

Kuching Bay IMMA

Summary, continued.

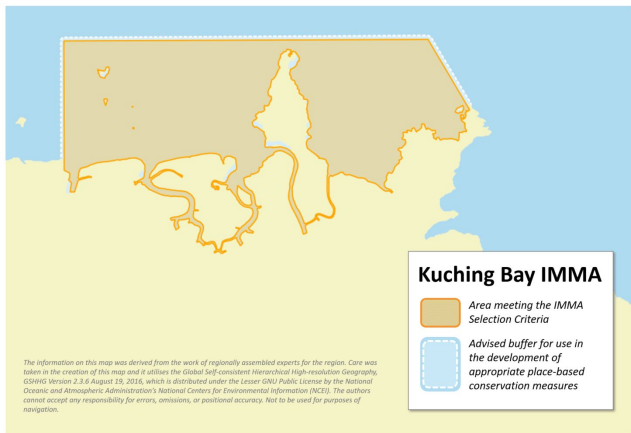
observations of calves and feeding indicate that the area is important for these species' year-round reproduction and feeding. Kuching Bay supports local artisanal fishing, with a high degree of overlap between fishing effort and dolphin distribution, creating a risk of bycatch. Freshwater inputs from flood mitigation channels, extensive aquaculture, and coastal development also present threats to the cetaceans. However, coastal marine protected areas in the heart of the area provide potential mechanisms for conservation and mitigation measures.



Figure 1: A pod of Irrawaddy dolphins in the Kuching Bay IMMA.
Photo: Sarawak Dolphin Project

Description

Kuching Bay, in Sarawak, East Malaysia includes three main components, the Salak-Santubong Bay, the Bako-Buntal Bay, and interconnecting portions of the Telaga Air, Salak, Santubong and Buntal rivers (Figure 2). The southern part of the study area is comprised of a series of interconnecting rivers and mangrove channels, sandy and rocky coastlines, while the northern part extends to more open waters with a maximum depth of 10 m and includes two small islands. While portions of the rivers reach



Area Size

475 km²

Qualifying Species and Criteria

Irrawaddy dolphin – *Orcaella brevirostris*

Criterion A; B (1)

Finless porpoise – *Neophocaena phocaenoides*

Criterion A; B (1)

Humpback dolphin – *Sousa chinensis*

Criterion A; B (1)

Marine Mammal Diversity

Neophocaena phocaenoides, *Orcaella brevirostris*,
Sousa chinensis, *Tursiops aduncus*

Summary

Kuching Bay in Sarawak, East Malaysia, encompasses two large estuaries and interconnecting river systems feeding into the area. Kuching Bay provides habitat for four species of cetaceans with overlapping distributions: Irrawaddy dolphins, Indo-Pacific finless porpoises, Indo-Pacific humpback dolphins, and Indo-Pacific bottlenose dolphins. Line transect and mark recapture studies indicate population sizes of approximately 200 Irrawaddy dolphins, 150 finless porpoises, and 100 humpback dolphins. Photo-identification studies demonstrate that Irrawaddy dolphins and humpback dolphins are resident in the area and

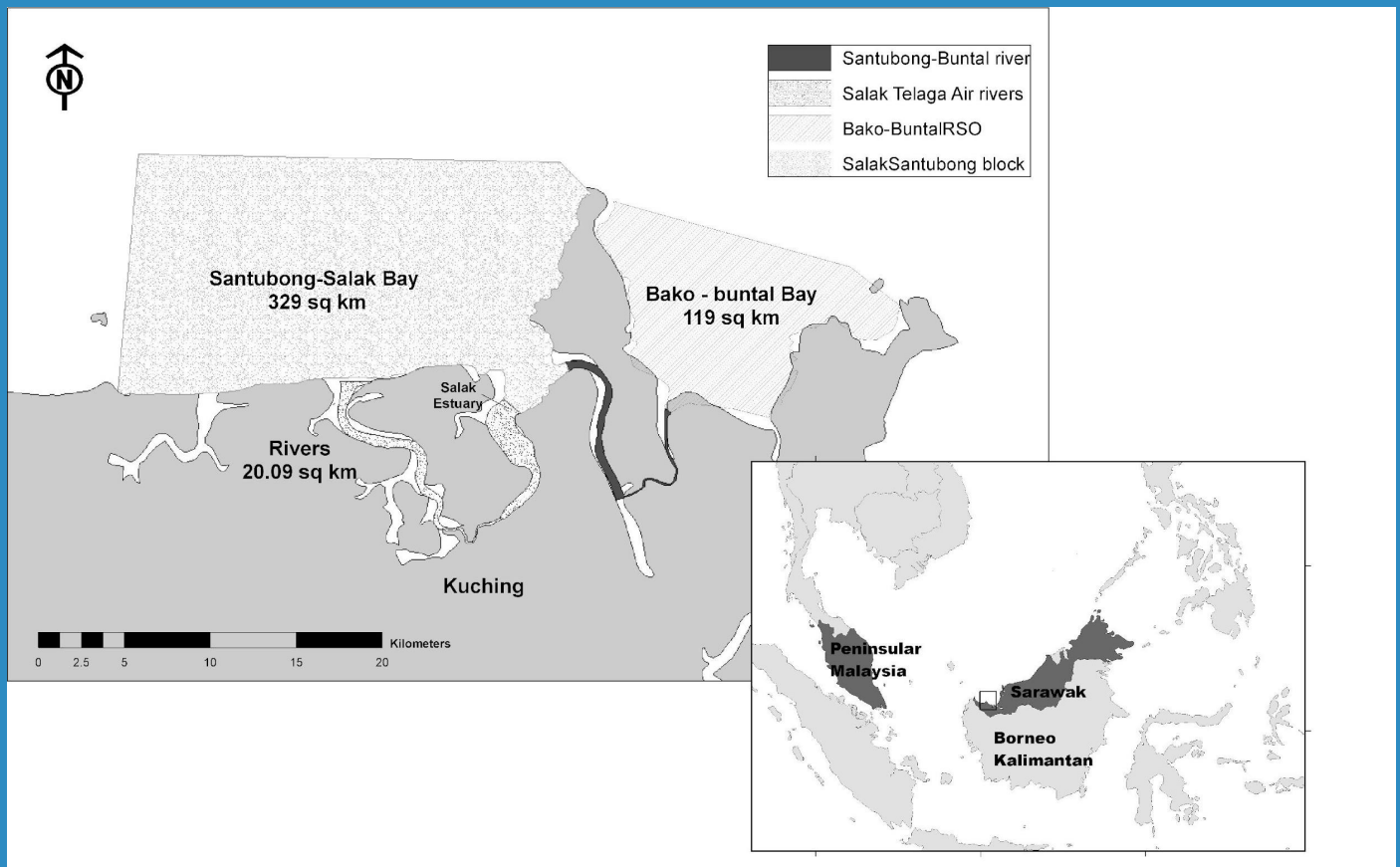


Figure 2: Kuching Bay, in Sarawak, East Malaysia includes three main components, the Salak-Santubong Bay, the Bako-Buntal Bay, and interconnecting portions of the Telaga Air, Salak, Santubong and Buntal rivers. Photo: Sarawak Dolphin Project

maximum depths of 11–12 m, both of the major bays are shallow, not exceeding 10 m in depth as far as 15 km from shore. The substrate throughout the study area is predominantly fine silt and sand and the waters range from brackish (27 ppt salinity) to saline (33 ppt salinity) (Peter, 2012). Kuching Bay encompasses several national parks, namely the Kuching Wetlands National Park on the west side (which is also a RAMSAR site), the Talang-Satang Island Marine Parks approximately 10 km offshore, and the terrestrial Bako National Park on the east and Mount Santubong National Park.

The Kuching Bay hosts four species of coastal cetaceans; Irrawaddy dolphins (*Orcaella brevirostris*), Indo-Pacific finless porpoises (*Neophocaena phocaenoides*), Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) and Indo-Pacific humpback dolphins (*Sousa chinensis*) (e.g. Beasley and Jefferson, 1997, Minton et al. 2011).

Minton et al. (2013) concluded that the best mark-recapture estimate for Irrawaddy dolphins based on a weighted mean of estimates derived from photographs of left sides and right sides of dorsal fins collected between 2008 to 2012 was 233 (CV = 22.5%, 95% CI = 151–360). The 95% confidence interval of this estimate overlapped well with that of the line transect estimate generated for the same species between 2010 and 2012: 149 (CV = 27.9%; 95% CI = 87–255). The line-transect estimate derived from the same study for finless porpoises was 135 individuals (CV = 31%, 95% CI = 74–246) (Minton et al., 2013). The best mark recapture estimate for Indo-Pacific humpback dolphins in the Kuching Bay using data collected between 2010 to 2013 was 84 (CV = 16.4%, 95% CI = 61 to 116) (Zulkifli Poh et al., 2016).

Peter et al. (2016b) showed that Irrawaddy dolphin distribution in Kuching Bay was significantly linked to salinity, with the species statistically more likely to be

present in waters within a 6 km radius of river mouths. The distribution of dolphins was also affected by tide levels, as they were more likely to be inshore during high tides and offshore during low tides.



Figure 3: Indo-Pacific Humpback dolphins in the Kuching Bay IMMA. Photo: Sarawak Dolphin Project

Finless porpoises were sighted in depths ranging from 1.3-16.8 m with a mean of 9.6 m (SD 11.8) (Minton et al., 2011). Humpback dolphins occurred in areas of statistically significantly lower turbidity and higher salinity in comparison to other species at this site (depth of 4.4–9.1 m, turbidity of 0.00-10.50 NTU and salinity of 31.04-33.00 PSU) (Zulkifli Poh, 2013). Humpback dolphins were also observed in groups of up to 45 individuals, larger than commonly documented for this species throughout its range (Zulkifli Poh et al., 2016).



Figure 4: Indo-Pacific Finless porpoises in the Kuching Bay IMMA. Photo: Sarawak Dolphin Project.

Studies reveal a high degree of overlap between the distribution of all four species in the Kuching Bay, particularly that of Irrawaddy dolphins and finless porpoises (Minton et al., 2011; Zulkifli Poh, 2013). Confirmed observations of neonate Irrawaddy dolphins and finless porpoise calves indicate that the nearshore areas of Kuching Bay are likely used as calving and nursing grounds for these species.



Figure 5: A mother-calf pair of Irrawaddy dolphins seen surfacing in the Kuching Bay IMMA. Photo: Sarawak Dolphin Project

Observations also indicate that both Irrawaddy dolphins and finless porpoises feed in shallow nearshore areas and are thus likely specialized in hunting techniques and dietary preferences that restrict them to nearshore habitats. Mark-recapture studies indicate a high degree of site fidelity and year-round residency for Irrawaddy dolphins in the area, with less than 10 km between sighting locations of identified individuals over a period of four years for some individuals, and a maximum straight-line distance of 26 km between re-sighting locations of others. The representative range and core area of photo-identified Irrawaddy dolphins estimated using fixed kernel range estimates was 246.42 km² and 37.22 km², respectively, with the core area located in the Salak Estuary (Zulkifli Poh, 2013), clearly defining the area as one of highest importance for this endangered species (Minton et al. 2017). Individually identified humpback dolphins also show a high degree of site fidelity and recurrent use of the study area (Zulkifli Poh et al., 2016). In short, the regular

occurrence of four cetacean species in the area, three of which are resident to at least some degree and rely on the area for feeding, mating, calving and nursing, make this area an important marine mammal area. As such, any coastal development that introduces significant changes to the salinity, turbidity, substrate or bathymetry, or introduces waterborne contaminants or toxins into the environment may seriously impact the dolphins' prey sources, feeding opportunities and subsequently their survival rates.

Criterion A: Species or Population Vulnerability

Irrawaddy dolphins are considered Endangered on the IUCN Red List of Threatened Species (Minton et al., 2017), and the Kuching Bay population may comprise one of the few remaining healthy populations of over 100 individuals. Studies demonstrate that the species is resident year round, feeding and breeding in the study area, and demonstrate a high degree of site fidelity with a dependence on nearshore or estuarine waters (Minton et al., 2011, 2013; Peter et al., 2016b). The population is known to be at risk of entanglement in fishing gear (Peter et al., 2016a), and studies indicate that this population is afflicted by skin nodules that may be an indication of environmental degradation and/or decreased immunity (Van Bresse et al., 2014).

Finless porpoises and humpback dolphins are listed as Vulnerable on the IUCN Red List of Threatened Species (Jefferson et al., 2017; Wang and Reeves 2017) and have been recorded in four incidents of bycatch in the Kuching bay, involving crab traps as well as gillnet fisheries (Sarawak Dolphin Project, unpublished data). One of the bycaught finless porpoises was a calf whose teeth had not erupted indicating a very young individual (Sarawak Dolphin

Project, unpublished data).



Figure 6: An Irrawaddy Dolphin is seen surfacing close to a fishing boat in the Kuching Bay IMMA. Dolphins sometimes occur in close proximity to fishing boats that are hauling their catches in, to feed on fishes discarded by the fisherfolk.
Photo: Sarawak Dolphin Project

Criterion B: Distribution and Abundance Sub-criterion B1: Small and Resident Populations

Surveys conducted between 2008 and 2013 yielded higher encounter rates with Irrawaddy dolphins in the nearshore waters of Kuching Bay than waters further offshore, or the neighboring Muara Tebas Bay to the east (Minton et al., 2011; 2013). This, coupled with the high rate of re-sights of individually identified Irrawaddy dolphins (Minton et al., 2013), and small core ranges (Zulkifli Poh, 2013), provides strong evidence that the Irrawaddy dolphin population numbering fewer than 300 individuals is resident and confined to the area. In addition several observations of calves of all three cetacean species have been recorded in the area (Minton et al. 2011), including Irrawaddy dolphin and finless porpoise calves with fetal folds (Sarawak Dolphin Project, unpublished data). Third-party reports and photographs shared by experienced wildlife guides have confirmed the occurrence of mating bottlenose dolphins and the birth of a humpback dolphin in Kuching Bay.

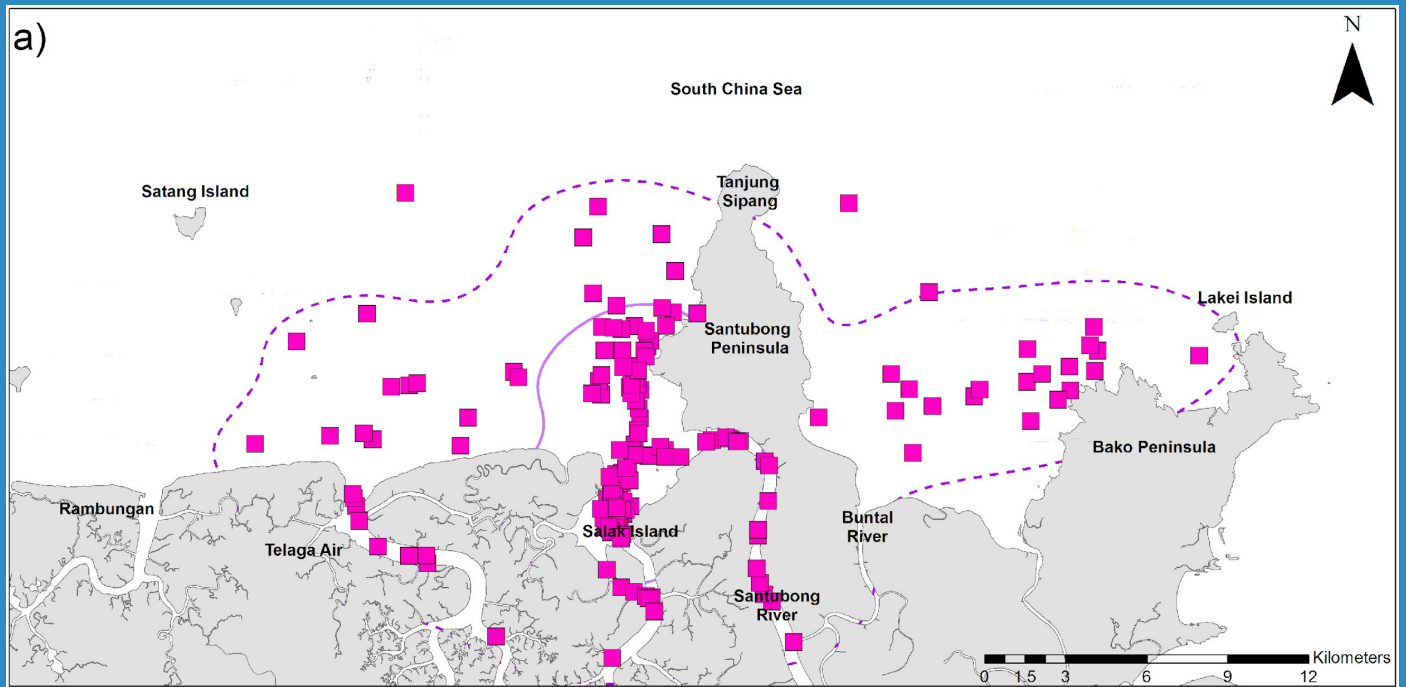


Figure 7: Map showing the core areas (identified by solid line) and representative ranges (delineated by broken line) of Irrawaddy dolphins in the Kuching Bay IMMA estimated using fixed kernel (from Peter et al., 2016b and Zulkifli Poh, 2013).

Supporting Information

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