

Photo-identification of dolphin dorsal fins from the research vessel (Photo: Kate Sprogis).

KATE SPROGIS, HOLLY RAUDINO (NEE SMITH), ROBERT RANKIN, COLIN MACLEOD & LARS BEJDER

Home ranges of bottlenose dolphins are habitat- and sex-specific

Characteristics of animals' home ranges can vary between and within populations. This variability may result from different habitat characteristics and biological priorities such as mating strategies, prey availability and predation risk.

In particular, the size of home ranges may be sex-specific, as has been observed in numerous marine and terrestrial species. Understanding sex-differences in the size and location of home ranges can have important conservation implications, as differences in space-use can render a particular sex more vulnerable to human impacts.

This research (Sprogis *et al.* 2016a) tested whether there were sex-specific differences in home range size for adult Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) in coastal and sheltered waters off Bunbury, Western Australia.

Methods

Systematic boat-based surveys ($n = 586$) were conducted across all seasons from 2007 to 2013 off Bunbury, Western Australia (Figure 1). Photographs of dolphin dorsal fins were taken so that individuals could be identified by their unique nicks and notches on their fin. To estimate home range size of adult male and female dolphins, a new kernel density method was applied that specifically accounted for physical barriers to movements (e.g. land masses for an aquatic species).

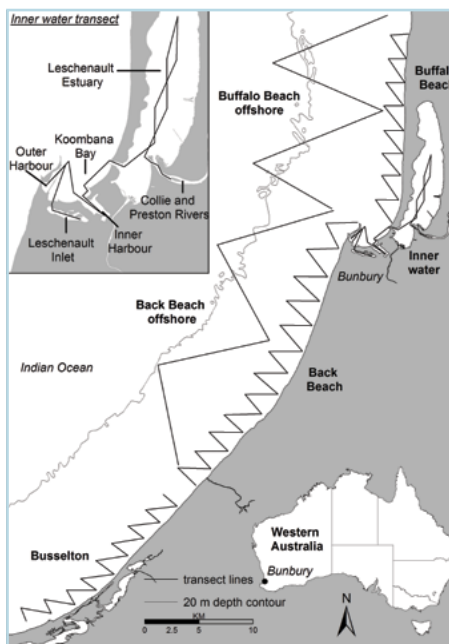


FIGURE 1 The study site off Bunbury, Western Australia (540km²). The **open water habitat** consisted of Buffalo Beach, Buffalo Beach offshore, Back Beach, Back Beach offshore and Busselton transects (zig-zag lines). The **closed water habitat** consisted of the Inner water transect, encompassing Koombana Bay, Leschenault Inlet and Estuary, Inner and Outer Harbours, and the lower reaches of the Collie River

Subsequently, a Bayesian mixture model was developed to: (1) test whether there was a sex effect in home range size; and, (2) explore whether dolphins could be partitioned into groups, based on home range size, associations with conspecifics, and by habitat (open vs. sheltered waters).

Results

There were two key findings from this research:

1. Home ranges were generally larger for adult males (mean = 94.8km²) than for adult females (mean = 65.6km²; Figure 2), with the Bayesian model indicating a 99% probability that males had larger home ranges than females. The smallest home range size in this study for a

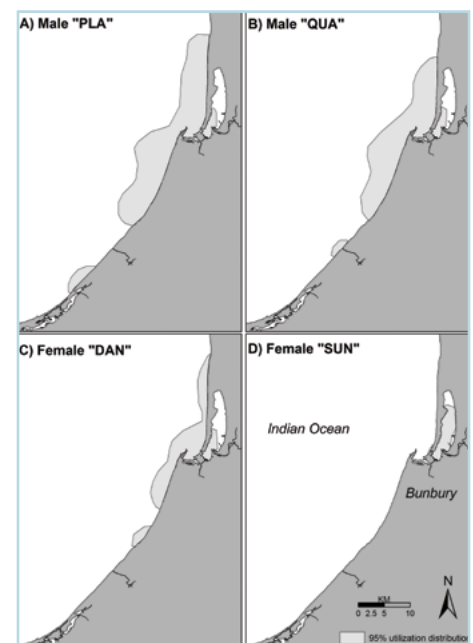


FIGURE 2 Examples of home ranges (95% utilization distribution; light grey polygons) within the Bunbury study area from Kernel Density Estimation including land barriers (dark grey) for two adult male (A, B) and two adult female dolphins (C, D)

female was 20km² and the largest for a male was 187km².

2. Both male and female dolphins that were regularly sighted in the sheltered waters (e.g. Koombana Bay and the Leschenault Estuary) had smaller home ranges than dolphins that frequented the open coastal waters (e.g. Back Beach, Buffalo Beach and offshore waters; Figure 3).

Discussion

The larger home ranges of adult male dolphins may relate to their mating strategies, as mammalian males generally roam over large areas in order to encounter multiple receptive females and maximise their potential mating opportunities. In contrast, adult females may not need to venture as far, especially if there are suitable prey and resources (such as protected habitat) available for themselves and their calves.

Importantly, findings also showed that the dolphins with the smallest home ranges were predominately female and resided in and around Koombana Bay (Figure 3).

Koombana Bay is a busy commercial port and a popular area for recreational fishing and dolphin-based tourism. These females with small home ranges residing in Koombana Bay may be at particular risk of human pressures due to their reliance on these busy, near-shore habitats. ■

More information

See www.mucru.org or contact Kate Sprogis at k.sprogis@murdoch.edu.au

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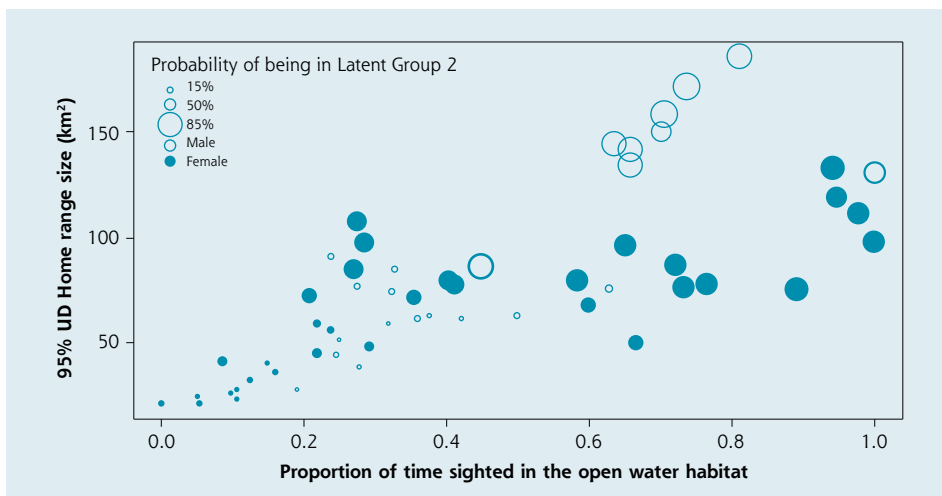


FIGURE 3 From Bayesian modelling, the relationship between home range size (95% utilization distribution, UD), the proportion of time a dolphin was sighted within the open water habitat, and the probability of an individual being in latent group 2 (open water habitat). Larger circles suggest dolphins with larger home ranges were sighted more often in the open water habitat; smaller circles suggest dolphins with smaller home ranges were sighted less often in the open water habitat, and consequently spent more time in the sheltered waters



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