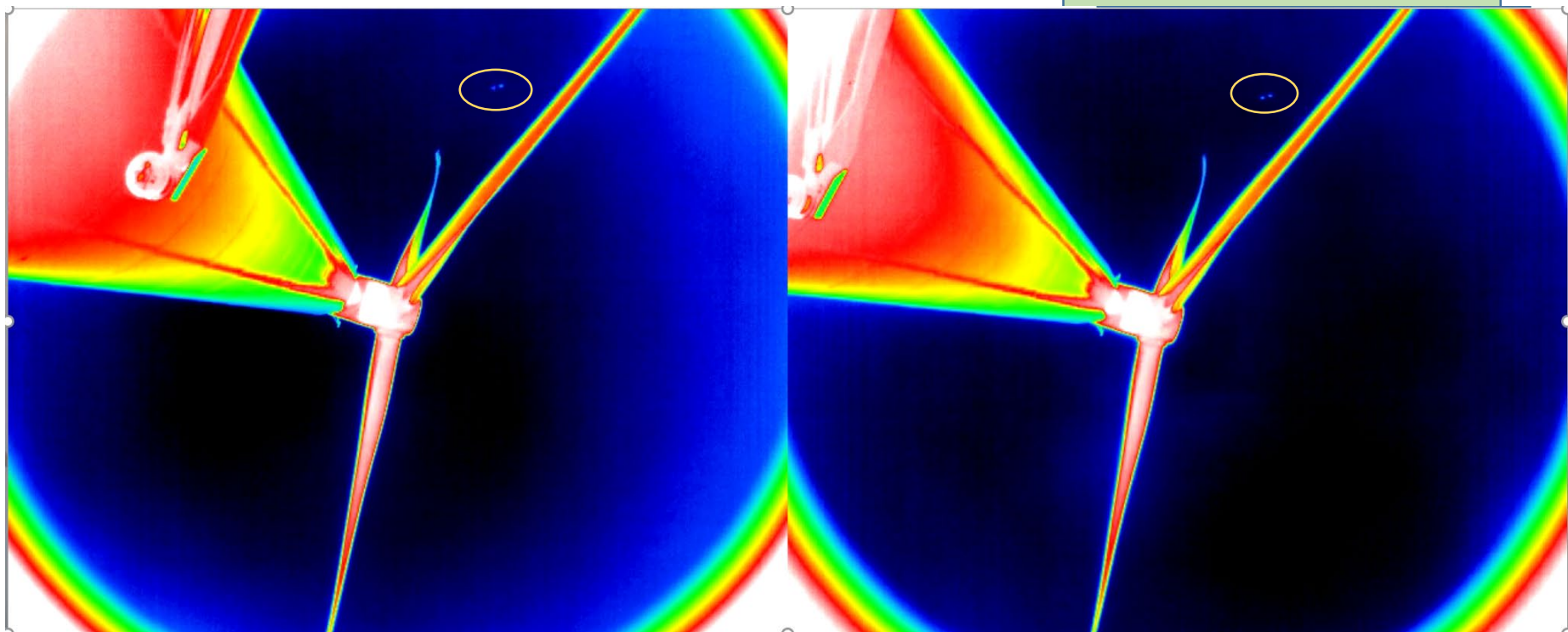
- ✦ Collision and avoidance rates at a meso- and micro-scale (displacement could be a surrogate for macro-avoidance)

## Filling the Gaps

- ✦ Finer temporal scale surveys
- ✦ Avian, bat, and mammal acoustic receivers
  - On FLiDAR Buoys can connect calling animals with wind variables collected in same location
  - Deployed at NYSERDA buoys in the Hudson South and Central Bight areas
- ✦ VHF and Satellite Tagging
  - Species specific: need more VHF receivers offshore (Pam Loring developing protocols)
  - GPS/satellite tags are large and do not last very long
  - VEMCO fish tag receivers and VHF receivers deployed on NYSERDA buoys in the Hudson South and Central Bight areas
- ✦ Acoustic, thermal and ambient light tracking of animals in the RSZ : flight heights, micro-avoidance and collision observations
  - Dominion ATOM system also includes VHF receivers
- ✦ Need an offshore technology for monitoring general passage rates and macro- and meso-avoidance
  - Normandeau with partners currently trying to advance such a technology





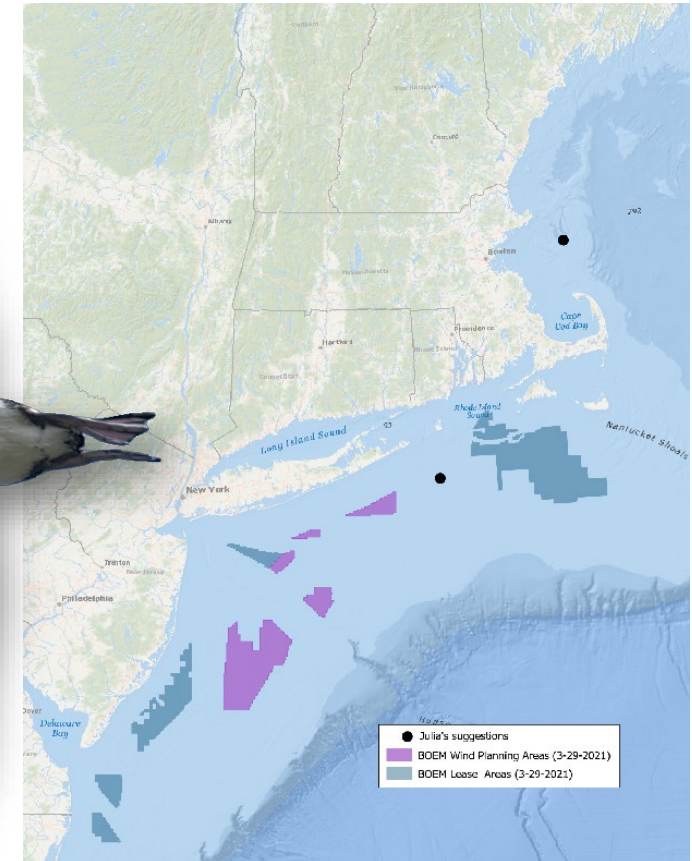


Thermal Image:  
Plane flying at ~36,000 ft traveling at ~450mph  
(values approximate as distance from camera adds error)

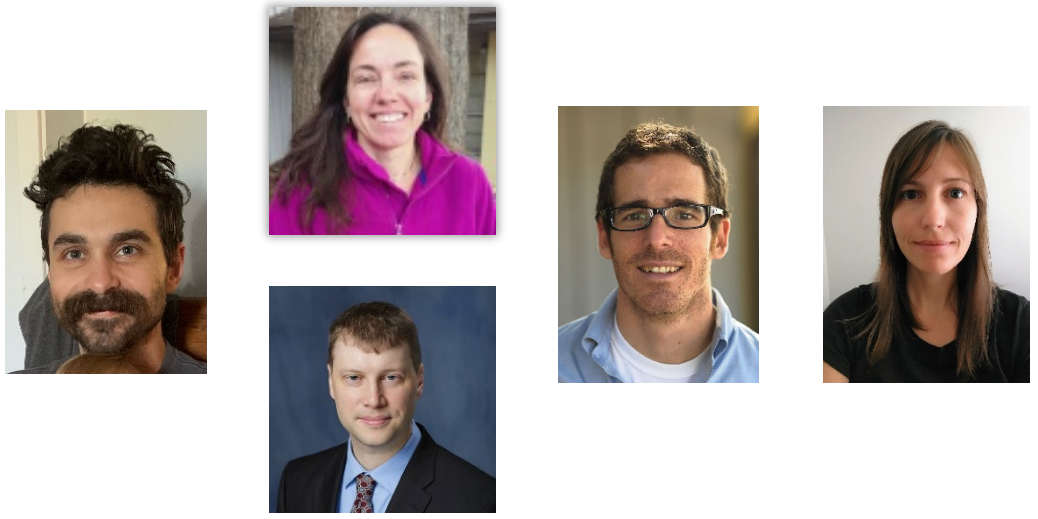


## Separating effect of OWED from other stressors

- Need for long term monitoring plots outside of the offshore wind energy development areas
- Species anticipated to move North as sea temperatures and other variables change
  - Species movement modeling in progress: BOEM-funded, NOAA modeling
  - Aerial digital would be good for this
- Needs discussion - frequency of surveys and size of monitoring plots
  - Monitoring targeted species and validating NOAA models would be of value



**Acknowledgments and Thanks!**



**Images:** Jonathan Mays, Trina Anderson and George Hoyt

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# Coming Next:

June 23, 1:00 p.m. ET

## The Science of Visibility

Gordon Perkins &  
Kiva VanDerGeest,  
Environmental Design &  
Research

Visit [wind.ny.gov](http://wind.ny.gov) to register

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