

Kimberley Marine Research Program

WAMSI Project 1.2.4

Abundance, population genetic structure and passive acoustic monitoring of Australian snubfin and humpback dolphins across the Kimberley

This project aims to improve the understanding of Australian snubfin (*Orcaella heinsohni*) and humpback (*Sousa sahulensis*) dolphins in northwestern Australian waters, and develop tools to assist in their research and monitoring.

Background

Australian snubfin (*Orcaella heinsohni*) and humpback (*Sousa sahulensis*) dolphins are two slow-growing species unique to shallow, coastal waters of northern Australia and parts of southern New Guinea. They are late-maturing species which appear to occur in small, somewhat isolated populations; consequently, there are concerns over their vulnerability to human activities. However, more data are required before we can assess if they are threatened species or not and take appropriate actions to protect them.

This project will help us to understand their numbers and important habitats in the Kimberley, and develop tools to use their vocalisations (sounds) to monitor them.

Research techniques and objectives

Specifically, we use a combination of techniques:

Population genetic structure

We collected tissue samples from free-ranging dolphins and analysed their DNA to examine how genetically connected populations are within the Kimberley region.

Relative abundance

We conducted boat-based surveys and photo-identification to obtain information on encounter rates of dolphins to assess the relative importance of several sites in the Kimberley to snubfin and humpback dolphins.

Passive acoustic monitoring

We are developing methods for recording and analysing the vocalisations (underwater sounds) produced by snubfin and humpback dolphins, and their application as a cost-effective tool for monitoring the occurrence of dolphins (passive acoustic monitoring, or 'PAM').

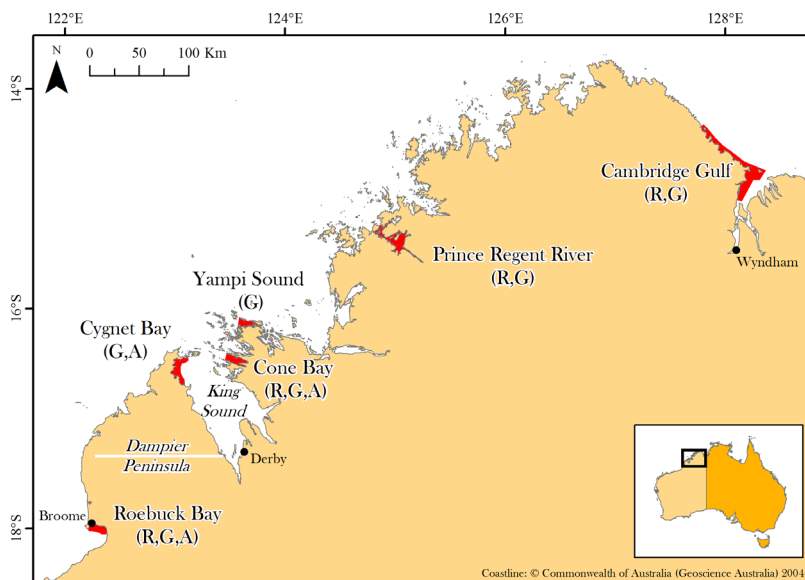


Figure 1. The Kimberley region, illustrating project study sites where data on dolphin relative abundance (R), population genetic structure (G) and/or passive acoustic monitoring (A) are presented here.

Kimberley Marine Research Program

WAMSI Project 1.2.4 Dolphins

This will involve two key stages:

1. using PAM to develop an understanding of the background underwater sounds in areas in the Kimberley; and
2. comparing acoustic and visual observations of dolphins to understand how vocalisations vary between different species, numbers and behaviours of dolphins.

What we've found

- Evidence of limited genetic connectivity between snubfin dolphins at Roebuck Bay and Cygnet Bay/Cone Bay, with evidence of a potential third genetic population further north/east.
- Variable encounter rates of snubfin and humpback dolphins among different locations, emphasising the importance of sites in the western Kimberley to snubfin dolphins, and an apparently low relative abundance of humpback dolphins at most areas surveyed.
- Passive acoustic monitoring effectively detects snubfin and humpback dolphins in high-use areas, but more work is needed to automatically detect and distinguish between the two species and to estimate abundance

Who will use this information?

Our results provide managers and policy-makers with valuable data on the relative importance of several sites in the Kimberley to snubfin and humpback dolphins, along with an improved understanding of the connectivity of populations and appropriate geographic scales at which to manage them.

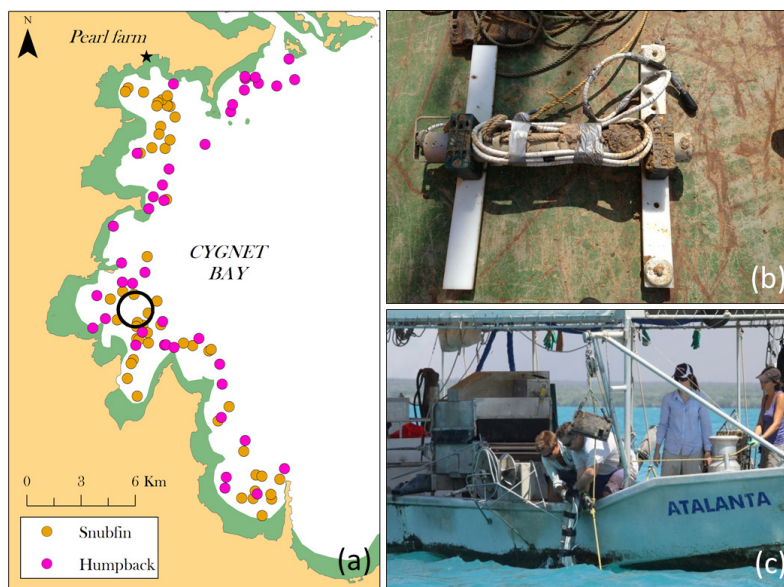


Figure 2.6. (a) Location of the deployed acoustic datalogger (black circle) in Cygnet Bay 2014 and inset map of the sightings of snubfin and humpback dolphins (from Brown et al. 2016), demonstrating the high density of dolphins in the vicinity of the acoustic datalogger; (b) a photograph of the acoustic datalogger; and, (c) the retrieval of the acoustic datalogger from the seabed.

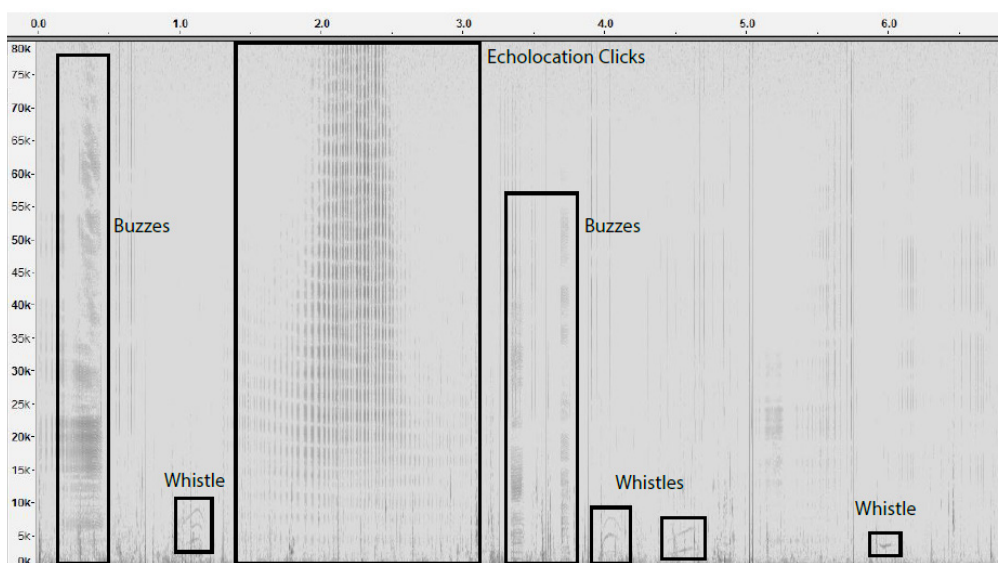


Figure 3. An audiogram of echolocation clicks, pulsed 'buzz' sounds, and tonal whistles recorded in the presence of snubfin dolphins.

Kimberley Marine Research Program

WAMSI Project 1.2.4 Dolphins

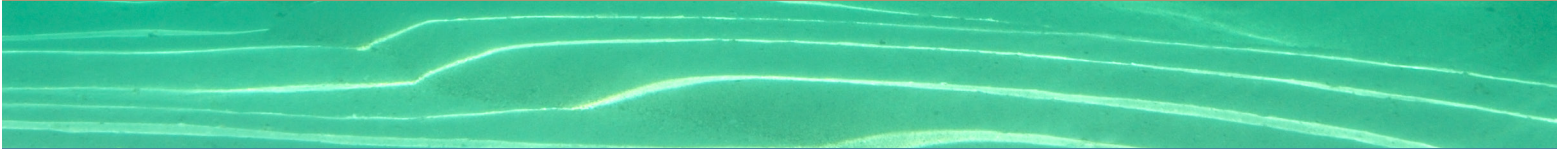


Figure 4. Photograph of (a) the Teena B which was used as the dolphin visual observation platform in Roebuck Bay, (b) snubfin dolphins swimming close to one of the three deployed acoustic recorders around the vessel to collect dolphin acoustic data and (c) observations on the top deck of the Teena B.

With some additional work, passive acoustic monitoring may provide a cost-effective tool for monitoring snubfin and humpback dolphins within Kimberley Marine Parks.

Further Work

The population structure and abundance of snubfin and humpback dolphins throughout the Kimberley region as a whole remains unknown.

Further targeted research, particularly genetic sample collection in the northern/eastern Kimberley, is required to better understand these species' status.

Passive acoustic monitoring represents a promising method for snubfin and humpback monitoring, although further work is required to refine the data analysis in order to improve both efficiency and efficacy.

Ongoing and new collaborations between researchers, Traditional Owners and Marine Park/Wildlife Managers will facilitate further research into these species in this large and remote region.

Type of data collected

- Dolphin group locations, survey routes and dorsal fin images. These will be archived in the WA Department of Parks and Wildlife 'DolFin' database.
- Results are presented in the final report, which will be available [online](#), in addition to several peer-reviewed publications

Indigenous areas acknowledgement

This research was carried out in Dambimangari, Balanggarra, Yawuru and Bardi-Jawi country.

Data available in:

The metadata associated with this project can be viewed via the [AODN](#) metadata catalogue. Data will be available via [Pawsey](#) after the embargo period for the project.

Project Team

Lars Bejder^{1,2}, Alexander M. Brown^{1,2}, Joshua Smith^{1,2}, Chandra Salgado Kent^{1,3}, Sarah Marley^{1,3}, Simon J. Allen^{1,2,4}, Deborah Thiele^{1,5}, Christine Erbe^{1,3}, Delphine Chabanne^{1,2}

¹Western Australian Marine Science Institution, Perth, WA, Australia

²Cetacean Research Unit, School of Veterinary and Life Sciences, Murdoch University, Australia, Perth, WA,

³Centre for Marine Science and Technology, Department of Imaging and Applied Physics, Curtin University, Perth, WA, Australia

⁴Centre for Marine Futures, School of Biological Sciences and Oceans Institute, University of Western Australia, Perth, WA, Australia.

⁵Fenner School of Environment & Society, Australian National University, Canberra, ACT, Australia.

Kimberley Marine Research Program

WAMSI Project 1.2.4 Dolphins

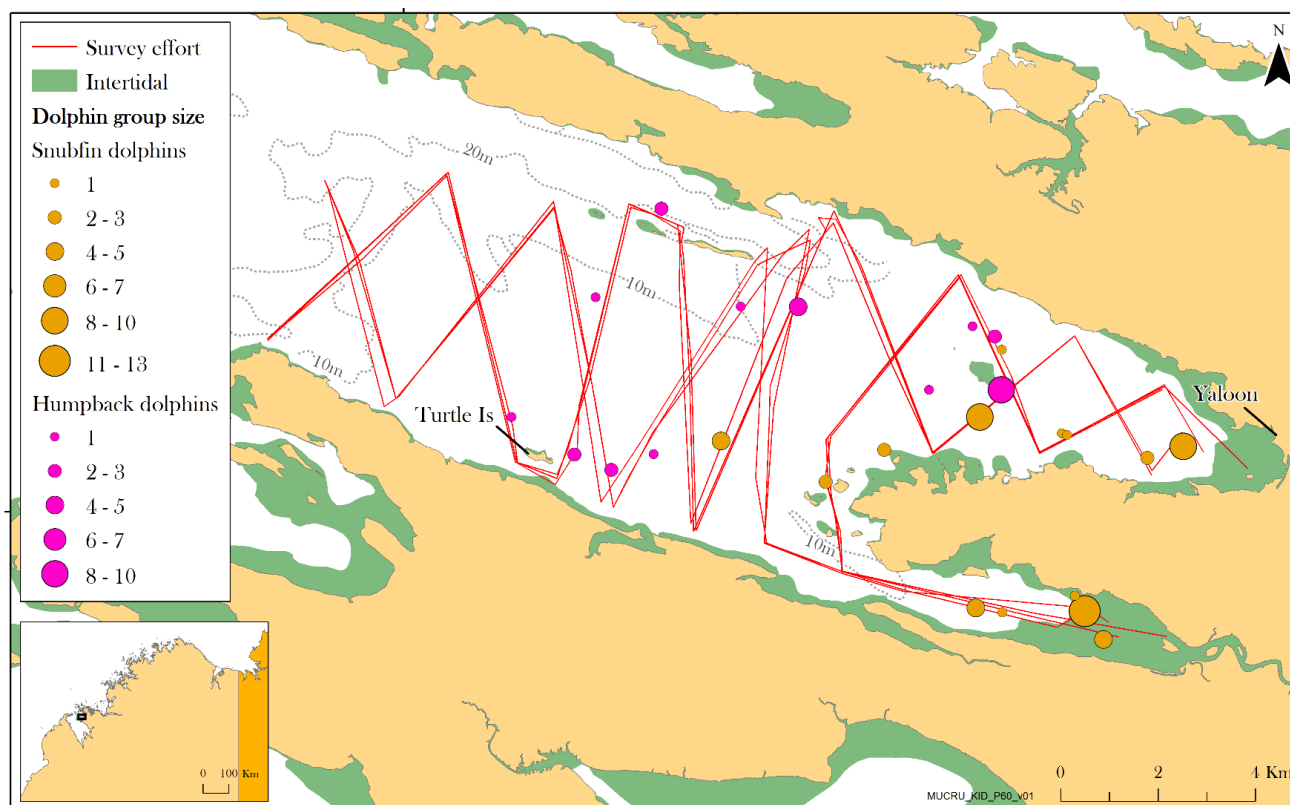


Figure 5. Sighting locations and group sizes of snubfin and humpback dolphins in Cone Bay, 2014, including transect survey effort. Only dolphins observed while on transect survey effort are shown; these represent those used to calculate encounter rates.

Contacts

Project Leader: Dr Lars Bejder

Murdoch University

- **Population genetic structure and relative abundance:**

Alexander Brown

Murdoch University,

Email: alex.brown@murdoch.edu.au.

- **Passive Acoustic Monitoring:**

Joshua Smith

Murdoch University

Email: joshua.smith@murdoch.edu

Chandra Salgado-Kent

Curtin University

Email: c.salgado@cmst.curtin.edu.au.

Project webpage:

<http://www.wamsi.org.au/research-site/dolphins>