SUPPLEMENTARY INFORMATION

Regional assessment of the conservation status of snubfin dolphins (Orcaella heinsohni) in the Kimberley region, Western Australia

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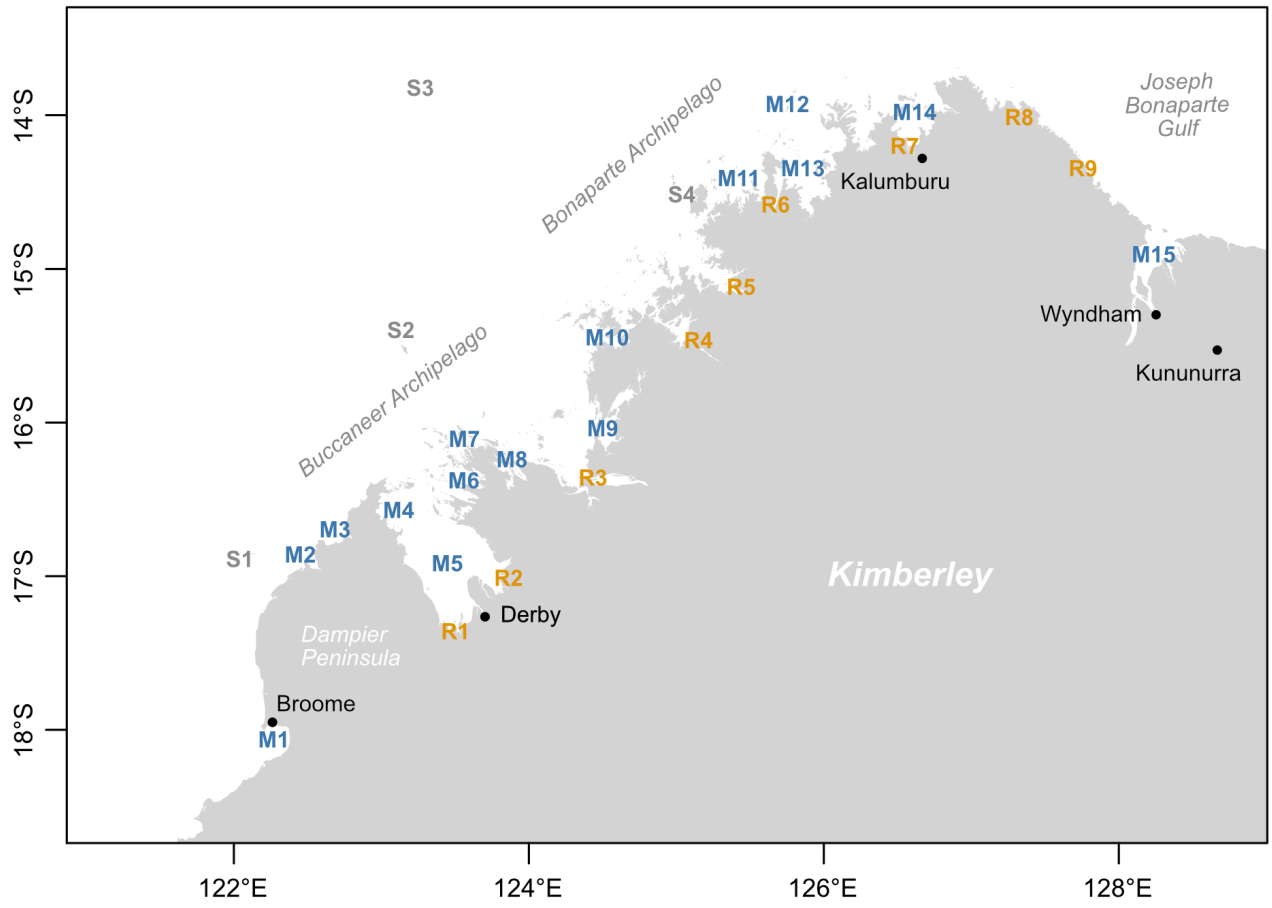
Acknowledgements

We acknowledge the contributions of Mayala, Bindunbur, and Yawuru Traditional Owners, who shared their knowledge of dolphins on their Sea Countries. In particular, we thank J. Melbourne, D. Mathews, N. Kay, C. Tolentino, P. Pedro, J. Mamid, E. Maher, P. Gregory, R. Wade and W. Edgar, and the Dambimangari community incl. J. Mansfield, J. Oobagooma, C. Oobagooma, K. Bangmorra, W. Barunga, G. Umbagai, F. Martin, P. O'Connor, and V. Numaduma. The following Rangers partook in field activities: M. Morlumbun; C. Sampi; K. Callaghan; J. Adams, D. Djanghara, S. Mangolamara, N. Waina, R. Warren, and D. Williams. We thank the skippers/crews of the vessels used: G. McKechnie, D. Cook, P. Canny & I. Lew, T. Richards, Trippy & Geoff. The NAQS, the ACS, and the KLC coordinated/participated in surveys. DT acknowledges assistance from the Broome Bird Observatory, Environs Kimberley, the Roebuck Bay Working Group, and many individuals: T. Vernes, J. Chapman, D. Glasgow, M. Tarzia, M. Gent, C. Palmer, A. Brown, P. Gill, L. Balance, B. Pitman, K. Stafford, A. Watson, J. Fowler, M. Pritchard, Ba.G. Mackey, C. Salgado-Kent, L. Thiele, M. Grey, K. Curran, and K. Golson. DBCA staff D. Barrow, A. Lane, D. Stevens, M. Hourn, B. Francis, C. Smith, L. Puertollano, J. Fong, A. Richardson, C. Douglas, E. D'Cruz, S. Mullineux, J. Murdoch, and C. Nutt were integral to snubfin records in Yawuru Nagulagun/Roebuck Bay and Lalang-garram/Camden Sound Marine Parks. We thank P. Bayliss & M. Hutton for providing the aerial survey data. Lastly, we thank S. Allen & R. McIntosh for thoughtful comments on the manuscript draft.

Funding: Mia J Tegner Award, The Whale and Dolphin Conservation Society UK, W.V. Scott Estate, Commonwealth Dpt. of Environment (Caring for Our Country), WWF Australia, Dpt. of Conservation Land Management WA, and Ghostnets Australia

Contents

1. Supplementary figures



Marine areas

M1.	Roebuck Bay	M9.	Doubtful Bay
M2.	Beagle Bay	M10.	Careening Bay
M3.	Pender Bay	M11.	Swift Bay
M4.	Cygnet Bay	M12.	Long Reef
M5.	King Sound	M13.	Admiralty Gulf
M6.	Cone Bay	M14.	Napier Broome Bay
M7.	Yampi Sound	M15.	Cambridge Gulf
M8.	Talbot Bay		

Islands

S1.	Lacepede Is.
S2.	Adele Is.
S3.	Ashmore Is.
S4.	Bigge Is.

Major rivers

R1.	Fitzroy
R2.	Gibb
R3.	Horizontal Waterfalls
R4.	Prince Regent
R5.	Roe
R6.	Mitchell
R7.	King Edward
R8.	King George
R9.	Berkeley

Figure S1: Regional map of the Kimberley, showing the location of marine and terrestrial sites referenced throughout the main article text.

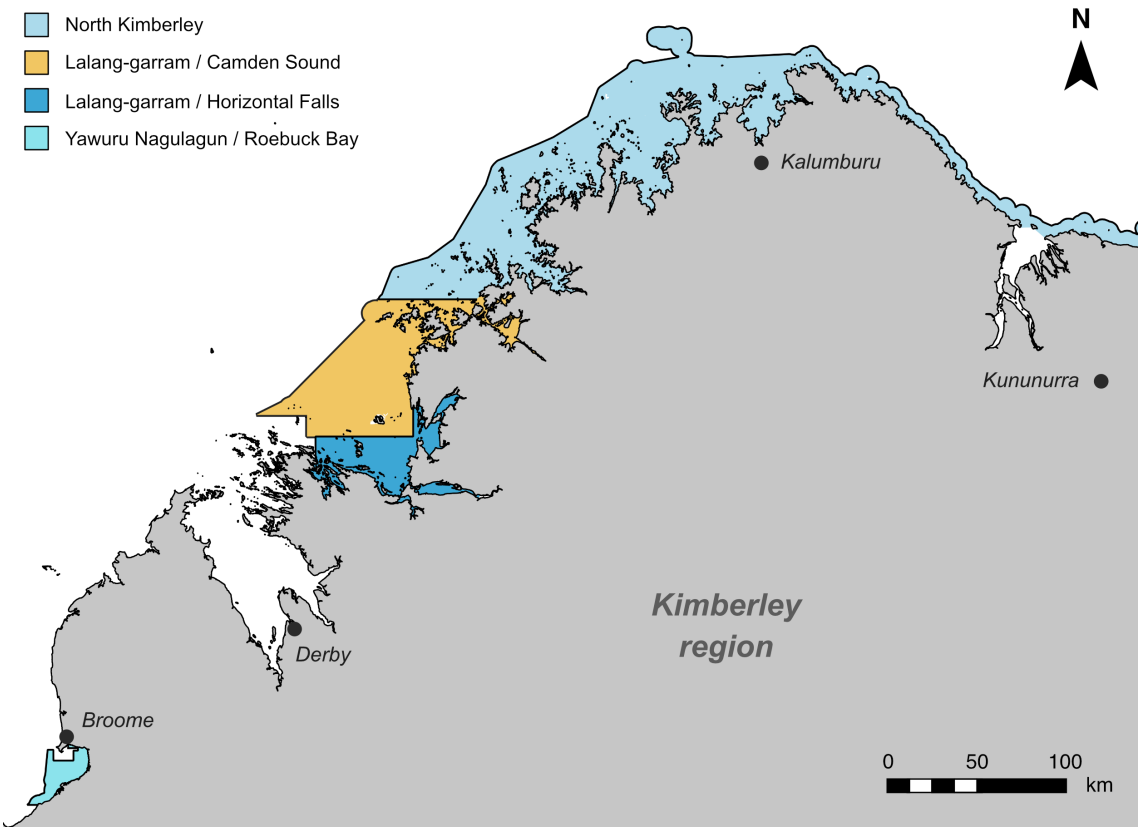


Figure S2: State Marine Parks in the Kimberley region of Western Australia.

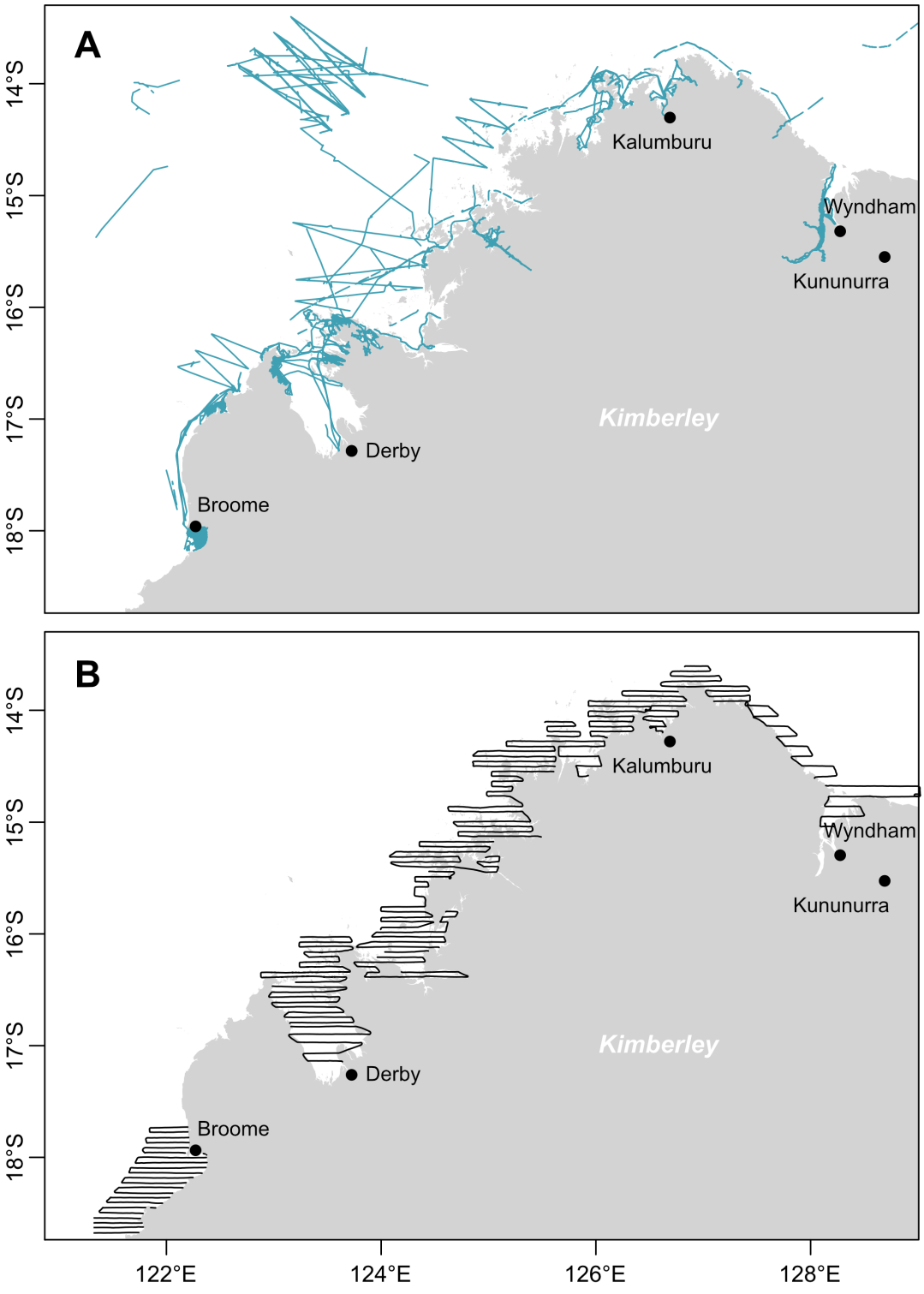


Figure S3: Map of sampling effort, showing GPS track lines for **(A)** vessel-based and **(B)** aerial surveys of snubfin dolphins (*Orcaella heinsohni*) across the Kimberley region of northern Western Australia.

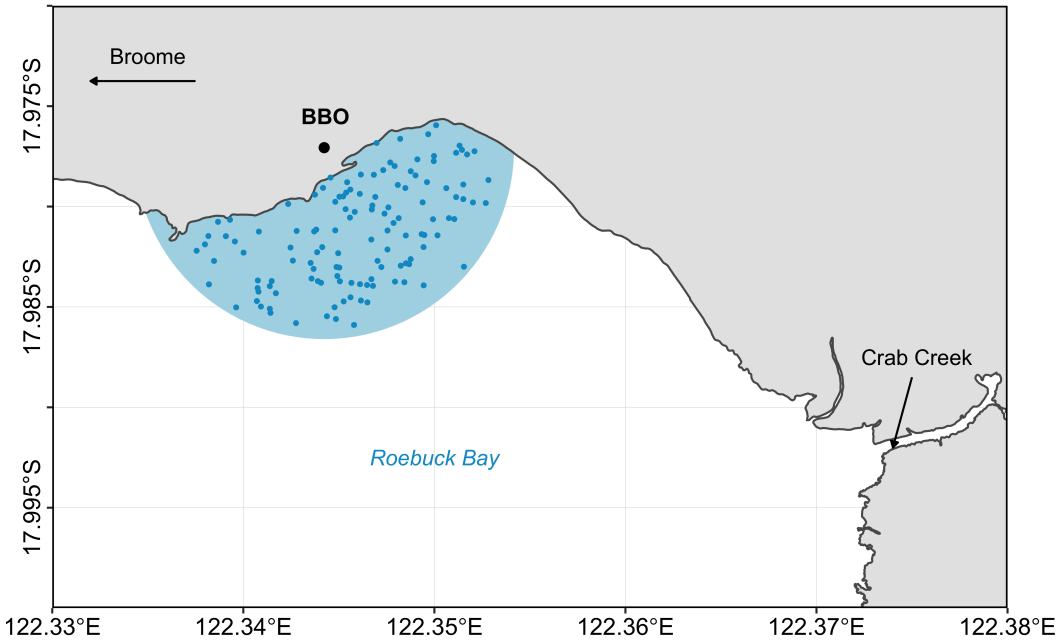


Figure S4: Example re-allocation of on-land observations. In crowd-sourced biodiversity data, it is common for the coordinates of survey sites to be reported rather than the actual locations of the animals seen [1]. Here, numerous snubfin dolphin sightings (blue) were originally logged at the Broome Bird Observatory (BBO, http://www.broomebirdobservatory.com). These were randomly re-assigned to the nearest ocean area within a 1 km buffer of the site (blue area).

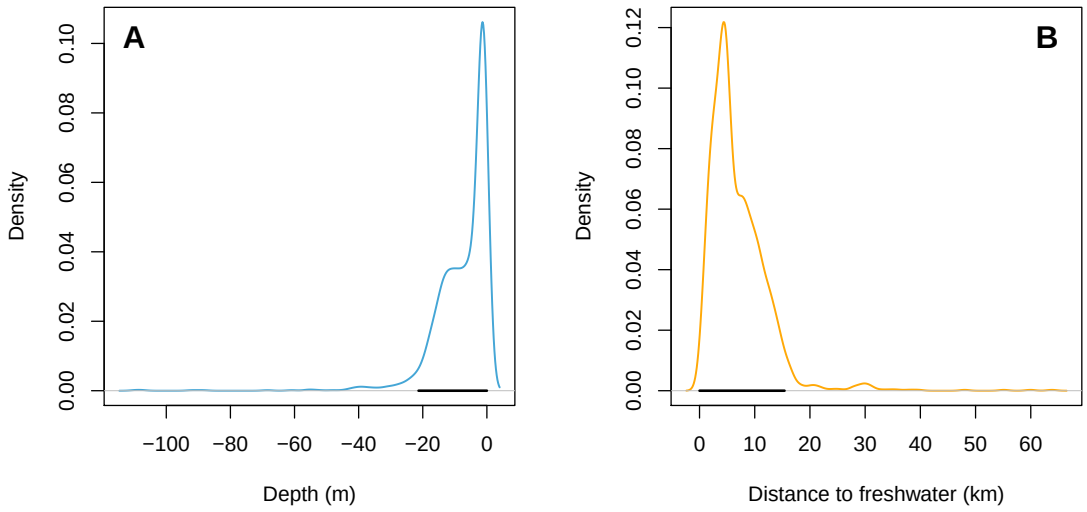


Figure S5: Kernel density distributions of snubfin dolphin (*Orcaella heinsohni*) sightings (see Table 1 in main text for data sources) as a function of **(A)** bathymetric depth, and **(B)** geodesic (i.e., shortest on-water) distance to the nearest freshwater outflow. Solid black lines mark the widths of the 95% highest density intervals (HDI) for each distribution.

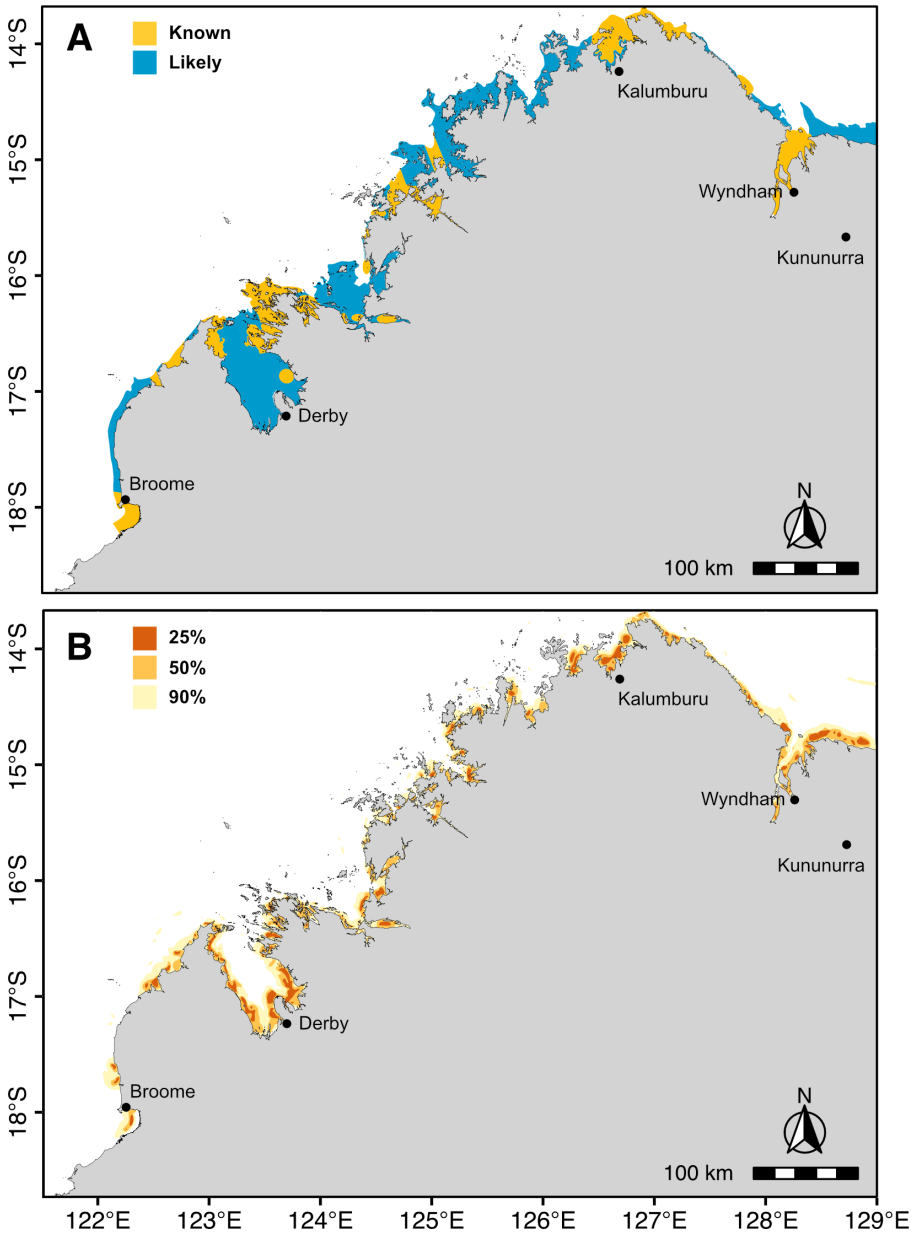


Figure S6: Overview of known, expected, and predicted snubfin dolphin (*Orcaella heinsohni*) occurrence in the Kimberley region of Western Australia. **(A)** Areas of known (yellow) and likely (blue) snubfin habitat identified as part of a nomination of the species for listing under the Environment Protection and Biodiversity Conservation (EPBC) Act. The nomination was prepared in 2011 by the World Wildlife Fund (WWF) and was complemented by a verbal nomination given to the Threatened Species Scientific Committee (TSSC) by Indigenous representatives. **(B)** Percent volume contours (PVC) derived from the bivariate kernel density surface of dolphin sightings (Figure 3 in main text), after back-transformation to geographic space. A PVC is a two-dimensional slice which contains a given percentage of the volume under the fitted kernel surface, such that a 90% PVC contour would on average contain 90% of the points used to generate the kernel density estimate [2]. These are shown for 25% (dark shade), 50% (medium shade), 90% (light shade) of location points.

2. Supplementary tables

Table S1: List of individuals who contributed to data collection (in alphabetical order).

Initials	Name
AB	Alex Brown
CJ	Curt Jenner
CP	Carol Palmer
CSK	Chandra Salgado-Kent
DT	Deborah Thiele
HR	Holly Raudino
JF	Jason Fowler
KW	Kelly Waples
KRG	Kimberley Ranger groups (incl. Nyamba Buru Yawuru, Dambimangari, Balanggarra, and Unguu)
PB	Peter Bayliss
PJB	Phil J Bouchet
SA	Simon Allen
SM	Sarah Marley

Table S2: Key to data sources and primary affiliations (listed in alphabetical order). For full details, refer to Table 1 in the main text. Note that Coastal Walkabout was decommissioned in 2015. For more information about the initiative, see https://sites.nicholas.duke.edu/johnston/2013/11/28/coastal-walkabout-launch/.

Code	Affiliation / Source	URL
ALA	Atlas of Living Australia	https://www.ala.org.au/
CSIRO	Commonwealth Scientific and Industrial Research Organisation	https://www.csiro.au/
CWalk	Coastal Walkabout	https://www.gaiaresources.com.au/
CWR	Centre for Whale Research WA Inc.	http://www.cwr.org.au/
DBCA	WA Department of Biodiversity, Conservation and Attractions	https://www.dbca.wa.gov.au/
DU	Deakin University	https://www.deakin.edu.au/
DW	Dolphin Watch	https://www.roebuckbay.org.au/
EK	Environs Kimberley	https://www.environskimberley.org.au/
GBIF	Global Biodiversity Information Facility	https://www.gbif.org/
MUCRU	Murdoch University Cetacean Research Unit (now known as Aquatic Megafauna Research Unit, AMRU)	https://amru.org.au/
NMap	NatureMap	https://naturemap.dbca.wa.gov.au/
NTG	Northern Territory Government	https://nt.gov.au/
WAMSI	Western Australian Marine Science Institution	https://www.wamsi.org.au/
WWF	World Wildlife Fund	https://www.worldwildlife.org/

3. Appendix 1: Conservation assessment using α-hulls

IUCN guidelines recommend the use of α-hulls for examining changes in the extent of occurrence (EOO) of species over time. α-hulls are generalisations of minimum convex polygons (MCPs) designed to better accommodate disjunctions in species distributions and exclude outlying occurrences [3]. α-hulls are formed by joining occurrence points using a Delaunay triangulation, with the constraints that no connecting lines are allowed to intersect, and that all those longer than a multiple (α) of the average line length are to be deleted [4]. As α tends to infinity, the α-hull approaches the MCP. Conversely, the α-hull shrinks as α decreases, allowing cavities to appear among species occurrences [5]. Both MCPs and α-hulls have been criticised on various grounds, including strong biases for species with narrow and irregularly-shaped distributions, sensitivity to geolocational inaccuracies and uneven sampling effort, indiscriminate inclusion of large patches of unsuitable habitat [3, 6–8] (MCP), or dependence on the choice of an α parameter, which remains largely subjective and context-specific (α-hulls). Our focus here was on assessing the conservation status of snubfin dolphins (*Orcaella heinsohni*) against criterion B at a regional scale, and we chose to measure the EOO as an MCP to abide by the most recent IUCN rules (see main text). However, a complementary analysis based on α-hulls may be equally as useful to support future evaluations of temporal trends in the dolphins' EOO throughout the Kimberley. For this reason, α-hull estimates of the EOO were also obtained using the *EOO.computing* function of the *ConR* package [9]. As per [5], we tested increasing values of α (between α = 0.1 and α = 2 in 0.1 unit increments), and chose the smallest value corresponding to an α-hull that enclosed all occurrence points and did not exhibit hollow spaces (note that this was done in geographic space, rather than environmental niche space). The median bootstrap estimate of the EOO was 11,110 km (95% CI: 1,890-19,354) (**Figure A1**), suggesting that the species meets the requirement for listing as VU according to criterion B1. In a marginal proportion of bootstrap iterations, EOO estimates met the criteria for up-listing to EN (B1) (N = 120, EOO < 5,000 km).

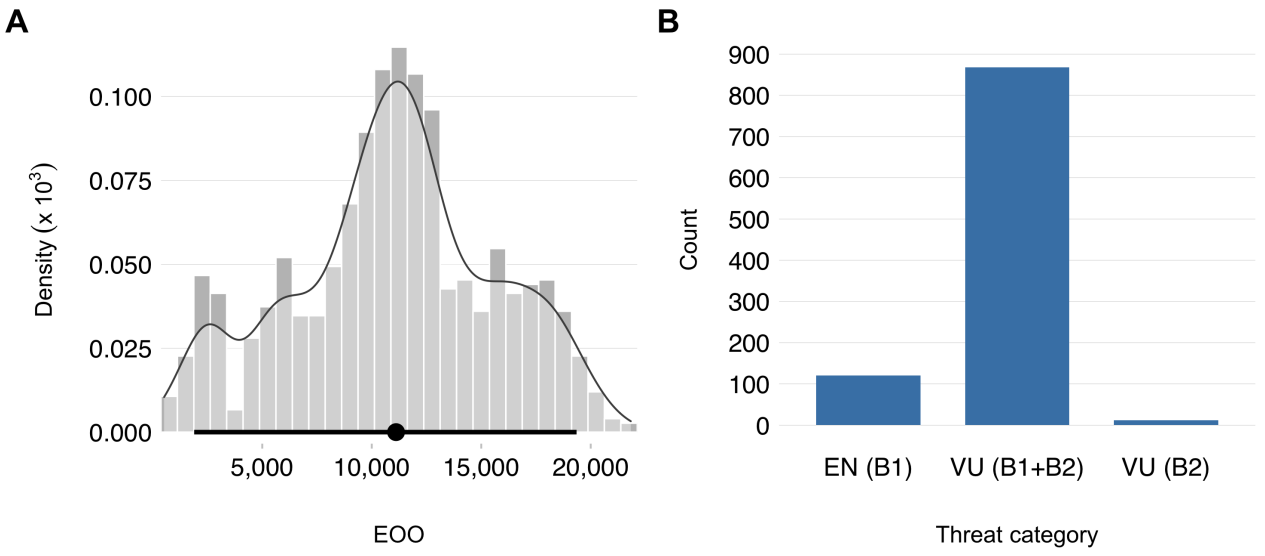


Figure A1. Regional conservation assessment for snubfin dolphins (*Orcaella heinsohni*) using α-hulls. **(A)** Distribution of estimates of the extent of occurrence (EOO, in km), obtained via weighted resampling. A smooth kernel density line is overlaid to aid interpretation. The mean and 95% percentile confidence intervals are shown in black as a segment and a filled circle, respectively. AOO estimates are identical to those presented in Figure 4 (see main text). **(B)** Corresponding IUCN threat classes under criterion B. EN: Endangered; VU: Vulnerable.

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