Atlantic Marine Assessment Program for Protected Species (AMAPPS)

Presented by: Dr. Debra Palka
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Contributions from:
Abundance: Lance Garrison, Sam Chavez, Doug Sigourney
Pinnipeds: Gordon Waring, Beth Josephson
Birds: Tim Jones, Beth Josephson, Harvey Walsh
Turtles: Heather Haas, Chris Sasso
Passive acoustics: Danielle Cholewiak, Melissa Soldevilla
Ecosystem: Mike Jech, Betsy Broughton, Erin LaBreque

and other organizations

Atlantic Marine Assessment Program for Protected Species (AMAPPS)

Outline:

1. What is AMAPPS
2. Types of data collected
3. Spatial-temporal scales
4. Current and future analytical work

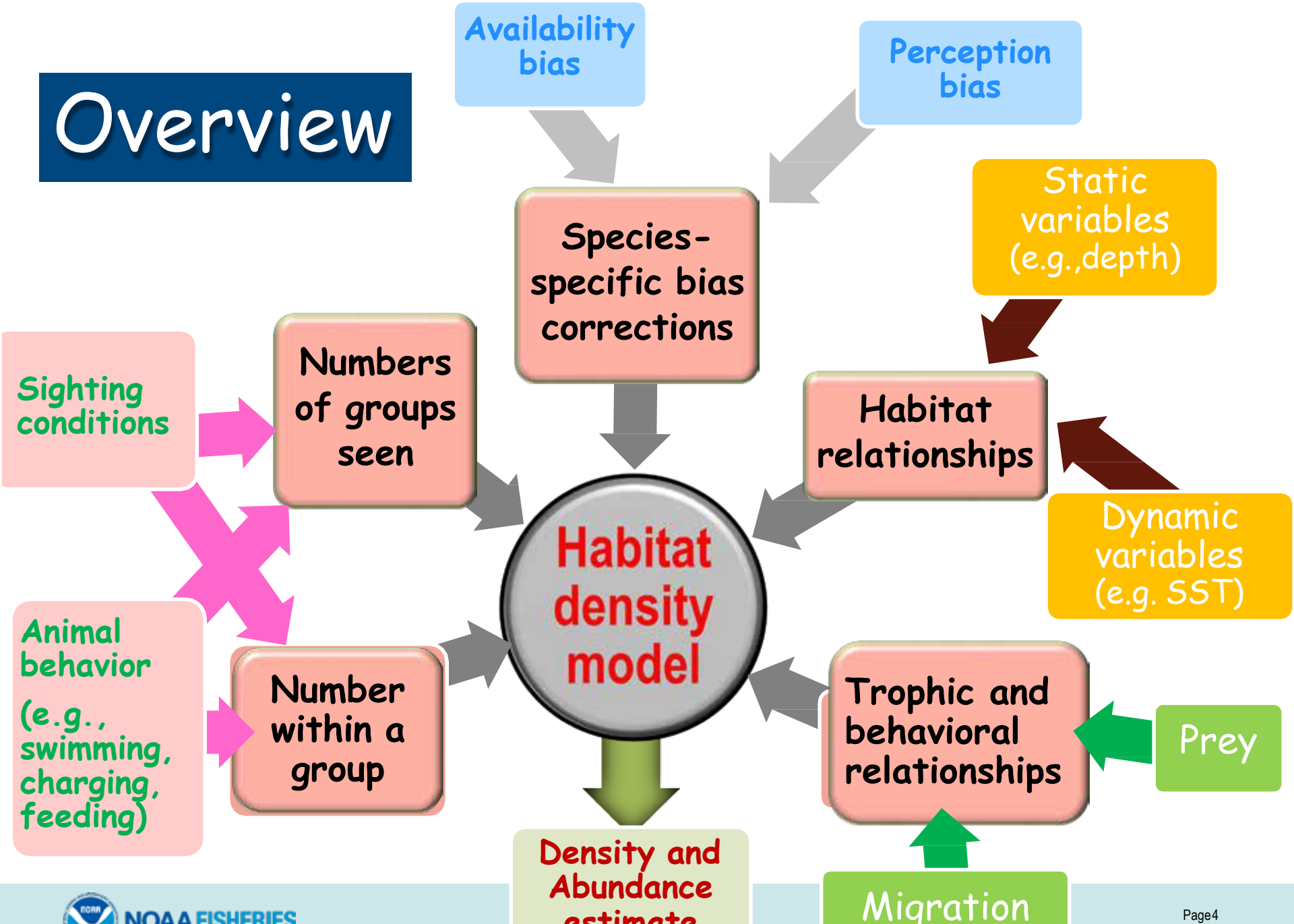
Background ofAMAPPS



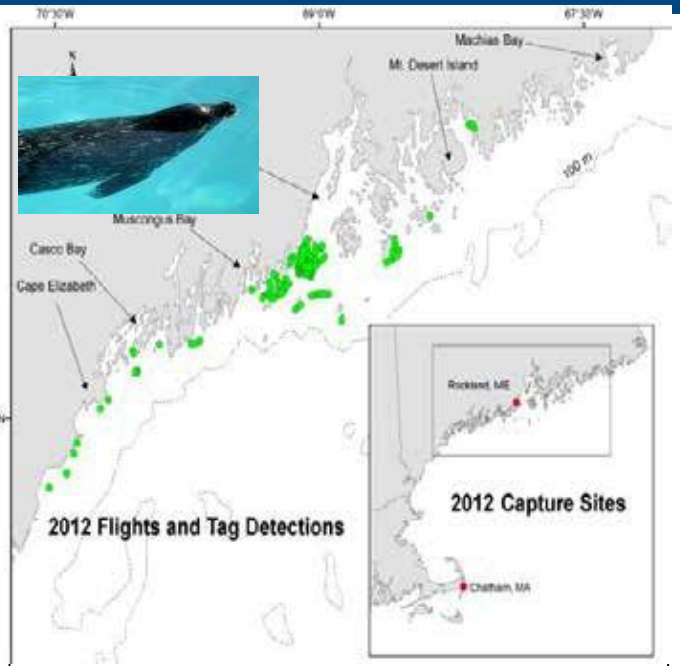


- Collaborative efforts with NMFS (NEFSC + SEFSC), US Fish and Wildlife Service, BOEM, US Navy and other organizations
- AMAPPS I: 2010 – 2014; AMAPPS II: 2015 – 2019
- Objectives:
  - Collect abundance and distribution data
  - Collect tag telemetry data
  - Estimate broad scale abundance estimates
  - Develop fine scale seasonal, spatially-explicit density estimates within the ecosystem context to be used for management purposes

Overview


Availability bias
Perception bias
Species-specific bias corrections
Static variables (e.g.,depth)
Sighting conditions
Numbers of groups seen
Habitat relationships
Habitat density model
Dynamic variables (e.g. SST)
Animal behavior (e.g., swimming, charging, feeding)
Number within a group
Trophic and behavioral relationships
Prey
Density and Abundance estimate
Migration

1. Pinniped distribution, abundance and ecosystem



Aerial photography surveys over seal haul out sites

1)Maine harbor seal abundance surveys 2011 and 2012

- Aerial photographic surveys of haul out sites
- Capture and tagging to correct for at sea animals
- G.T. Waring, R.A. DiGiovanni Jr., E. Josephson, S. Wood, and J.R. Gilbert. 2012 population estimate for the harbor seal (*Phoca vitulina concolor*) in New England waters. 2015. NOAA Technical Memo F/NE-235.

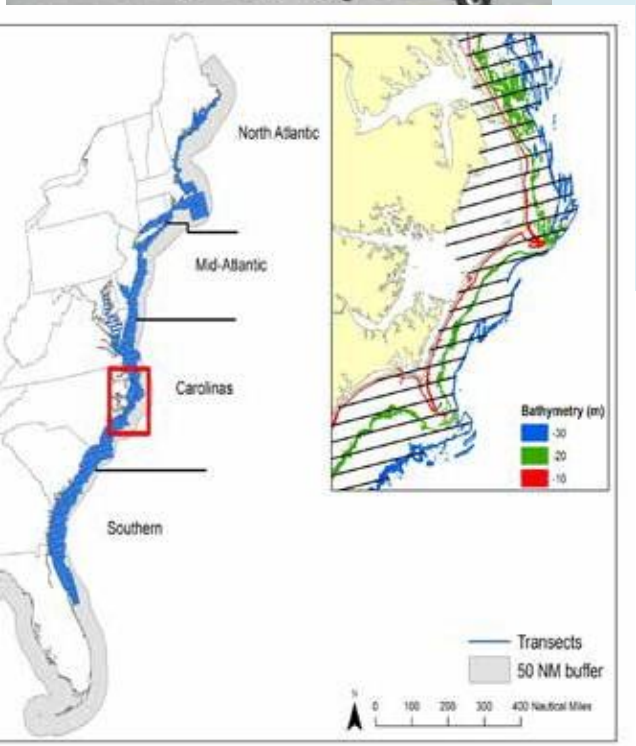
2)Satellite tag of adult gray seal, captured in Chatham in June 2013, tracked for 206 days to document habitat usage

3) At-sea and aerial observations of harbor and gray seals.

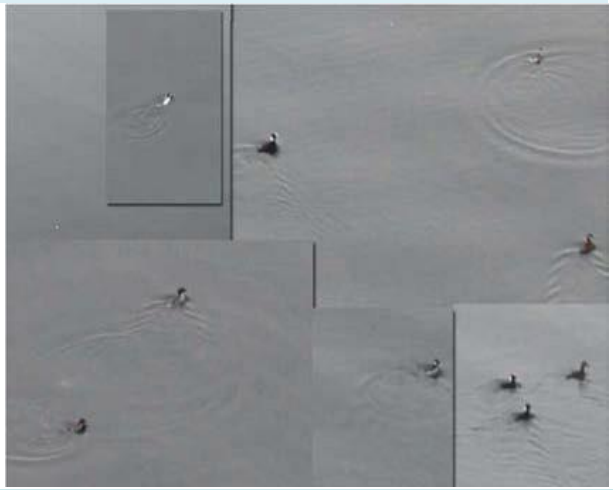
Harbor seals on beach

NOAA FISHERIES

2. USFWS seabird aerial surveys

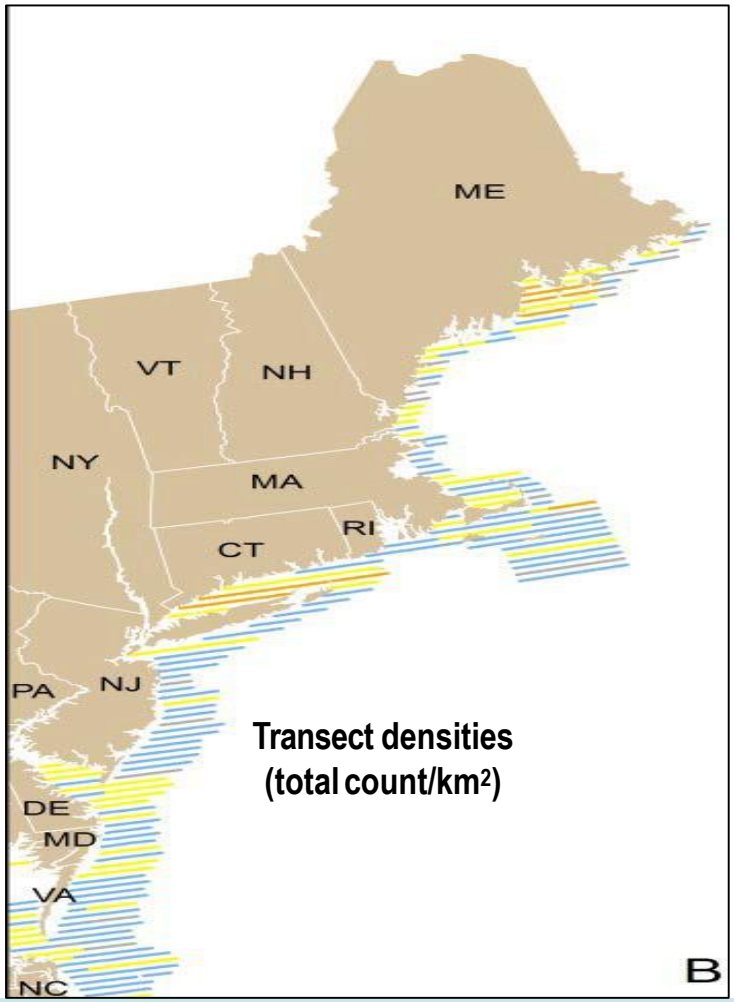


1. Routine visual strip transect surveys
   - 200 ft altitude; 110 knots; 1 team of 3 people
   - 200 m strip width on each side of the aircraft
   - Target species: all birds
   - Record all turtles and marine mammals
2. Detection studies (with WAFWS)
   - Goals: quantify perception and availability bias to understand counting errors and mis-identification
   - Double observer teams
   - 2 DSLR cameras mounted to aircraft: forward facing and point of view

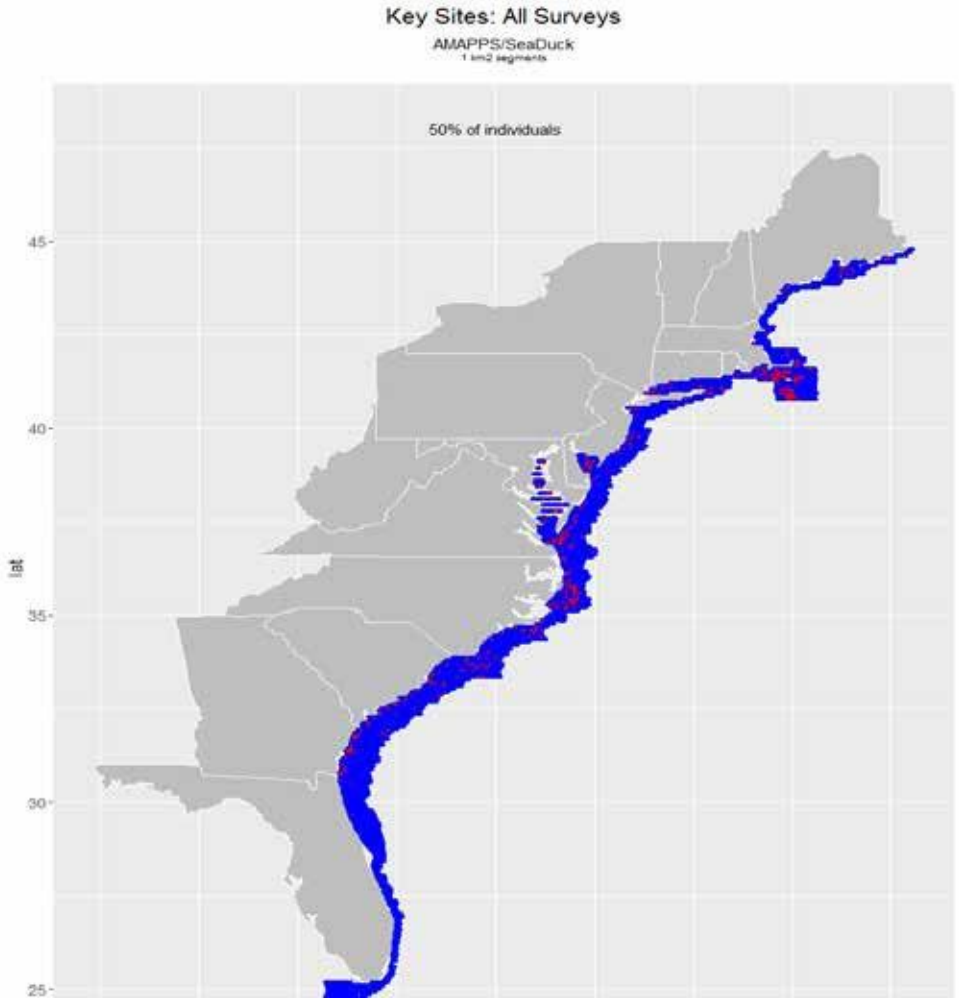


Seabird Results

1) Transect densities and Key sites of seabird species

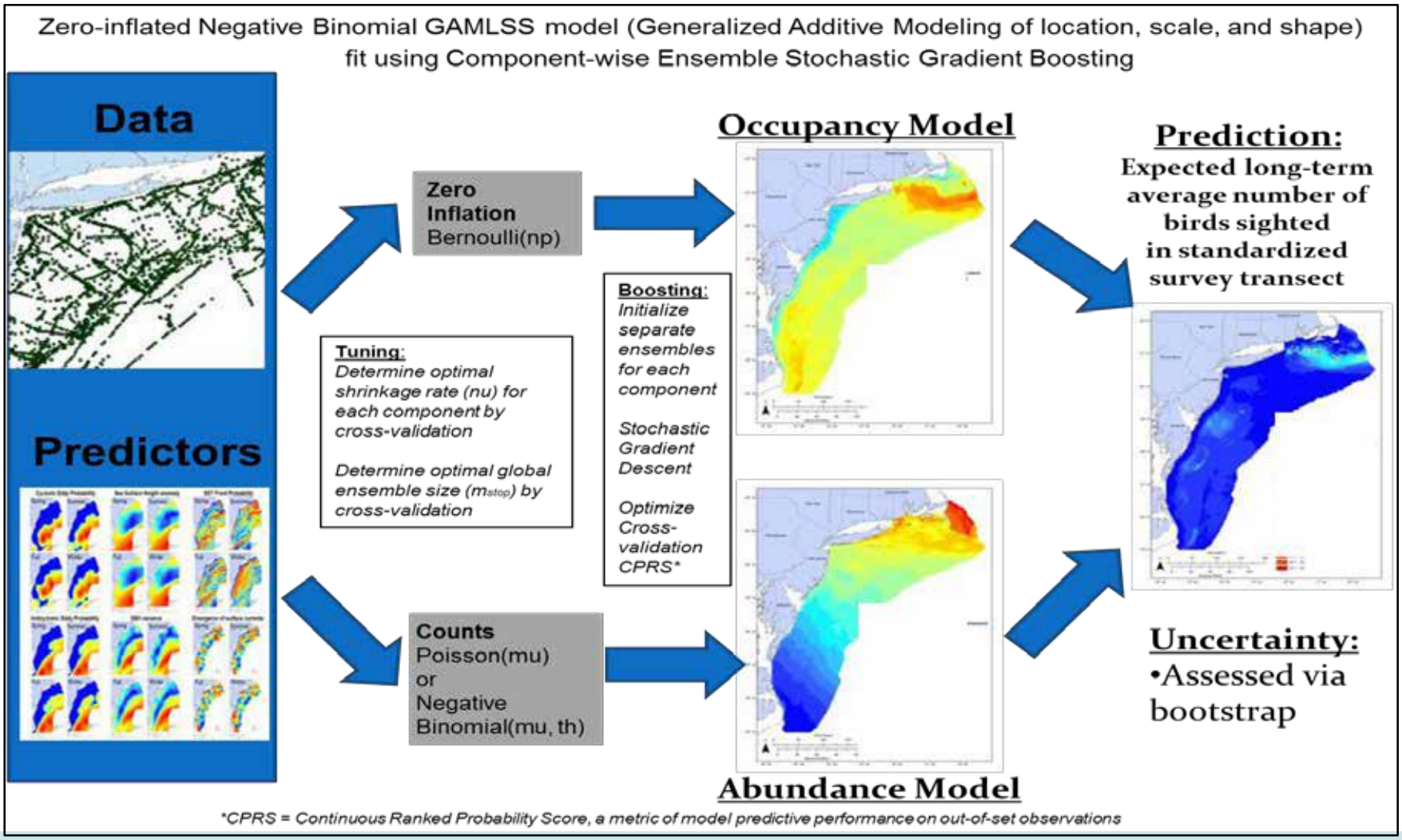


Transect densities (total count/km²)



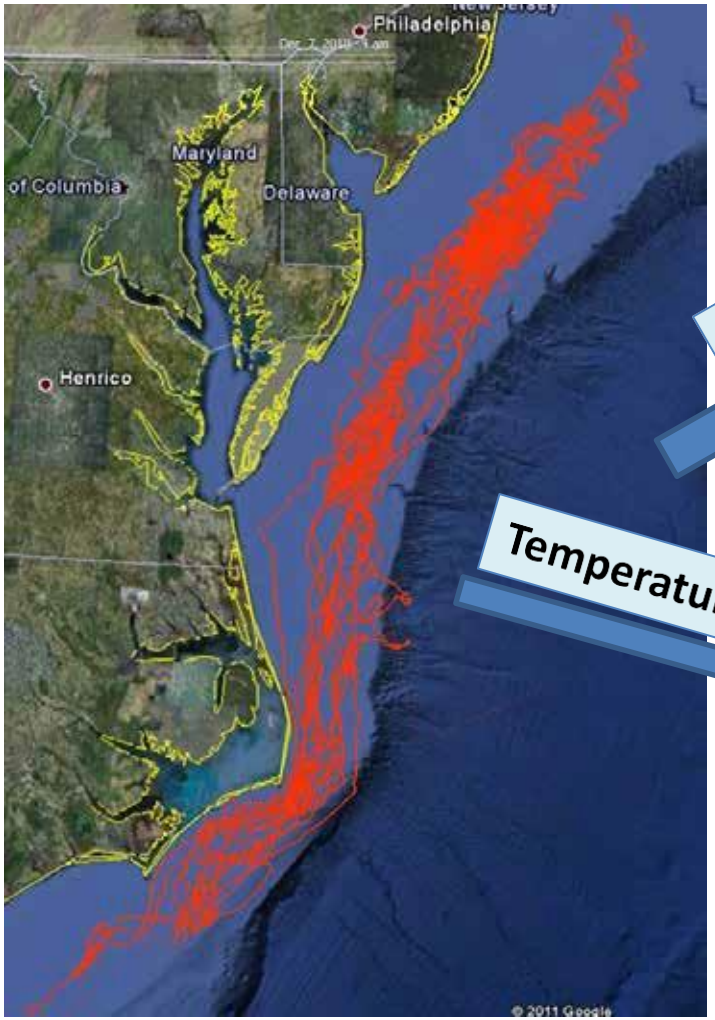
Contributed to Kinlan et al. 2016

***Modeling At-Sea Occurrence and abundance of marine birds to support Atlantic marine Renewable energy planning. Phase 1 Report*. OCS Study BOEM 2016-039 xvii+113 pp.**

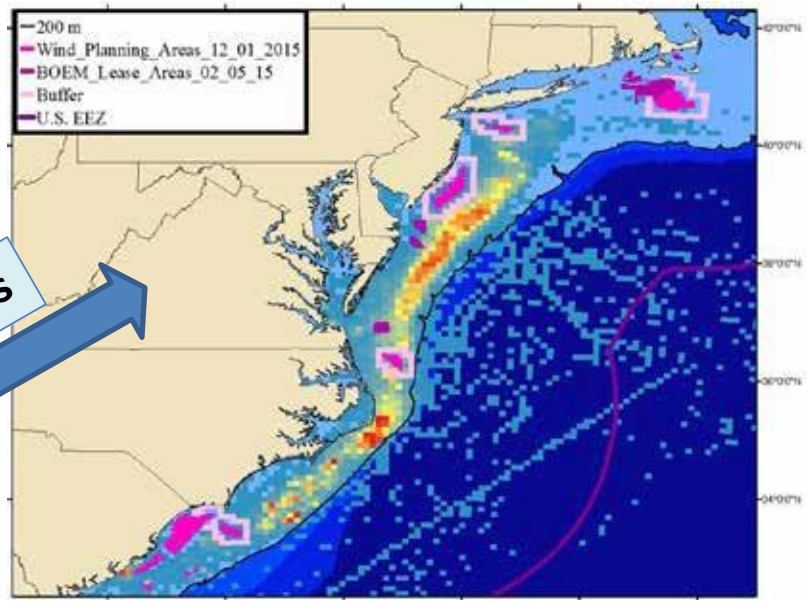


3. Satellite tags of loggerhead turtles

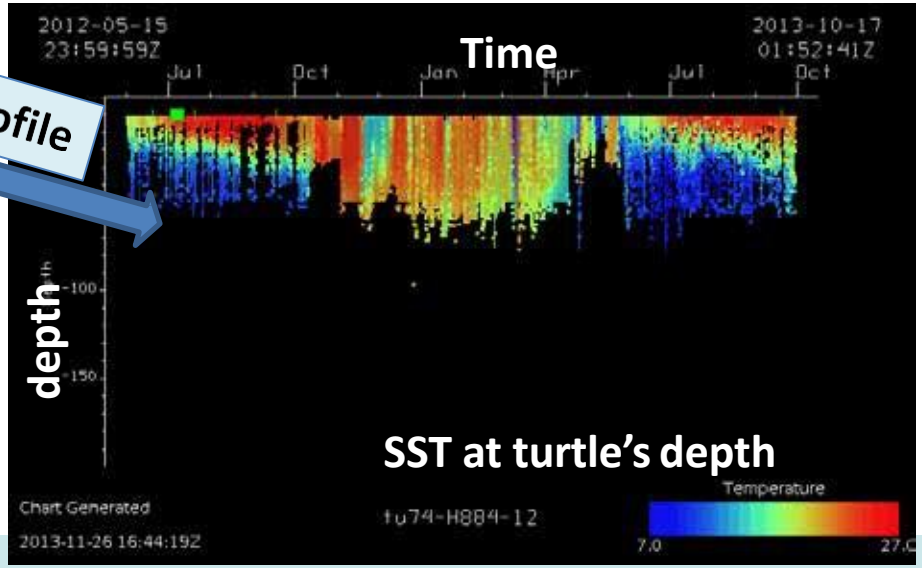
Distribution, Abundance, Ecosystem



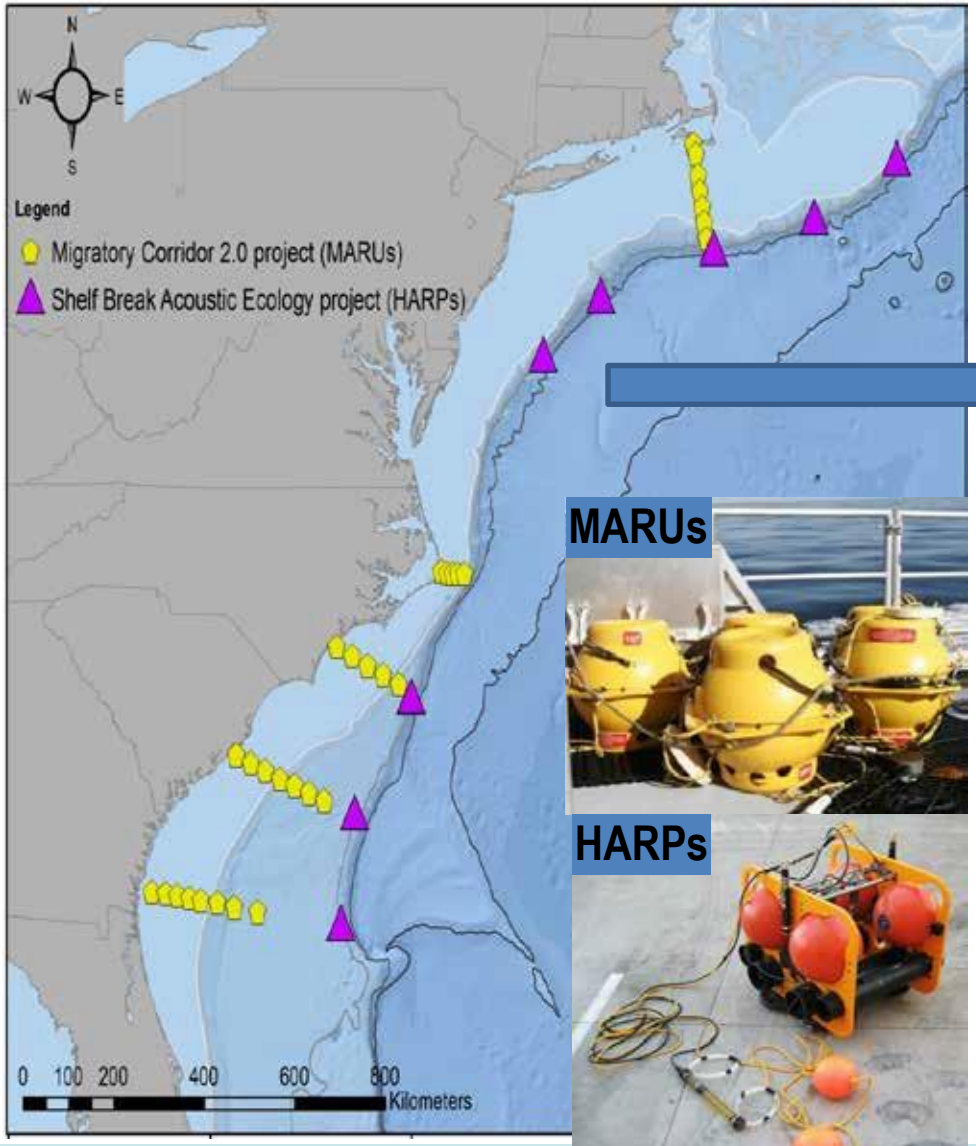
Density models

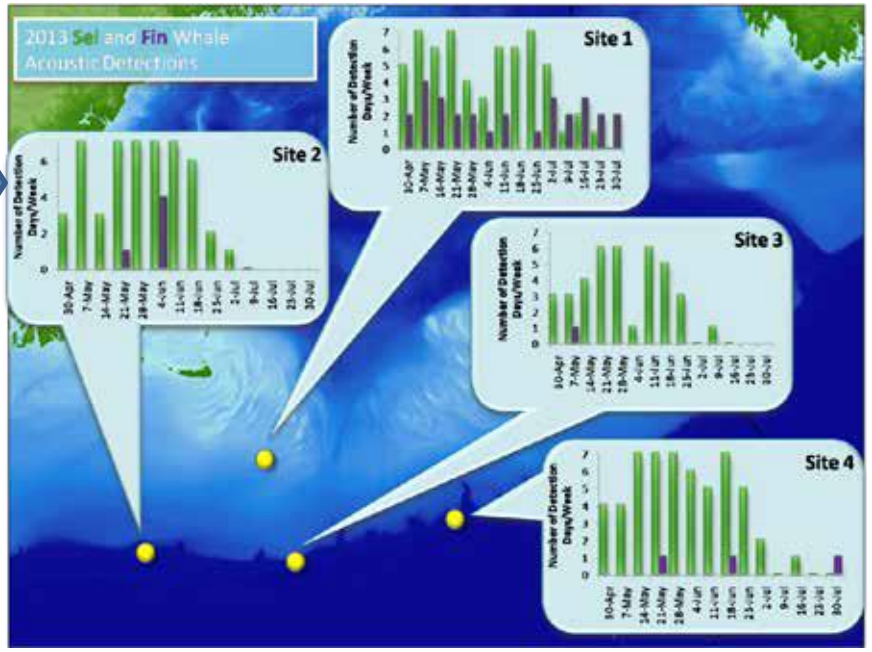


Temperature profile



4. Bottom mounted passive acoustic recorders





5. NMFS abundance shipboard and aerial surveys

Aerial surveys: target marine mammals and sea turtles from 600 ft altitude

Shipboard surveys: line transect target marine mammals and sea turtles

strip transects targeting seabirds

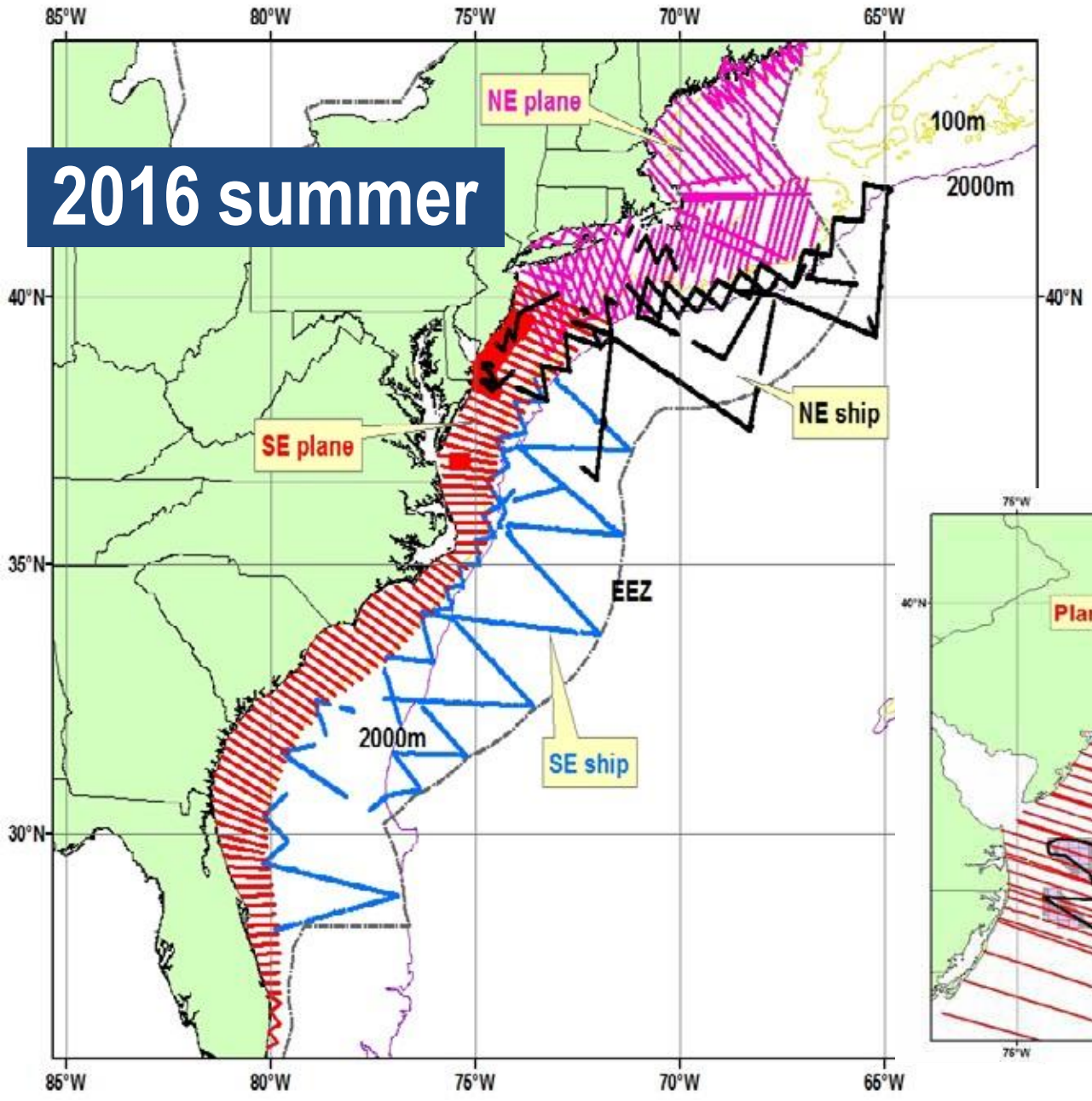
Perception bias accounted for in NMFS ship and plane surveys by using 2 or 3 independent line transect platforms and mark-recapture distance analytical techniques to estimate g(0)

Front team

Upper team

Lower team

Back team



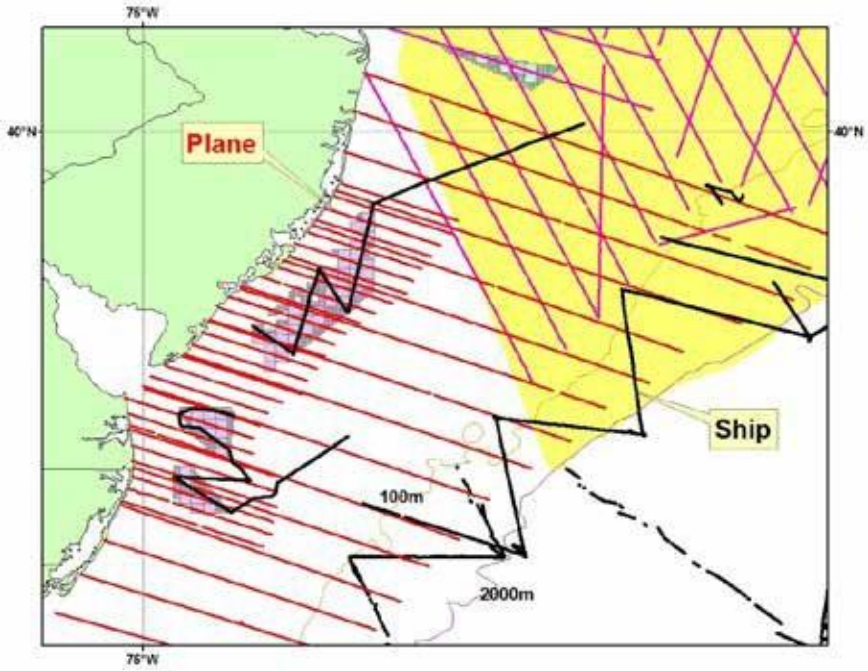
2016 summer

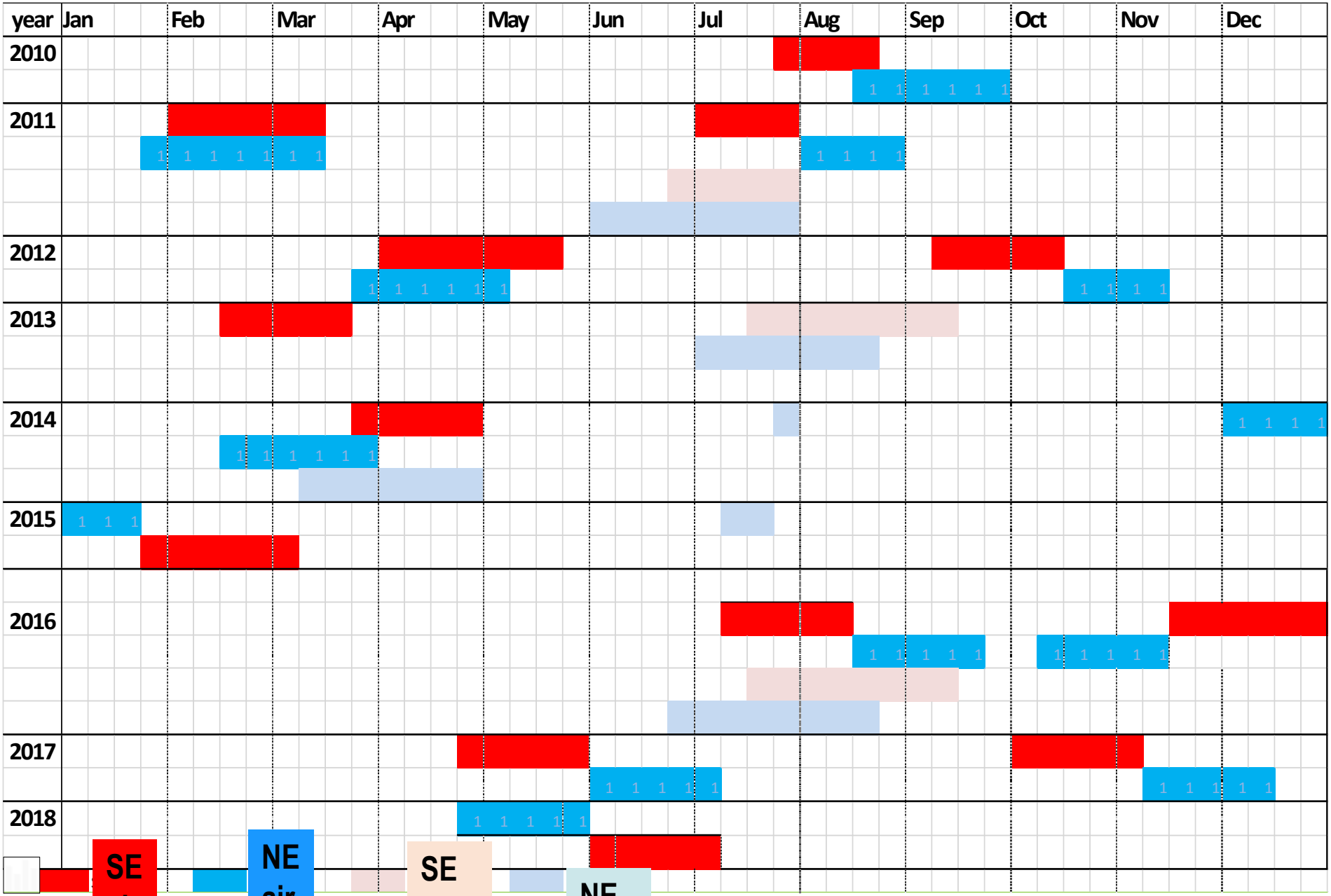
NE

5,113 km ship
11,872 km plane

SE

5,381 km ship
11,356 km plane





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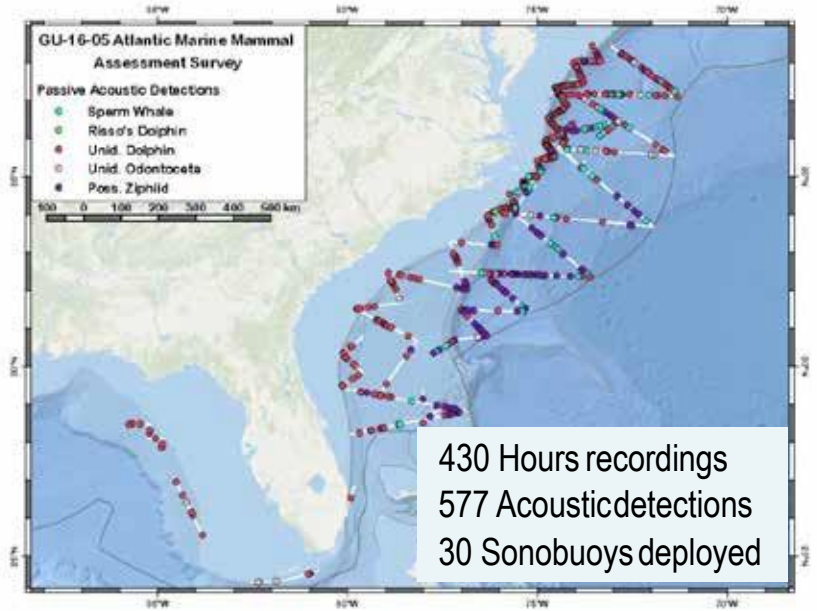
Shipboard - Passive Acoustic

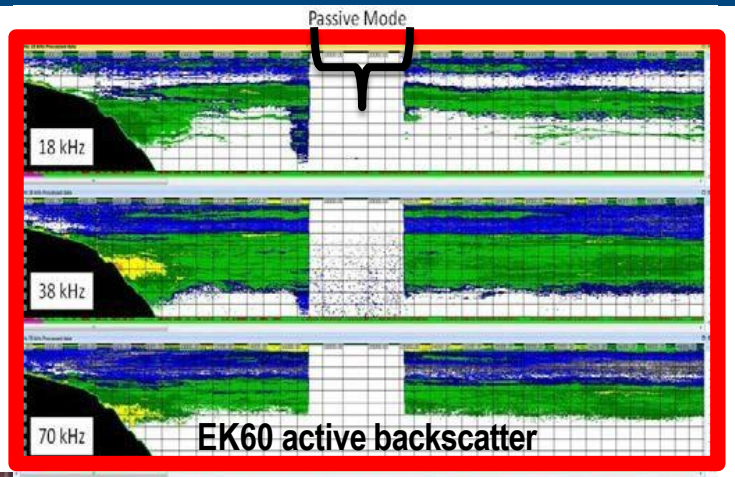
- Hydrophones deployed in waters > 100 m depth, during daytime and nighttime
- Sonobouys deployed to record large whales
- Goals:
  - Acoustic abundance estimation for deep-divers (sperm whales, beaked whales)
  - Supplement visual data for acoustically identifiable species
  - Contribute to development of species-specific classifiers for other odontocetes
  - Integrate visual and acoustic sperm whale data for improved abundance

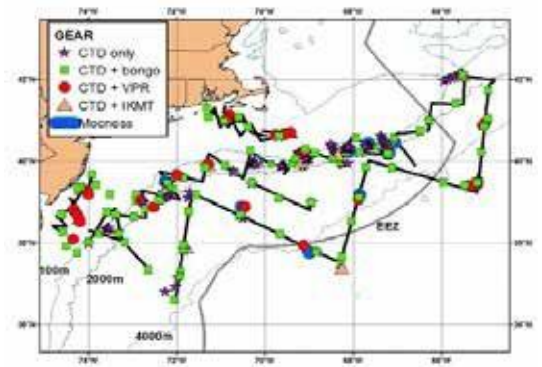


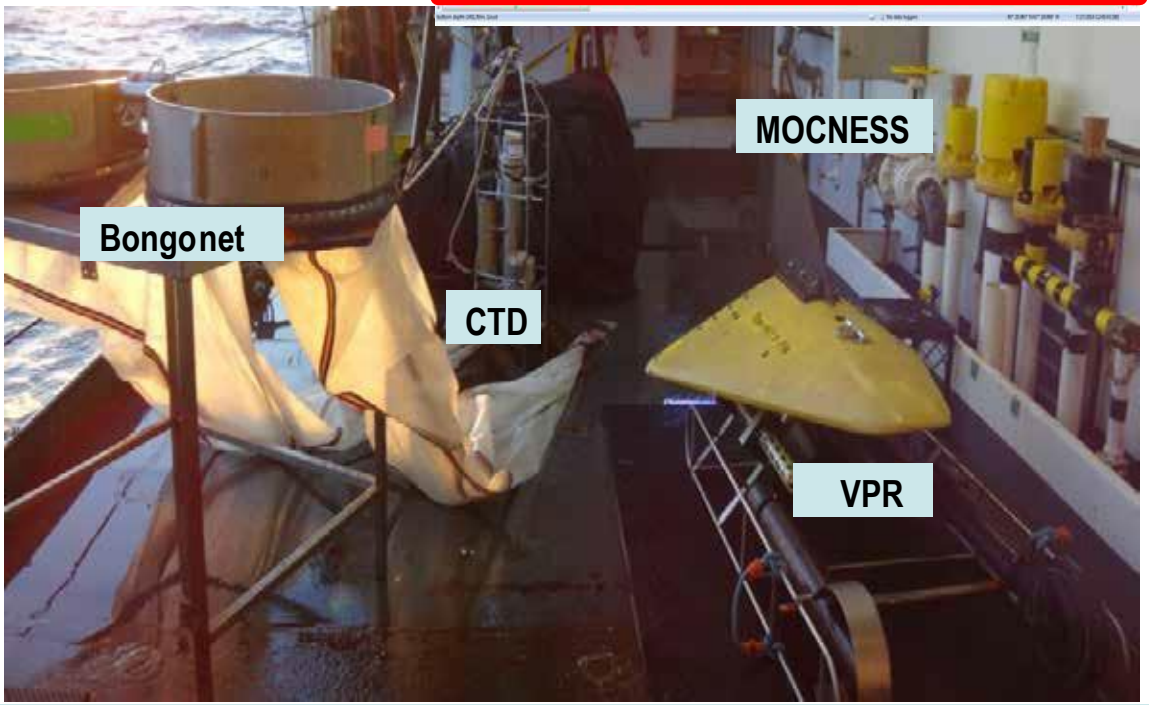
Shipboard - Ecosystem

Data collected simultaneously

- EK60 backscatter data for plankton & fish
- Plankton and macronekton samples from bongo nets, video plankton recorder (VPR), MOCNESS, Isaac-Kidd trawl, mid-water trawls
- Physical oceanographic characteristics from continuous flow-through surface measurements and station water column samples using CTD etc.







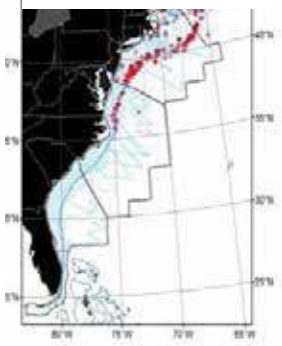
Cetacean Habitat Density Models

Covariates (Beaufort)

Ship + Plane Data

Dive and surfacing times

Number of sightings detected



Detection relationship

Point independence

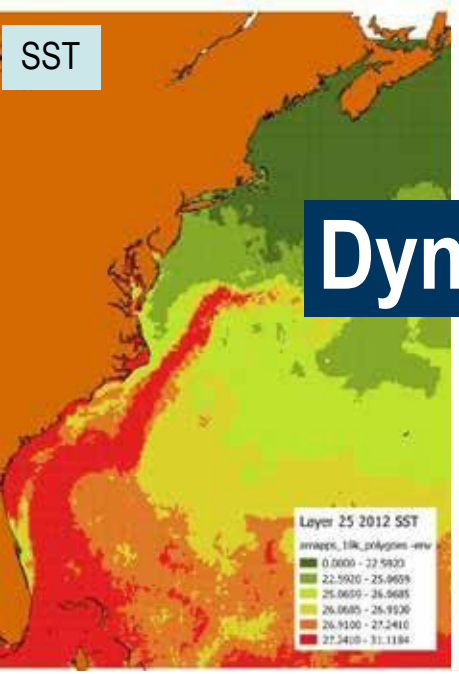
Static variables (depth, slope, roughness)

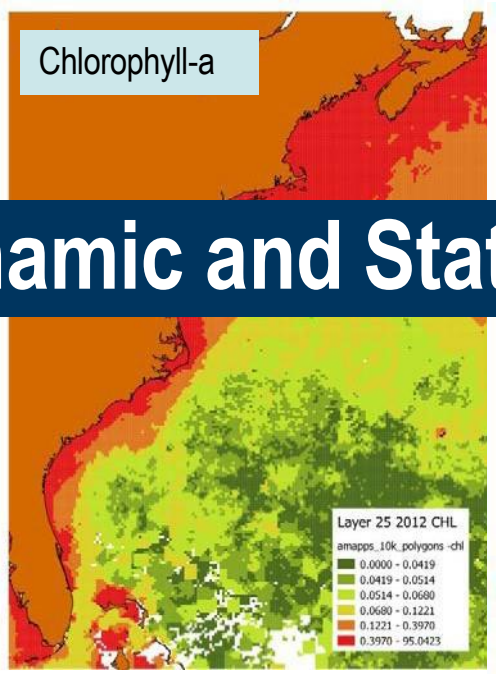
Dynamic variables (SST, chl)

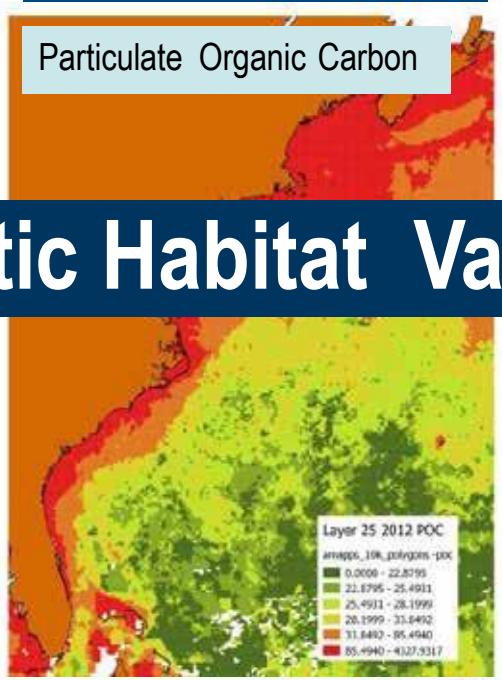
Habitat relationship

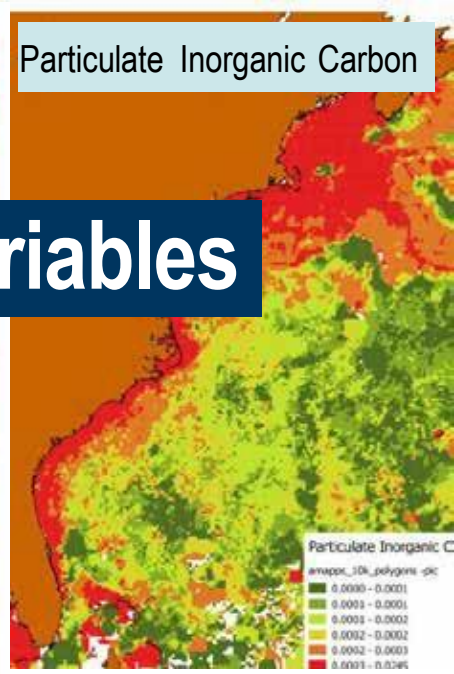
Frameworks: GAMs and Hierarchical Bayesian; Distributions: Tweedie, Zero inflated Poisson, plus others

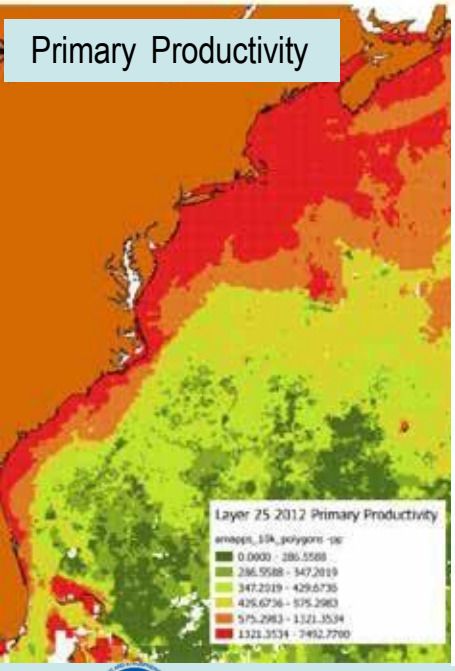
Dynamic and Static Habitat Variables

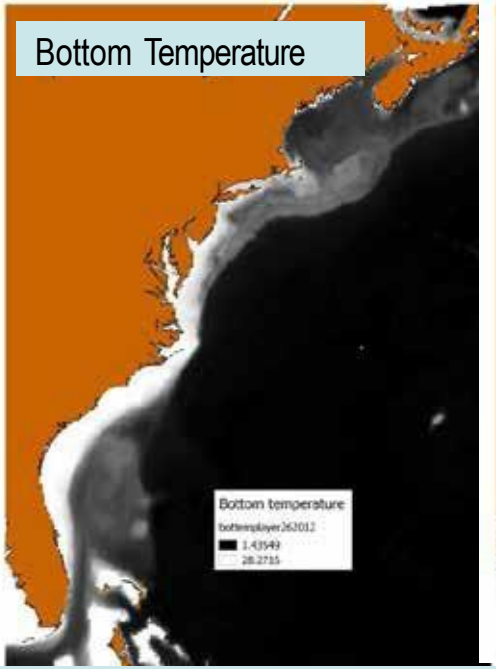


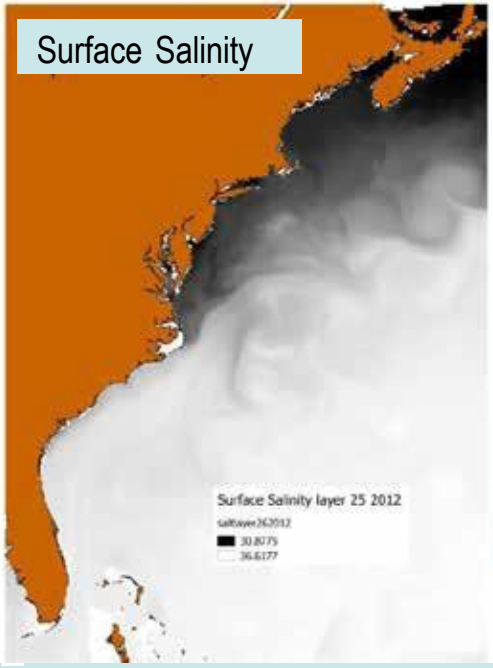


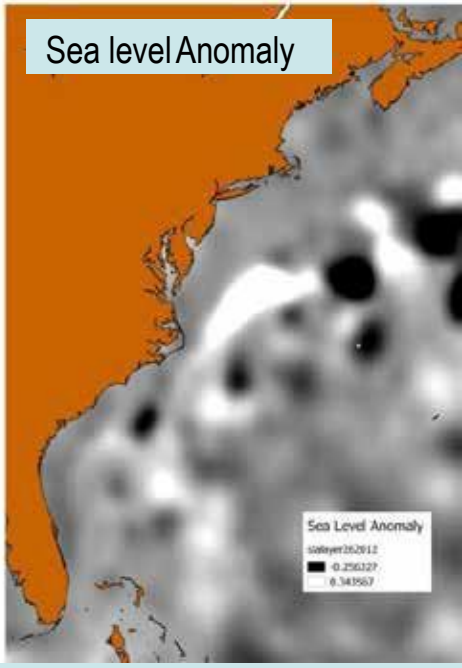






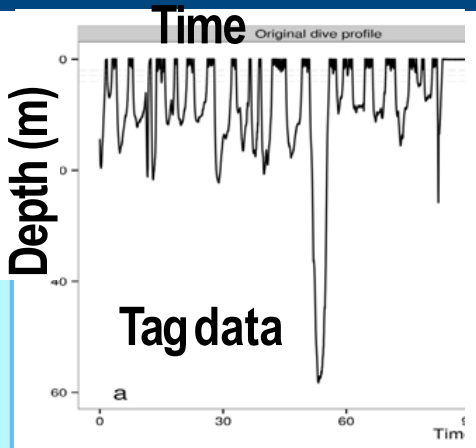






Animal Tagging

To estimate availability bias, describe habitat usage and vocalization patterns.



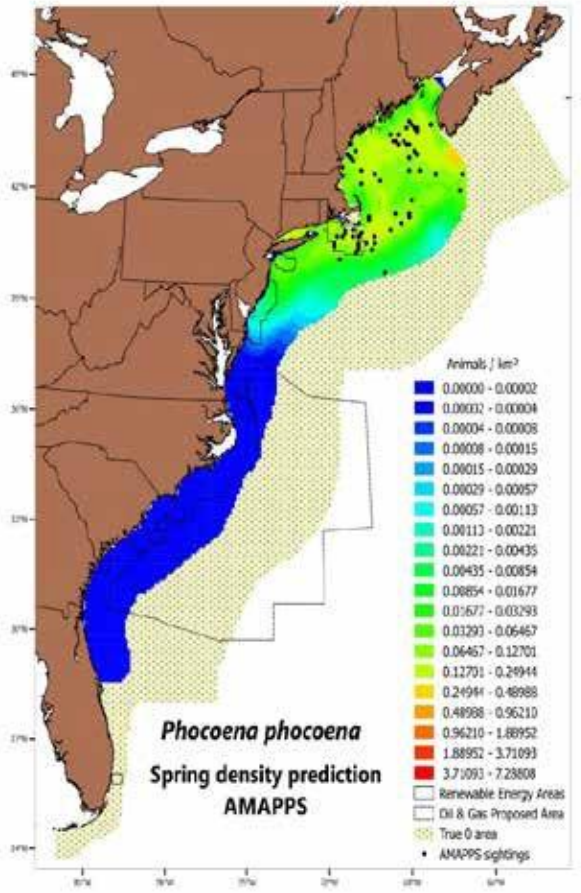
Availability bias correction factor increases abundance estimate by 2 – 6 times, depending on platform & species.

Conduct future cruises to tag deep divers: beaked whales and sperm whales

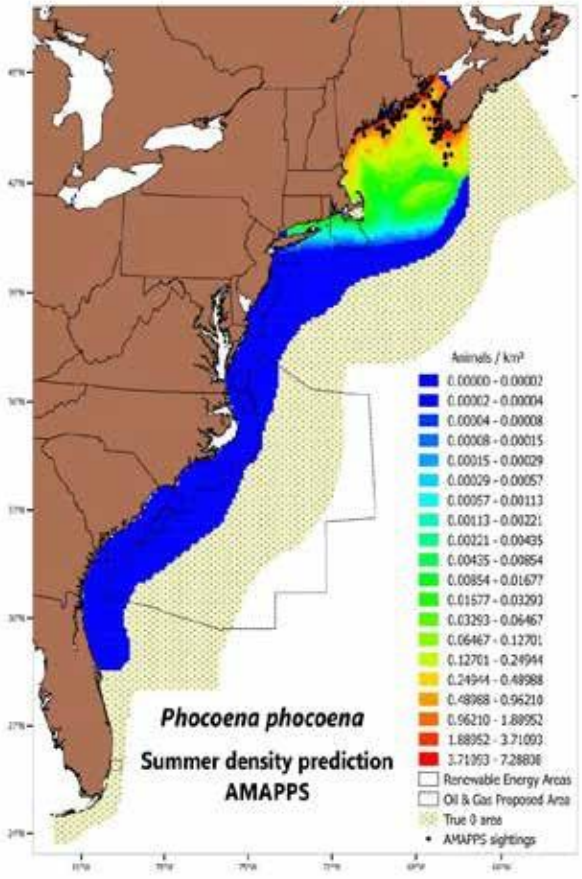
~ 200 satellite tags for loggerhead and leatherback turtles

~150 DTags from sperm whales,beaked whales ,blue, sei, fin, humpbackand pilot whales and Risso's dolphins

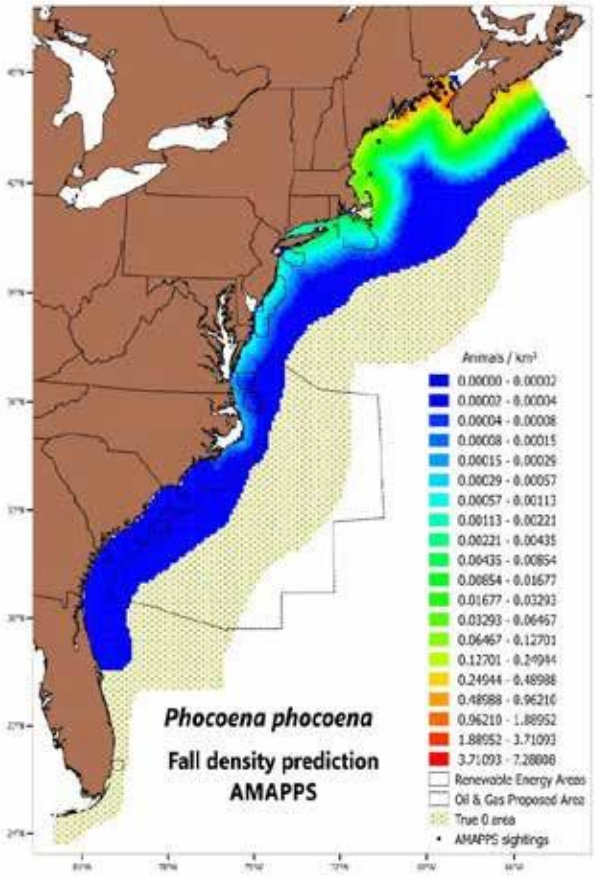
Results: Seasonal maps of density 17 marine mammal species



Spring



Summer

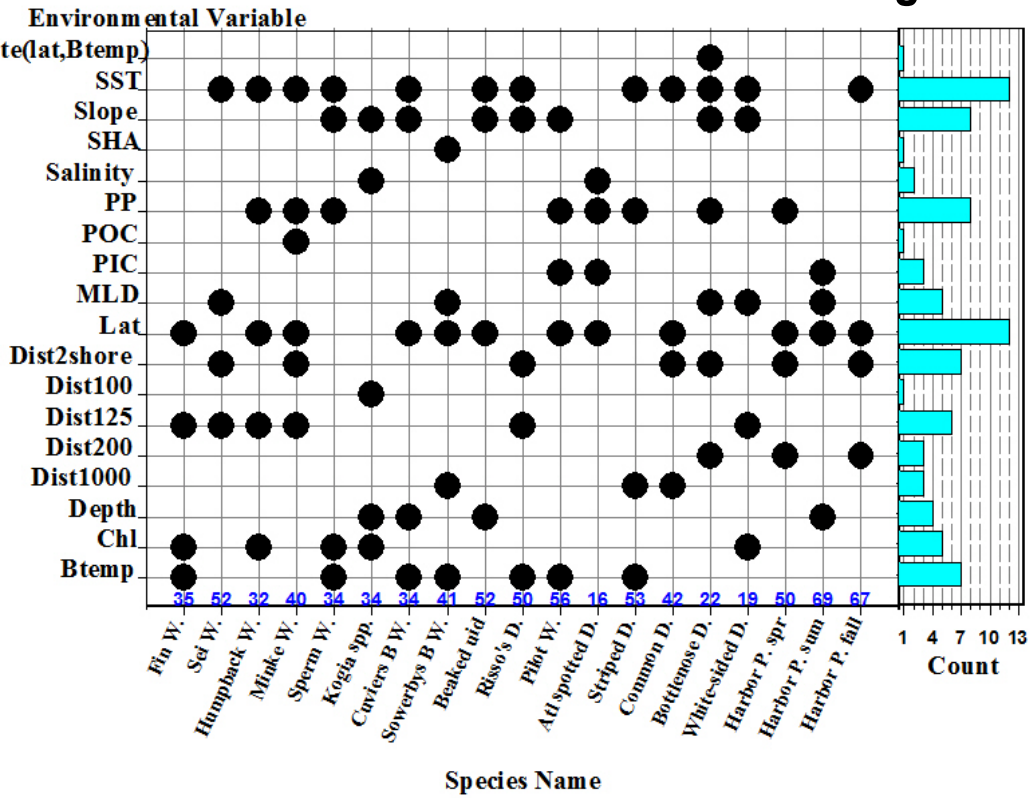


Fall

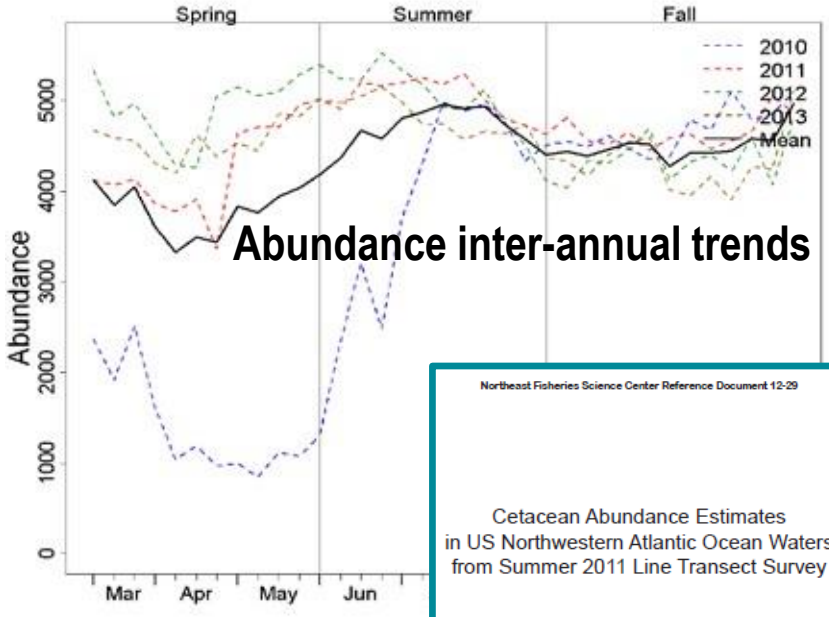
Results

Season	Abundance	CV	95% Confidence Interval
Spring (March-May)	3,817	0.148	2,883 - 4,752
Summer (June-August)	4,718	0.127	3,722 - 5,714
Fall (September-November)	4,514	0.123	3,545 - 5,479

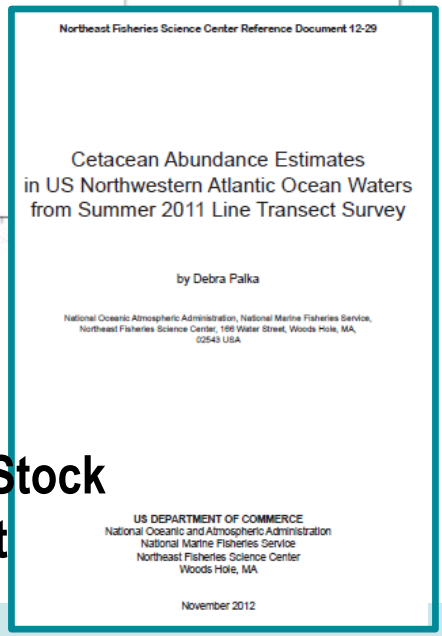
Average seasonal abundance estimates



Significant environmental variables associated with spatial-temporal density model



Abundance inter-annual trends


Northeast Fisheries Science Center Reference Document 12-29

Cetacean Abundance Estimates in US Northwestern Atlantic Ocean Waters from Summer 2011 Line Transect Survey

by Debra Palka

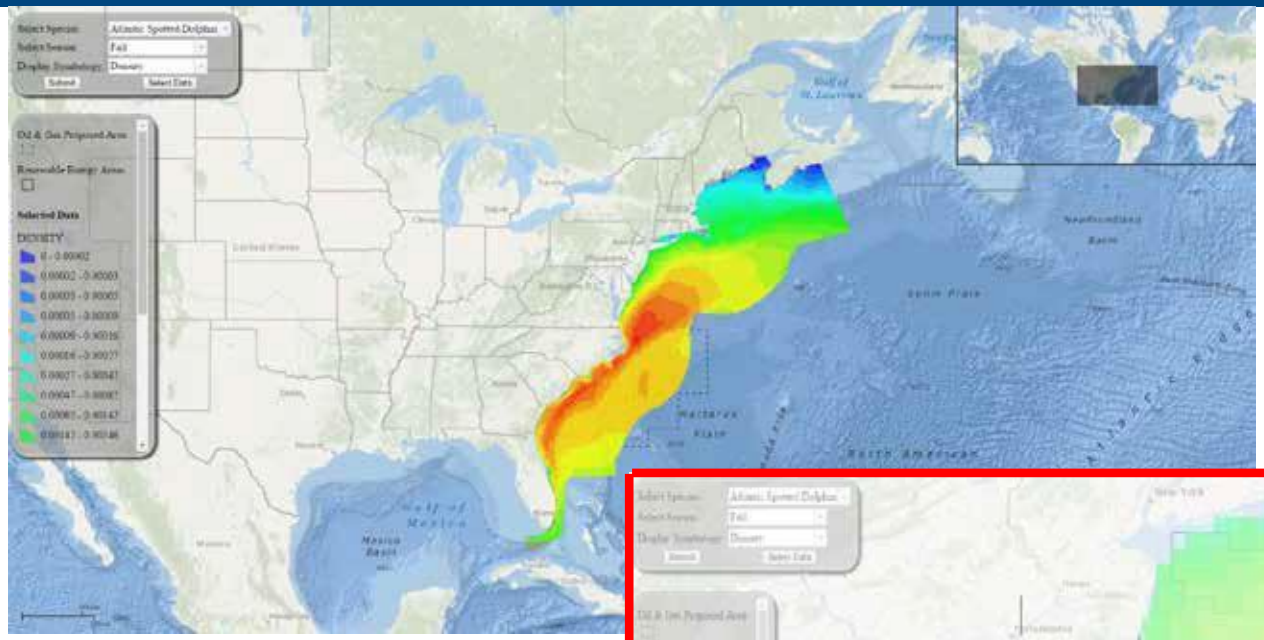
National Oceanic Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center, 166 Water Street, Woods Hole, MA, 02543 USA

US DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Fisheries Science Center
Woods Hole, MA

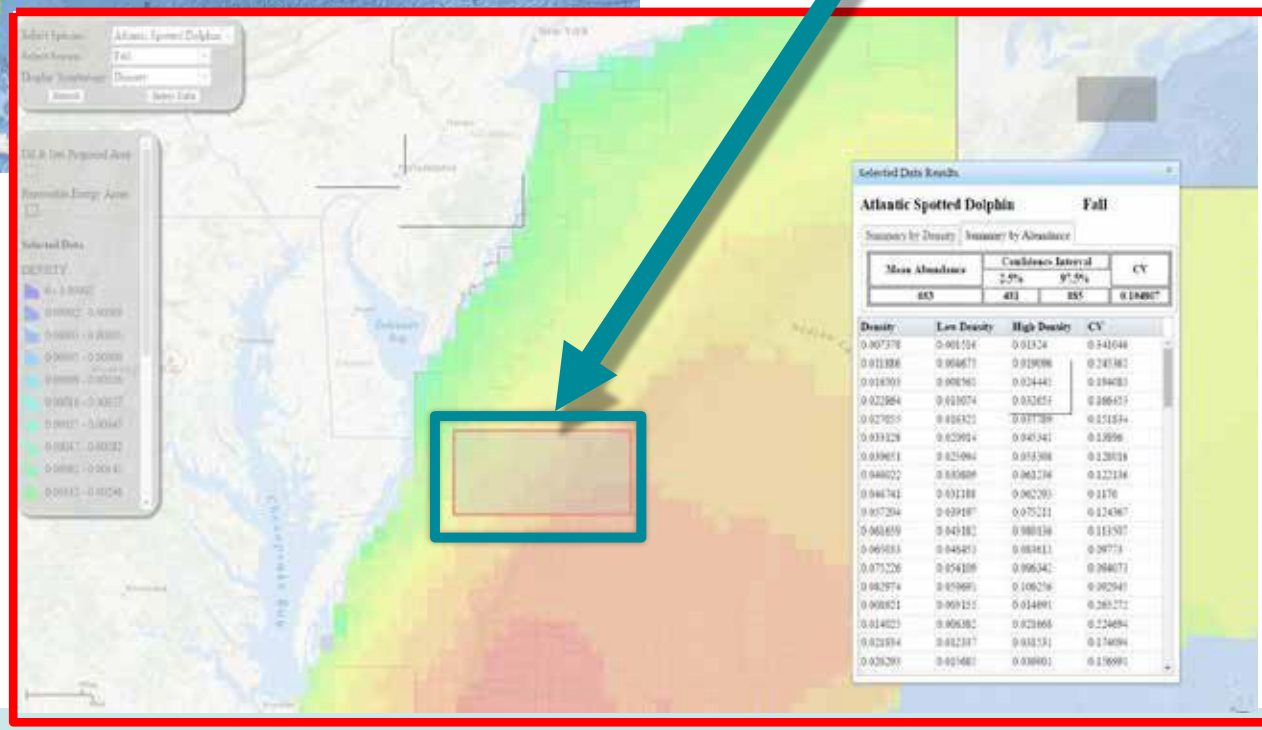
November 2012

Abundance estimates reported in Stock Assessment Reports

Share results of seasonal habitat-density models

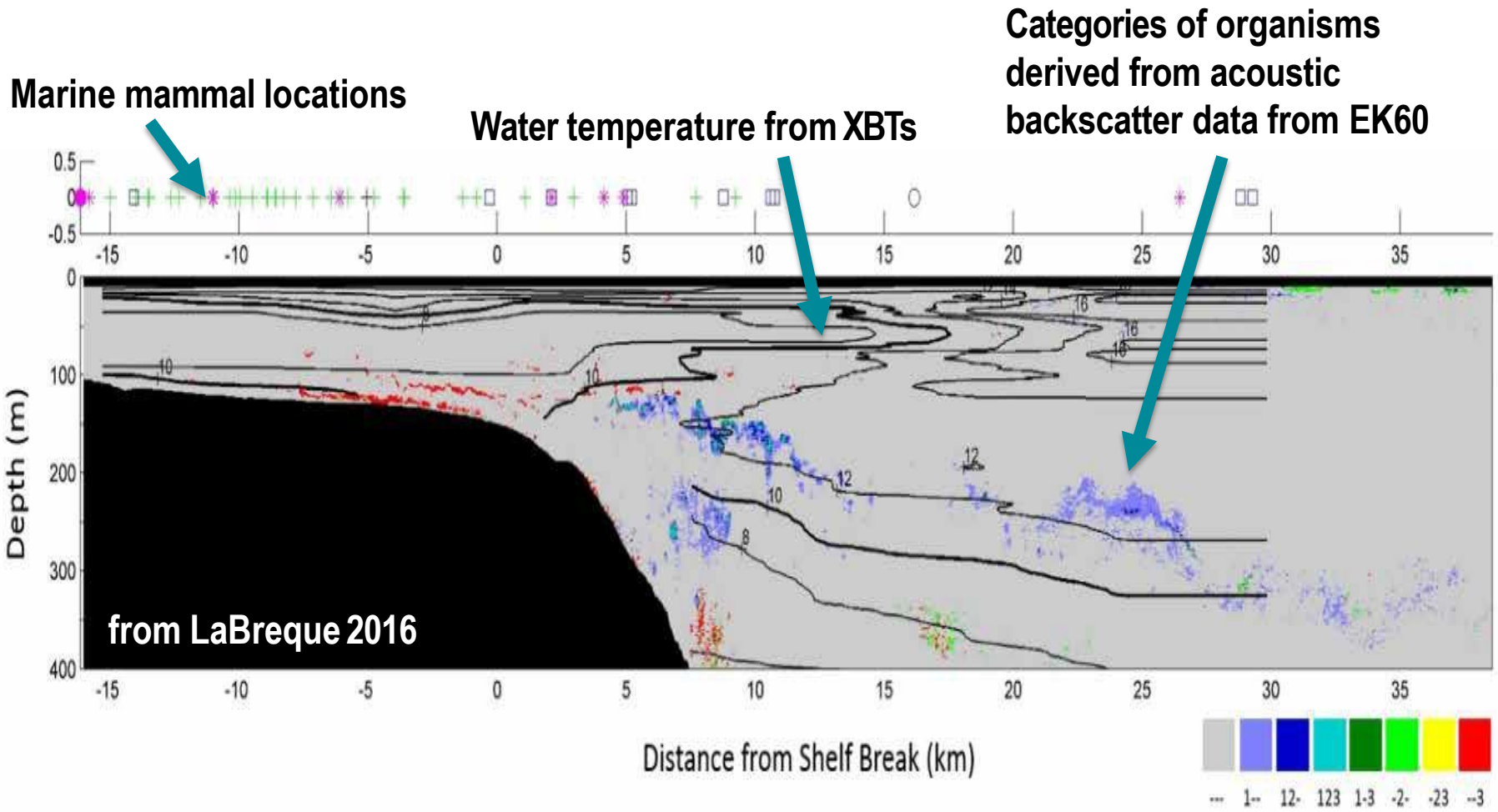


User selected area of interest



Website with ability to select an area of interest and get density and abundance information for each gridcell

Ongoing: Understanding ecosystem interactions



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