

# Borikén IMMA

## Summary

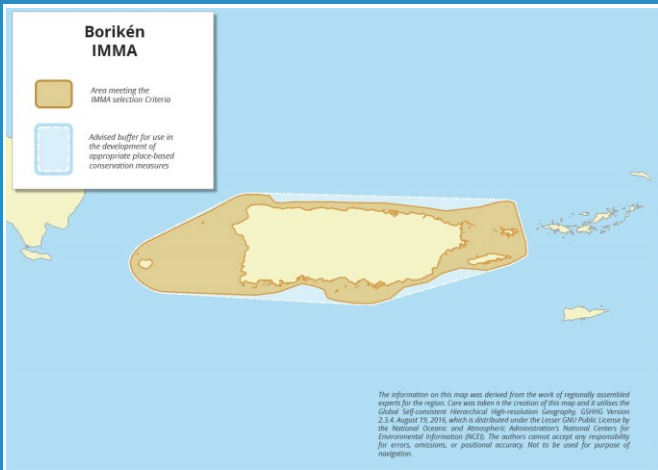
The Borikén IMMA consists of the coastal, neritic over the insular shelf, and oceanic waters adjacent to the shelf-edge of the island of Puerto Rico. This IMMA harbors a resident and genetically isolated population of Greater Caribbean manatees (*Trichechus manatus manatus*), together with a diverse ensemble of 21 cetacean species, of which six occur regularly, including humpback whales, which use the IMMA during Northern Hemisphere winter months for breeding.

## Description:

The habitat of the Borikén IMMA consists of the coastal, neritic over the insular shelf, and oceanic waters adjacent to the shelf-edge of the island of Puerto Rico, including Mona, Desecheo, Caja de Muertos, Culebra and Vieques islands. Most of the coastal areas on the south, southwest, and east coast are bordered by mangroves, and rich in seagrass beds.

## Criterion A: Species or Population Vulnerability

The Greater Caribbean manatee (*Trichechus manatus manatus*) (based on Mignucci-Giannoni et al., 2024), previously known as the Antillean manatee, is red-listed as Endangered based on current population estimates and a decreasing population trend (Self-Sullivan & Mignucci-Giannoni, 2008; Self-Sullivan & Mignucci-Giannoni, 2012; Morales-Vela et al., 2024). The primary threat to the species until the early 1990s was hunting for their meat (Mignucci-Giannoni et al., 2000; Freire & Mignucci, 2022), but since then other



## Area Size

9,380 km<sup>2</sup>

## Qualifying Species and Criteria

Greater Caribbean Manatee –  
*Trichechus manatus manatus*

Criterion A; B (1); D (1)

Humpback Whale – *Megaptera novaeangliae*  
Criterion C (1, 3b)

Criterion D (2) - Marine Mammal Diversity  
*Globicephala macrorhynchus*, *Megaptera novaeangliae*, *Physeter macrocephalus*, *Stenella longirostris*, *Steno bredanensis*, *Trichechus manatus manatus*, *Tursiops truncatus*

## Other Marine Mammal Species Documented

*Balaenoptera acutorostrata*, *Cystophora cristata*,  
*Feresa attenuata*, *Grampus griseus*, *Kogia breviceps*, *Kogia sima*, *Lagenodelphis hosei*,  
*Mesoplodon densirostris*, *Mesoplodon europaeus*,  
*Orcinus orca*, *Peponocephala electra*, *Pseudorca crassidens*, *Stenella attenuata*, *Stenella coeruleoalba*, *Stenella frontalis*, *Ziphius cavirostris*

major threats have emerged including increased mortality due to watercraft strikes, orphaning of calves, and the effects of small population size and low genetic variability (Mignucci, 2010; Freire & Mignucci, 2022).

## **Criterion B: Distribution and Abundance**

### **Sub-criterion B1: Small and Resident Populations**

The Greater Caribbean manatee population inhabiting Puerto Rico is considered a resident, small, isolated population, with no known or significant immigration or emigration of individuals from or to other areas (Hunter et al., 2012). Manatees can be found along the entire coast of Puerto Rico but are detected less often along the northern coast where seagrass beds are not as extensive and habitat is less suitable (Powell et al., 1981; Collazo et al., 2019). The highest concentrations are documented in four areas: Ceiba on the east coast, Jobos Bay between Guayama and Salinas on the southeast coast, Guayanilla and Guánica Bay on the southwest coast, and off the Guanajibo River, between Cabo Rojo and Mayagüez on the west coast (Powell et al., 1981; Rathbun et al., 1986; Freeman & Quintero, 1990; Drew et al., 2012; Mignucci-Giannoni et al., 2018; Collazo et al., 2019). A recent sighting was recorded for Mona Island, and sightings in Culebra Island have become more common in recent years. Their distribution is dependent on available resources such as freshwater, seagrass, and areas that provide shelter from strong waves (Mignucci-Giannoni, 1989; Drew et al., 2012).

While rescue data of orphaned calves includes all months of the year and all municipalities of Puerto Rico, including Culebra Island (Adimey et al., 2012; Caribbean Manatee Conservation Center, unpubl. data), aerial survey data (Powell et al., 1981; Rathbun et al., 1985; Freeman & Quintero, 1990; Mignucci-

Giannoni et al., 2018; Collazo et al., 2019), indicates that the calving occurs also throughout the year, and most commonly in Salinas, Jobos Bay, Guánica, Lajas, Guayanilla Bay, and Ceiba. However, recent sightings attest to calves being raised in the Condado Lagoon, a protected sanctuary in Metropolitan San Juan (Caribbean Manatee Conservation Center, unpubl. data). Helicopter aerial surveys off the south coast (Mignucci-Giannoni et al., 2018), detailed that reproductive groups were most commonly observed in Guanica Bay, Jobos Bay, Juana Díaz, and Peñuelas.

In Puerto Rico the average minimum population estimate for manatees is 386 (range 312-535, standard deviation 89) based on surveys conducted from 2010-2014 (Collazo et al., 2019). Ten percent of the manatees counted during these surveys were calves. One additional survey was recently flown in April 2021 with a direct count of 109 manatees, 11 of those calves (Mignucci-Giannoni, 2022), but the estimate from this survey has not yet been calculated. Radiotelemetry data from 35 manatees between 1992 and 2005 (Slone et al., 2006), and between 2010-2017 (Hernández-Lara & Mignucci-Giannoni, 2024a, b) in Puerto Rico show short distance movements (~3-15 km) to take advantage of food, water, and shelter resources (Hernández-Lara & Mignucci-Giannoni, 2024a).

Mignucci-Giannoni and Beck (1998) detailed the diet of the Greater Caribbean manatee in Puerto Rico, mainly consisting of seagrasses, turtle grass (*Thalassia testudinum*), manatee grass (*Syringodium filiforme*), and shoal grass (*Halodule wrightii*). Some ingestion of green alga (*Ulva lactuca*), mangrove, and the seaweed *Caulerpa prolifera* was also documented (Mignucci-Giannoni & Beck, 1998). Aerial surveys (Rathbun et al., 1985; Mignucci-Giannoni et al., 2018; Collazo et al., 2019) and telemetry studies (Slone et al., 2006), have revealed important feeding areas for manatees along

the east and south coast of the island, including Vieques Island, Ceiba and Naguabo, Patillas, Jobos Bay, Salinas Bay, Santa Isabel, Guayanilla, Guánica, and Cabo Rojo, which has been used by Drew et al. (2012) to recommend boundaries for protected areas in Puerto Rico.

## **Criterion C: Key Life Cycle Activities**

### **Sub-criterion C1: Reproductive Areas**

Humpback whales (*Megaptera novaeangliae*) are known utilize the coasts of this IMMA, particularly the northern and western coast, during the winter season (November to May, peak season is mid-February to mid-March) (Matilla & Clapham, 1989; Mignucci-Giannoni, 1989; Burks & Swartz, 2000; Sanders et al., 2005; MacKay, 2015; MacKay et al., 2016). Females arrive early in the season to give birth in protected waters off Aguada and Aguadilla, and males sing and court females in the Borinquen Bank off Aguadilla, Isabela, off Rincón, Desecheo Island, and banks west of Cabo Rojo and Mayagüez (bajoa de Sico, El Seco, and Sierra) in the Mona Passage (Sanders et al., 2005; MacKay et al., 2016). Songs are also readily heard and recorded off Culebra Island (P. Knapp, pers. comm.).

### **Sub-criterion C3: Migration Routes**

#### **C3b – Migration / Movement Area**

While some whales use the IMMA as their primary breeding ground for calving and nursing, others use it as a stop-over on their migration to other North Atlantic humpback whale breeding areas in the Caribbean. Their residency peaks from mid-February to mid-March) (Matilla & Clapham, 1989; Mignucci-Giannoni, 1989; Burks & Swartz, 2000; Sanders et al., 2005; MacKay, 2015; MacKay et al., 2016). Their general movement seems to be from east to west, probably headed to Borinquen Bank off Aguadilla and Isabela and to Rincón and Desecheo Island, before moving along to Samaná Bay, Silver and

Navidad banks in the Dominican Republic, and later back to their northward migration to the summer feeding grounds. Of 558 individually identified humpback whales in Puerto Rico 43.4% were matched in Eastern Canada (Newfoundland, Labrador, and Gulf of St. Lawrence), 35.7% were matched in the Dominican Republic, 8.4% in the Gulf of Maine, 6.5% off Bermuda, 3.4% off Greenland, 1.5% off Iceland, and 1.1% in Eastern North Atlantic (Martin et al., 1984; NAHWC unpubl. Data, 2018). Intra-Caribbean sightings of humpback whales has also been recorded between Puerto Rico and Guadeloupe, Anguilla, and Dominica islands in the Lesser Antilles (Stevick et al., 1999; MacKay, 2015; MacKay et al., 2019).

## **Criterion D: Special Attributes**

### **Sub-criterion D1: Distinctiveness**

The Greater Caribbean manatee population in Puerto Rico is distinctive enough genetically, based on mitochondrial and nuclear DNA, considered to be marginal, isolated, and with an evolutionary connection with the now extinct population of the Lesser Antilles (Vianna et al., 2006; Hunter et al., 2012; Álvarez-Alemán, 2019).

From mitochondrial genetic data (Hunter et al., 2012), two distinct haplotype manatee subpopulations have been detected: Haplotype A01 manatees (30.1%), inhabiting mostly the north and north-eastern coast of the island, and Haplotype B01 animals (65.5%), inhabiting mostly the south and south-western coast of the island. A01 and B01 haplotypes meet in the mid-west coast and mid-east coast, where they seem to intermingle for reproduction to enhance genetic variability (Hunter et al., 2012). Haplotype A01 is shared with manatees in Florida, Cuba, and Dominican Republic, and haplotype B01 is only shared with manatees from the Dominican Republic (Vianna et al., 2006; Álvarez-Alemán, 2019; Álvarez-

Alemán et al., 2022). Based on this, Hunter et al. (2012), recommended that the Puerto Rico manatee population be managed as a distinct population, compared to the Florida subspecies.

## Sub-criterion D2: Diversity

Puerto Rico hosts not only endangered Greater Caribbean manatees, an additional six species are commonly and regularly observed, including humpback whales between the months of November and May of each year, short-finned pilot whales (*Globicephala macrorhynchus*), spinner dolphins (*Stenella longirostris*), rough-toothed dolphins (*Steno bredanensis*), and common bottlenose dolphins (*Tursiops truncatus*) and less frequently, but with some regularity, sperm whales (*Physeter macrocephalus*) (Mignucci-Giannoni, 1989; Rodríguez-Ferrer et al., 2018).

A further 16 cetacean species are occasionally sighted, but their presence is well documented by less regular sightings and stranding events (Barragán et al., 2023; Bolaños-Jiménez et al., 2014, 2021, 2023; Burks & Swartz, 2000; Caballero-Gaitán et al., 2012; Cardona-Maldonado & Mignucci-Giannoni, 1999; Carrasquillo-Casado et al., 2002; Erdman, 1970; Ewing & Mignucci-Giannoni, 2003; Lettrich et al., 2023; MacKay, 2015; MacKay et al., 2016; MacKay & Bacon, 2019; Mattila & Clapham, 1989; Merten & Rodríguez-Ferrer, 2014; Mignucci-Giannoni, 1988, 1989, 1996, 1998; Mignucci-Giannoni et al., 1998a, b, 1999a, b., 2000, 2003, 2009; Pérez-Zayas et al., 2002; Rodríguez-Ferrer et al., 2018, 2020; Rodríguez-López & Mignucci-Giannoni, 1999; Rosario-Delestre et al., 1999; Sanders et al., 2005; Swartz et al., 2001; Tellez et al., 2014).

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