Using data and surveys of Atlantic Coast, scientists identify areas of high marine mammal diversity

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A fin whale and common dolphins seen during a New England Aquarium aerial survey of Northeast Canyons and Seamounts Marine National Monument in 2020. Credit: New England Aquarium

Sightings of more than 1 million marine mammals in the federally protected Northeast Canyons and Seamounts Marine National Monument and sites along the Atlantic Coast have been used to identify areas of high marine mammal diversity. These findings underscore the importance of ocean conservation as these waters face increasing impacts from human activities.

In a new study published in *Conservation Science and Practice*, New England Aquarium scientists reviewed marine mammal sightings to gain a better understanding of habitat use along the U.S. East Coast. The research team used North Atlantic Right Whale Consortium data from aerial and boat surveys conducted by 49 organizations between 1979 and 2020 to calculate marine mammal species diversity in the North Atlantic Ocean between Florida and Nova Scotia, Canada. The data set contained 189,175 sightings of more than 1 million animals from 30 unique species or species groupings.

High species diversity occurred more frequently in the northern part of the Atlantic Coast, particularly around the Monument, on the edge of the continental shelf, and across the Gulf of Maine and Georges Bank, they found. "It was very exciting to see these results," said Brooke C. Hodge, the study's lead author and Associate Scientist in the Spatial Ecology, Mapping, and Assessment (EcoMap) Program for the Anderson Cabot Center for Ocean Life at the New England Aquarium.. "Our research shows us that the Monument is diverse compared to the East Coast. It is clearly well-sited and protects a unique and diverse marine mammal community."

Last October, the Biden-Harris Administration reinstated the Monument's federal protection status, which had been removed by the previous administration. The nearly 5,000-square mile underwater sanctuary is located 130 miles southeast of Cape Cod and is home to vibrant deep-sea ecosystems that include coral reefs, fish, and

endangered whales. In 2016, Aquarium scientists provided strong scientific evidence that helped the Monument's initial designation under President Obama. In 2021, Aquarium scientists explored the consequences of removing protections from the Monument and demonstrated that opening the Monument to fishing increased the risk of entanglement, bycatch, and habitat destruction for species from the sea surface to sea floor.

In this study, scientists found that species diversity was highest in the northern and mid-Atlantic regions with steep continental shelf edges. Canyons and areas with high salinity and low temperatures also had a high diversity of marine mammals. "Well designed and effectively managed marine protected areas can lead to conservation success," Hodge said. In the study, the authors wrote: "Our analyses contribute to efforts to designate MPAs (marine protected areas) to conserve habitat that is important for protecting species by identifying drivers of biodiversity and potential sites for protecting 30 percent of the plant by 2030." The Biden-Harris Administration aims to protect 30 percent of federal U.S. lands and waters by 2030.

"Identifying MPAs in our study area is critical because U.S. East Coast waters face intensive human use from fishing, shipping, planned wind energy development, and features that support marine mammal foraging are subject to specific threats," researchers wrote in the study. "The Gulf of Maine is one of the most rapidly warming marine ecosystems in the world, and evidence of changes in productivity have already been observed. Designating MPAs and establishing effective management measures to meet the goal of protecting areas of particular importance to biodiversity are needed to protect marine mammals and the ecosystems on which they depend." However, the authors acknowledge that further research is needed to more fully characterize marine mammal species diversity in these areas and to assess the biodiversity of the full wildlife community and the habitat, such as seabirds, deep-self invertebrates,

deep-sea corals, sponges, and fish.

The study's coauthors include several New England Aquarium scientists: Daniel E. Pendleton, Research Scientist; Laura C. Ganley, Postdoctoral Associate Research Scientist; Orfhlaith "Orla" O'Brien, Associate Scientist; Scott D. Kraus, Emeritus Scientist; and Jessica V. Redfern, Senior Scientist and Chair of the Spatial Ecology, Mapping, and Assessment Program. Ester Quintana-Rizzo of Simmons University also contributed to the research.

More information: Brooke C. Hodge et al, Identifying predictors of species diversity to guide designation of marine protected areas, *Conservation Science and Practice* (2022). DOI: 10.1111/csp2.12665

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