Data Collection At-Sea Abundance of Marine Birds developed by the NOAA National Centers for Coastal Ocean Science (NCCOS), prepared by the Marine-life Data and Analysis Team (MDAT)	
Data Collection Title	MDAT_WS_AVIAN_MODEL_DATA_V2.0_2018_03_01
Data Collection URL	Map services: http://mgelmaps.env.duke.edu/mdat/rest/services/MDAT

Data Set	
Data Set Title	MDAT_WS_AVIAN_MODEL_DATA_V2.0_2018_03_01
Principal Investigators	NCCOS Project: Arliss J. Winship, Brian P. Kinlan, Timothy P. White, Jeffery B. Leirness, John Christensen – US DOC; NOAA; NOS; National Centers for Coastal Ocean Science (NCCOS) MDAT Project: Patrick N. Halpin (PI) – Marine Geospatial Ecology Lab at Duke University; Earvin Balderama (Co-I) - Loyola University Chicago; Michael Fogarty (Co-I) - NOAA/NEFSC; Arliss Winship (Co-I) - NOAA/NCCOS
Primary Points of Contact	NCCOS Models: Arliss Winship (arliss.winship@noaa.gov) - US DOC; NOAA; NOS; National Centers for Coastal Ocean Science (NCCOS) and CSS, Inc. MDAT Collection: Jesse Cleary (jesse.cleary@duke.edu) - Marine Geospatial Ecology Lab at Duke University
Collaborators	David Bigger - US DOI, Bureau of Ocean Energy Management (BOEM) Mary Boatman - US DOI, Bureau of Ocean Energy Management (BOEM) James Woehr - US DOI, Bureau of Ocean Energy Management (BOEM) Allan O'Connell - US DOI, United States Geological Survey (USGS) Mark Wimer - US DOI, United States Geological Survey (USGS) Allison Sussman - US DOI, United States Geological Survey (USGS) Tim Jones - US DOI, United States Fish and Wildlife Service (USFWS) Kaycee Coleman - US DOI, United States Fish and Wildlife Service (USFWS) Kyle Detloff - US DOI, United States Fish and Wildlife Service (USFWS) Robert Fowler - US DOI, United States Fish and Wildlife Service (USFWS) Carina Gjerdrum – Canadian Wildlife Service (CWS), Environment and Climate Change Canada (ECC) Peter Miller – Plymouth Marine Laboratory Peter Cornillon – University of Rhode Island Michael Coyne - US DOC, NOAA, NOS, National Centers for Coastal Ocean Science (NCCOS) and CSS Inc. Matthew Poti - US DOC, NOAA, NOS, National Centers for Coastal Ocean Science (NCCOS) and CSS Inc. Robert Rankin - US DOC, NOAA, NOS, National Centers for Coastal Ocean Science (NCCOS) and CSS Inc. Zhifa Liu - US DOC, NOAA, NOS, National Centers for Coastal Ocean Science (NCCOS) and GAMA-1 Technologies And many additional data providers – listed in Appendix A of Winship et al. 2018 MDAT members: Earvin Balderama (Co-I, Loyola University Chicago) Jesse Cleary (Duke University) Corrie Curtice (Duke University) Michael Fogarty (Co-I, NOAA/NEFSC) Patrick N. Halpin (PI, Duke University) Brian Kinlan (NOAA/NCCOS) Charles Perretti (NOAA/NEFSC)

	Jason Roberts (Duke University) Emily Shumchenia (NROC) Arliss Winship (Co-I, NOAA/NCCOS)
Author List	Avian Models: Arliss J. Winship[1,2], Brian P. Kinlan[1], Timothy P. White[3], Jeffery B. Leirness[1,2], John Christensen[1] [1] NOAA National Centers for Coastal Ocean Science, Silver Spring, MD, U.S.A. [2] CSS, Inc, Fairfax, VA, U.S.A. [3] Bureau of Ocean Energy Management, Sterling, VA, U.S.A. MDAT Technical Report: Corrie Curtice[1], Jesse Cleary[2], Emily Shumchenia[3], Patrick Halpin[2] [1] Marine Geospatial Ecology Laboratory, Nicholas School of the Environment, Duke University Marine Lab, Beaufort, NC, US [2] Marine Geospatial Ecology Laboratory, Duke University, Durham, NC, US [3] Northeast Regional Ocean Council, US
Abstract	In 2014, the Marine Geospatial Ecology Lab (MGEL) of Duke University began work with the Northeast Regional Ocean Council (NROC), the NOAA National Centers for Coastal Ocean Science (NCCOS), the NOAA Northeast Fisheries Science Center (NEFSC) and Loyola University Chicago, as part of the Marine-life Data and Analysis Team (MDAT), to characterize and map marine life in the Northeast region in support of the Regional Ocean Plan. In 2015, the Mid-Atlantic Regional Council on the Ocean (MARCO) contracted with MDAT to build upon and expand this effort into the Mid-Atlantic planning area, and in support of the Mid-Atlantic Regional Ocean Plan. These research groups collaborated to produce "base layer" predictive model products with associated uncertainty products for cetacean species or species guilds and avian species, and three geospatial products for fish species. Periodic updates to these base layer models and data are produced by the individual institutions in the MDAT team based on schedules set by the funders of each modeling effort. MDAT member NCCOS developed a comprehensive synthesis of models and data on marine and coastal birds as part of a 5-year BOEM funded project "Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf." In 2017, NCCOS updated the source data, covariates, and modeling methodology to produce new models, including additional species. The NOAA report and the full set of model products for this project can be found here: https://coastalscience.noaa.gov/data_reports/modeling-at-sea-density-of-marine-birds-to-support-atlantic-marine-renewable-energy-planning-final-report/ MDAT compiled the NCCOS long-term average density model results, with two products characterizing model uncertainty. The individual species maps represent the results of predictive modeling applied to data from the Northwest Atlantic Seabird Catalog (US Fish and

	Wildlife Service) and the Eastern Canada Seabirds at Sea database (Canadian Wildlife Service, Environment and Climate Change Canada). The modeling framework enabled predictions beginning 1-2km offshore and extending to the US EEZ boundary along the entire US Atlantic coast. As a result, model predictions are not available for nearshore (0-2km) areas, embayments, or estuaries, such as Long Island Sound. Density model results are the long-term average relative abundance of individuals per unit area. It is not possible to infer absolute density because of how the survey data were collected and compiled, and how the models were generated. Relative density model results are predicted to the full extent of the study area, and a hatched mask delineating areas with no survey effort in the dataset is provided. Mid-points of survey transect segments (~4 km in length) were gridded at a 10 x 10 km resolution, and hatched areas indicate grid cells with no segment mid-points (i.e. minimal or no survey effort). Model results in these hatched areas should be interpreted with caution. See Winship et al. (2018) Section 2 for more details. The 90% Confidence Interval and the Coefficient of Variation are provided as two statistical measures of model uncertainty.
Purpose	NCCOS conducted this assessment in partnership with the Bureau of Ocean Energy Management (BOEM) to inform BOEM's renewable energy policy decisions in the Outer Continental Shelf (OCS) waters and to inform marine spatial planning in the region. MDAT incorporated model results and uncertainty products into the products delivered to the Northeast and Mid-Atlantic (US) regional ocean portals and the national Marine Cadastre to inform ocean planning.
Methods	See Winship et al. (2018) Section 2: Methods. Pp. 2-11.
Citations	NCCOS/BOEM study: Winship, A.J., Kinlan, B.P., White, T.P., Leirness, J.B. and Christensen, J. (2018) Modeling At-Sea Density of Marine Birds to Support Atlantic Marine Renewable Energy Planning: Final Report. U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs, Sterling, VA. OCS Study BOEM 2018-010. 67 pp. MDAT: Curtice, C., Cleary J., Shumchenia E., Halpin P.N. 2018. Marine-life Data and Analysis Team (MDAT) technical report on the methods and development of marine-life data to support regional ocean planning and management. Prepared on behalf of the Marine-life Data Analysis Team (MDAT). Accessed at: http://seamap.env.duke.edu/models/MDAT/MDAT-Technical-Report.pdf.
Data Start Date	1978-01-01
Data End Date	2016-10-05
Data Northern Boundary	44.8 degrees N
Data Southern Boundary	23.8 degrees N
Data Western Boundary	83.0 degrees W
Data Eastern Boundary	63.1 degrees W
Place Keywords	North Atlantic Ocean

Spatial Reference Information	Type: Projected Geographic Coordinate Reference: GCS_North_American_1983 Projection: All_Atlantic_Projection Well-Known Text: PROJCS["All_Atlantic_projection", GEOGCS["GCS_North_American_1983", DATUM["D_North_American_1983", SPHEROID["GRS_1980",6378137.0,298.257222101]], PRIMEM["Greenwich",0.0], UNIT["Degree",0.0174532925199433]], PROJECTION["Hotine_Oblique_Mercator_Azimuth_Center"], PARAMETER["false_easting",0.0], PARAMETER["false_northing",0.0], PARAMETER["scale_factor",0.9996], PARAMETER["azimuth",40.0], PARAMETER["longitude_of_center",-75.0], PARAMETER["latitude_of_center",35.0], UNIT["Meter",1.0]]
Spatial Representation Type	Grid
Datasets	Listed in Table 1 of Curtice et al. (2018)
Update Frequency	Irregular
Resource Provider	*Marine Geospatial Ecology Lab (MGEL) at Duke University (marinelife_data@duke.edu), on behalf of MDAT and NCCOS.*
Comment	*This data documentation describes numerous geospatial datasets archived together as a data collection, and is intended to provide dataset-level metadata for the purposes of discovery, use, and understanding.*
Use Limitation	*Please note: BOEM and NOAA make no warranty, expressed or implied, regarding these data, nor does the fact of distribution constitute such a warranty. BOEM and NOAA cannot assume liability for any damages caused by any errors or omissions in these data. If you use this dataset in a scientific publication or other formal publication, we request that you cite the Winship et al. (2018) and Curtice et al. (2018) publications.*