Marine-life Data and Analysis Team (MDAT) Cetacean Product Updates
Summary of Changes for v2.1 Update (June 2019)

Overview

Marine mammal individual species or species guild models were originally produced by the Marine Geospatial Ecology Lab at Duke University (MGEL) in 2016 (Roberts et al., 2016) with funding by the U.S. Navy and NASA. Selected species and species guild models were updated with additional data and minor method changes in fall 2017 (Roberts et al., 2017). Additional species and species guilds models have now been updated as of fall 2018, along with minor method changes. These products were reviewed by species experts and are documented in detail in Roberts et al. (2018). Collectively, these updated products are referred to as the Second Generation Marine Mammal Density results.; the Navy refers to them as the "Phase IV models." This document contains a brief summary of the changes to the base-layer models and the MDAT group summary products that occurred in the fall of 2018 update. Additional details on the base-layer models and summary products can be found in the MDAT Technical Report (Curtice et al., 2019).

Individual species or species guild base-layer updates in fall 2018

1. Improved modelling methodology.
    a. Detection functions for shipboard surveys were improved to account for species known to be attracted to ships. This attraction resulted in a problematic "spike" in sightings close to the trackline, mainly in shipboard surveys conducted on two ships by the Southeast Fisheries Science Center (SEFSC). These species are: Atlantic spotted, Clymene, common bottlenose, pantropical spotted, rough-toothed, and short-beaked common dolphins.
    b. Improvements were made to the availability and perception bias corrections.
    c. Improvements were made to the classification of ambiguous sightings for:
        i. Short-beaked common vs Atlantic white-sided dolphin
        ii. Atlantic spotted vs common bottlenose dolphin
    d. The fin and sei whale models were re-fit to include the ambiguous "fin or sei whale" sightings that had been classified into one species or the other. These ambiguous sightings were mistakenly left out of fin and sei whale models produced in 2017.

2. One additional spatial covariate was introduced: a salinity covariate from the Hybrid Coordinate Ocean Model (HYCOM) at 0.08° resolution helped distinguish the more saline waters within and south of the Gulf Stream with the fresher waters north of Cape Hatteras along the continental shelf. This covariate provides a better distinction than other covariates between habits of off-shelf and on-shelf waters north of Cape Hatteras throughout all seasons. It's helpful in modeling species that occur in one of those habitats but not the other (i.e. striped dolphin).

3. Updated model products were produced for:
   - Atlantic spotted dolphin (now 12 monthly predictions for the on-shelf subregion)
   - Atlantic white-sided dolphin
   - Clymene dolphin (previously stratified model, now habitat-based density surface model)
   - Common bottlenose dolphin; renamed from bottlenose dolphin
   - Dwarf and pygmy sperm whales guild (previously stratified model, now habitat-based density surface model); renamed from Kogia guild
   - Fin whale
   - Pantropical spotted dolphin (previously stratified model, now habitat-based density surface model)
   - Risso's dolphin
   - Rough-toothed dolphin (previously stratified model, now habitat-based density surface model)
   - Short-beaked common dolphin
   - Sei whale
   - Striped dolphin

Species group summary product updates

1. Taxa that switched from stratified models to habitat-based density surface models are now included in group summary products as follows (including the "all cetaceans" group). Previously, when these taxa were stratified models, they were not included in group summary products.

   1. Clymene dolphin now included in: Small delphinoids, mid-frequency sound sensitivity
   2. Dwarf sperm whale (Kogia whales) now included in: Sperm and beaked whales, high-frequency sound sensitivity
   3. Pantropical spotted dolphin now included in: Small delphinoids, mid-frequency sound sensitivity
   4. Pygmy sperm whale (Kogia whales) now included in: Sperm and beaked whales, high-frequency sound sensitivity
   5. Rough-toothed dolphin now included: Small delphinoids, mid-frequency sound sensitivity

References

Curtice C., Cleary J., Shumchenia E., Halpin P.N. 2019. 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.

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