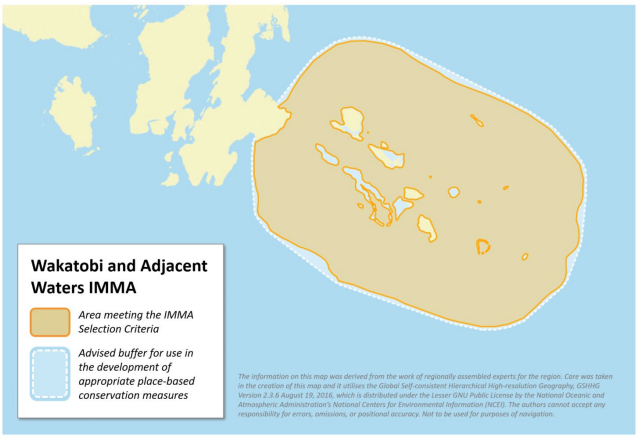

Area Size

26,815 km²

Qualifying Species and Criteria

Sperm whale – *Physeter macrocephalus*

Criterion A; C (2)

Spinner dolphin – *Stenella longirostris*

Criterion B (2); C (2)

Criterion D (2) - Marine Mammal Diversity

Balaenoptera edeni, Balaenoptera musculus, Globicephala macrorhynchus, Grampus griseus, Peponocephala electra, Physeter macrocephalus, Stenella attenuata, Stenella longirostris, Tursiops aduncus, Tursiops truncatus, Ziphius cavirostris

Summary

The Wakatobi IMMA is situated between the Banda and Flores Seas, southeast Sulawesi and is one of Indonesia's marine national parks. Wakatobi and its adjacent waters are formed of the four main Tukangbesi Islands in the archipelago including Wangi-wangi, Kaledupa, Tomia, and Binongko (Wa-ka-to-bi). This area is characterised by a highly variable submerged landscapes and channels between major islands that act as habitat for sperm whales (*Physeter macrocephalus*). This area is also an important

Wakatobi and Adjacent Waters IMMA

Summary, continued.

habitat for spinner dolphins (*Stenella longirostris*), of which a significant number of individuals have been observed across multiple years of study. A concentration of both species occurs here and their habitat use has been confirmed via spatial modelling studies of their habitats. The area contains an important diversity of cetacean species; at least 11 marine mammal species have been observed utilising the area of Wakatobi and its adjacent waters.

Description

Wakatobi and its adjacent waters cover an area of 40,575.6 square km. The Wakatobi area is situated between the Banda and Flores Seas, southeast Sulawesi, Indonesia. As part of the Banda Sea Ecoregion and Southeast Sulawesi Seascape, the IMMA has a high marine biodiversity and is the second highest priority site of marine conservation in the region (Green and Mous, 2008; Huffard et al., 2012; Pet-Soede and Erdmann, 2003). The Wakatobi National Park (NP) is the second largest marine NP in Indonesia, covering an area of 1.39 million hectares and consisting of four main islands that lie in a south-easterly direction. It is well known as a conservation hotspot hosting high diversity of corals and fishes (Pet-Soede and Erdmann, 2003), as well as important habitat for seagrass, mangroves (Wakatobi NP, 2008) and seabirds (Sahri et al., 2014a). There are two big atolls to the southwest of the islands; two other small atolls and several patch reefs spread across the east of four main islands. The area also has submerged canyons and channels between major landmasses as well as oceanographic conditions that serve as important habitat for migrating marine mammals

(Pet-Soede and Erdmann, 2003). In 2012, Wakatobi was declared a World Biosphere Reserve.

Opportunistic boat-based surveys have been carried out in Wakatobi waters from 2004 to 2012. These surveys have shown that the waters support a high diversity of cetaceans. Sperm whales are most abundant in the north of Wangi-wangi island (Sahri et al., 2014b) where the slope drops off and seamount-like features are found. It is believed that there is upwelling in this location as the seascape forces nutrient circulation thereby providing more prey. Sperm whales are also found in the channels between the main islands and outer reefs.

In the east part of this area adjoining the wider Banda Sea, blue whales (Endangered species) reach the migration in the Banda Sea (Double at al., 2014). The channels between major landmasses in this area serve as passageways for migrating cetaceans (Pet-Soede and Erdmann, 2003) from the Indian Ocean. At least 11 species of whale and dolphin occur in Wakatobi (Sahri et al., 2014b), a third of the total of 33 species of cetaceans found in Indonesia (Rudolph et al., 1997; Mustika et al., 2015).

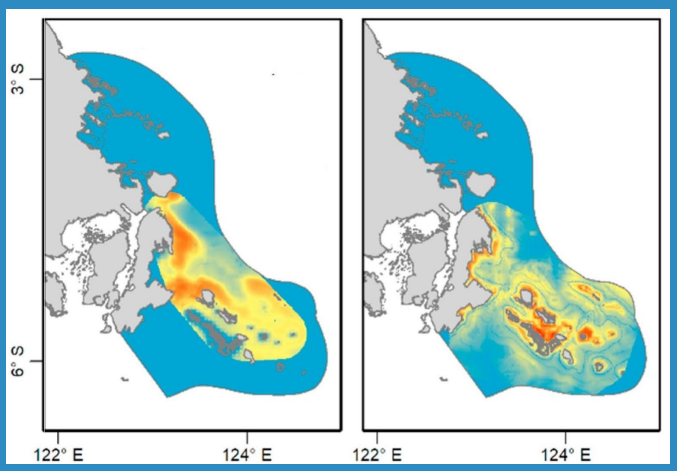

Figure 1: Habitat suitability map of sperm whale (left) and spinner dolphin (right) in Wakatobi and adjacent waters. Habitat Suitability Index ranges from 0 (blue) to 1 (red). (from Sahri et al., 2021).

Criterion A: Species or Population Vulnerability

The Sperm whale (*Physeter macrocephalus*) is assessed as Vulnerable A1d (Taylor et al., 2008) on the IUCN Red List, and was targeted in historical whaling in Indonesia (Sahri et al., 2020b). In Wakatobi, the sperm whale is commonly found in the northern part of the Wangi-Wangi Islands and east part of Wakatobi waters where deep channels pass between landmasses (Sahri et al., 2020c). Besides occupying the deep channels of Wakatobi, the species also tend to avoid shallow reefs (Sahri et al., 2021). The Indonesian government has classed sperm whales, along with all marine mammals, as a fully protected species (Government of The Republic of Indonesia, 1999; Sahri et al., 2020a).

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

According to monitoring data from 2006-2012 in the region (Sahri et al., 2020c), large aggregations of >100 spinner dolphins (*Stenella longirostris*) were frequently recorded in the area. Distribution of sightings indicate that bottlenose dolphins and spinner dolphins regularly utilize all parts of Wakatobi waters. This further indicates that Wakatobi waters and the habitats therein function to aggregate the species into groups of significant numbers.

Criterion C: Key Life Cycle Activities Sub-Criterion C2: Feeding Areas

The Wakatobi IMMA has highly variable submerged landscapes with drop-offs and channels between major islands. Sperm whales are most abundant in the north of Wangi-Wangi Island (Sahri et al., 2014;

Figure 2: A pod of sperm whales, *Physeter macrocephalus*, in Wakatobi waters. Photo: Robert Delfs

Sahri et al., 2020c) where the slope edges and drop-offs are located. Upwelling points that force nutrient circulation, greater productivity and aggregate prey, create a very good habitat for this squid-eating deep-diving species. From Maxent habitat modelling, the distribution of sperm whales in Wakatobi was determined by chlorophyl concentration in the area (Sahri et al., 2021). Oceanographic features (e.g. upwelling current, bathymetric slopes, thermal fronts and mesoscale eddies) support high-densities of prey. Feeding behaviour has also been observed for spinner dolphins in this area. This was validated by direct observation of this species actively feeding at the surface on schooling baby skipjack tuna and anchovies. Many sightings of dolphins associated with seabird aggregations, and feeding or foraging in this area have been documented (Sahri et al., 2020c).

Criterion D: Special Attributes
Sub-criterion D2: Diversity

The waters of Wakatobi are an important habitat for cetaceans and one of the most productive areas in the Banda Sea region, attracting a diversity of cetaceans. At least eleven common and also other rare whale and dolphin species can be observed in the area (Sahri et al. 2014; Sahri et al., 2020c), which accounts for a third of the total of 33 species of cetaceans found in Indonesia (Mustika et al., 2015). In addition to sperm whales, blue whales (*Balaenoptera musculus*) which are listed as Endangered on the Red List occur (Reilly et al., 2008). Short-finned pilot whales (*Globicephala macrorhynchus*), Indo-Pacific bottlenose dolphins (*Tursiops aduncus*), Cuvier's beaked whales (*Ziphius cavirostris*), spinner dolphins

(*Stenella longirostris*), melon-headed whales (*Peponocephala electra*), common bottlenose dolphins (*Tursiops truncatus*), Risso's dolphins (*Grampus griseus*), pantropical spotted dolphins (*Stenella attenuata*), and Bryde's whales (*Balaenoptera edeni*) are all recorded.

Supporting Information

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