



## Area Size

376 km<sup>2</sup>

## Qualifying Species and Criteria

Greater Caribbean Manatee –

*Trichechus manatus manatus*

Criterion A; B (1)

## Summary

The Lake Gatun and Panama Canal IMMA includes the Panama Canal, Lake Gatun, and surrounding wetlands. The artificial lake, created for the operations of the Panama Canal, is uniquely situated 26 m above sea level and provides important habitat to a population of Endangered Antillean/Greater Caribbean manatees (*Trichechus manatus manatus*). The secluded population in Gatun Lake and the Panama Canal has grown from 10 animals that were translocated from Peru and the Bocas Del Toro area in the north of Panama in 1964, and now composes a minimum of 16 individuals. Connectivity for this population segment, removed from its original natural habitat, is limited by man-made canal locks operations. Population viability is currently being assessed.

# Lake Gatun and Panama Canal IMMA

## Description:

The Lake Gatun and Panama Canal IMMA includes the Panama Canal, Lake Gatun, and surrounding wetlands. The artificial lake, created for the operations of the Panama Canal, is uniquely situated 26 m above sea level. The lake and surrounding wetlands contain vegetation known to be favoured by manatees, but the area also hosts some of the busiest shipping traffic in the world. The IMMA includes wetland areas surrounding the lake, as well as the Caribbean entrance to the Panama Canal and some of the lock systems extending toward the Pacific side of the canal.

## Criterion A: Species or Population Vulnerability

This IMMA encompasses the habitat of the Greater Caribbean manatee (*Trichechus manatus manatus*), recognized as the Antillean manatee by the Society for Marine Mammalogy's Committee on Taxonomy. The American manatee (*Trichechus manatus*) as a species is globally assessed as Vulnerable on the IUCN Red List (Deutsch & Morales-Vela, 2024), but the Caribbean sub-species is considered Endangered (Morales-Vela et al., 2024). At local levels, the Greater Caribbean manatee is also listed and protected as Endangered by the Ministry of Environment of Panama (Resolution No. DM-0657, 2016). Self-Sullivan and Mignucci-Giannoni (2012) reported population estimates for Panama and Costa Rica at 100 individuals each, with minimum counts of 10 and 30, respectively, suggesting a critical status.



Figure 1: The Lake Gatun and Panama Canal IMMA from aerial view. Photo credit: Hector M. Guzman

## Criterion B: Distribution and Abundance

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

In 1964 ten individual manatees – one male Amazonian manatee (*Trichechus inunguis*) and nine Greater Caribbean manatees from the Changuinola region in the north of Panama – were translocated into Lake Gatun, an artificial lake created during the construction of the Panama Canal (Nillipour, 2022; Muschett & Vianna, 2015). The original motivation for bringing in these manatees was to control growth of the water hyacinth (*Pontederia crassipes*), which was thought to create breeding habitat for mosquitoes (MacLaren, 1967; Nillipour, 2022; Muschett & Morales, 2020).

A study conducted in 2007 using aerial, small boat and interview surveys estimated the population to contain a minimum of 16 individuals, including

newborn calves and juveniles, and noted that vegetation in the lake included many species known to feature in manatee diets: *Eichhornia crassipes*, *Pistia stratiotes*, *Pontederia rotundifolia* and *Hydrilla verticillata*, (Muschett & Vianna, 2015). This minimum estimate is thought to be a significant underestimate, given the frequency of reports from interviewed villagers, and the turbidity of the water that hindered boat- or aerial based observations (Muschett & Morales, 2020).

A more recent population viability modelling exercise determined that the survival of the original population may only have been possible with the immigration by individuals that entered the Canal from the Caribbean through the Canal locks (Muschett & Morales, 2020), and there is even speculation, based on an observation of an Antillean manatee on the Pacific side of the Panama canal, that at least one animal from the Lake Gatun population



Figure 2: Greater Caribbean manatee (*Trichechus manatus manatus*) mother and calf observed from an aerial survey using a drone.  
Photo credit: Hector M. Guzman



Figure 3: A small group of Greater Caribbean manatees (*Trichechus manatus manatus*) observed from aerial surveys using a drone.  
Photo credit: Hector M. Guzman



Figure 4: An aerial view of the Lake Gatun and Panama Canal IMMA showing the manatee habitat. Photo credit: Hector M. Guzman

may have crossed over into the Pacific (Guzman & Real, 2022). However, the authors indicate that such immigration and emigration is unlikely to occur regularly given the complexity of the lock systems and the high volumes of vessel traffic using the system, and that for most practical purposes the population should be considered discrete and isolated (Muschett & Morales, 2020; Guzman & Real, 2022).

## Supporting Information

Castelblanco-Martínez, D.N., Nourisson, C., Quintana-Rizzo, E., Padilla-Saldivar, J., and Schmitter-Soto, J.J. 2012. 'Potential effects of human pressure and habitat fragmentation on population viability of the Antillean manatee *Trichechus manatus manatus*: a predictive model'. *Endangered Species Research*, 18(2):129-145.

Deutsch, C.J. and Morales-Vela, B. 2024. *Trichechus*

*manatus*. The IUCN Red List of Threatened Species 2024: Available at: [e.T22103A43792740](https://www.iucnredlist.org/species/22103A43792740). (Accessed: 15 November 2024)

Guzman, H.M. and Real, C.K. 2023. 'Have Antillean manatees (*Trichechus manatus manatus*) entered the Eastern Pacific Ocean?'. *Marine Mammals Science*, 39:274-280.

Jiménez, I. 2005. 'Development of predictive models to explain the distribution of the West Indian manatee *Trichechus manatus* in tropical watercourses'. *Biological Conservation*, 125(4):491-503.

Lépiz, A.G. 2010. 'Plantas emergentes y flotantes en la dieta del manatí (Familia: Trichechidae: *Trichechus manatus*) en el Caribe de Costa Rica'. *Journal of Marine and Coastal Sciences*, 2:119-134.

Marsh, H., O'Shea, T.J. and Reynolds, J.E. 2011.

Ecology and conservation of the Sirenia: dugongs and manatees (No. 18). Cambridge University Press.

Mou Sue, L.L., Chen, D. H., Bonde, R.K., and O'Shea, T.J. 1990. 'Distribution and status of manatees (*Trichechus manatus*) in Panama'. *Marine Mammals Science*, 6:234–241.

Mignucci-Giannoni, A.A., González-Socoloske, D., Álvarez-Alemán, A., Aquino, J., Caicedo-Herrera, D., Castelblanco-Martínez, D.N., Claridge, D., Corona-Figueroa, M.F., Debrot, A.O., de Thoisy, B., Espinoza-Marín, C., Galves, J.A., García-Alfonso, E., Guzmán, H.M., Khan, J.A., Kiszka, J.J., de Oliveira Luna, F., Marmontel, M., Olivera-Gómez, L.D., O'Sullivan, C., Powell, J.A., Pugibet-Bobea, E., Roopsind, I., and Silva, C.J. 2024. 'What's in a name? Standardization of vernacular names for *Trichechus manatus*. Caribbean Naturalist' (in press).

Muschett, G. and Morales, N.S. 2020. 'Using ecological modelling to assess the long-term survival of the West-Indian Manatee (*Trichechus manatus*) in the Panama Canal'. *Water*, 12:1275.

Muschett, G. and Vianna, J.A. 2015. 'Distribution and abundance of the West Indian manatee (*Trichechus manatus*) in the Panama Canal'. *bioRxiv* 2015, 26724.

Nillipour, L. 2022. 'Have Antillean manatees crossed the Panama Canal?'. Smithsonian Tropical Research Institute. Available at: <https://stri.si.edu/story/manatee-lagoon>.

Sanchez-Galan, J.E., Contreras, K., Denoce, A., Poveda, H., Merchan, F., and Guzmán, H.M. 2025. 'Drone-Based Detection and Classification of Greater Caribbean Manatees in the Panama Canal Basin'. *Drones* 2025, 9:230. Available at: <https://doi.org/10.3390/drones9040230>.

Self-Sullivan, C. and Mignucci-Giannoni, A. 2012. 'West Indian manatees (*Trichechus manatus*) in the wider Caribbean region'. Pp.36–46 in E.M. Hines, J.E. Reynolds, L.V. Aragones, A.A. Mignucci-Giannoni, and M. Marmontel, editors. Sirenian conservation, issues and strategies in developing countries. University Press of Florida, Gainesville, USA.

Schad, R.C., Montgomery, G. and Chancellor, D. 1981. 'La distribución y frecuencia del manatí en el lago Gatún y el Canal de Panamá'. *ConCiencia*. 8:1–4.

## Acknowledgements

We would like to thank the participants of the 2024 IMMA Regional Expert Workshop for the identification of IMMAs in the North West Atlantic Ocean and wider Caribbean region. Funding for the identification of this IMMA was provided by the Water Revolution Foundation, with additional funding and collaboration from the Sargasso Sea Commission, OceanCare and Animal Welfare Institute. Essential administrative support was given by Tethys Research Institute and Whale and Dolphin Conservation.

