MISIÓN MANATÍ

PANAMÁ

MANATEES

also known as "sea cows", are aquatic mammals that live in tropical and subtropical shallow coastal-marine ecosystems. As herbivores, they control the growth of seagrass meadows and aquatic vegetation by assisting in seed dispersal and nutrient cycling. This growth control benefits fish nurseries, thus promoting high primary productivity in coastal areas. The **Antillean Manatee** subspecies is widely distributed from northern Mexico to central Brazil and the Caribbean Islands, where they search for **rivers and coastal wetland habitats** with abundant aquatic vegetation, which provides manatees with food, mating areas, and protected areas for breeding.

Identified as an important species, Manatees have been protected by the **United States Marine Mammal Protection Act** since 1972, the **United States Endangered Species Act, and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)**, and also listed since 2008 as endangered species under the **International Union for Conservation of Nature (IUCN)**.

Central America, from Belize to Panama, has a network of over ten coastal Ramsar-designated wetland areas that host manatee populations. However, due to the natural murky conditions and difficulty tracking this elusive species, population size and behavior are regionally unknown.

In Panama, manatees are protected by **Decree No. 23 of 1967** and cataloged as endangered by **Resolution No. DIR-0002-80 of 1980** (updated in 2017). However, even though Manatees have regulatory protection, historical hunting, modern illegal fishing nets, collisions with boats, and habitat loss continue to be a greater threat to the populations in coastal rivers and wetlands of Panama and elsewhere.

To reduce threats and mortality rate, we must increase our knowledge of manatee populations and behavior in order to aid management efforts in the region which include respecting established protected areas and maintaining the quality and integrity of water and habitat.

Study Areas

The San San Pond Sak (HSSPS)

is a wetland along the western Caribbean coast of Panama, between the Sixaola River and the Boca del Drago peninsula in the province of Bocas del Toro, with an area of 16,400 hectares.

The Damani-Guariviara wetland

Is located in the Ngäbe-Buglé Indigenous Comarca, specifically in the Ñö Kribo region, encompassing an area of 24,000 ha. Both wetlands were designated as internationally important sites and protected by the Ramsar Convention in 1993 and 2004, respectively

And several other regional wetlands across Central America, from Belize to Panama.

Acoustic Monitoring

Antillean manatees **communicate frequently** by vocalizing at frequencies that are between **2 and 20 KHz** and at very low intensities of approximately 112 decibels, to maintain the group, parental and reproductive relationships. On average, **vocalization time is 364 milliseconds.**

Through research we have determined that it is even possible to **differentiate manatees individually by their vocalizations**, as each one emits sounds with slightly different harmonic components.

Between mother and calf there is **continuous communication** through different sounds, especially squeaks.

A very promising and tested methodology consists in using a **network of hydrophones** to continuously record underwater and using signal processing and machine learning to individually identify individual manatees by the sounds they produce.

With this new approach the Smithsonian Tropical Research Institute and the Universidad Tecnológica de Panamá with the **#MisiónManatí** initiative has estimated a number of **33 manatees for the San San River** and **47 manatees for the Changuinola River.**
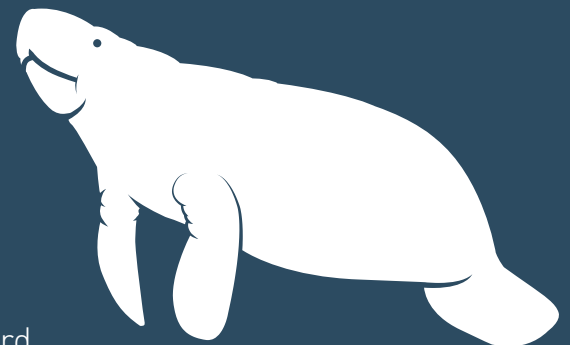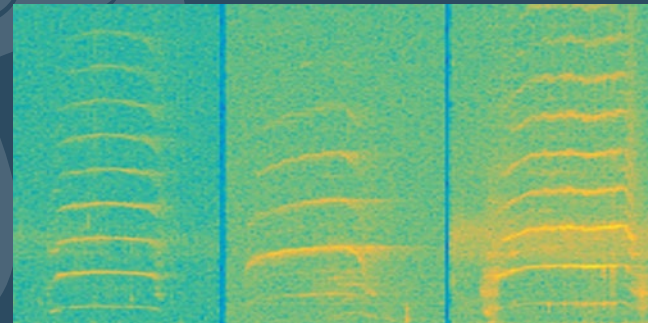
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To restore and protect manatee populations, it is essential for the Misión Manatí team to have research tools that can estimate changes in local and regional populations and understand how manatees use their habitat.

THE TEAM WILL:

- Conduct and increase the acoustic monitoring network of the San San Pond Sak and Damiani-Guariviara wetlands to determine the local and regional movements of the manatee through the use of hydrophones and signal processing and machine learning algorithms for tonal analysis of the vocalizations.

- Relate manatee interaction to human activities, food availability, habitat conditions, and threats in order to generate updated information that will guide and involve government resource managers and local stakeholders.

- Involve the Ngäbe-Buglé indigenous leadership and community in the process, so they feel empowered to save their manatees

- Launch an awareness campaign to build public appreciation for these animals and the importance of Panama's feeding grounds. The campaign will highlight the current threats to the species survival and will place visual awareness signs to inform tourists and locals of the laws. Additionally, a mobile phone app will be used to develop a citizen science-monitoring program to help Panamanian government obtain essential data on manatees (mortality rate, distribution, threats).

With these efforts, and the acquisition of more hydrophones, it is possible to use science-based research to implement a successful management plan that promotes the protection and survival of manatees in Panama.

Thank you for your interest in manatee research in Panama. If you would like more information on the program or the research please contact program manager **Dr. Hector Guzmán by email:** guzmanh@si.edu or **WhatsApp:** +507 6618-8406.

The Smithsonian Tropical Research Institute is a 501(c)(3) organization (Federal tax ID 53-0206027). For further information on making a financial contribution to support this research, please contact **Kate Davis** at DavisKH@si.edu or **+1(202)394-2187**.