

Seabird distribution & abundance data & models for the eastern USA

Arliss Winship

CSS, Inc.  & NOAA NCCOS; arliss.winship@noaa.gov



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SCIENCE SERVING COASTAL COMMUNITIES

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- BOEM (David Bigger, Mary Boatman)

Data



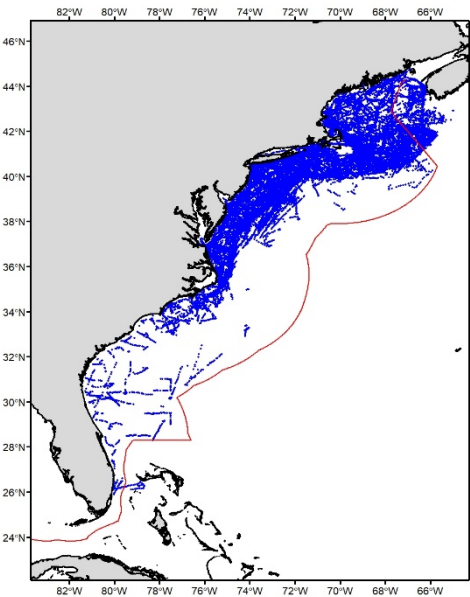
The database

- Northwest Atlantic Seabird Catalog (formerly Avian Compendium)
- USGS → USFWS → NOAA
- At-sea surveys
- Aerial & boat-based
- Visual & photo/video counts
- Strip transect, distance sampling & other
- Discrete & continuous recording
- Auxiliary information (sighting conditions, behavior, etc.)

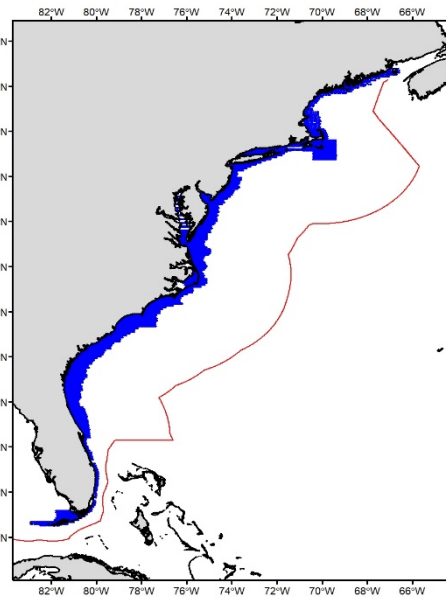


Datasets

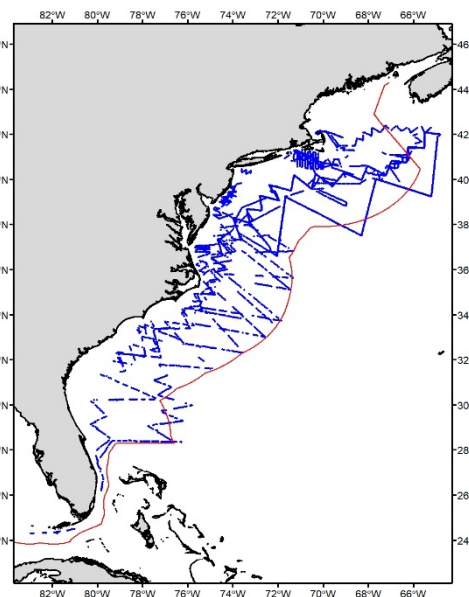
- Government agencies, non-governmental organizations, academics & others
- Local, regional & coast-wide
- Dedicated surveys & platforms of opportunity



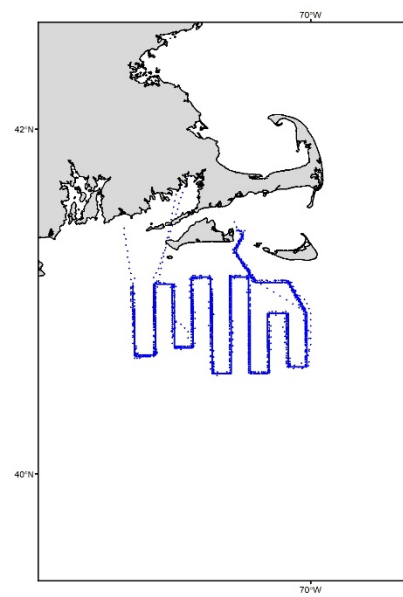
CSAP (1980-1988)



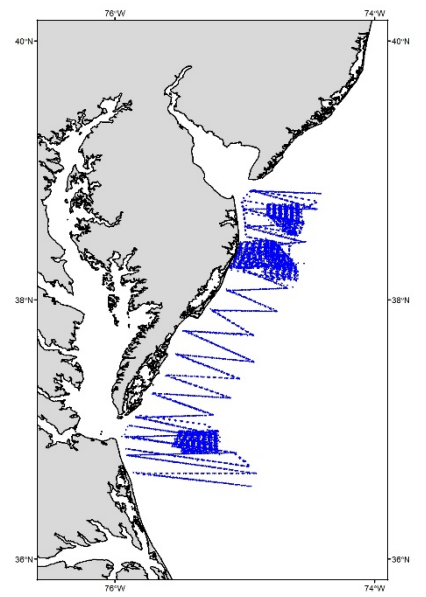
AMAPPS (FWS) (2010-)



AMAPPS (NOAA) (2011-)

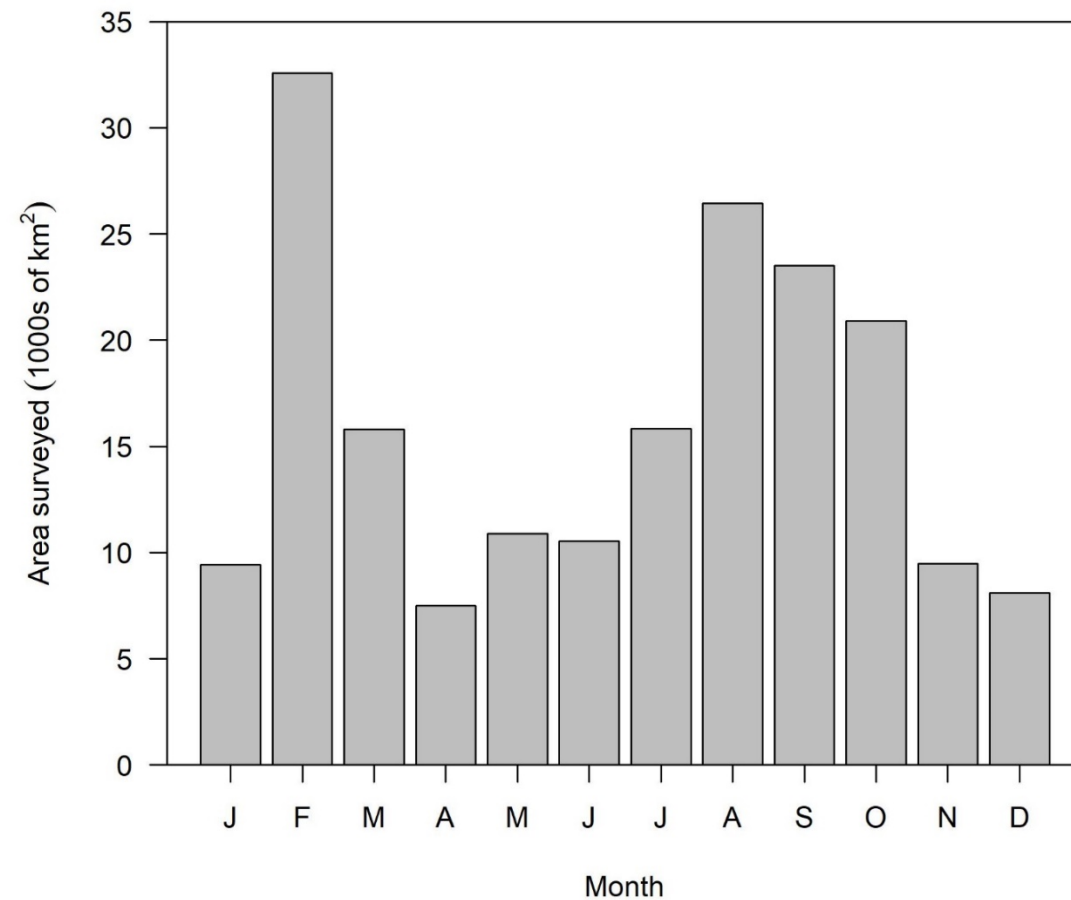
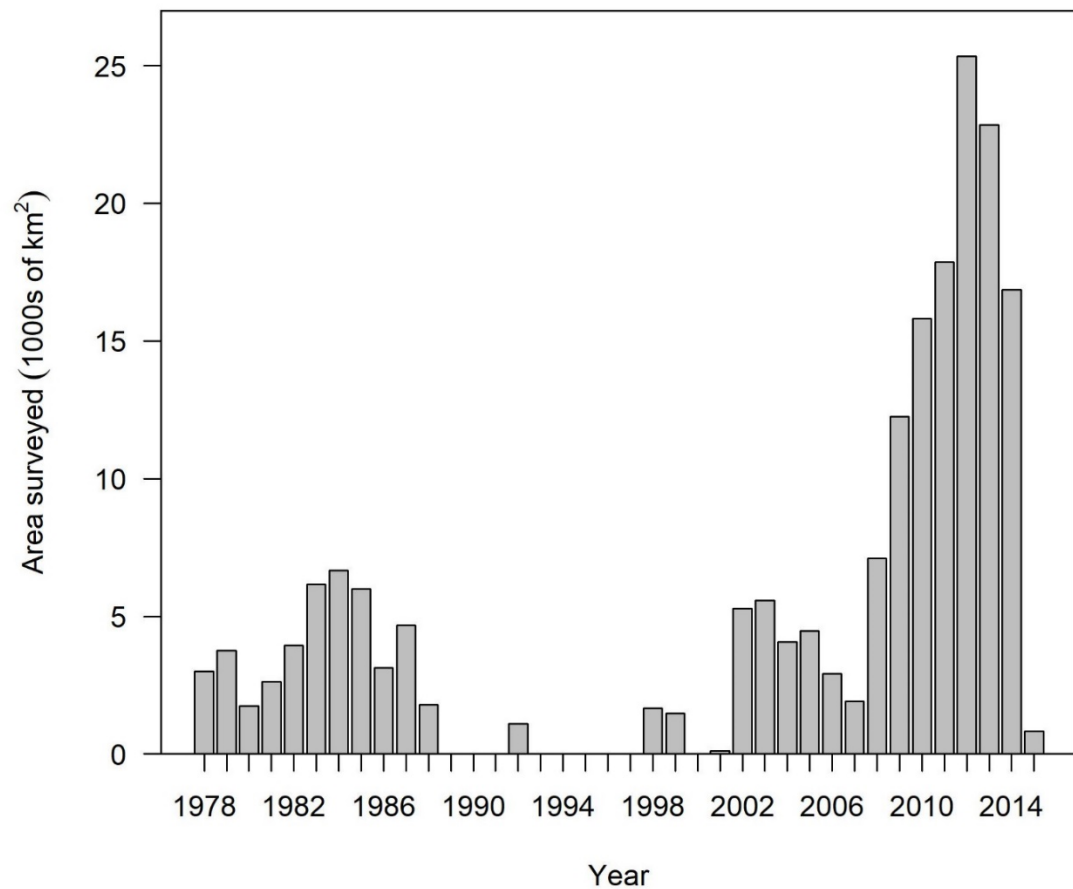


MassCEC (2011-2015)

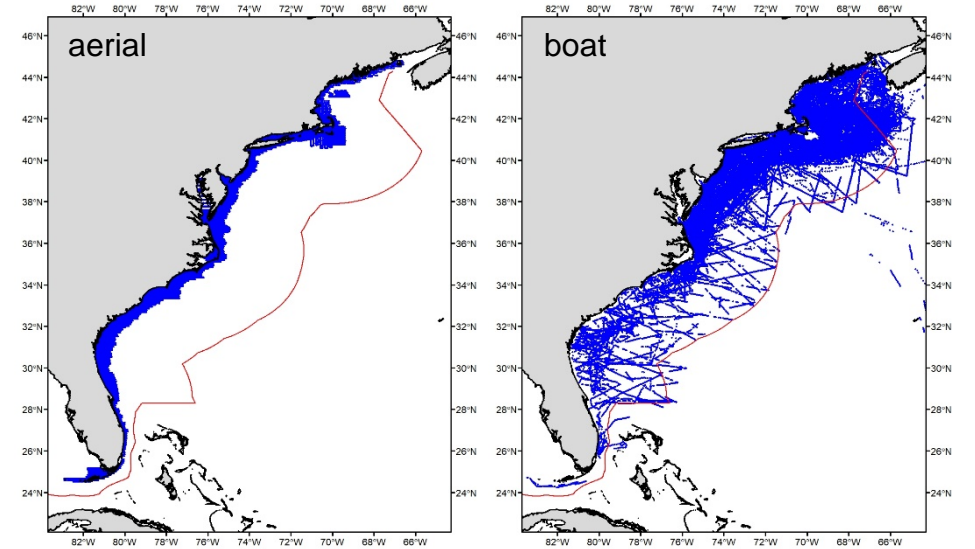
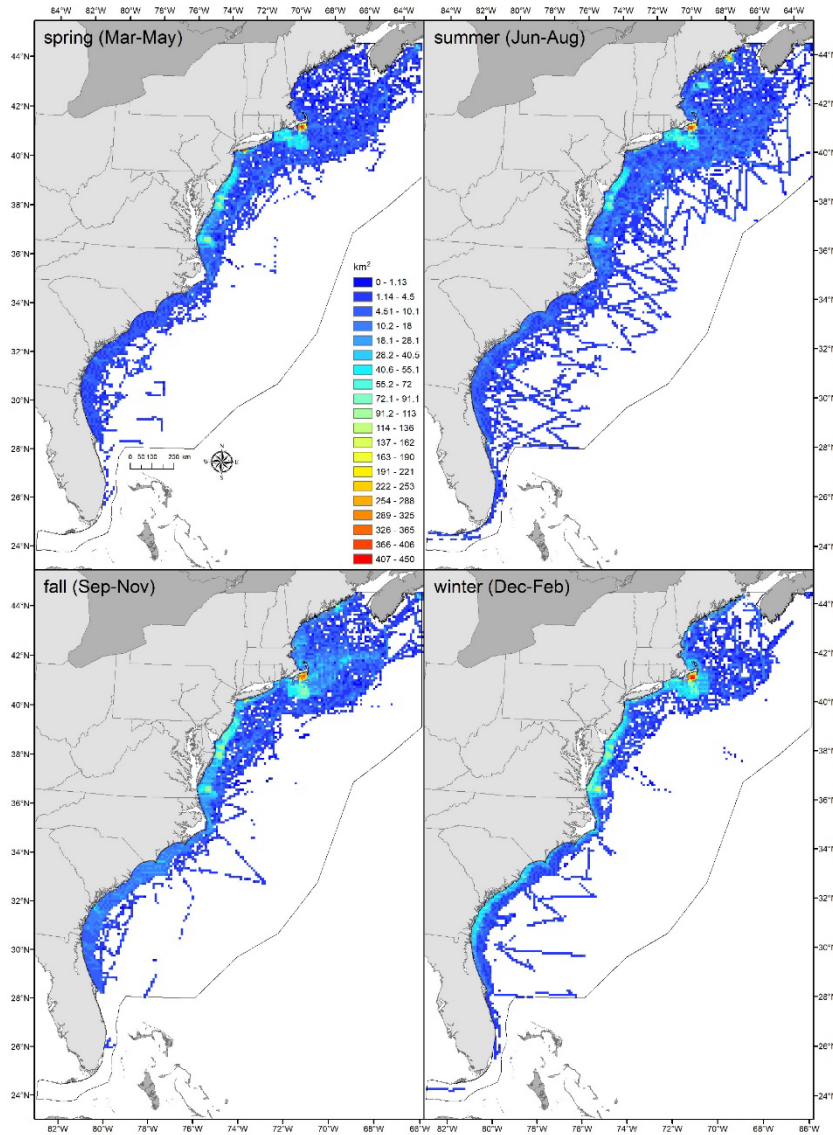


DOE BRI (2012-2014)

Temporal data distribution



Spatial data distribution

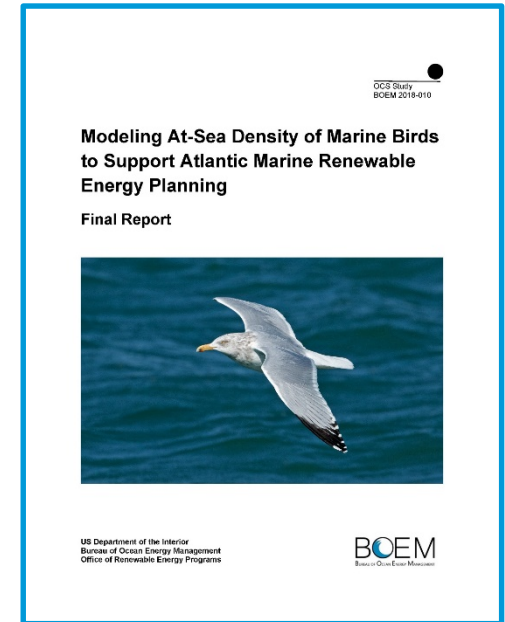


Analysis

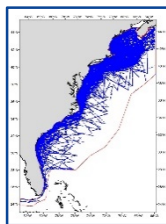


Spatial predictive modeling

- Survey coverage variable with gaps
- Comprehensive environmental datasets available
- Relate species counts to environmental variables
- Predict density across entire region

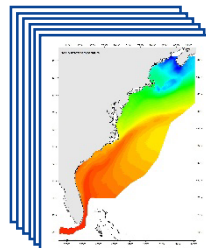


Observed counts

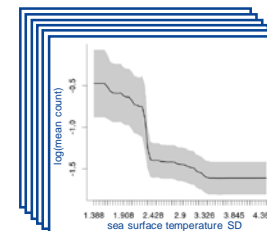


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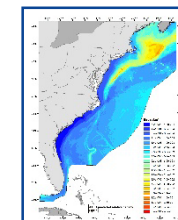
Environmental variables



Functional relationships



Predicted density

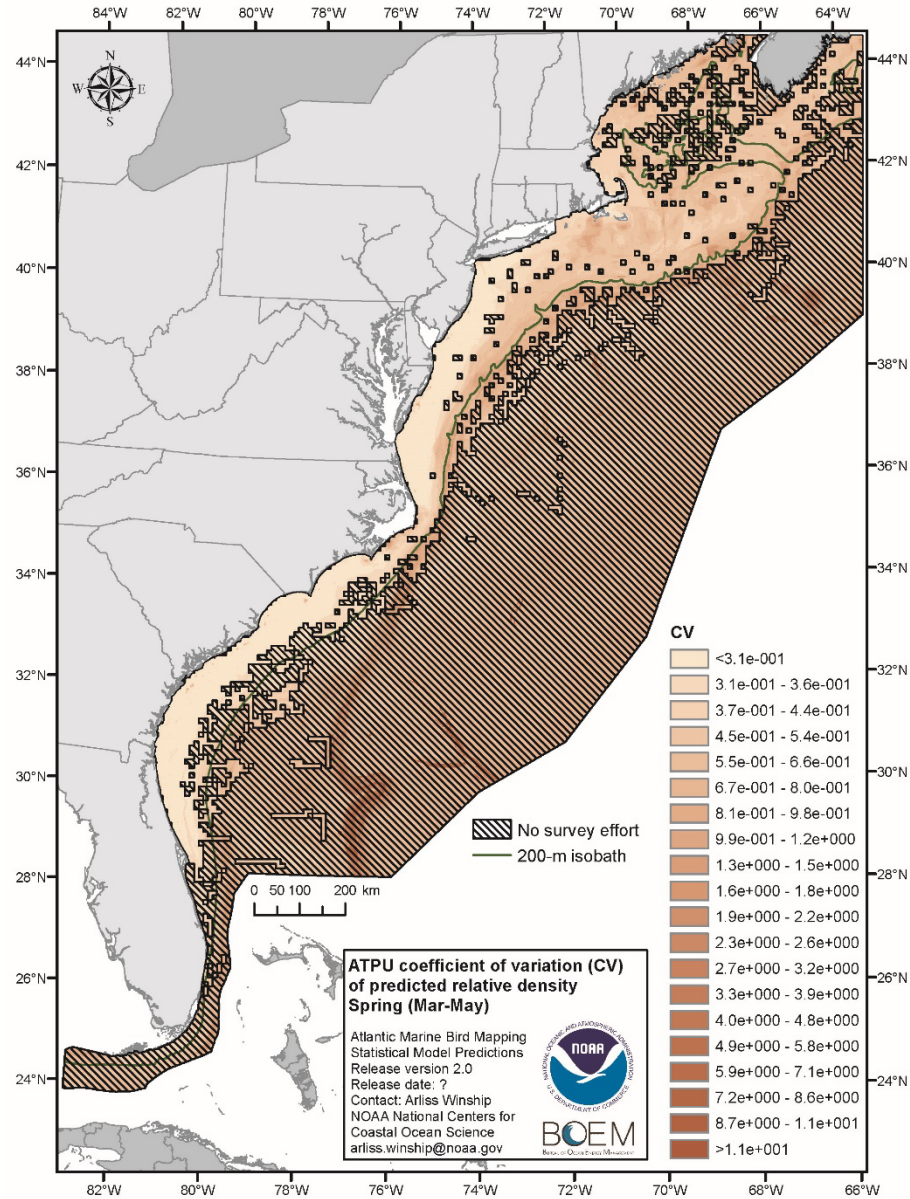
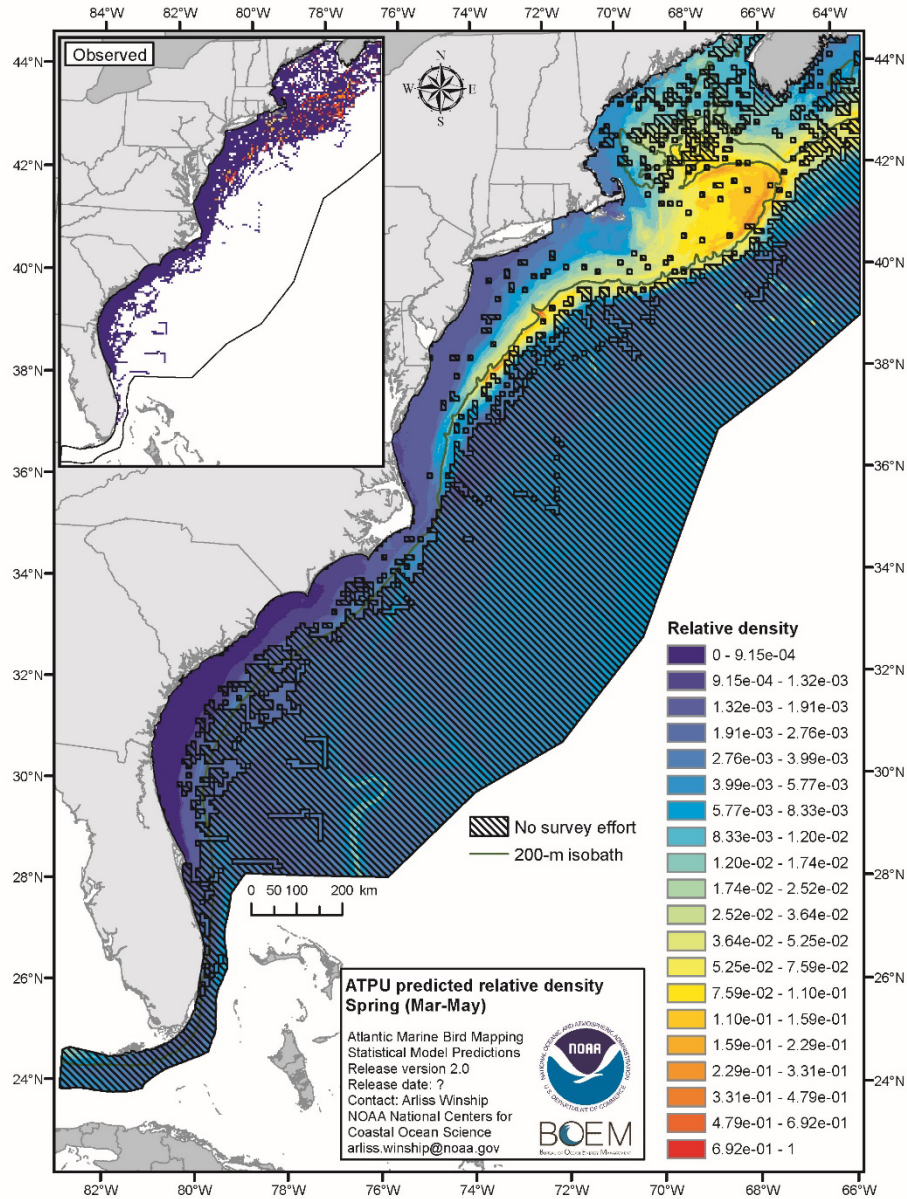


Model details

- Standardizing & accounting for effort
- Boosted generalized additive models
- Zero-inflated likelihoods
- Effects of survey platform & transect
- Cross-validation to prevent over-fitting
- Bootstrapping to quantify uncertainty
- Model performance & selection



Seasonal species maps



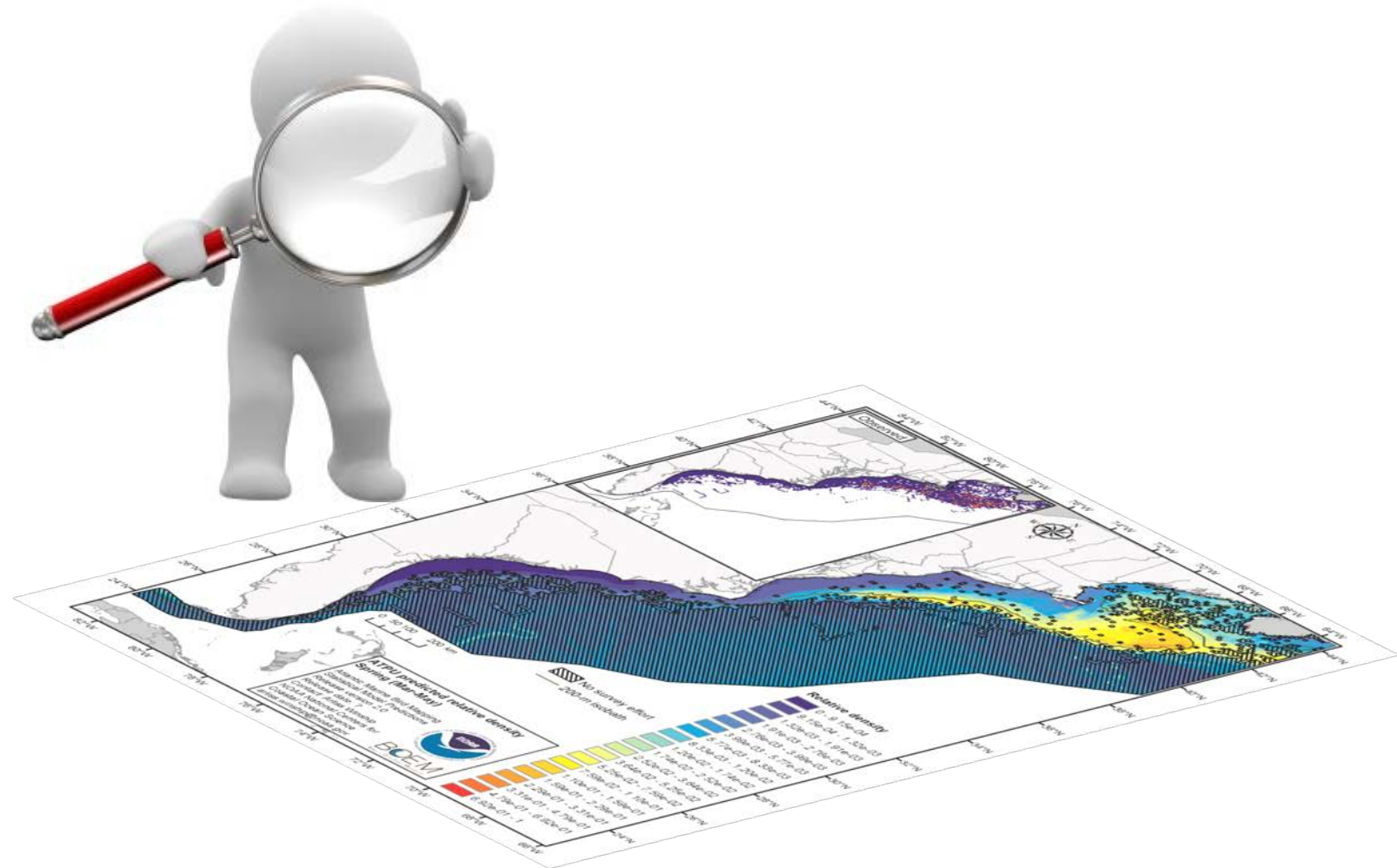
Example maps of predicted relative density (and its CV) for one species (Atlantic Puffin) and season (spring).

Proportional abundance by BOEM area

Predicted relative abundance of WWSC as a proportion of total relative abundance in the study area by BOEM area (Fig. D1) and season. Note that these results are relative to the study area. They do not account for birds outside of the study area. If the entire range of a species were to be considered then the proportional relative abundance in BOEM areas could decrease.

BOEM area	Spring	Summer	Fall	Winter
Massachusetts OCS-A 0478	7.1e-04		2.8e-02	4.4e-03
Rhode Island / Massachusetts OCS-A 0486	8.2e-04		5.8e-04	1.6e-03
Rhode Island / Massachusetts OCS-A 0487	5.5e-04		2.9e-04	9.2e-04
Massachusetts OCS-A 0500	4.6e-03		8.5e-04	1.4e-02
Massachusetts OCS-A 0501	1.3e-02		4.8e-03	3.5e-02
Massachusetts OCS-A 0502	1.3e-02		9.9e-03	3.5e-02
Massachusetts OCS-A 0503	1.4e-03		1.4e-03	4.4e-03
New York Proposed Commercial Lease - Unsolicited	1.6e-04		6.6e-05	1.4e-04
New York OCS-A 0512	3.1e-04		1.3e-04	3.3e-04
New Jersey OCS-A 0499	6.4e-04		2.0e-04	6.1e-04
New Jersey OCS-A 0498	4.8e-04		1.2e-04	6.0e-04
Delaware OCS-A 0482	2.8e-04		6.2e-05	2.5e-04
Maryland OCS-A 0489	9.1e-05		2.1e-05	7.9e-05
Maryland OCS-A 0490	1.2e-04		2.8e-05	9.2e-05
Virginia OCS-A 0483	2.7e-04		5.9e-05	1.5e-04
Virginia OCS-A 0497	8.6e-06		1.4e-06	4.0e-06
North Carolina OCS-A 0508	2.8e-04		6.5e-05	1.6e-04
North Carolina WEA - Wilmington West	1.2e-04		2.5e-05	5.0e-05
North Carolina WEA - Wilmington East	2.7e-04		6.3e-05	2.1e-04
South Carolina Call Area - Grand Strand	1.5e-03		3.2e-04	6.2e-04
South Carolina Call Area - Cape Romain	3.5e-04		5.9e-05	1.6e-04
South Carolina Call Area - Winyah	6.7e-05		1.6e-05	4.9e-05
South Carolina Call Area - Charleston	6.2e-05		1.7e-05	4.2e-05
All	3.9e-02		4.7e-02	1.0e-01

Expert review



Applications



NORTHEAST OCEAN DATA

Maps and Data for Ocean Planning in the Northeastern United States

HOME ABOUT CASE STUDIES THEME MAPS **DATA EXPLORER** RESOURCES

DATA EXPLORER

Turn all Layers Off

BIRDS

SPECIES: Northern fulmar

TIME PERIOD: Northern fulmar, winter

DATA TYPE (modeled): Relative Density 90% Confidence Interval Range Coefficient of Variation

[Layer Information](#)

Add to Layer List

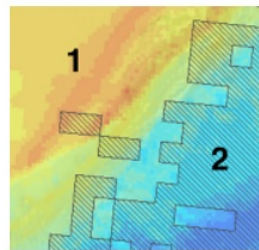
Legend

Avian Surveys, No Effort - Winter

Northern fulmar, winter relative density

High

NORTHERN FULMAR, WINTER RELATIVE DENSITY



1. Model predictions in area with survey effort
2. Model predictions in area without survey effort; interpret cautiously

Abundance model results are the long-term average relative number of individuals per unit area. Source data used to create the models are from January 1978 through October 2016. Model resolution is 2km x 2km grid cells, and models were generated with an original extent of approximately the entire US east coast EEZ.

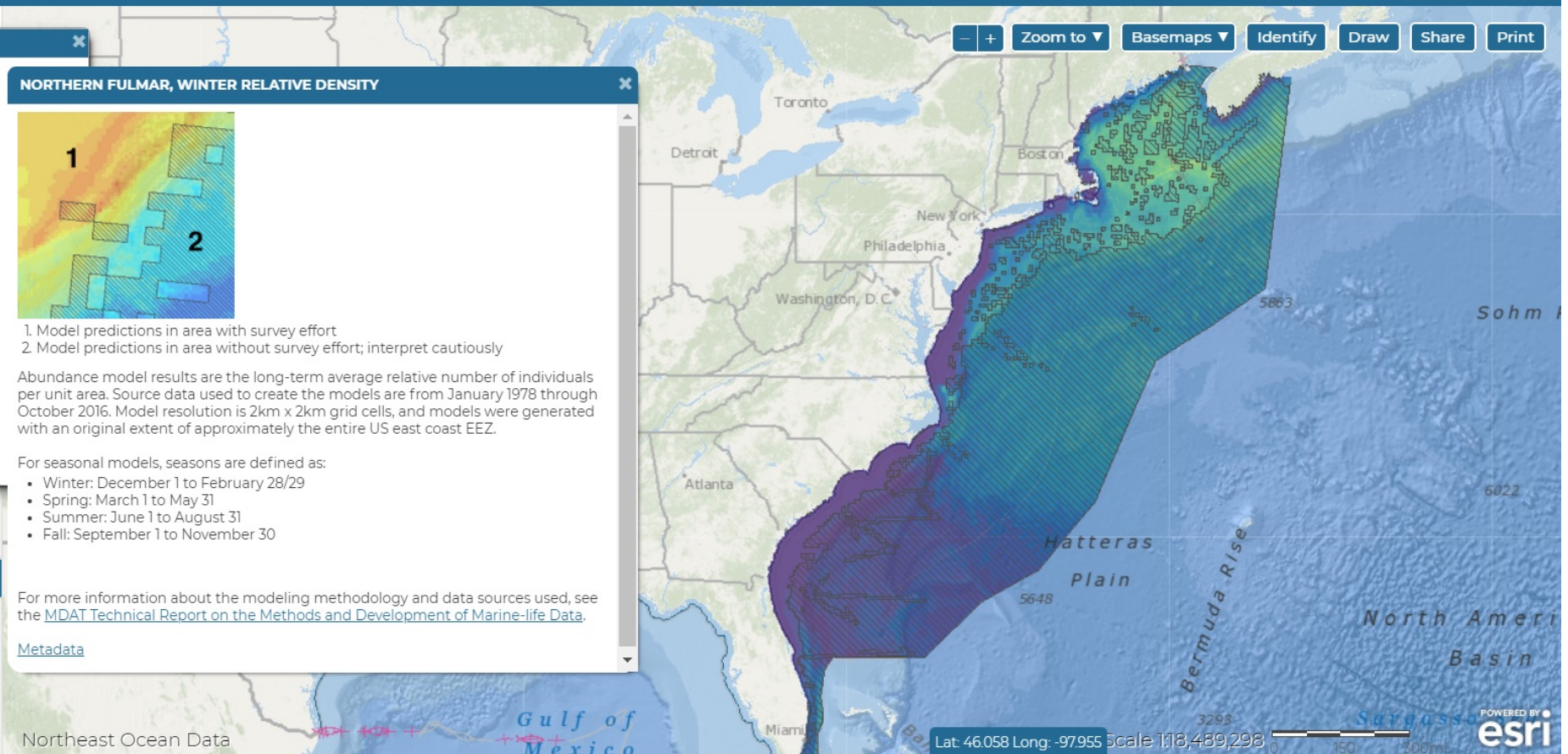
For seasonal models, seasons are defined as:

- Winter: December 1 to February 28/29
- Spring: March 1 to May 31
- Summer: June 1 to August 31
- Fall: September 1 to November 30

For more information about the modeling methodology and data sources used, see the [MDAT Technical Report on the Methods and Development of Marine-life Data](#).

[Metadata](#)

Northeast Ocean Data



Lat: 46.058 Long: -97.955 Scale 1:18,489,298



Next steps



New data

- Recent and ongoing surveys
 - AMAPPS
 - Normandeau/APEM (NYSERDA, Carolinas, WEAs)
 - BRI (WEAs)
- Extended temporal coverage
- Augmented spatial coverage (e.g., southeast)



D. Pereksta

New analyses

- Funding by BOEM
- Spatio-temporal modelling
- Forecasting
- Data requirements
 - temporal replication
 - contemporaneous environmental data (and forecasts)
- Species, spatial extent, etc. T.B.D.

Lynch et al. 2015. ICES J. Mar. Sci. 72:374-387.

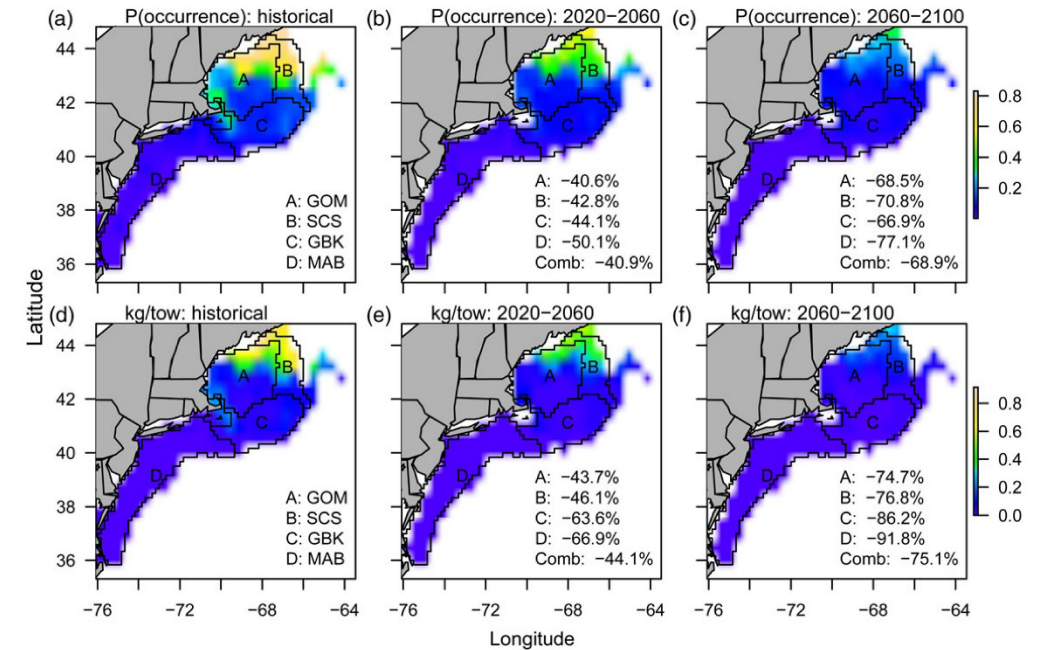


Figure 3. Historical and future mean probability (P) of occurrence (a–c) and density (kg tow^{-1} ; d–f) of alewife in fall in the Northwest Atlantic Ocean estimated by linking an SDM with historical climatology and ensemble mean climate projections based on a moderate (A1B) greenhouse gas emissions scenario. Projections assumed an average abundance scenario, and mean per cent changes were estimated for all regions combined (Comb) and for four EPU: (A) GOM, (B) SCS, (C) GBK, and (D) -MAB.

Thank you very much for your time

Questions?

arliss.winship@noaa.gov

