

Area Size

1 244 km²

Qualifying Species and Criteria

Dugong – *Dugong dugon*

Criterion A; B (2); C (1, 2); D (1)

Marine Mammal Diversity

Neophocaena phocaenoides, *Orcaella brevirostris*,

Sousa chinensis, *Tursiops aduncus*,

Delphinus delphis tropicalis

Summary

The Mersing Archipelago is a cluster of tropical islands and rocky outcrops situated off the east coast of the state of Johor, Peninsular Malaysia. These islands have a rich geological history, and host high marine biodiversity and ecosystems that include mangroves, coral reefs and verdant seagrass meadows. Since 1994, these islands' surrounding waters up to 2 nautical miles from the lowest watermark have been gazetted as Marine Parks. Tourism is the main economic activity, while artisanal and commercial fishing communities are found along the adjacent mainland coast. Of particular significance in this IMMA are the seagrass meadows, especially those found on the leeward sides of the Sibul and Tinggi cluster of islands which constitute a significant critical habitat for dugongs (*Dugong*

Mersing Archipelago IMMA

Summary, continued.

dugon) in Peninsular Malaysia. Ongoing research on the dugongs since 2014 has revealed a small but reproductive population that feed on the seagrasses in the meadows, breed and socialise in this IMMA year-round.

Description

The area covers shallow coastal (mainland) waters and adjacent tropical islands (~6 nm from the mainland coast) along the east coast of Johor state in Peninsular Malaysia, starting from Air Papan in the north and going south to just north of Sedili Cape. The islands have extensive subtidal seagrass meadows on the leeward sides, with the largest meadows found at Sibul and Tinggi Islands (Ooi et al., 2011; Heng et al., 2022). There are also mangroves, coral reefs, rocky shores and coastal mudflats. Due to their geological significance, the islands are part of the larger Mersing District region that is currently being proposed as a national Geopark as of 2018, with eventual plans to attain UNESCO Geopark status (Said et al., 2021). The shallow waters in the area (<35 m, 6 - 15 m depth on average) are habitats to a large array of marine biodiversity, including sea turtles, syngnathids (seahorses, pipehorses, pipefishes), invertebrates, pelagic fish, elasmobranchs and marine mammals (Ponnampalam et al., 2015; Ponnampalam, 2017).

With regards to marine mammals, small cetaceans that are found in the IMMA are Indo-Pacific finless porpoises (*Neophocaena phocaenoides*), Indo-Pacific humpback dolphins (*Sousa chinensis*), Irrawaddy dolphins (*Orcaella brevirostris*), long-beaked common

dolphins (*Delphinus capensis*) and Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) (Jaaman and Mohamed, 2014; Ponnampalam, 2017). However, the area is predominantly considered to be a critical habitat for dugongs, which are the most frequently observed marine mammal species in the IMMA (Figure 1). Multi-disciplinary research since 2014 (Ichikawa et al., 2015; Ponnampalam et al., 2014, 2015; Ponnampalam, 2017) has revealed that dugongs are present in the area year-round, with Sibu and Tinggi Islands being the most important sites for the species within the larger area (Ponnampalam, 2017; Hines et al., 2020).



Figure 1: A dugong herd, including the presence of mother-calf pairs, sighted during aerial surveys around Sibu Island, Johor, Malaysia. Photo: The MareCet Research Organization

The seagrass meadows, measuring approximately 12.9 km² at Sibu Island and 3.0 km² at Tinggi Island are confirmed feeding grounds for the dugongs (Ooi et al., 2011; Heng et al., 2022) (Figure 2), and the areas close to the leeward sides of the islands, especially at Sibu Island, are nursing grounds for the species (Ponnampalam et al., 2014, 2015; Ponnampalam, 2017). The habitat use by the dugongs between the different islands has also been found to be different

(Ponnampalam, 2017).

The islands are legally protected as a nationally gazetted Marine Park, which covers the area around each island extending from the low water mark to 2 nm being designated as no-take zones. A larger area of 150,000 hectares was proposed in 2016 and is currently pending official recognition as a Dugong Sanctuary (Kili, 2016; The Star, 2016). The boundary delineation where the proposed Sanctuary area will be zoned was based on the data available on seagrass distribution, dugong distribution and habitat use, and human use (Fairul Izmil, pers comm).

Criterion A: Species or Population Vulnerability

Dugongs are listed as VU on the IUCN Red List of Threatened Species, and the species is also listed as a Marine Endangered Species under the Malaysian Fisheries Act 1985 and Fisheries (Control of Endangered Species) Regulation (Amended) 2008. Furthermore, the Mersing Archipelago is the only place in Peninsular Malaysia where dugong occurrence is frequent and reliable. The population is small and there have been at least 19 dugong deaths recorded between 2015 and 2022, most of which were of calves/juvenile individuals (MareCet, unpublished data). A bycatch risk assessment on dugongs at Sibu and Tinggi Islands revealed that the species was most likely to be impacted by the use of gillnets in the surrounding waters (Hines et al., 2020).

Criterion B: Distribution and Abundance Sub-criterion B2: Aggregations

Systematic aerial surveys were conducted three times a year from 2014 to 2016 covering total search effort of 23,790 km over 145 hours (Ponnampalam, 2017). A total of 642 dugong sightings were made over the course of the surveys with group size

ranging from solitary animals to large herds of more than 40 animals (maximum count of 43 in a single sighting) (Ponnampalam, 2017). Although dugongs have a wide global range, populations are often small and fragmented throughout its range. While this population does not represent a large proportion of the entire global population of the species, it is the only population around Peninsular Malaysia where regular occurrences of the species have been observed. These herds are usually inclusive of mother-calf pairs. These aggregations were observed mainly in the mornings, concentrated mainly in a small area south of Sibu Island (Ponnampalam, 2017) (Figure 3).

Criterion C: Key Life Cycle Activities
Sub-Criterion C1: Reproductive Areas

The area around Sibu island, especially to the southwest, is considered to be an important nursing ground where most dugong mother-calf pairs were observed (24% of all dugong groups sighted during aerial surveys were of mother-calf pairs/contained mother-calf pairs) (Ponnampalam et al., 2014, 2015; Ponnampalam, 2017) (Figure 1).

Sub-Criterion C2: Feeding Areas

The seagrass meadows in the area, especially those around Sibu Island are known dugong feeding grounds due to documented presence of many feeding trails during surveys throughout the year (Ponnampalam, 2017, Heng et al., 2022) (Figure 2).

Criterion D: Special Attributes
Sub-criterion D1: Distinctiveness

The seagrass meadows in the area especially those of Tinggi Island and the area south of Mentigi and Nanga Kecil and Nanga Besar Islands are identified



Figure 2: A feeding trail left behind by a dugong in a seagrass meadow dominated by *Halophila ovalis* in Sibu Island, Johor, Malaysia. Photo: The MareCet Research Organization

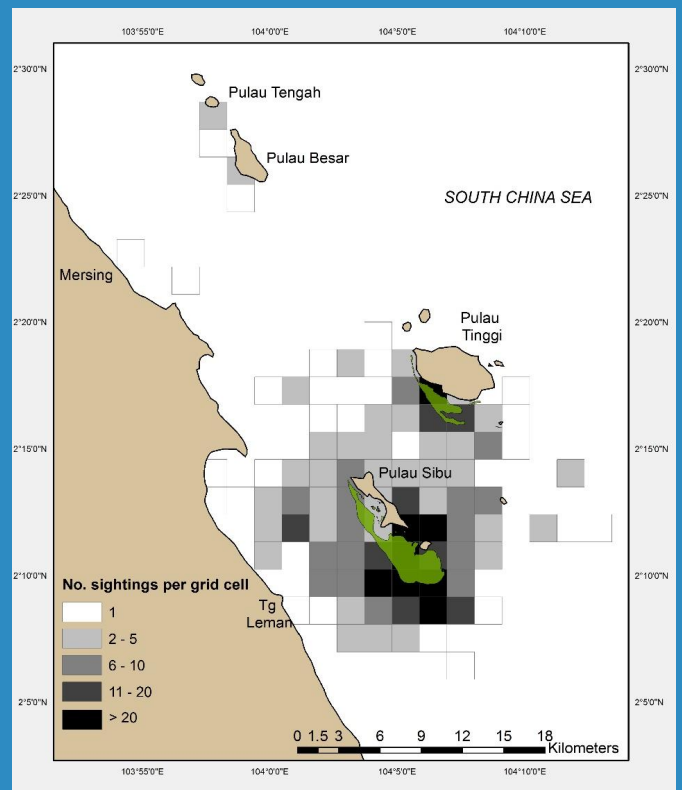


Figure 3: Distribution of dugong sightings around the Mersing Archipelago, based on line transect distributional aerial surveys conducted in 2014 – 2016. Dugongs were primarily observed in the south of Sibu Island, Johor, Malaysia. Extracted from: Ponnampalam, 2017

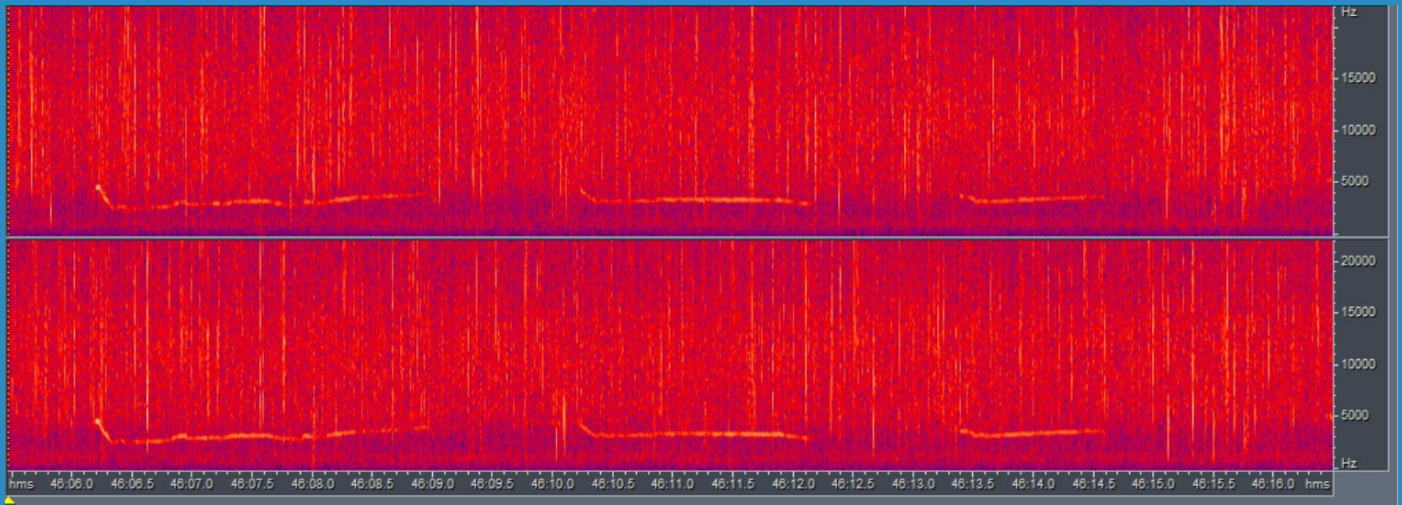


Figure 4: A spectrogram reading from an acoustic recording on 15 November 2016 from the 'vocal hotspot' off Tinggi Island, Johor, Malaysia, showing three distinctive 'trills' produced by a dugong. Extracted from: Ponnampalam, 2017

as dugong 'vocal hotspots' where dugong vocalizations were often detected (Ichikawa et al., 2015; Ponnampalam, 2017) (Figure 4). The 'vocal hotspot' is believed to be an area for daily communication and social cohesion for the dugongs using the area.

Supporting Information

Heng, H.W.K., Ooi, J.L.S., Affendi, Y.A., Kee Alfian, A.A. and Ponnampalam, L.S. 2022. Dugong feeding grounds and spatial feeding patterns in subtidal seagrass: A case study at Sibul Archipelago, Malaysia. *Estuarine, Coastal and Shelf Science* 264: 107670. Available at: <https://doi.org/10.1016/j.ecss.2021.107670>

Hines, E., Ponnampalam, L.S., Junchompoo, C., Peter, C., Vu, L., Huynh, T., Caillat, M., Johnson, A.F., Minton, G., Lewison, R. and Verutes, G.M. 2020. Getting to the bottom of bycatch, a GIS-based toolbox to assess the risk of marine mammal bycatch. *Endangered Species Research*. Available at: <https://doi.org/10.3354/esr01037>

Ichikawa, K., Akamatsu, T., Ponnampalam, L., Alfian, K. and Arai, N. 2015. Heterogeneous movement of dugongs between a vocal hotspot and a seagrass bed in Johor, Malaysia. Abstracts of the 3rd Design Symposium on Conservation of Ecosystem (SEASTAR2000), Kyoto, Japan, 15 March 2015.

Jaaman, S.A. and Mohamed, C.A.R. 2014. Marine mammals in the waters of east coast Johor, Malaysia. *ASM Science Journal* 8(2): 143-149. Available at: <https://www.akademisains.gov.my/asmsj/article/marine-mammals-in-the-waters-of-east-coast-johor-malaysia/>

Kili, K.A. 2016. Johor seeks best way to protect dugong, *The Star Online*, 19 May, accessed 22 October 2018. Available at: <https://www.thestar.com.my/news/nation/2016/05/19/johor-seeks-best-way-to-protect-dugong/>

Ooi, J.L.S., Kendrick, G.A., Van Niel, K.P. and Affendi, Y.A. 2011. Knowledge gaps in tropical Southeast Asian seagrass systems. *Estuarine, Coastal and Shelf Science* 92: 118-131. Available at: <https://doi.org/10.1016/j.ecss.2010.12.021>

Ponnampalam, L.S. 2017. A three-pronged approach for overcoming knowledge barriers on the ecology and status of dugongs in Johor, Malaysia – Towards critical habitat protection. Narrative Report #3: Year 3 (Final) Progress Report of PEW Fellowship in Marine Conservation (2014 – 2017). Report submitted to The PEW Charitable Trusts.

Ponnampalam, L.S., Fairul Izmal, J.H., Ichikawa, K., Akamatsu, T., Kee Alfian, A.A., Wetzel, D. and Reynolds III, J. 2014. A multi-pronged approach for overcoming knowledge barriers on the ecology and status of dugongs (*Dugong dugon*) in Johor, Malaysia: Towards critical habitat protection. In: Wan Musthapa, W. F. Z., Nik Rosely, N. F. and Othman, A. S. (eds.) Johor Nature Heritage, pp 101-112. School of Biological Sciences, Universiti Sains Malaysia, Penang, Malaysia.

Ponnampalam, L.S., Fairul Izmal, J.H., Adulyanukosol, K., Ooi, J.L.S. and Reynolds III, J.E. 2015. Aligning conservation and research priorities for proactive species and habitat management: the case of dugongs *Dugong dugon* in Johor, Malaysia. *Oryx* 49(4): 743-749. Available at: [10.1017/S0030605313001580](https://doi.org/10.1017/S0030605313001580)

Said, M.Z., Komoo, I., Mohamad, E.T., Ali, C.A., Ahmad, N., Abd Wahid, M.E. and Rajimin, M.F. 2021. Geological, biological, cultural and local wisdom heritage a key element of Mersing Geopark development. *Bulletin of the Geological Society of Malaysia* 71: 89 – 98. Available at: <https://doi.org/10.7186/bgsm71202108>

The Star. 2016. Johor allocates RM1mil to set up dugong sanctuary, The Star Online, 15 May, accessed 24 October 2018. Available at: <https://www.thestar.com.my/news/nation/2016/05/15/johor-allocates-rm1mil-to-set-up-dugong-sanctuary/>

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**MARINE MAMMAL
PROTECTED AREAS
TASK FORCE**



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