Atlantic Marine Assessment Program for Protected Species (AMAPPS)

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Background of AMAPPS

- **Work conducted by NEFSC/SEFSC and USFWS**

- **Inter-agency agreements with BOEM and Navy**

- **Collaborative efforts with many other organizations**

- **AMAPPS I: 2010 – 2014**

  - **Data collection during 2010 – 2014**

  - **Expecting density models/maps to be completed in summer 2015**

- **AMAPPS II: 2015 – 2019**

  - **Coordination/planning meeting in Aug 2014 with 13 agencies to discuss future data needs**

Bottom line up front

- AMAPPS has been a poster child of interagency cooperation

- Focused on and has delivered a world-class dataset

- AMAPPS 1 moving into analyses – primarily focused on the habitat-based seasonal density maps/estimates

- AMAPPS 2 will continue to focus on data collection, with more as-we-go analytical products expected

- Potential growth in off-season, offshore survey effort

- Ramping up use of acoustics; BACI design deployment of recorders in O&G area and in northern non-O&G area

Objectives – Collect new data

- **Collect broad-scale data over multiple years on the seasonal distribution and abundance** of marine mammals (cetaceans and pinnipeds), marine turtles, and sea birds using direct aerial and shipboard surveys of coastal U.S. Atlantic Ocean waters

- **Collect similar data at finer scales** at several sites of particular interest to NOAA partners using visual and acoustic survey techniques

- **Conduct tagging studies** of protected species to develop corrections for availability bias in the abundance survey data and to investigate behavior and ecology of species in areas of interest;

- **Collect additional data on life-history and ecology**, including habitat use, residence time, frequency of use, and behavior;

Objectives - Analyses

- **Assess the population size and/or density estimates** of surveyed species at regional scales

- **Explore alternative platforms and technologies** to improve population assessment studies

- Develop models and associated tools to translate these survey data into **seasonal, spatially-explicit density estimates incorporating habitat** characteristics
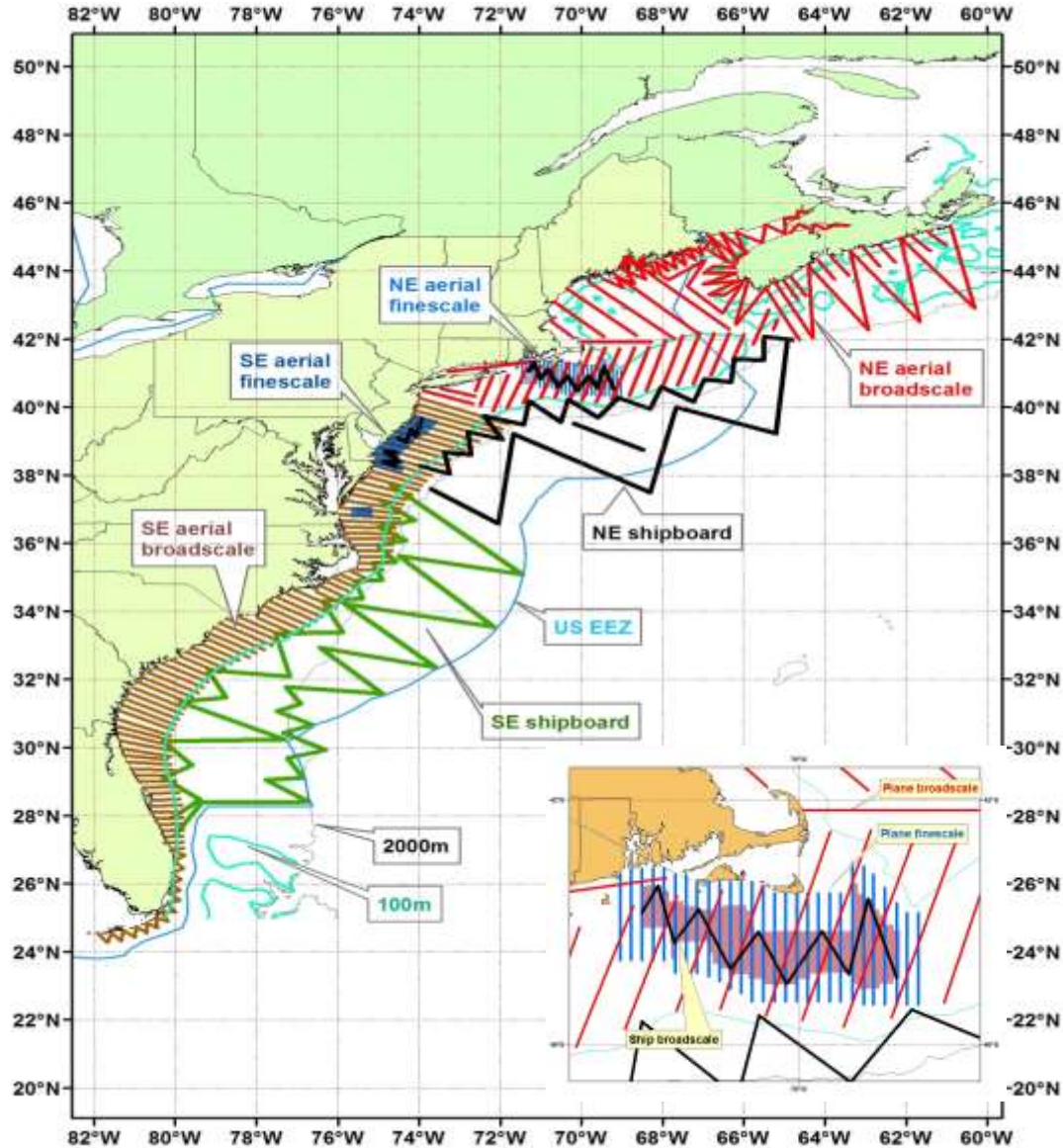
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AMAPPS ship and aerial surveys since 2010

Planning another NE + SE ship + plane survey summer 2016
Coordinating with Canada and parts of EU to have a larger survey effort over the North Atlantic

SE aerial   NE aerial   SE ship   NE ship
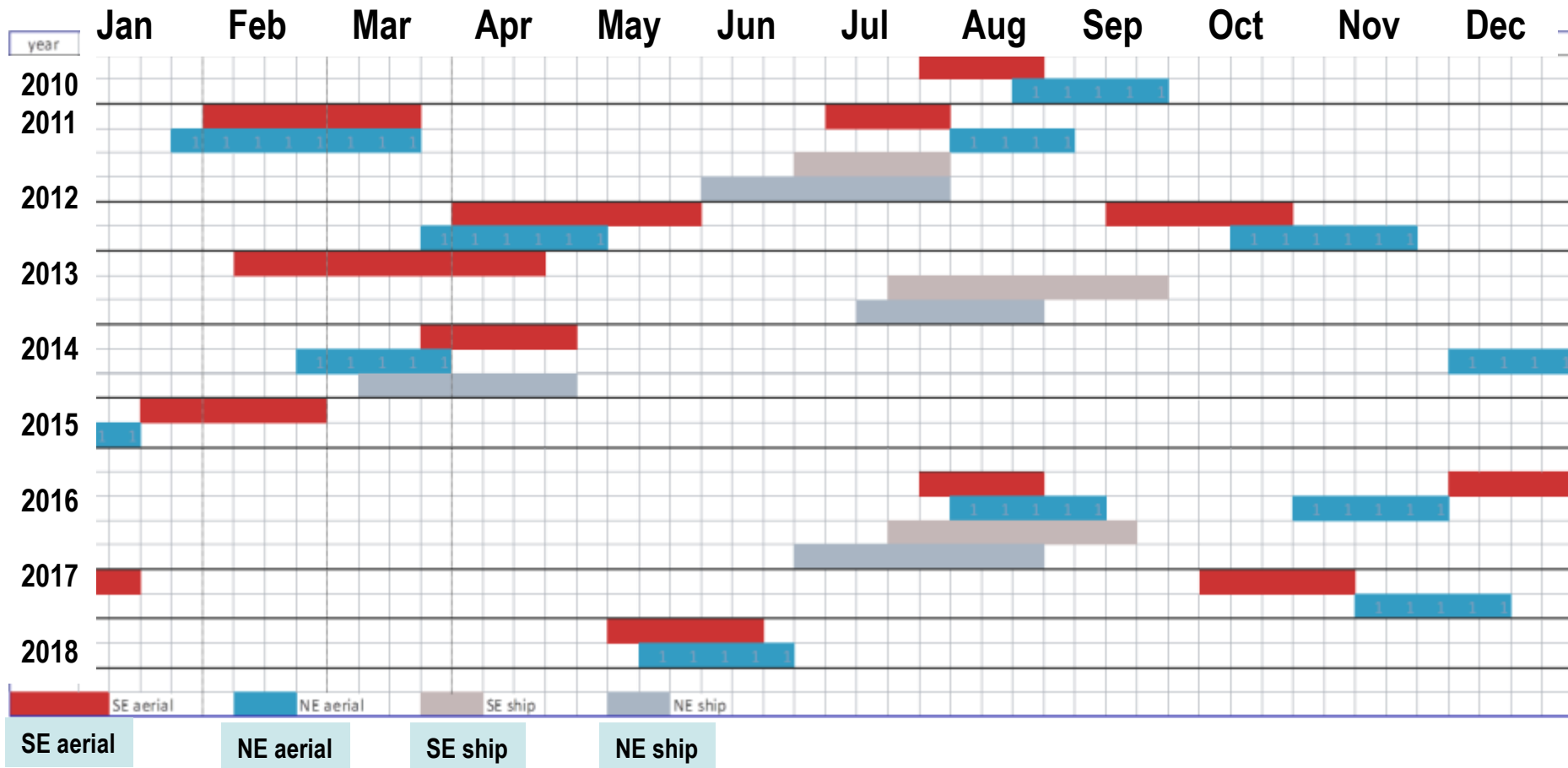
NMFS aerial and shipboard surveys

NOAA's Twin Otter and ship

NMFS aerial and shipboard surveys

Surveys:
  2010: Jul-Aug
  2011: Jan-Mar, Jun-Aug
  2012: Mar-May, Sep-Nov
  2013: Jul-Sep
  2014: Feb-Apr, Jul, Dec

103,300 km of track lines

2 team line transect

5400 cetaceans detected
5850 turtles detected
200 seals detected
4100 seabirds detected

Regional cetacean and loggerhead
turtle abundance estimates
available

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Passive Acoustics

Bottom mounted recorders:

➤ **MARUs and AMARs deployed and/or picked up during AMAPPS shipboard surveys**
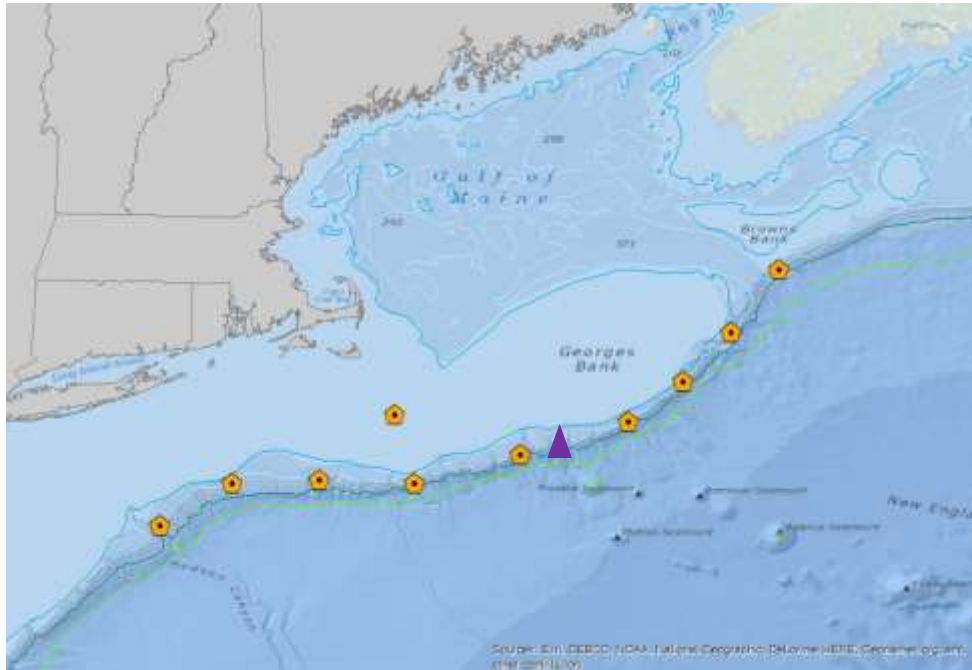
Towed arrays:

➤ **Beaked whales**

➤ **Sperm whales**

➤ **Risso's dolphins**

➤ **ROCCA (dolphin whistle classifier)**

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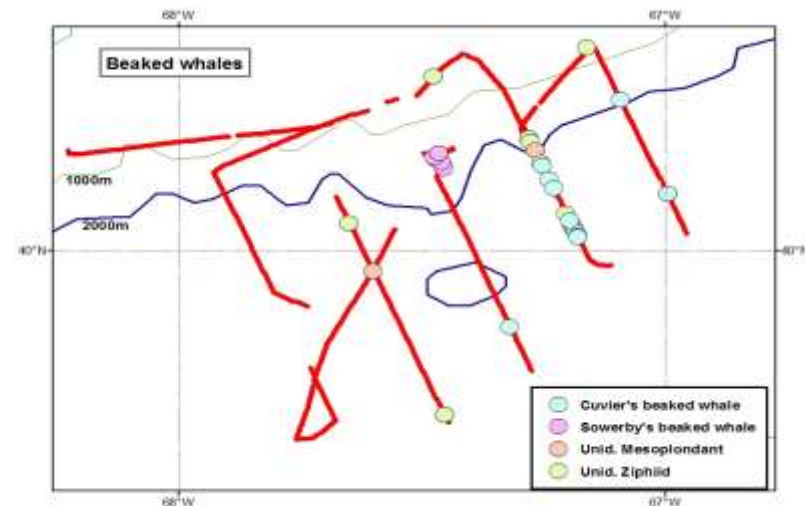
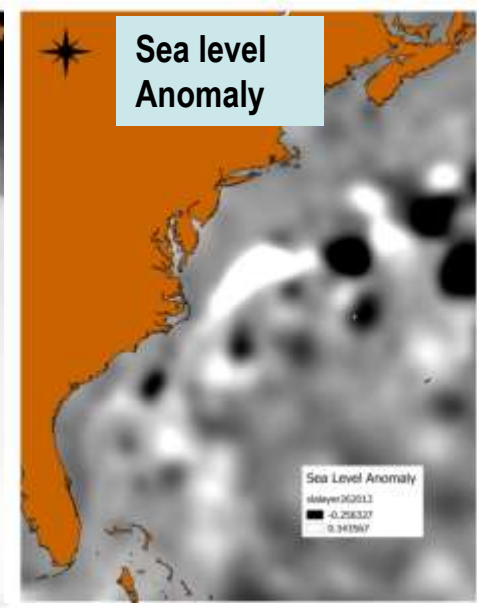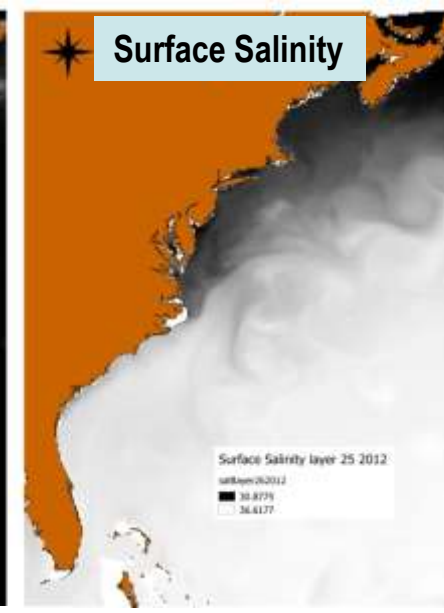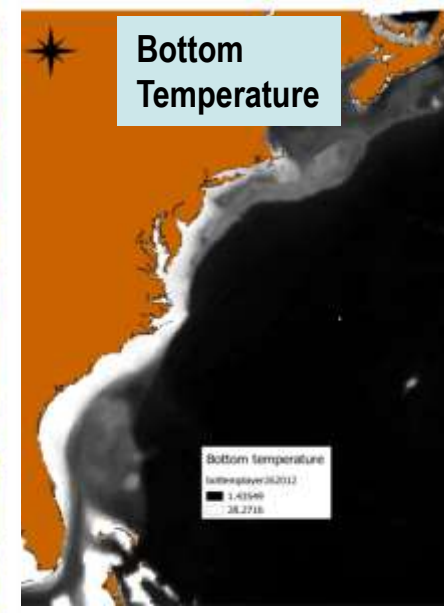# Habitat and trophic data
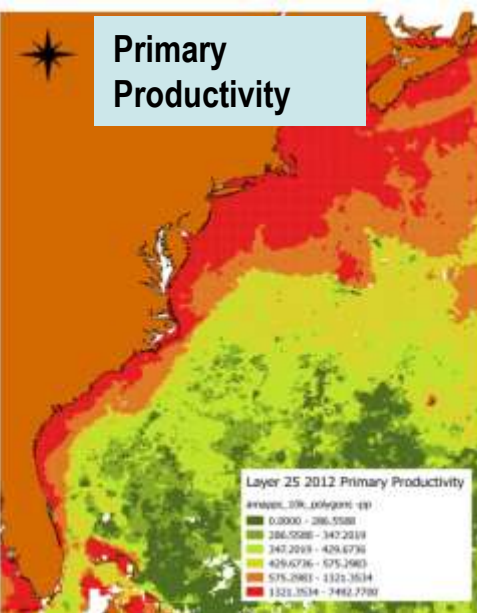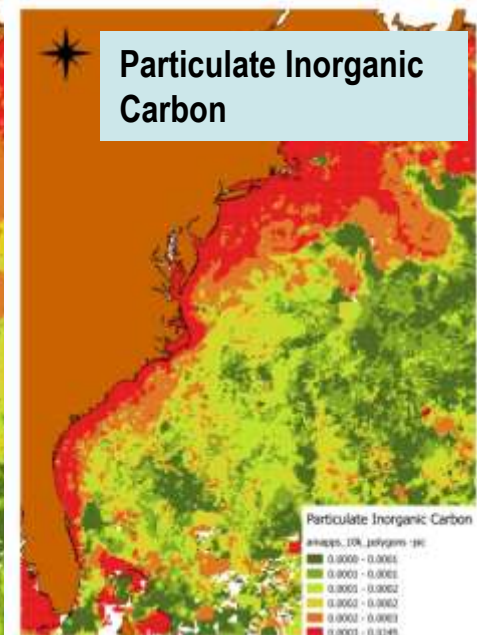
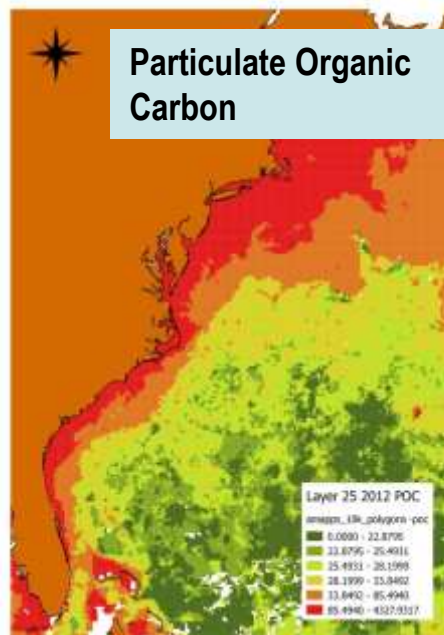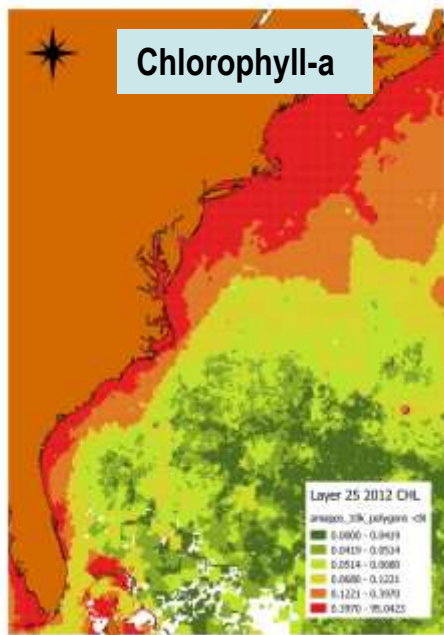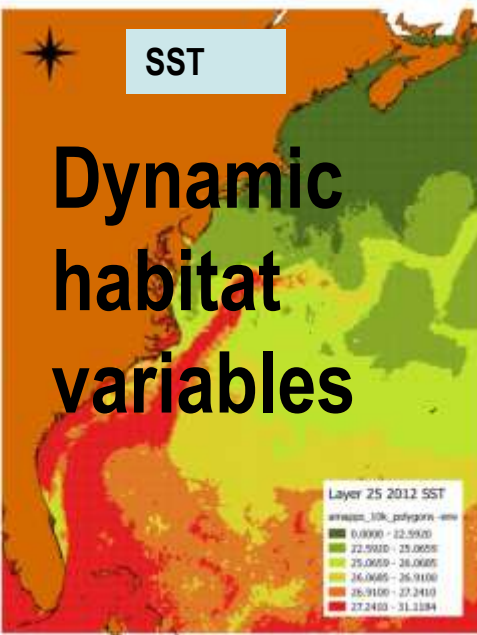## Shipboard data collected simultaneously

- EK60 backscatter data for plankton & fish
- Plankton and macronekton samples from bongo nets, VPR, MOCNESS, Isaac-Kidd trawl
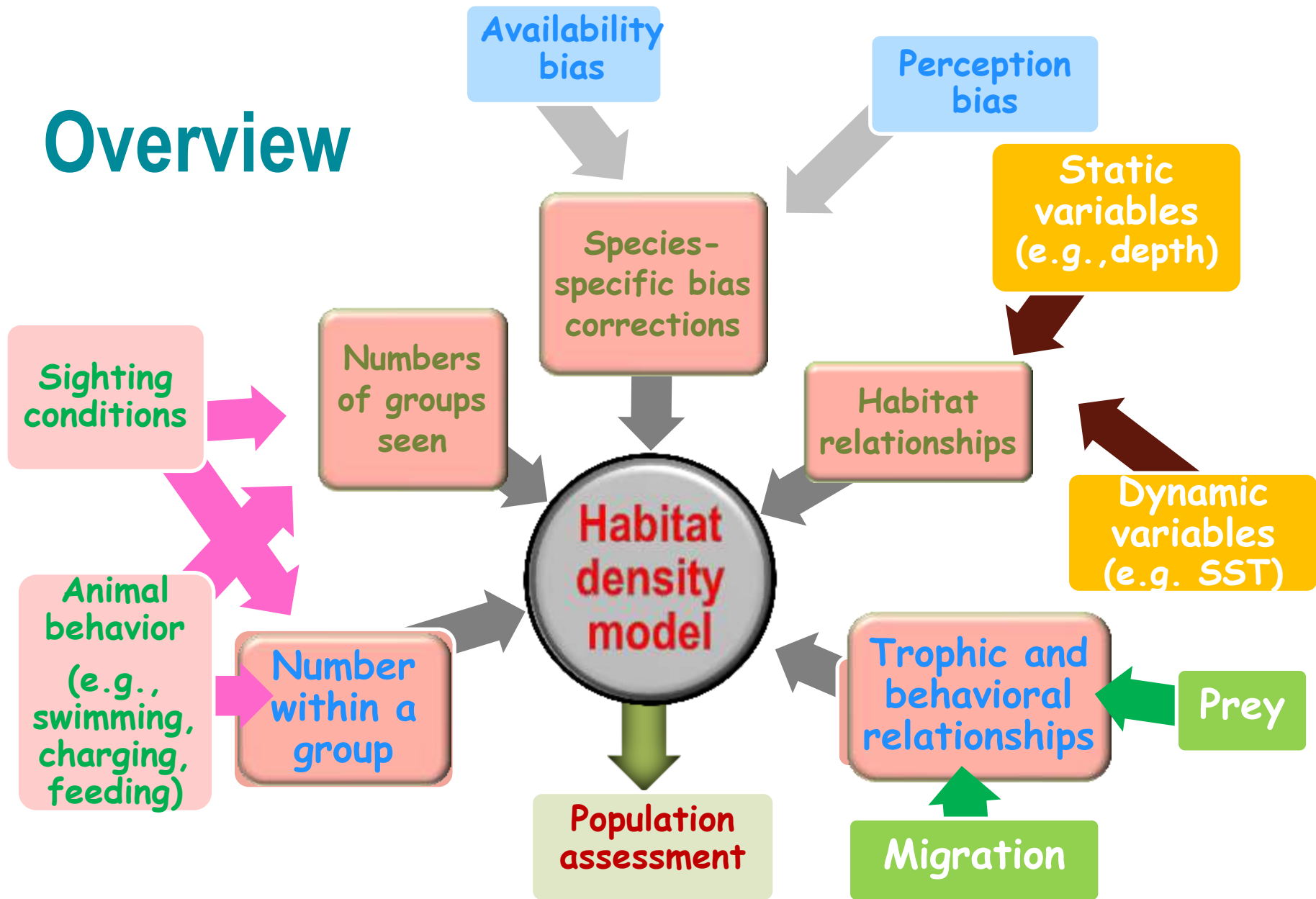- Benthic samples from beam trawl, bottom grab


Beam trawl

Bottom grab

Isaac-Kidd

VPR

Bongo

Static habitat variables

Depth (m)

Sediment Grain Size (φ)

Bottom Slope (degree)

Roughness

Roughness
roughness
■ 1.89684
□ 330.05

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Dynamic habitat variables

SST

Chlorophyll-a

Particulate Organic Carbon

Particulate Inorganic Carbon

Primary Productivity

Bottom Temperature

Surface Salinity

Sea level Anomaly

Overview

Availability bias

Perception bias

Static variables (e.g.,depth)

Species-specific bias corrections

Numbers of groups seen

Habitat relationships

Sighting conditions

Animal behavior (e.g., swimming, charging, feeding)

Number within a group

Habitat density model

Dynamic variables (e.g. SST)

Trophic and behavioral relationships

Prey

Population assessment

Migration

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Habitat seasonal density estimates

Bayesian hierarchical models
**Generalized linear and additive models**
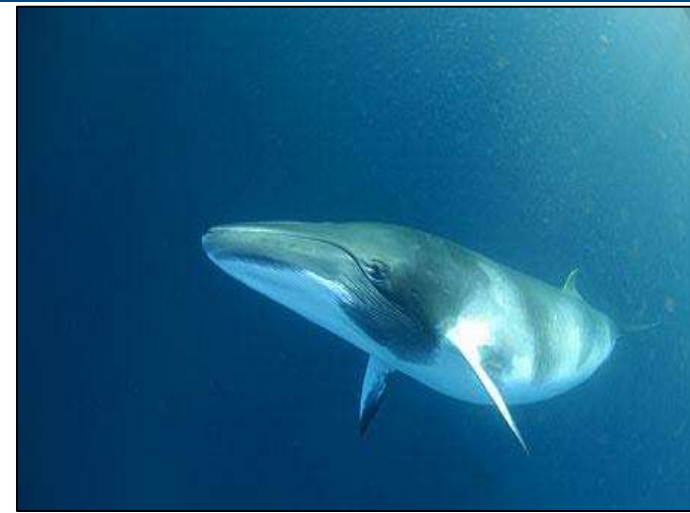
Multiple methods allow comparison of methods, development of best method for each species, model averaging since each method has its pros and cons
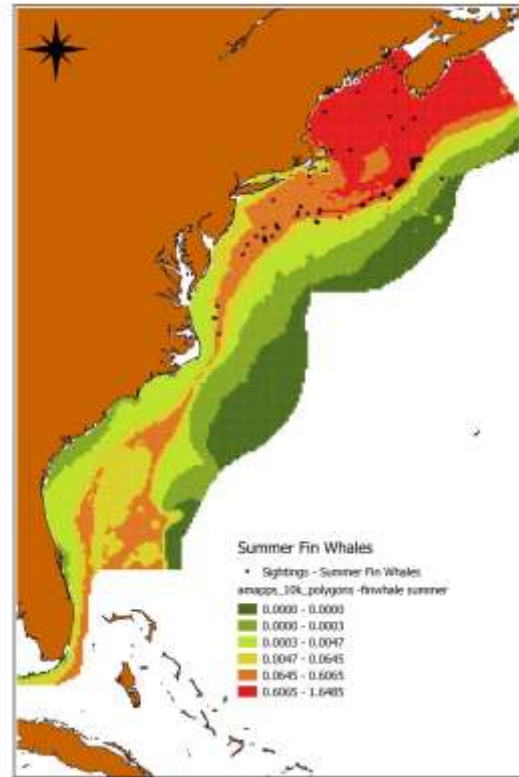
Goals:

1) Produce spatially-explicit seasonal density maps that incorporate habitat variables
2) Estimate population abundance
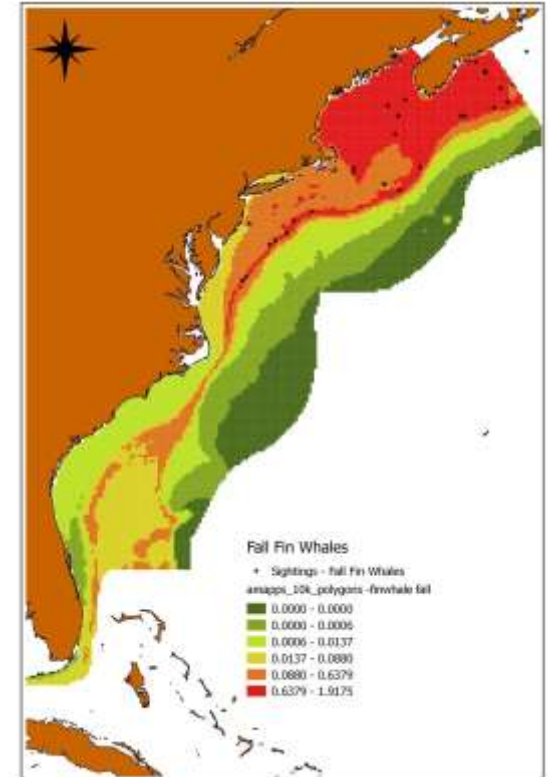3) Quantify uncertainty
4) Forecast future distributions
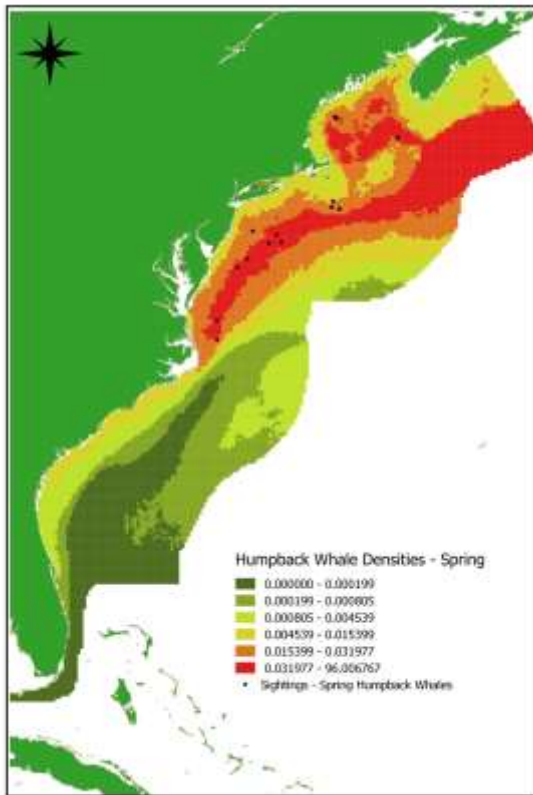
Preliminary fin whale seasonal maps
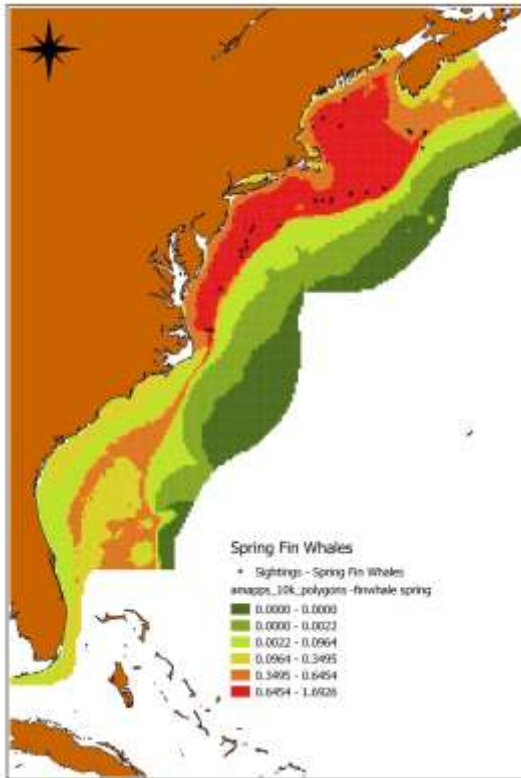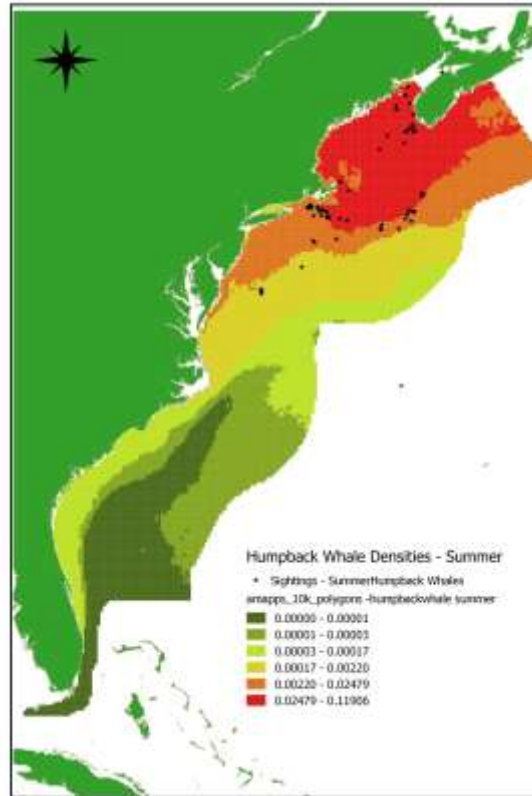

Spring
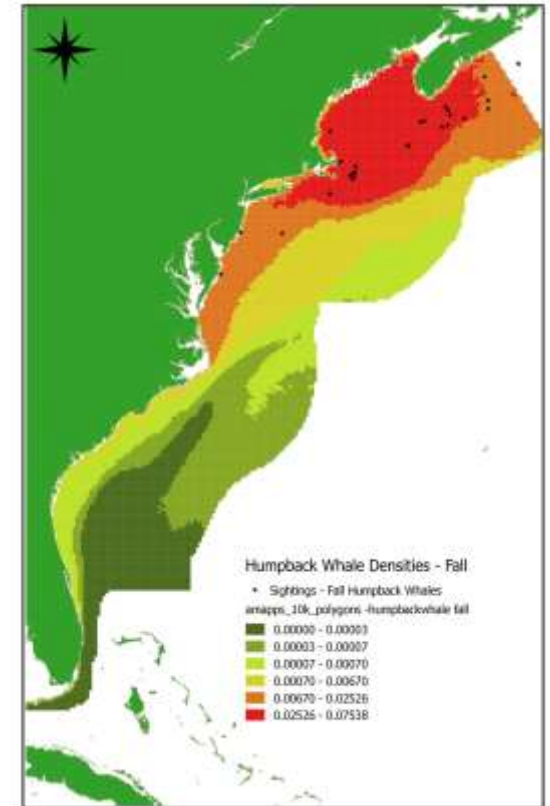
Summer

Fall
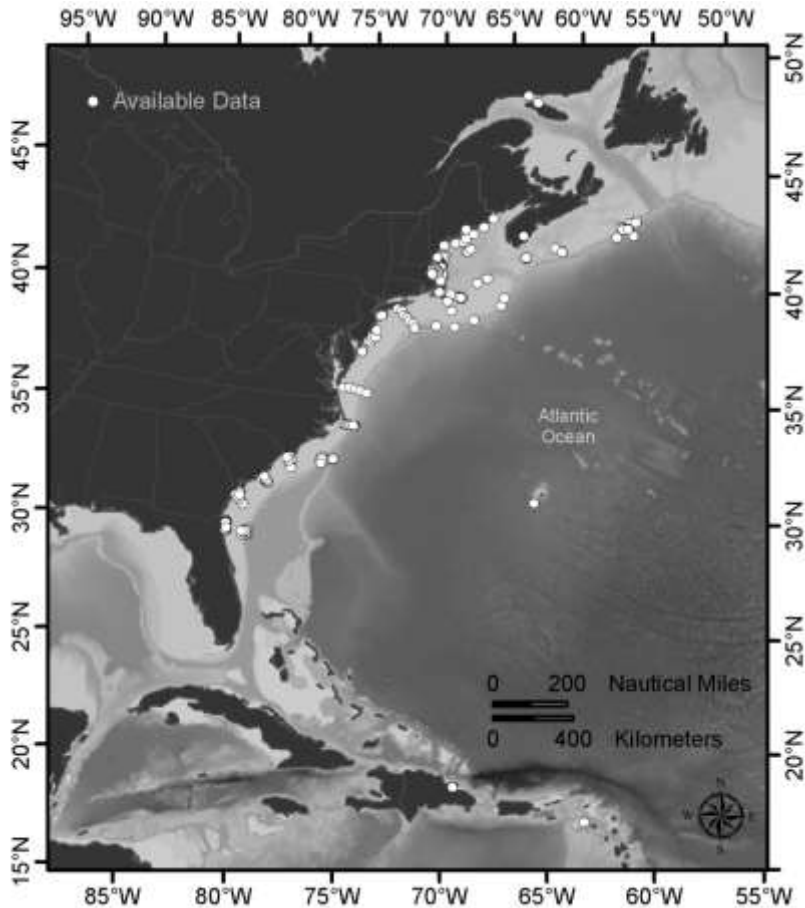
Preliminary humpback seasonal maps

Spring

Summer
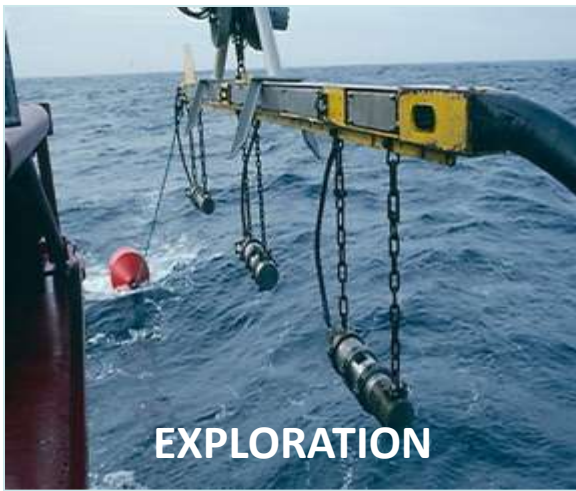

Fall

MIGRATION CORRIDORS

Defining migration corridors and presence of baleen whales

See Risch et al. 2014 for minke migration from PAM

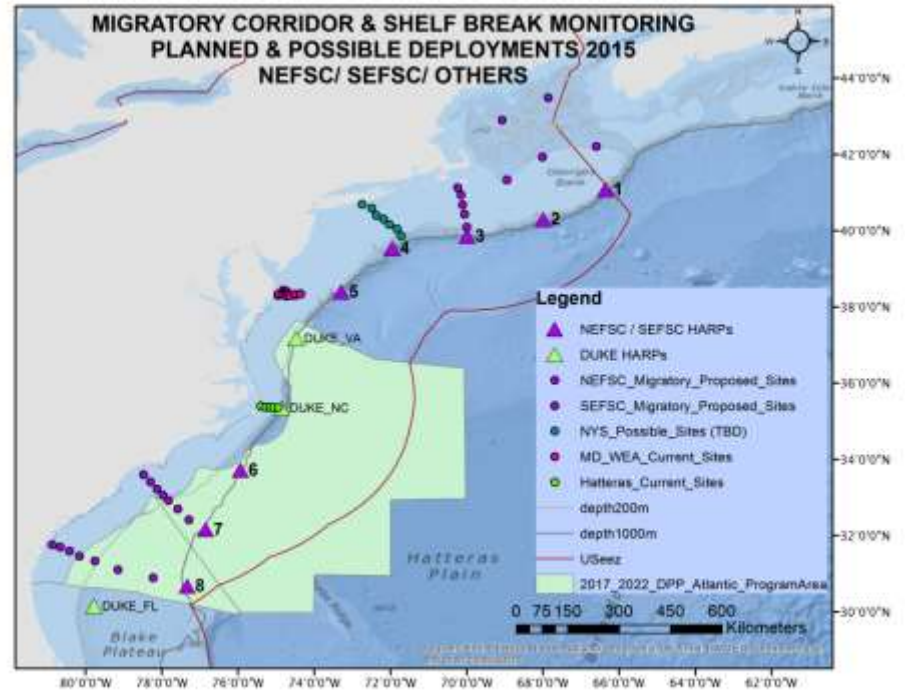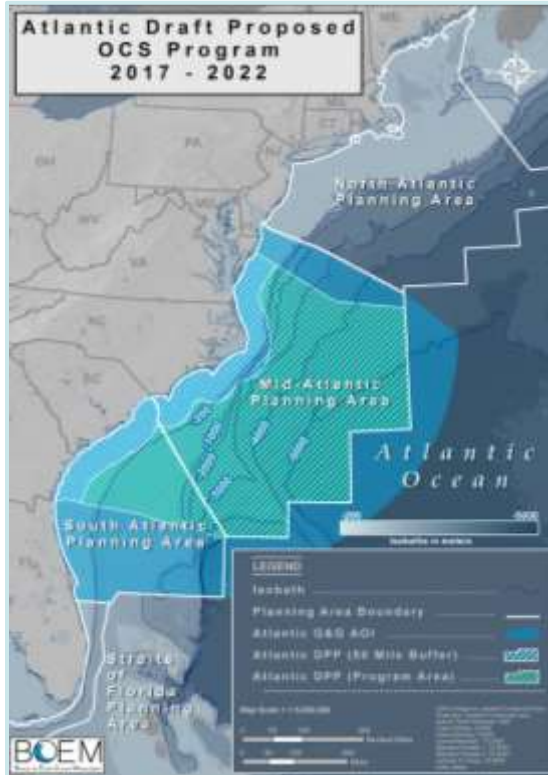NOAA FISHERIES

NOISE IMPACTS

EXPLORATION

WIND
Photo: Global Nevadacorp

Proposed BACI design

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Thank you