Marine Megafauna Research Expedition: Establishing a Bilateral Marine Protected Area Around the Beata Ridge, Dominican Republic.

Expedición de Investigación de Megafauna Marina: Establecimiento de un Área Marina Protegida Bilateral alrededor de la Dorsal Beata, República Dominicana.

Expédition de recherche sur la mégafaune marine: Création d'une aire marine protégée bilatérale autour de la crête de Beata, République Dominicaine.

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EXTENDED ABSTRACT

The Beata Ridge Marine Megafauna Expedition, conducted from January to February 2024, represents the first scientific expedition to support the Dominican Republic's efforts to establish a bilateral Marine Protected Area (MPA) in the southwestern marine territory of the country as part of a joint effort between the Colombian and Dominican governments. Four 5-day expeditions were conducted, following pre-established routes. The study area begins approximately 20 km from Isla Beata and extends over 12,674 km² to the south-southwest. With a length of 450 km and a width of 300 km, it is one of the most important underwater structures in the Caribbean. The ridge has a complex morphology and varies in depth from 1500 to 4400 km.

The multidisciplinary expedition incorporated advanced methodologies, including eDNA analysis, visual observation, passive acoustic monitoring, Baited Remote Underwater Video (BRUV), and photographic identification to collect critical baseline data. The vessel used for this expedition was a 47-foot Fountaine Pajot catamaran, model Saona 47.

The Caribbean Cetacean Society's Standardized Cetacean Monitoring Protocol (CCS) was the backbone of data collection efforts. Advanced tools were implemented for each study objective to generate comprehensive data on species diversity, distribution, and habitat use, improving our understanding of marine traffic, anthropogenic impacts, and addressing the research questions of this study. Cetacean monitoring included data on presence, species identification, group size, behavior, individual identification, juvenile presence, environmental parameters, maritime traffic, and vocalizations. For active listening and passive acoustic monitoring, a towed hydrophone array was used, with an acoustic point taken every 30 minutes for 10 minutes. BRUV and eDNA methods were implemented twice a day, from 7:00 AM to 8:00 AM and from

6:00 PM to 7:00 PM. To avoid water contamination during BRUV use, eDNA collection was conducted before launching the BRUV.

The findings highlighted the ecological significance of the Beata Ridge as a key area for marine megafauna. The team identified shark, cetacean, and seabird species, emphasizing the area's role as a vital biological corridor for species connectivity. The first evidence in the region of the EC2 vocal clan of sperm whales (*Physeter macrocephalus*) was obtained, and a significant number of individuals sightings of black-capped petrels (*Pterodroma hasitata*), an endangered species, was documented.

Six cetacean species were identified, including sperm whales, short-finned pilot whales, false orcas, pantropical spotted dolphins, Atlantic spotted dolphins, and bottlenose dolphins, with a total of 26 sightings and over 300 individuals. Sperm whales were the most frequently sighted (11 times), followed by Atlantic spotted dolphins (6) and pantropical dolphins (5). Juveniles were recorded in 4 species, including 11 pantropical dolphin juveniles. Observations mainly occurred south of Isla Beata, with sperm whales and Atlantic spotted dolphins being the furthest from shore.

The data collection process confirmed the presence of 15 bird species, including 14 seabirds and a glossy ibis (*Plegadis falcinellus*). Bridled terns (*Onychoprion anaethetus*) and sooty terns (*Onychoprion fuscatus*) were grouped as *Onychoprion spp*. due to identification difficulties at sea. Additionally, only the brown morph of red-footed boobies (*Sula sula*) was observed. The black-capped petrel (*Pterodroma hasitata*) was the most observed species, with 80 sightings and 101 individuals counted along the ridge. Flight, hunting, feeding, and resting behaviors were recorded, and both light and dark morphs were confirmed in the area.

Three shark species were identified at two sampling points, including two silky sharks (*Carcharhinus falciformis*) and a juvenile oceanic whitetip shark (*Carcharhinus longimanus*). These sharks were observed along the Beata Ridge and the southern coast of the Dominican Republic, at varying depths and environmental conditions. Observations of *Stenella sp*. dolphins included bite scars caused by deepwater sharks (*Isistius sp.*), indicating recent attacks.

During the four missions, a total of 73 vessels were observed. Small fishing boats were sighted near the shore, while cargo ships and oil tankers were frequently found in the ridge area, sometimes coinciding with sperm whale sightings. This highlights the coexistence of marine megafauna and maritime traffic, underscoring the need to manage associated risks for biodiversity conservation and maritime safety.

The expedition recorded a total sampling effort of 356 hours, covering 2770 km at an average speed of 4.5 knots. Monitoring included both daytime and nighttime activities, which created differences in visual and acoustic efforts. Visual effort spanned 184 hours and 1523 km, while passive acoustic monitoring included 60 hours of active listening. The expedition involved 27 participants from 12 national and regional institutions and organizations, demonstrating a collaborative approach to marine conservation. These important results led to the designation of Beata Ridge as a Marine Protected Area (MPA) under Category IV, through Presidential Decree 194-24, officially naming the area as the Orlando Jorge Mera Marine Sanctuary in Beata Ridge, with a total area of 54,795 km². The area is currently in development for a comprehensive management plan, emphasizing its importance as a critical MPA in the Caribbean. The findings advocate for the urgent establishment of conservation measures to safeguard Beata Ridge's unique biodiversity. The region's strategic ecological role strengthens its case for regional conservation initiatives, fostering cross-border cooperation among neighboring nations

LITERATURE CITED

Caribbean Cetacean Society, 2024; Scientific Report: Marine Megafauna Research Expedition for the Establishment of a Marine Protected Area around the Beata Ridge, Dominican Republic.

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