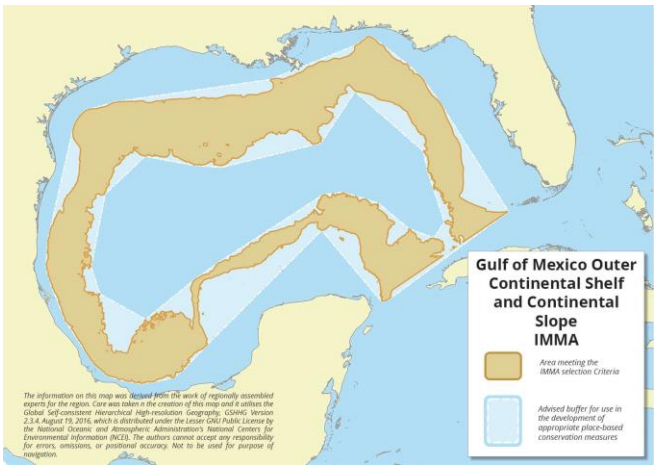

Area Size

509,644 km²

Qualifying Species and Criteria

Sperm Whale – *Physeter macrocephalus*

Criterion A; B (2)

Rice's Whale – *Balaenoptera ricei*

Criterion A; B (1)

Criterion D (2) -Marine Mammal Diversity

Balaenoptera ricei, Feresa attenuata, Globicephala macrorhynchus, Grampus griseus, Kogia breviceps, Kogia sima, Lagenodelphis hosei, Mesoplodon densirostris, Mesoplodon europaeus, Orcinus orca, Peponocephala electra, Physeter macrocephalus, Pseudorca crassidens, Stenella attenuata, Stenella clymene, Stenella coeruleoalba, Stenella frontalis, Stenella longirostris, Steno bredanensis, Tursiops truncatus, Ziphius cavirostris

Gulf of Mexico Outer Continental Shelf and Continental Slope IMMA

Summary

The area covers the Gulf of Mexico outer continental slope (100-200 m depth) continental slope (200-2000 m depth) and a portion of the abyssal plain (2,000–2,500 m depth). Critically Endangered Rice's whales (*Balaenoptera ricei*) are known to primarily inhabit the Gulf of Mexico where they are associated with upwellings of cold, high-salinity water, and seasonal inputs of highly productivity water from coastal sources. This species is not known to migrate and move outside of the Gulf of Mexico, and apparently forages exclusively, or at least primarily, within the boundary of the IMMA.

The IMMA also hosts a population of Vulnerable sperm whales (*Physeter macrocephalus*). Both of these species feed and reproduce in these waters, with limited movements outside of the Gulf. The area sustains a high diversity and density of other cetaceans (21 species) that include beaked whales (*Ziphius cavirostris*, *Mesoplodon europaeus*, *M. densirostris*), short-finned pilot whales (*Globicephala macrorhynchus*), killer whales (*Orcinus orca*), Risso's dolphins (*Grampus griseus*), melon-headed whales (*Peponocephala electra*), Clymene dolphins (*Stenella clymene*), spinner dolphins (*Stenella longirostris*), and pantropical spotted dolphins (*Stenella attenuata*).

A Biologically Important Area (BIA) has been delimited based on ship- and aerial based sighting data in the northeastern part of the Gulf.

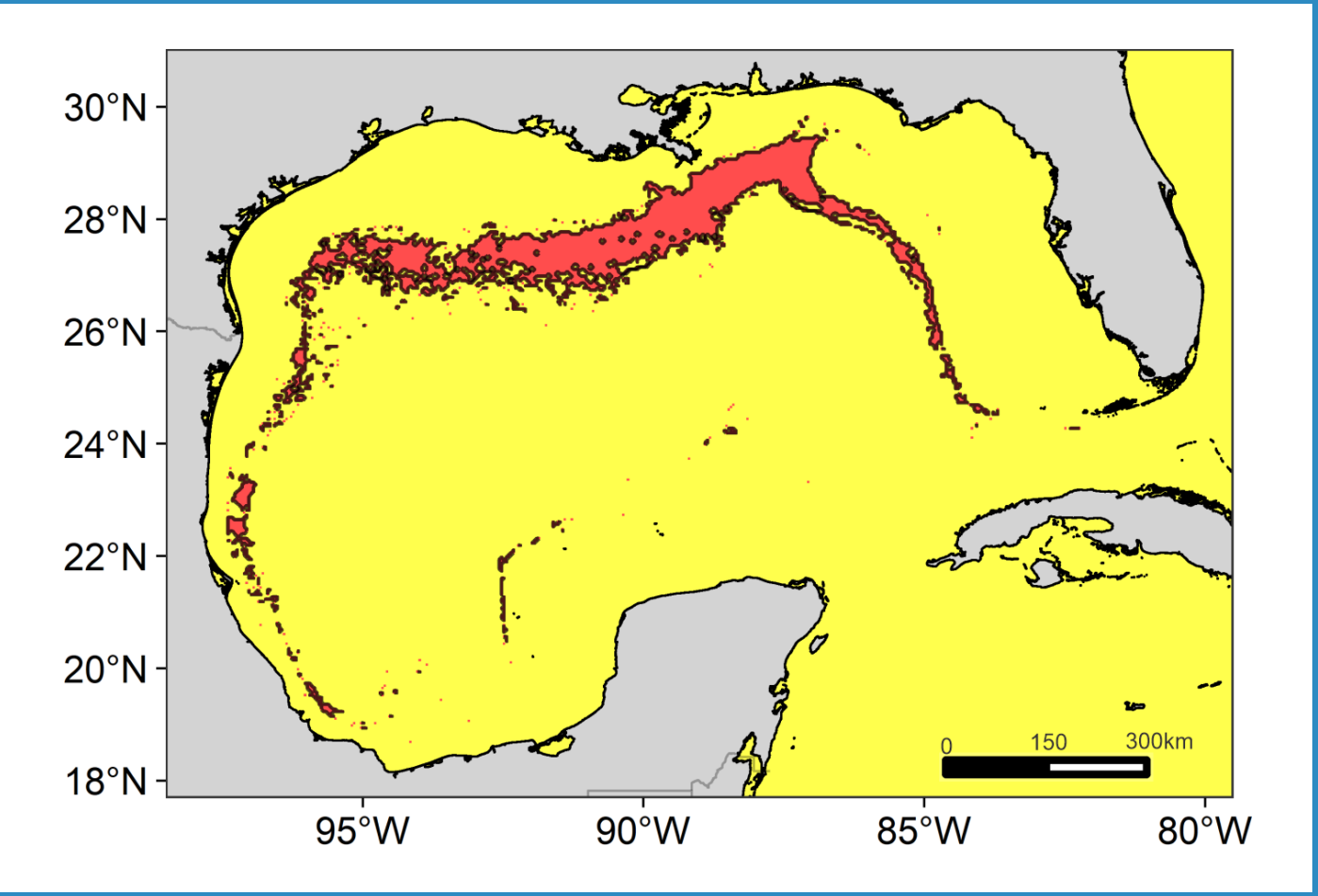

Figure 1: Map of the overlap of the suitable habitat of cetaceans in the Gulf of Mexico. The solid line delimits the highly suitable regions with a high diversity of cetaceans (≥7 species). Excerpt from Ramírez-León et al. (2021).

Figure 2: Rice's whale (*Balaenoptera ricei*) aerial view using drone in this IMMA. Photo credit: NOAA SEFSC MMPA Permit No 779-1633.

Description:

The IMMA consists of the waters of the Gulf of Mexico, between the 100 and 2,500 m isobaths. It includes outer continental shelf and continental slope waters and a portion of the abyssal plain. In the northeastern Gulf of Mexico, particularly where the highest Rice's whale densities have been recorded (Soldevilla et al., 2017; Garrison et al., 2014), upwellings of cold and high-salinity water, along with seasonal input of high-productivity water from coastal sources, likely promote the presence of high aggregations of schooling fish prey consumed by Rice's whales, particularly the silver-rag driftfish (Kiszka et al., 2023; Garrison et al., 2024). A Biologically Important Area (BIA) delimited for Bryde's whale in the Gulf of Mexico (i.e., Rice's whale) based on multiple sighting data sources (LaBrecque et al., 2015). However, the BIA currently excludes portions of the range of this species (Rosel et al., 2022; Garrison et al., 2024). The continental slope of the Gulf of Mexico covers a large area and presents major bathymetric features like the Florida Escarpment, Campeche Escarpment, Campeche Canyon, Bay of Campeche, Mississippi Canyon, and De Soto Canyon. The main prey of the deep-diving species can accumulate in these features (Biggs et al., 2000). The continental slope ecosystem is characterized by high primary productivity. In the north, productivity is directly influenced by the input nutrients from the Mississippi and Atchafalaya rivers, while in the southwest, it is influenced by the Grande, Pánuco, and Usumacinta-Grijalva rivers (Lohrenz et al., 1999). The plumes of nutrient-rich waters are transported through the continental shelf, reaching the slope through interactions with anticyclonic-cyclonic eddies (Martínez-López & Zavala-Hidalgo, 2009). The Loop Current and associated eddies, which drift to the west, are the primary oceanographic features contributing to this nutrient transport.

Criterion A: Species or Population Vulnerability

This IMMA is designed to encompass the habitat of the Rice's whale (*Balaenoptera ricei*), which is listed as Critically Endangered on the IUCN Red List of Threatened Species (Rosel et al., 2022), and listed as Endangered under the U.S. Endangered Species Act. Rice's whale was only recently recognized as distinct from other species in the "Bryde's whale complex" and with a population size below 100 whales (Rosel et al., 2022), it is the most threatened whale species in the world.

The sperm whale (*Physeter macrocephalus*) is listed as Vulnerable on the IUCN Red List of Threatened Species and as Endangered under the U.S. Endangered Species Act (ESA).

Criterion B: Distribution and Abundance Sub-criterion B1: Small and Resident Populations

Rice's whales are only known to reside in the Gulf of Mexico. Rice's whale occurrence in the northern Caribbean and the southeast U.S. Atlantic is not well understood. There are four confirmed stranding records (Brownell et al., 2024) and potential sightings of Rice's whales in the Atlantic off the southeastern U.S. (NOAA Southeast Fisheries Science Center, unpublished data), but opportunistic passive acoustic recordings in these waters have not detected Rice's whale calls. At this time, there is insufficient evidence to support their regular occurrence in the southeast U.S. Atlantic.

The core habitat where the highest densities have been recorded lies primarily between the 100 and 400 m isobaths (Soldevilla et al., 2017; Garrison et al., 2024; Rosel et al., 2022), which corresponds to an area of 49,359 km² in the northeastern portion of the

Gulf of Mexico. The currently accepted population estimate for Rice's whales is 51 individuals (95% CI: 20–130 individuals) based on large-vessel line transect surveys conducted in 2017 and 2018 (Garrison et al., 2020). An estimate from a habitat model using data collected between 1992 and 2009 produced an abundance estimate of 44 (CV=0.27, Roberts et al., 2015, 2016). The Gulf of Mexico is the only location where Rice's whales are known to occur and this species is not known to undertake any migration (Rosel et al., 2022). Movements and site fidelity are unknown, but an analysis of photo-identification data is currently underway, and it is expected that the animals will prove to be essentially resident in the area delineated by the IMMA boundary (NOAA Southeast Fisheries Science Center, unpublished data). Data from a time-depth recorder deployed on several individuals suggest that Rice's whales undertake deep dives during the day (200-250 m) to forage, whereas resting was primarily observed within 0-15 m at night (Soldevilla et al., 2017). Recent evidence suggests that Rice's whales feed in the Gulf of Mexico, particularly within their core range. Bayesian stable carbon and nitrogen isotope mixing models from skin biopsy samples suggest that the diet of Rice's whales is dominated by silver-rag driftfish (*Ariomma bondi*) (66.8% relative contribution), a schooling fish occurring near the bottom of the continental shelf/upper slope waters of the Gulf (Kiszka et al., 2023). Recent habitat models suggest that surface chlorophyll-a concentration, bottom temperature, and bottom salinity are important environmental parameters in defining the habitat of Rice's whales (Garrison et al., 2024). Those conditions are consistent with the presence of upwellings along the continental shelf break, which would promote the presence of small pelagic fish species consumed by Rice's whales in the area (Garrison et al., 2024; Kiszka et al., 2023).

Sub-criterion B2: Aggregations

All evidence indicates that the female and subadult portion of the northern Gulf of Mexico sperm whale population are resident to the Gulf of Mexico. Tracks from 39 sperm whales satellite tagged during 2002-2005 and monitored for up to 607 days show that only one, a male, briefly left the Gulf of Mexico (Jochens et al., 2008). Photo-identification studies compared 285 whales from the Gulf to 2,500 from the Atlantic and Mediterranean Sea and found no matches (Jochens et al., 2008). The best abundance estimate (Nest) for northern Gulf of Mexico sperm whales is 1,180 (CV=0.22). This estimate is from summer 2017 and summer/fall 2018 oceanic surveys covering waters from the 200-m isobath to the seaward extent of the U.S. EEZ (Garrison et al., 2020). Movements of sperm whales between the eastern Caribbean, Gulf of Mexico, and western Atlantic may occur but are not believed to be common. No match between photo-identified individuals from the eastern Caribbean islands was found with individuals from the Gulf of Mexico and the Sargasso Sea (Gero et al., 2007).

Criterion D: Special Attributes
Sub-criterion D2: Diversity

The outer continental slope and continental slope in the Gulf of Mexico have high primary productivity due to the input of nutrients from rivers systems which allow an abundance of concentrated prey (Ramírez-León et al., 2021). The IMMA's waters include a significant part of the range for sperm whales (VU) and, and host a diversity of 21 marine mammals. The waters >200 m deep host the highest density of marine mammals in the Gulf of Mexico (Roberts et al., 2016; Ramírez-León et al., 2021; Rappucci et al., 2023). The species that occur regularly include beaked whales (*Ziphius cavirostris*, *Mesoplodon europaeus*, *M. densirostris*), short-finned pilot whales (*Globicephala*

macrorhynchus), killer whales (*Orcinus orca*), Risso's dolphins (*Grampus griseus*), melon-headed whales (*Peponocepha electra*), Clymene dolphins (*Stenella clymene*), spinner dolphins (*S. longirostris*), and pantropical spotted dolphins (*S. attenuata*) (Würsig et al., 2000). The density of most of these species including sperm whales, short-finned pilot whales, Risso's dolphins, spinner dolphins and pantropical spotted dolphins is highest in continental slope waters (Roberts et al., 2016). The most abundant species in this area in the northern Gulf of Mexico is by far the pantropical spotted dolphin but all of these species have regularly been sighted since surveys began in 1990 (e.g., Mullin & Fulling, 2004; Rappucci et al., 2023). However, some of the less common species such as the killer whales and Fraser's dolphins (*Lagenodelphis hosei*) are not sighted during every survey.

Figure 3: Gervais' beaked whale (*Mesoplodon europaeus*) surfacing in this IMMA. Photo credit: NOAA SEFSC MMPA Permit No 779-1633.

Figure 4: Pantropical spotted dolphins (*Stenella attenuata*) leaping in this IMMA. Photo credit: NOAA SEFSC MMPA Permit No 779-1633.

Figure 5: Fraser's dolphins (*Lagenodelphis hosei*) observed in this IMMA. Photo credit: NOAA SEFSC MMPA Permit No 779-1633.

Figure 6: Rough-toothed dolphins (*Steno bredanensis*) observed from the Southern Gulf of Mexico, near Veracruz.
Photo credit: M. Rafael Ramírez-León.

Figure 7: A pod of short-finned pilot whale (*Globicephala macrorhynchus*) observed from the Southern Gulf of Mexico, near Veracruz.
Photo credit: M. Rafael Ramírez-León.

Supporting Information

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