Marine-life Data and Analysis Team (MDAT) Avian Product Updates
Summary of Changes for v2.0 Update (June 2018)

Overview

Avian individual species models were updated by NOAA NCCOS in late 2017. These products were reviewed by species experts, as well as the MDAT avian expert working group at that time, and are documented in detail in Winship et al. (2018). These updated products are referred to as the Phase II Atlantic Marine Bird Model results. This document contains a brief summary of the changes to the base-layer models and the MDAT group summary products. Additional details on the base-layer models and summary products can be found in the MDAT Technical Report (Curtice et al., 2018).

Individual species base-layer updates

1. Additional survey data. The number of datasets increased from 75 to 92 and now include new data collected since the previous modelling effort (January 1978 through October 2016), new types of data (aerial high resolution digital video), and new data from previously underrepresented areas (e.g., Canadian waters). Previously, source data were from the 'Compendium of Avian Occurrence Information for the Continental Shelf waters along the Atlantic Coast of the U.S.' database developed and maintained by USGS and USFWS; the sources data for this update are now 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).

2. Improved modelling methodology. NCCOS incorporated an effort offset allowing better standardization of survey effort across datasets. With this change, model results now predict *relative density of individuals* (or relative number of individuals per unit area), while the v1.0 products predicted *relative abundance of individuals per strip transect segment*. This update also includes more models per species-season (4 instead of 2) resulting in a wider selection of models from which to choose the best model. In this phase, all models are bootstrapped, while in v1.0 several models were not bootstrapped.

3. Additional species. This update includes model predictions for the following seven additional species:
    - Bridled Tern
    - Great Skua
    - Parasitic Jaeger
    - Red-breasted Merganser
    - Sooty Tern

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- South Polar Skua
- Thick-billed Murre

This update also provides predictions for the following additional species-seasons combinations:

- Common Eider spring-fall
- Dovekie summer
- Least Tern fall
- Ring-billed Gull summer
- Red Phalarope fall
- Red-necked Phalarope spring

4. Updated environmental predictor data. New models include climatologies with additional years for dynamic predictors whose datasets are ongoing. The bathymetry predictor layer has been revised to include additional datasets and to improve the methods used to create the predictor.

5. New masking method. In v1.0, the avian base-layer models contained a built-in "mask" (grey area) where predictions were beyond 100 km from a minimum-distance path connecting the raw sighting location data for a species (to avoid interpreting predictions that are far from recorded observations), and a hatched mask was applied to the area that lies outside 95% of all survey effort for each model time period (i.e., each season and annually). This update allows the models to predict to the full extent of the study area, and provides an updated hatched mask delineating areas with no survey effort in the dataset. 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).

6. For v2.0, NOAA NCCOS did not update the relative occurrence base-layer products. MDAT has removed these layers from the provided web services and data download packages.

<u>Species group summary product updates</u>

1. The annual predictions for newly modeled species were added in the appropriate species groups (see MDAT Technical Report for full species / group information).
    - Bridled Tern: offshore/pelagic, ABMCC low, surface plungers, use NE shelf for feeding, migrant, higher collision sensitivity, higher displacement sensitivity
    - Great Skua: offshore/pelagic, fish eaters, use NE shelf for feeding, migrant, higher collision sensitivity
    - Parasitic Jaeger: nearshore, surface feeders, fish eaters, use NE shelf for feeding, migrant, higher collision sensitivity
    - Red-breasted Merganser: nearshore, coastal waterfowl, divers and pursuit plungers, fish eaters, use NE shelf for feeding, migrant, higher collision sensitivity

- Sooty Tern: offshore/pelagic, ABMCC low, surface feeders, fish eaters, use NE shelf for feeding, migrant, higher collision sensitivity, higher displacement sensitivity
- South Polar Skua: offshore/pelagic, surface feeders, fish eaters, use NE shelf for feeding, migrant, higher collision sensitivity
- Thick-billed Murre: offshore/pelagic, divers and pursuit plungers, fish eaters, use NE shelf for feeding, migrant, higher collision sensitivity, higher displacement sensitivity

2. Summary products are created from individual species predictions that were first normalized by their mean. Summary products are calculated using the full prediction area. The new hatched mask that delineates areas with no survey effort in the dataset is then overlaid on the product to indicate areas where caution should be used in interpreting results.

3. In the previous release, four species were not included in the summary analysis products because their maximum prediction values were too large: Audubon's shearwater, black guillemot, black-capped petrel, and common eider. In this v2.0 release, these species are now included in summary products.

References

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 and Analysis Team (MDAT). Accessed at: http://seamap.env.duke.edu/models/MDAT/MDAT-Technical-Report.pdf.

A.J. Winship, B.P. Kinlan, T.P. White, J.B. Leirness, and J. Christensen. 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. x+67 pp. Accessed at: https://coastalscience.noaa.gov/data_reports/modeling-at-sea-density-of-marine-birds-to-support-atlantic-marine-renewable-energy-planning-final-report/.