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The identification of cetacean aggregation areas based on species distribution models

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Introduction

The cetacean distribution is mainly influenced by the availability and dispersal of its prey. Cetaceans can be found at particular depths, temperature ranges, and oceanographic features, which control their prey's supply and abundance.

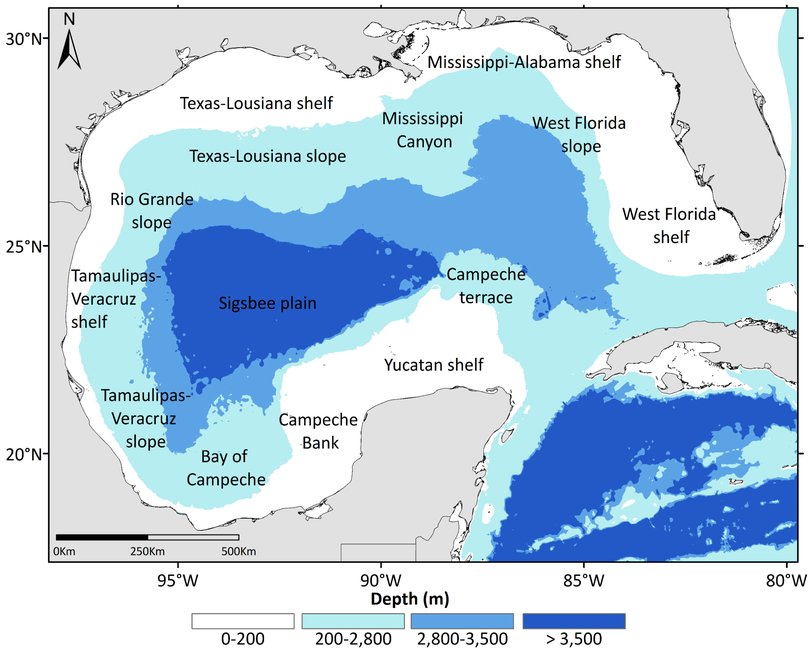

Figure 1. Study area

Objectives

1. Modeling the habitat suitability of cetaceans of the Gulf of Mexico (GOM), and determining their potential distribution.
2. Identify the aggregation areas in the GOM.
3. Evaluated the importance of the environmental predictors.

Methods

Study and modeling area

The study area is the GOM, bathymetrically characterized by a deep ocean basin, vast canyons, and regions with extensive continental platforms.

Occurrence & environmental data

Occurrence data from 19 species of cetaceans that inhabit the GOM were compiled. We used two dynamic oceanographic variables and three bathymetric:

- Sea Surface Temperature
- Chlorophyll-*a* concentration
- Depth
- Slope
- Distance to the 200-m isobath

Habitat suitability & aggregation areas

We used the MaxEnt framework to predict the habitat suitability of cetaceans in the GOM. We established as aggregation areas, those regions with habitat suitability values greater than 0.6 with more than seven species.

Results

Main findings

1. We modeled the habitat suitability of 12 species of cetaceans.
2. The depth and the SST were the most important predictors.
3. The distribution of cetaceans had a segregation partition

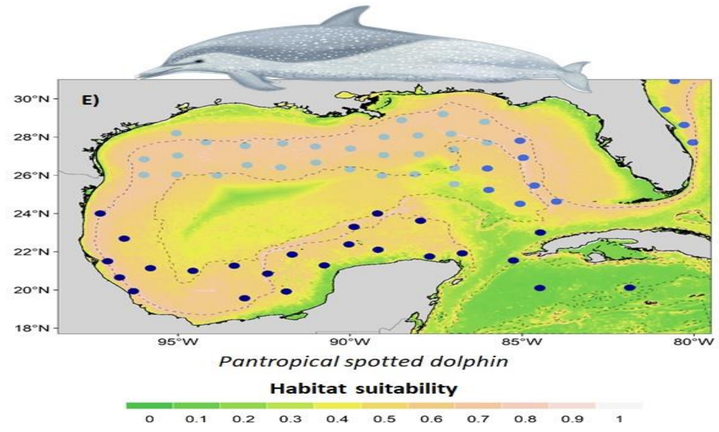

Figure 2. Oceanic species

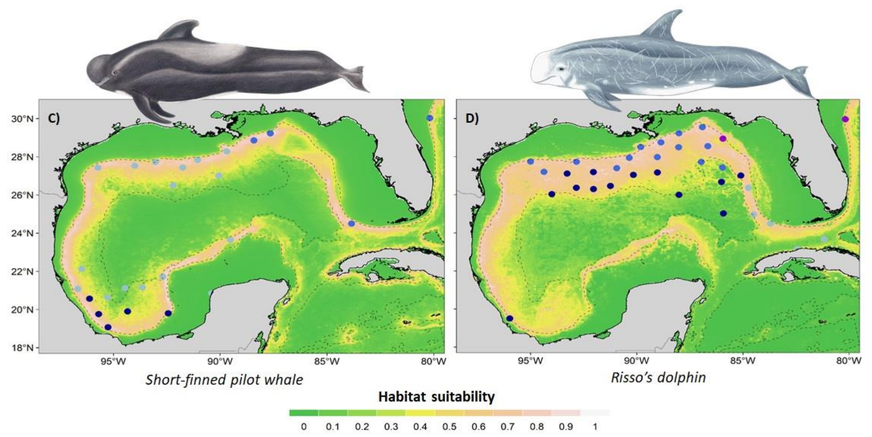

Figure 3. Continental slope species

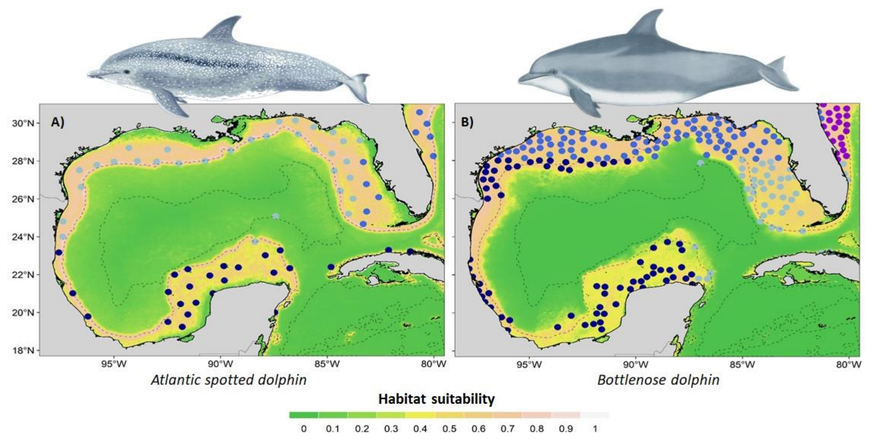

Figure 4. Continental shelf species

Conclusions

The distribution of cetaceans had a segregated partition according to the physiography:

- Oceanic species
- Continental slope species
- Continental shelf species

The continental slope of the GOM is an important aggregation area for cetaceans since it frequently presents a high concentration of their prey.

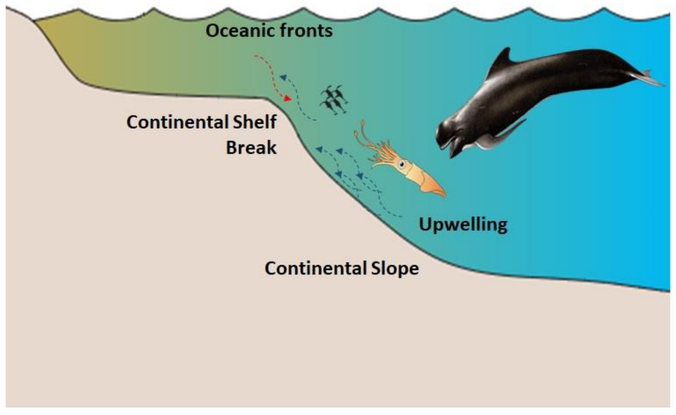

Figure 5. Continental slope habitat