NORTH WEST SHOALS TO SHORE RESEARCH PROGRAM

Theme 3 - Threatened Species

Quantifying the distribution, important areas and overlap with potential threats for pygmy blue whales on the NW Shelf

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Acknowledgements and collaborators

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- Curt and Micheline Jenner, Centre for Whale Research
- Mike Double, Virginia Andrews Goff, Brian Miller, Australian Marine Mammal Centre
- Margie Morrice, Parks Australia and Natalie Kelly, Australian Antarctic Division
- Danielle Harris, Sea Mammal Research Unit

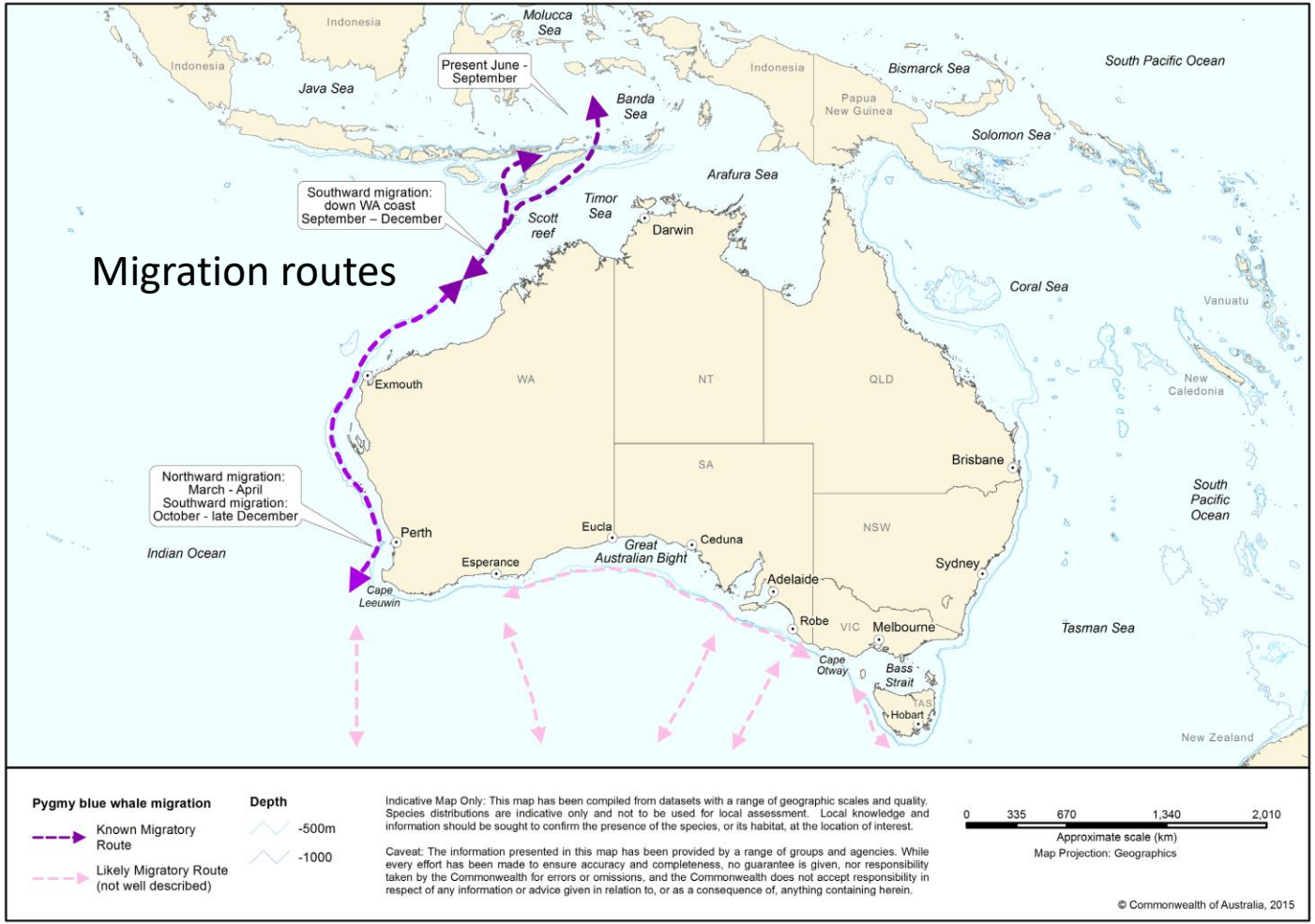
Pygmy blue whales

- Listed as endangered
- Distribution overlaps with industry activities
- Limited understanding of movement, distribution and biological important areas (BIA)
- Current management precautionary

Centre for Whale Research

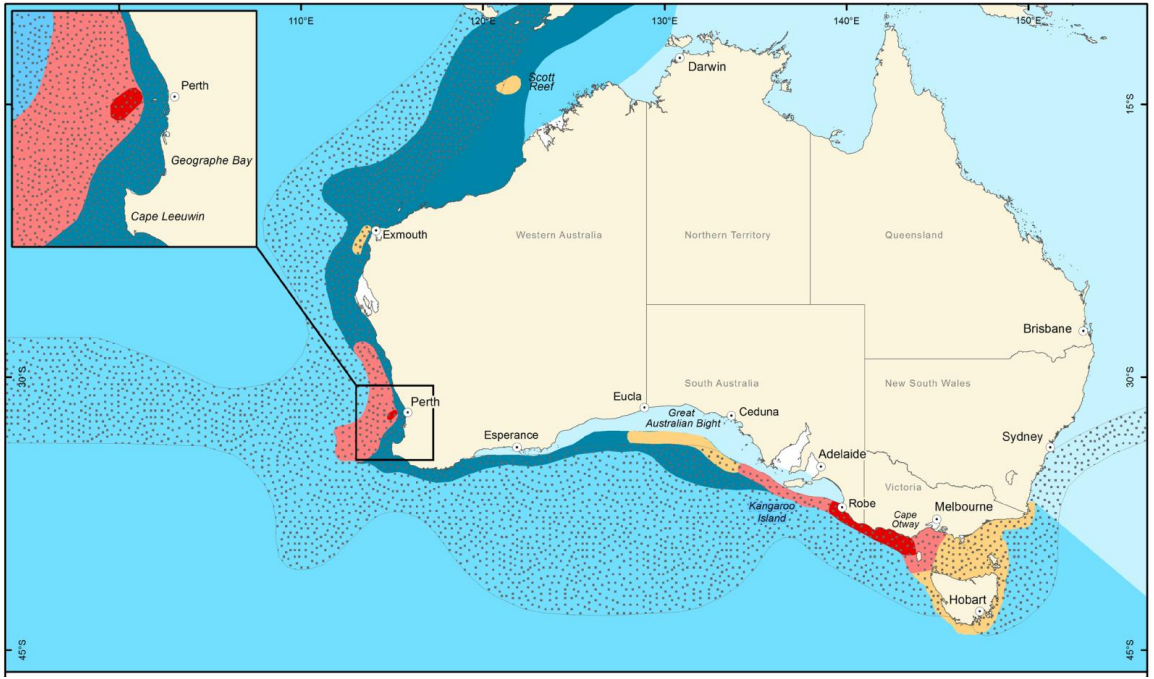
OBJECTIVE: Quantify the movement, distribution and threats to pygmy blue whales on the NW Shelf and to refine BIAs.

Migration routes



Commonwealth of Australia 2015

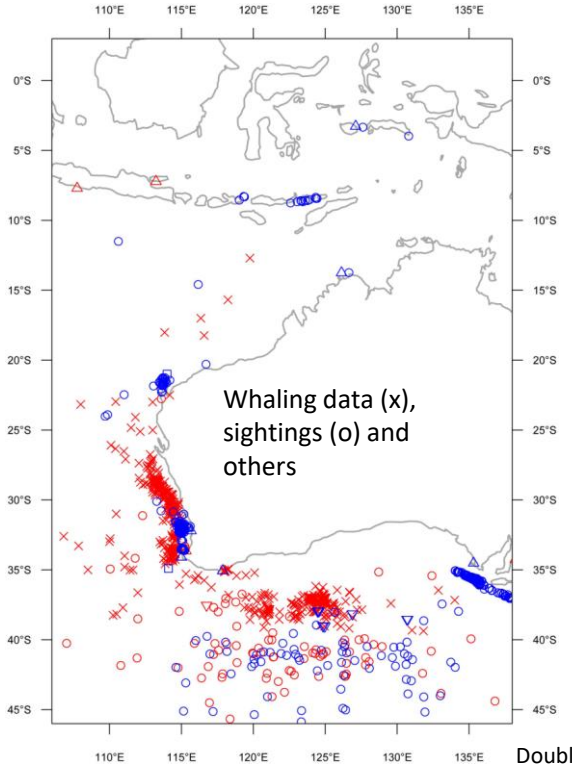
Pygmy blue whale distribution



Foraging area (annual high use area)
Known foraging area
Possible foraging area
Known to occur
Likely to occur
May to occur
Historical catch area

Need to refine distribution and BIAs on NW Shelf

- Based on limited data, especially NW Shelf
- Visual survey methods difficult
- Our approach to obtain spatial data on this species
  - Deploy satellite tags
  - Acoustic surveys (on board gliders and fixed)
  - Trial eDNA analysis
  - Use of existing data



Double et al. 2014

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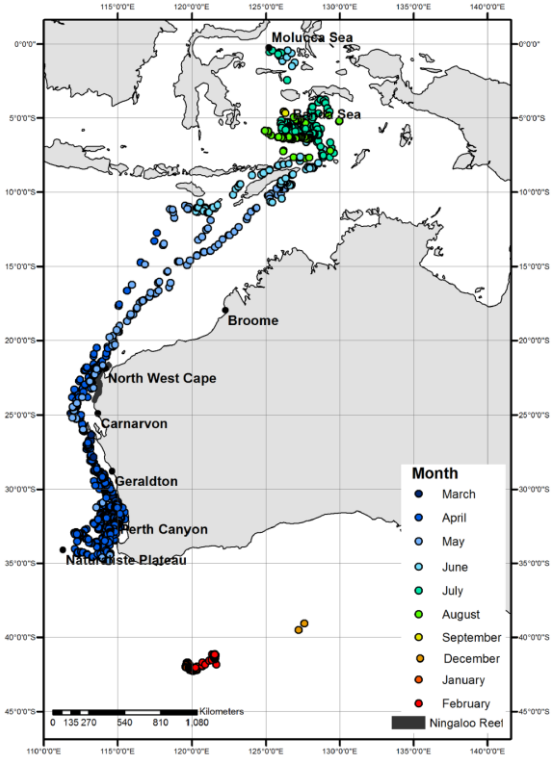

Double et al. 2014

Satellite Tracking

Photos: Centre for Whale Research

Limpet tags

Attached at highest part of body

Pros: 1. High spatial resolution location estimates,

2. Less invasive than transdermal tags

Cons: 1. short deployment durations – a few weeks on average

- Also collect data on diving behaviour

Satellite tracking

- NW Cape June on northern migration
- Ashmore Reef in Nov on southern migration
- 8-10 tags at each site
- Collaboration with CWR

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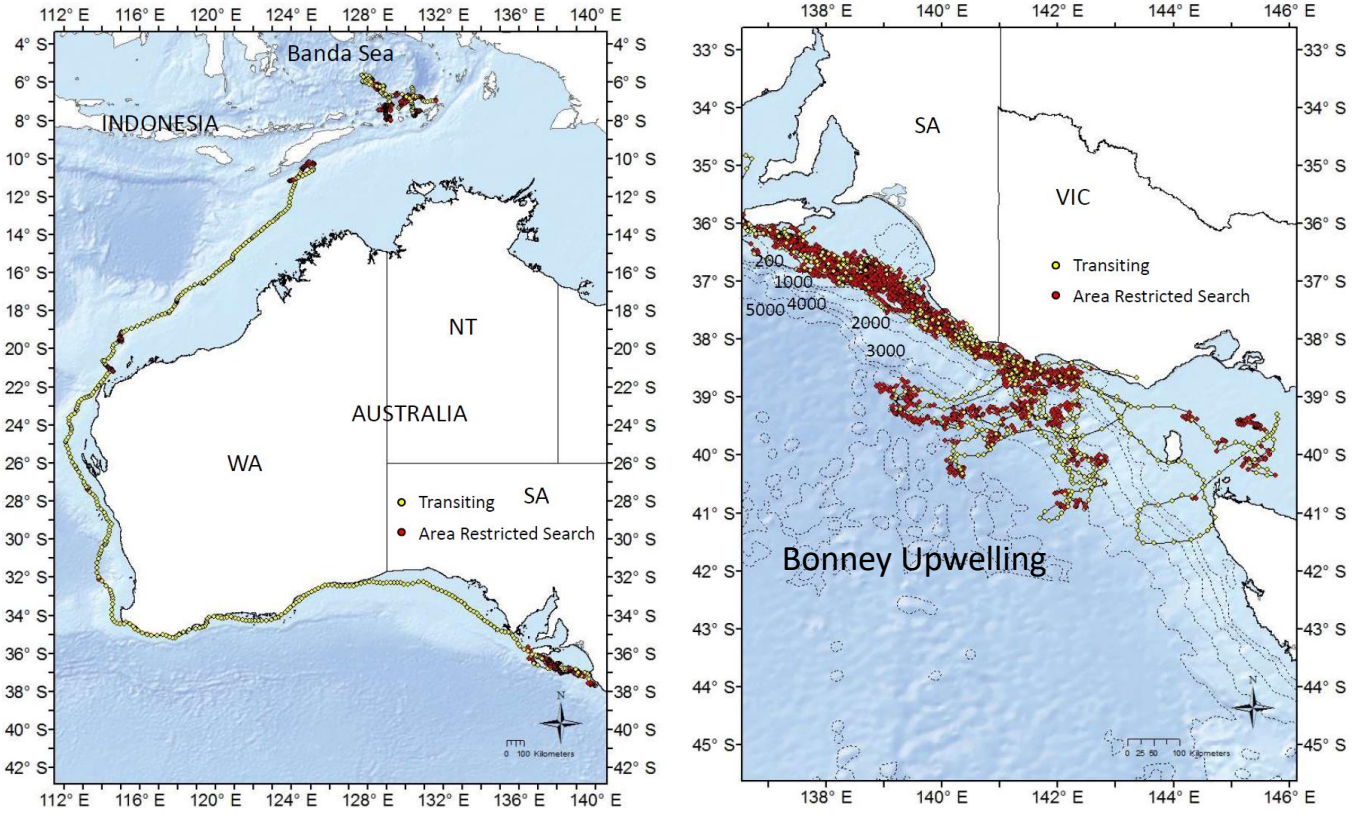
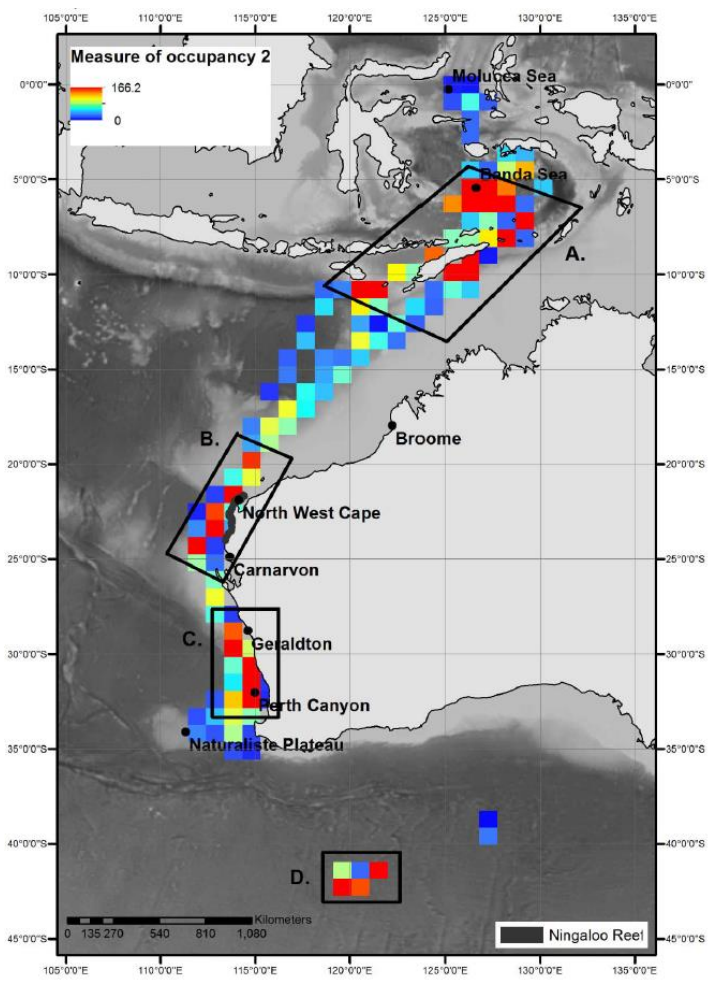
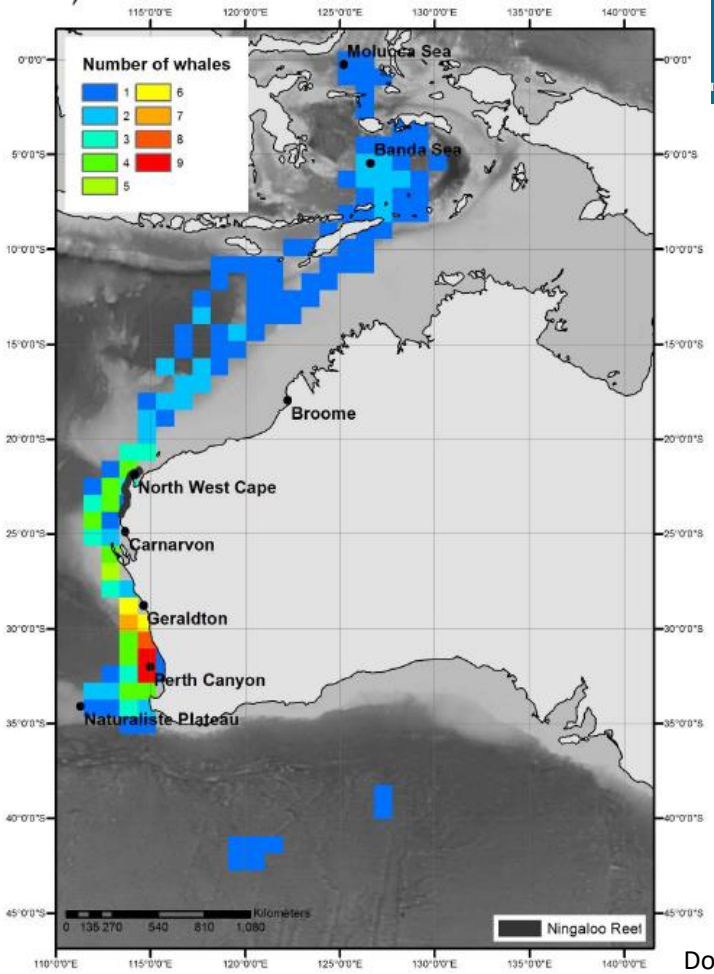
Refining biologically important areas (BIA)



Moller et al. 2015

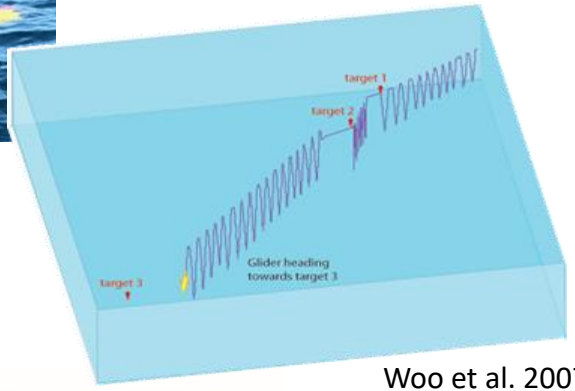




Double et al. 2014

Acoustic surveys - Gliders

IMOS slocum glider

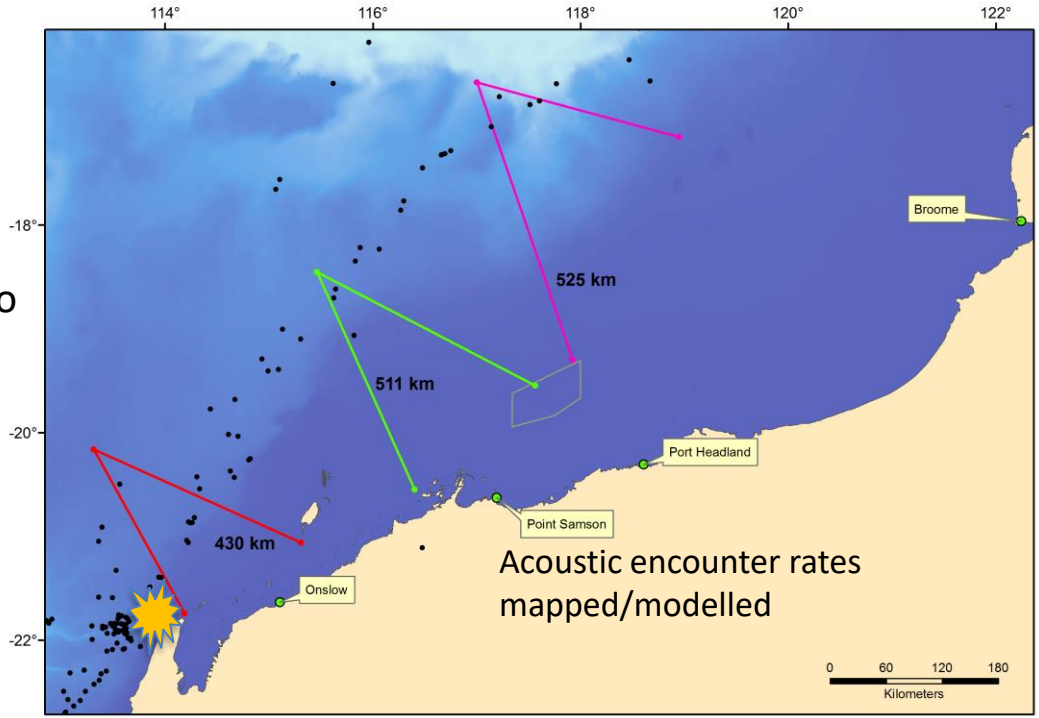


Woo et al. 2007

IMOS Integrated Marine Observing System

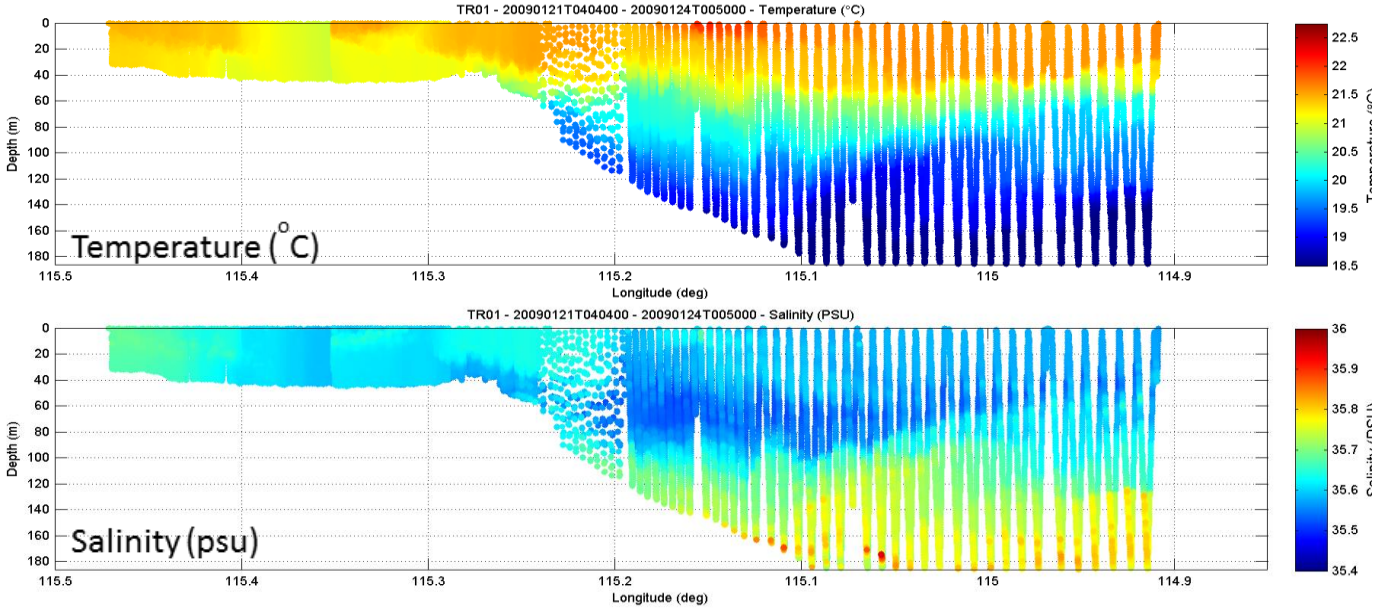
Proposed glider acoustic survey paths

- Three gliders
- Peak of the northern migration
- Two fixed noise loggers at NW Cape deployed Apr 2018 to document temporal pattern



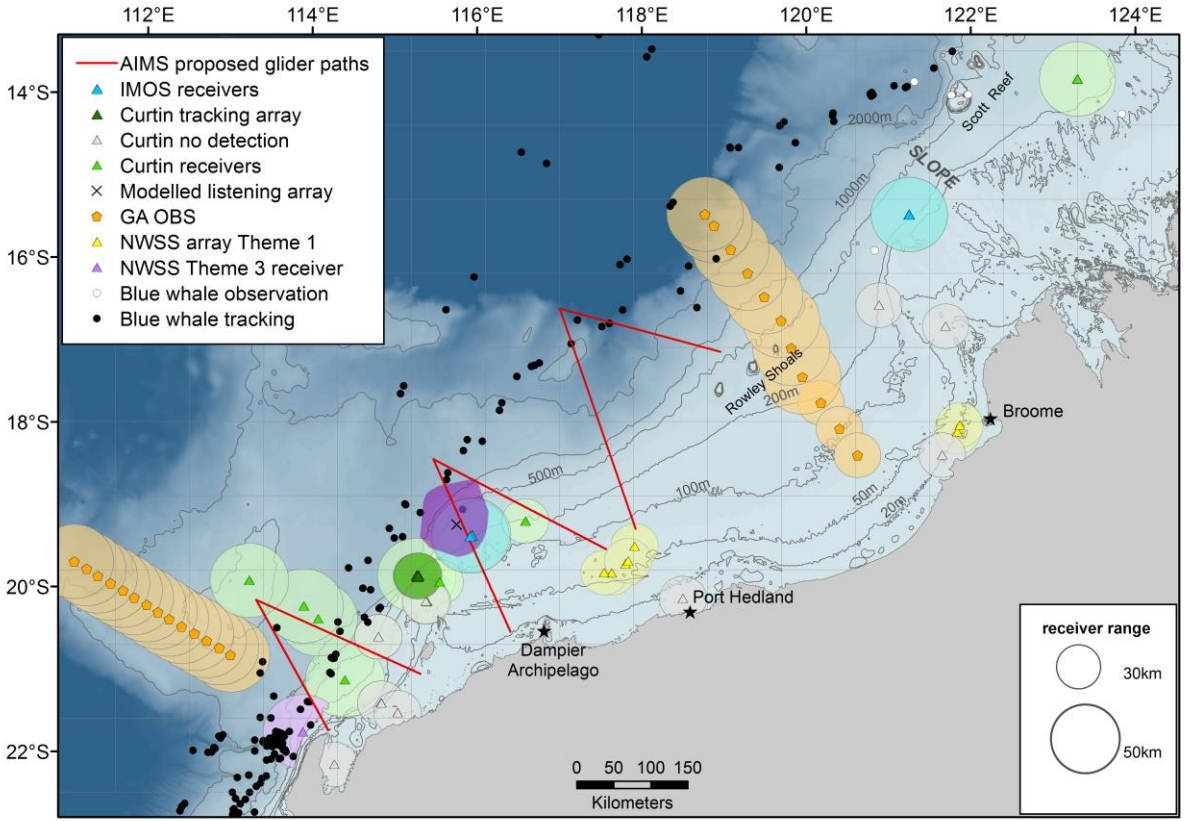
Black points are Double et al. tracking data

- Glider's usual job is to collect oceanographic data like this
- Here, can be used to understand whether the whales might target specific temperature fields or water bodies for example



Paul Thomson

Existing acoustic data



- ~85 deployments of fixed sea noise loggers since 2000
- Calculate sets of heading boundaries and detection range as in purple polygon
- Semi automated detection algorithm for blue whale calls
- Number of individual whales calling at an instantaneous point in time (e.g. 15 mins)

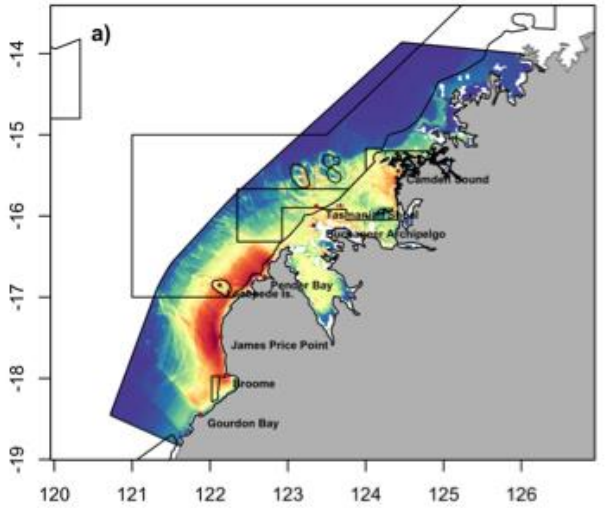
Other existing datasets

- Try to compile all existing data, limited but useful:
  - Marine Mammal Observer Data
  - Other satellite tracking data
  - Visual survey/sightings data

Blue Whale Study

Synthesising the data to map/model distribution

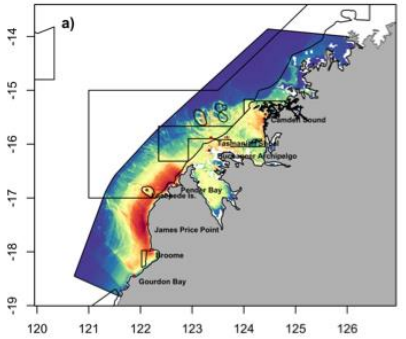
- Can map whale spatial use using time spent in area analyses or similar (tracking data), or number of whales/ calling whales/ acoustic encounter rates
- But with modelling can understand the variables driving their distributions
- Generalised additive model (GAM) or similar
- Whale/whale call presence, number of calling whales/ encounter rates
- Bathymetry, sea surface temp, chlorophyll a, etc



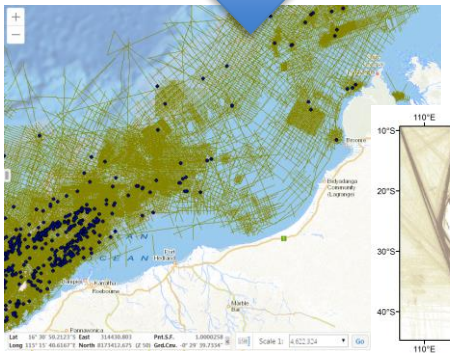
e.g. Humpback whale distribution model predictions

Assessment of potential threats

- Once we have distribution model/maps and refined BIAs
- Can assess overlap with vessel movement and industrial infrastructure & activities
- Threat may be highest where high density of the potential threat (e.g ships) overlaps with high use areas/high habitat suitability for whales
- High priorities in the CMP
- Improved understanding to assess impacts and base mitigation



Whale distribution map



Seismic surveys

Vessel traffic