Movement patterns and habitat preferences of two albatross species at a shared wintering site

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Background

- Chatham Albatross (*Thalassarche eremita*) and Northern Buller's Albatross (*Thalassarche bulleri platei*) breed sympatrically in the Chatham Islands, New Zealand.
- Preliminary tracking studies found Chatham Albatross migrate across the South Pacific and spend the austral winter off the coast of Chile and Peru[1,2,3].
- No data has been available on the non-breeding distribution of Northern Buller's Albatross.
- To implement suitable conservation and mitigation measures for endangered albatross species, patterns of habitat use at sea need to be identified.
- Global Location Sensing (GLS) loggers offer the opportunity to measure environmental variables like sea surface temperatures (SST) in combination with geographic location.

Objectives

- Do Northern Buller's Albatross share wintering sites with Chatham Albatross?
- How do birds utilise their wintering grounds over space and time?
- Can we identify distinct movement patterns and/or habitat preferences using GLS data?

Methods

- GLS loggers got deployed on the legs of 15 adult Chatham and 15 Northern Buller's Albatross between Nov 2007 and Nov 2008.
- The loggers (GLS-Mk5, 3.5g, built by the British Antarctic Survey (BAS)), included salt water immersion and water temperature sensors (accuracy ± 0.5°C, with a resolution of 0.125°C). Light levels were measured every 60 s, and the maximum value over each 10 min recording interval was logged.

- GLS light and temperature data were downloaded and processed using BAS software, unreliable positions excluded and dataset smoothed to account for random deviation of locations.
- Spatial distribution was derived from kernel density estimates, using ArcGIS 9.3.
- Remotely sensed sea surface temperature was downloaded from http://poet.jpl.nasa.gov.

Results

- Northern Buller's Albatross used the same wintering areas off the coast of Chile and Peru as Chatham Albatross, with highest densities between 10°S and 25°S (Fig.1).

Wintering distribution

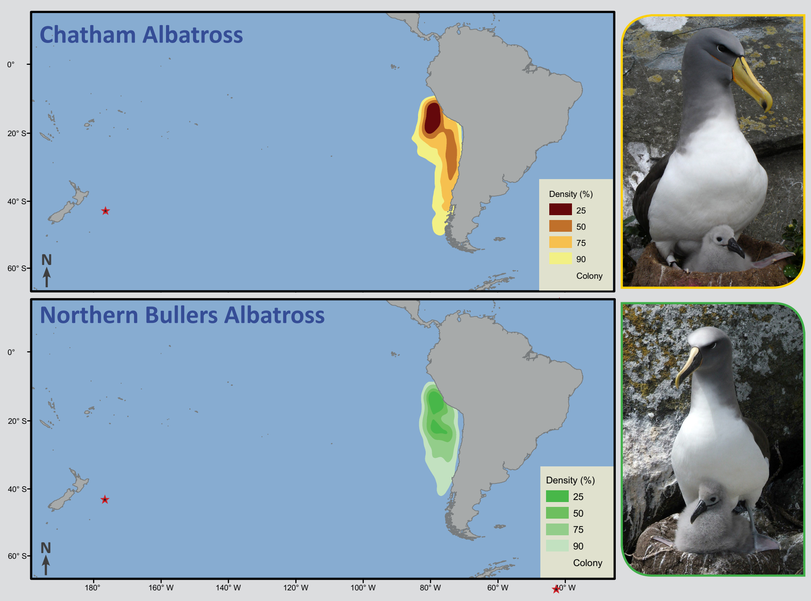

Figure 1: Wintering distribution of a) Chatham Albatross [n=15] and b) Northern Buller's Albatross [n=15]. 25%-50% kernels delineate core areas.

- Chatham Albatross were present at their wintering areas between February and July, whereas Northern Buller's Albatross occupied the area between March and October.
- Sea surface temperatures (SST) recorded via GLS loggers were ranging between 13°C and 24°C with an overall mean of 18.1 ±1.2°C for Chatham Albatross and 17.6 ±1.1°C for Northern Buller's Albatross. Monthly average SST revealed little change over time in the temperature range sampled by the two species (Fig.2).

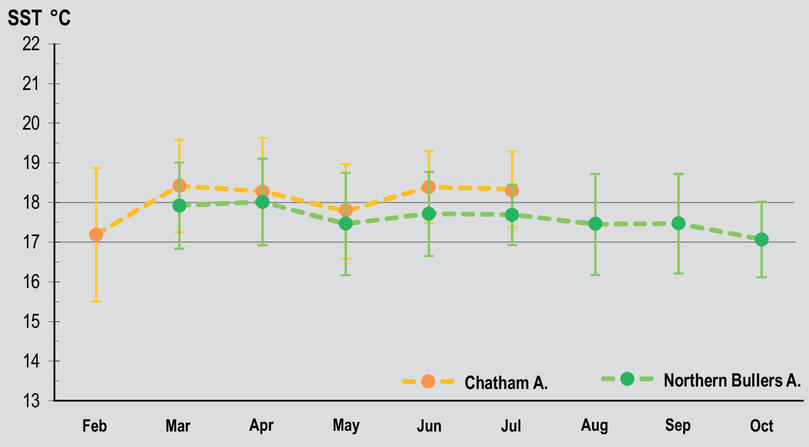

Figure 2: Average sea surface temperatures (SST) recorded by GLS loggers per month and species. Error bars show standard deviation.

- Both species showed northward movement along the Chilean coast until they reached latitudes around 20°S (Fig.3). This movement aligned (though at a slightly faster rate) with the northward shift of remotely sensed SST ranges from 17-18°C, which also did not proceed much further than 20°S. From here Chatham Albatross departed for their breeding grounds, whereas Northern Buller's Albatross moved southwards again into slightly cooler waters over the last three wintering months (Fig.2&3).

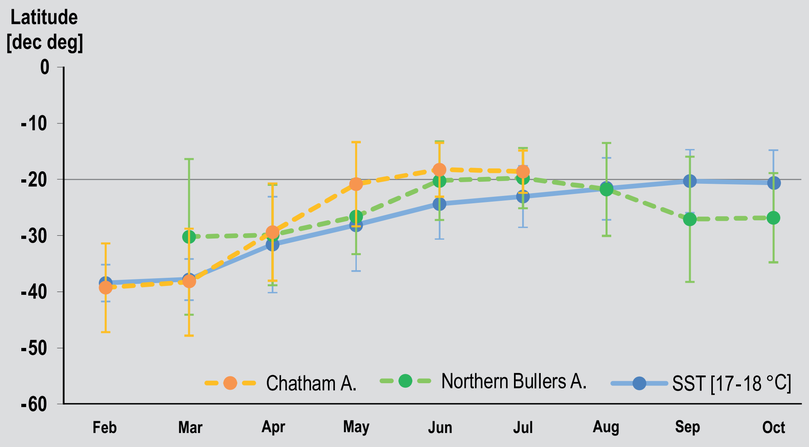

Figure 3: Average latitude per month shown for albatross species and remotely sensed sea surface temperatures (SST) at a selected range of 17-18°C. Error bars show standard deviation.

Conclusions

- This study indentifies sea surface temperature as a crucial factor in habitat selection for wintering Chatham and Northern Buller's Albatross.
- The seasonal shift of cooler water masses along the Humboldt Current seems to trigger the birds directional movement along the Chilean coast.
- The preference for water temperatures around 17-18°C appears to restrict the northward movement of the two species.
- Both species occurred in highest densities in areas where they displayed sedentary behaviour.
- Similar movement patterns found for Chatham Albatross in preliminary studies from 1997/98[2], pointing towards the identified habitat utilisation being a conservative general pattern.
- Northern Buller's Albatross shifting southward again still complies with their preferred temperature range but indicates other influential habitat parameters need to be explored.
- Global location sensing techniques (GLS) proved to be a valuable tool to identify relationships between SST and albatross distribution on a more accurate level.
- More detailed knowledge about the spatio-temporal patterns and determinators of habitat use will contribute to conservation and mitigation measures based on species specific behavioural patterns. It is clear from this study that these are subject to change over space and time.

References

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2. Nicholls, D. G. and C. J. R. Robertson (2007). Assessing flight characteristics for the Chatham albatross (*Thalassarche eremita*) from satellite tracking. Notornis 54(3): 168-179.
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Acknowledgements

We would like to thank MFish NZ for funding the project, the Chatham Islanders and DOC for logistical support and M. Bell, M. Fraser, D. Palmer, G. Robertson and others for helping out in the field.

Poster design by Matt Walters