Comparative foraging distribution and ecology of Tropical shearwaters (*Puffinus bailloni*) and Wedge-tailed shearwaters (*P. pacificus*) in Seychelles

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Introduction

As top predators, seabirds play an important role in the marine ecosystem and are considered a good bio-indicator of its health. It is particularly important to understand species habitat requirements and interactions with the environment in order to inform conservation management.

Study Area

Aride Island Nature Reserve (Seychelles) is an Important Bird Area (Rocamora & Skerrett, 2001) and hot-spot for biodiversity. It hosts one of the largest shearwater (and seabirds) colonies in the Indian Ocean (Skerrett et al. 2011) and it's one of the few tropical islands where two species of shearwaters breed in a mixed colony and yet their behaviour and movements at sea is poorly known.

Study species

Tropical shearwater (TS)
Puffinus bailloni
Little studied, year round breeder, Aride hosts the biggest world's population; forages mainly upon Mullidae and Carangidae.

Wedge-tailed shearwater (WS)
P. pacificus
Breeding season from October to March, Aride population stable, forages mainly upon Mullidae and Carangidae.

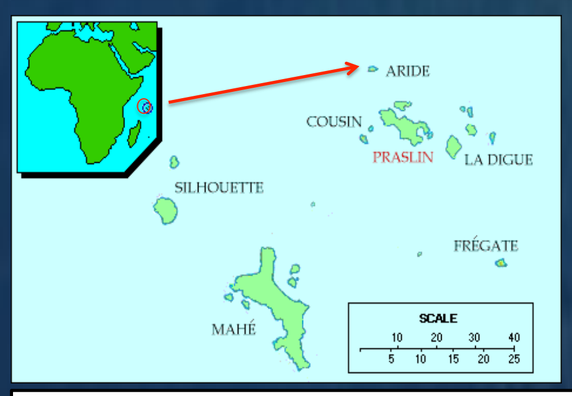
Objectives

The aims of this research are:

1) **to investigate the foraging behaviour of the two species during the breeding season, focusing on the diving depth.**

2) **to study their movements at sea and their habitat selection during the inter breeding season.**

3) **to assess potential threats in foraging areas**



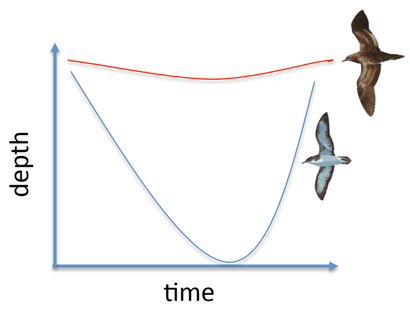
Methods

1) Foraging behaviour → A total of 36 and 276 days of foraging activity were recorded with TDR devices during the chick rearing on 30 and 22 breeding adults TS and WS respectively. The device weight was less than 1.5% of the body mass for both species.

2) Movements at sea and habitat selection → Ecological Niche Factor Analysis (ENFA) was applied to 25 and 20 inter-breeding trips (for TS and WS respectively) obtained with GLS to identify preferred habitat at sea (Basille et al. 2008). Kernels (95 and 50%) were used to analyse areas overlaps.

Results

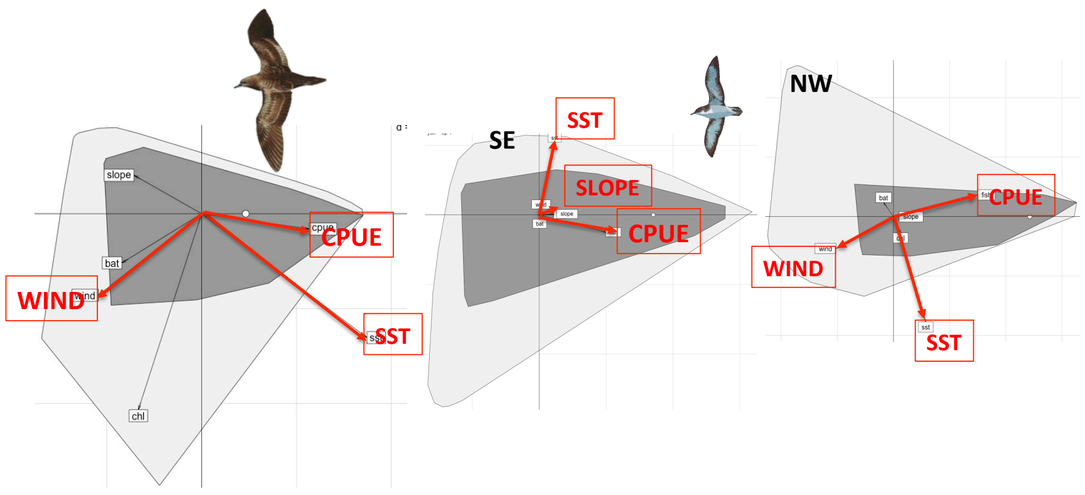
1. Foraging behaviour – breeding season



Wedge-tailed shearwater (N=22)
Maximum depth reached: 1-4 m
Mean maximum depth: water surface.
The wedge-tailed shearwater did not show any diving behaviour.

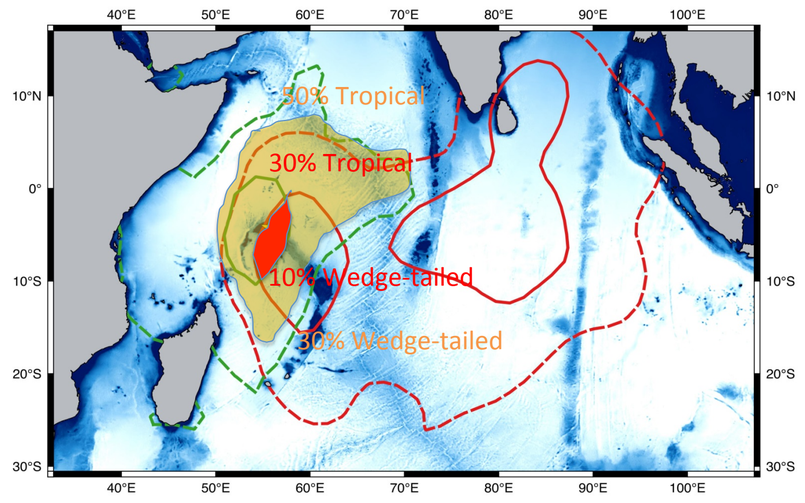
Tropical shearwater (N=30)
Maximum depth reached: 16 m
Mean maximum depth: 6.7 m

2. Habitat selection at sea – inter-breeding season

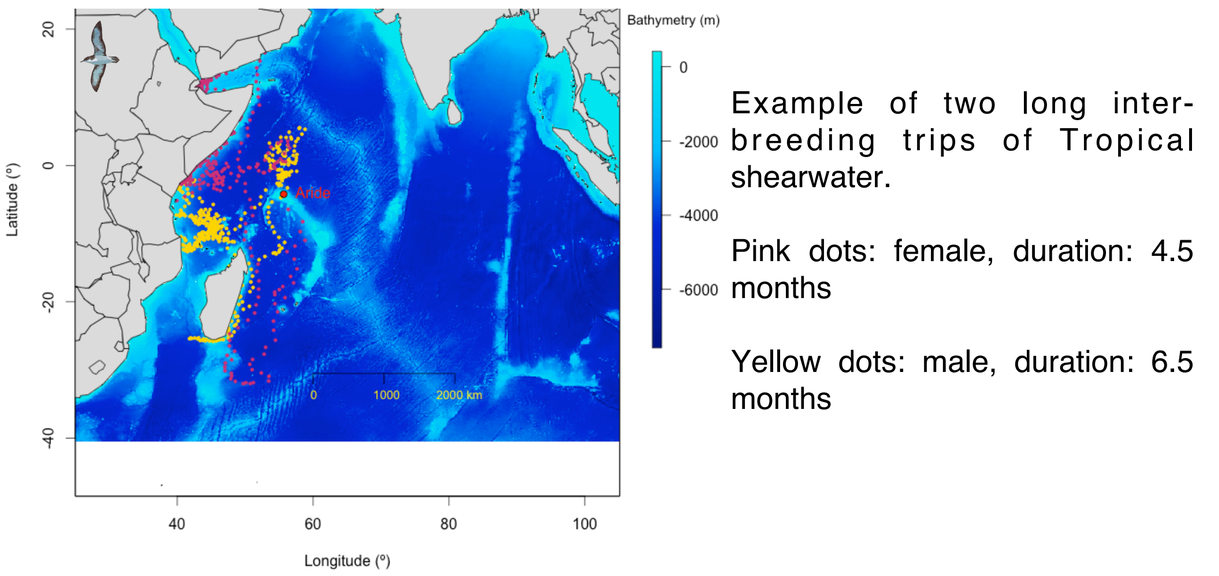


ENFA output showing habitat preferences during inter-breeding period for the wedge-tailed during the NW monsoon season (a) and the tropical shearwater during the SE (b) and NW (c) monsoon seasons. CPUE: Catch Per Unit Effort.

2. Movements at sea – inter-breeding season



Inter-breeding period kernels (95 and 50% dashed and continuous lines) of TS (green) and WS (red). The orange and the red areas indicate the % overlap zone of the 95% and the 50% kernel among the two species respectively. Results obtained for the WS differ from those from Carty et al. 2009.



Example of two long inter-breeding trips of Tropical shearwater.

Pink dots: female, duration: 4.5 months

Yellow dots: male, duration: 6.5 months

Conclusions and Perspectives

At sea, the foraging behaviour during chick-rearing differs strongly because the TS dives while the WS does not. During the inter-breeding period, both species select similar habitat features but the areas which they exploit show little overlap (see kernels). In particular, they both seem to select areas with high CPUE, which could indicate the association of these two species to schools of tuna. To conclude, despite the two species forage upon the same preys, we found spatial segregation at sea in both foraging behaviour (diving depth) and inter-breeding areas, which may indicate a shadow of past competition for resources. Moreover the association with tuna is an important information for the conservation of the species as the Western Indian Ocean is particularly exploited for tuna catch. Therefore, future conservation efforts should be focused on gathering more information on the interaction among shearwaters and sub-surface predators and on the competition among the two species. Identifying feeding areas of the TS during the breeding season, threats on land and at sea for both species, and continued monitoring of their breeding populations is also required.

Further information

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Basille et al. (2008). Assessing habitat selection using multivariate statistics: some refinement of the ecological-niche factor analysis. Ecological modelling.

Rocamora, G. & Skerrett, A. (2001). Seychelles. *IBAs in Africa and associated islands*. Pisces Publications *&* BirdLife International. Cambridge, UK.

Skerrett, A. and T. Disley. (2011). Birds of Seychelles, 2nd ed. Christopher Helm, London, U.K.

Catry, T., J. a. Ramos, M. Le Corre, and R. a. Phillips. 2009. Movements, at-sea distribution and behaviour of a tropical pelagic seabird.. Marine Ecology Progress Series 391:231–242 .