

A short study of the wedge-tailed shearwater (*Puffinus pacificus*) on Cousine Island, Seychelles.

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Abstract: The size of the colony of wedge-tailed shearwaters (*Puffinus pacificus*) on the island of Cousine in the central Seychelles was estimated for the first time, using belt transects and quadrat counts. The results indicate that Cousine hosts the second largest colony in the central Seychelles, smaller only than the one on Cousin. A ringing study performed at the same time show a high return rate between the 1996 and 1997 breeding season.

Keywords: Wedge-tailed shearwater, Cousine, population estimate, return rate, population density

Introduction

The wedge-tailed shearwater (*Puffinus pacificus* Gmelin, 1789) has a widespread distribution across the Pacific and Indian Oceans. Within the Seychelles archipelago it breeds on islands in the central Seychelles and the Amirantes (Diamond 1994). The largest known colonies in Seychelles exist on Aride and Cousin (Diamond 1994; Stoddart 1984), both of which are rat-free (Racey & Nicoll 1984). Since the eradication of a population of cats in the 1980's (Laboudallon 1984), the island of Cousine is now the only island in the central Seychelles devoid of alien mammals. There is an established colony of wedge-tailed shearwaters on the island (Penny 1974), however its size has never been determined.

Copsey (1997), in a census of lesser noddies (*Anous t. tenuirostris* Temminck, 1815), divided Cousine into three principle areas: a coastal plateau on the eastern side, a forested hill region and an unforested coastal rim, which, together with the beach, encircles the island. He provided baseline figures for the number of shearwaters nesting in the forest, but as this study was directed at lesser noddies, the unforested coastal rim was not taken into account, due to a lack of suitable nest sites for this species. As the wedge-tailed shearwater breeds in burrows (Penny 1984), the abundance of rocks and the availability of soil makes this area ideal nesting ground for this species.

The following study was conducted to determine a more comprehensive estimate for the wedge-tailed shearwater population breeding on Cousine. A ringing and biometric study was performed to aid in the long-term monitoring of the species on Cousine.

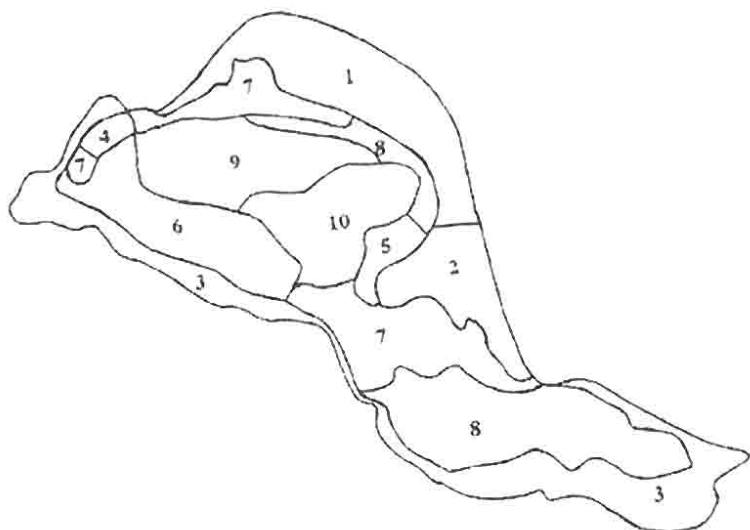


Fig. 1: The distribution of the major vegetation types on Cousine island (simplified from Bourquin 1997). 1: Plateau (open vegetation), 2: garden and houses, 3: bare rock, 4: bare rock and grasses, 5: cleared bamboo, 6: *Pandanus*, 7: *Pisonia grandis* woodland (sheltered), 8: *Pisonia* - *Ficus* spp. (sheltered), 9: *Euphorbia pyrifolia* - *Ficus* spp., 10: *Ficus Ficus* - *Pisonia* (exposed).

Methods

The survey was conducted between 22 and 23 August 1997. At this time of the year the shearwaters should have been constructing burrows (Stoddart 1984; Penny 1974). The estimated numbers of pairs are based on the number of apparently occupied burrows (Bibby et al. 1992) as this takes account of birds that were absent during the count. A vegetation map (Fig. 1) was used to identify the different areas and estimate their sizes, using a grid constructed from the map scale. A preliminary study of the eastern coastal plateau failed to find any nesting wedge-tailed shearwaters, so the total island population was considered to be limited to the forested hill region and the unforested coastal rim.

To census the forested hill region Copsey (1997) used twenty-six 20×20 metre quadrats. Within these he counted the number of shearwaters seen. No account was taken of nest site abundance. As the unforested coastal rim is less than ten metres wide in certain places, a belt transect methods was considered to be a more practical alternative to sample this area than quadrats. Each of the 269 (14×14 metre) grid squares lying within (or partially within) the study area were numbered consecutively. Twenty-seven of these (±10%) were selected using a calculator to generate random numbers. The squares were located on the ground using the map and in each a 10×2 metre belt transect was laid. Transects started from the middle of the square and the direction in which it was laid was decided randomly by picking cards labelled North, South, East or West. In squares that overlapped with the sea or forest, the transect started at the border of that region and followed one of three possible directions: along

the border at either side of the fieldworker or out into the study area. This was done to ensure that the edge of the unforested region was also included in the survey. None of the squares overlapped with both the sea and the forest.

Within each of these 20m² transects the number of adult birds and the number of apparently occupied burrows were recorded. A burrow was considered to be occupied if there were signs of a scrape, droppings or feathers, a method used in censusing Manx shearwaters in the U.K. (Bibby et al 1992). Burrows were only counted when their entrances fell within the transect. Each transect was surveyed twice by two fieldworkers.

By comparing the total number of birds seen to the numbers of burrows a ratio of birds : burrows was determined. Assuming that the ratios within the forested and unforested regions of the island were similar, the number of apparently occupied burrows in the forested region could be calculated. There were no clear indications that the densities in the two areas differed greatly. Finally, an island population estimate was calculated, based on the assumption that each apparently occupied burrow represented a breeding pair.

During 22 to 24 August 1997 a total of 30 wedge-tailed shearwaters were caught by hand after dark (mostly between 21.00 and 23.00). The birds were ringed, weighed and measured (wing, tail and tarsus) before release.

Results

I. Census

A summary of the number of birds and burrows found within each region of the island is given in Table 1

The estimated number of nesting pairs is equal to the estimated number of apparently occupied burrows. Therefore the total estimated population of wedge-tailed shearwater on Cousine in 1997 is 31,095 pairs

II. Biometric study

A total of 31 birds were caught, including 5 (16%) recaptures from 97 birds ringed on the island by G. Rocamora in 1996. All five recaptures were in areas where the 1996 ringing group had been ringing. If the six unbanded birds caught in a different part of the island in 1997 are excluded, the proportion of recaptures becomes even higher.

Table 1: The total number of birds found and the estimated number of burrows for the different vegetation zones of Cousine Island.

Region	Approx. area (m ²)	no. of birds	est. no. of burrows
Forested hill	165,586	426	23,844*
Unforested coast	41,200	27	7,251
Coastal plateau	50,214	0	0
Total	257,000	453	31,095

* figure calculated from a bird : burrow ratio of 0.284 derived from the unforested coastal rim

Table 2: Biometrics of the wedge-tailed shearwater on Cousine Island.

Measurement	This study (mean \pm s.e.; n=30)	Maclean (1993) (mean)	P-value (T-test)
Tarsus	48.6 \pm 0.2	46 (n=20)	< 0.001
Wing	288.6 \pm 0.9	290 (n=21)	n.s.
Tail	13.0 \pm 0.1	12.6 (n=20)	<0.001
Weight	371.2 \pm 4.9		

20%. Measurements were taken from all but one recaptured bird. These are summarised in table 2, together with data from Maclean (1993).

The weights in 1997 were significantly heavier than those of the birds caught in 1996 (mean for 1996 = 342.3 \pm 2.7g., n=94; paired sample T-test: P<0.001).

Discussion

The only islands in the Seychelles for which population estimates were available were Cousin and Aride. 35,000 and 20,000 pairs, respectively (Diamond 1994). The results of this study have revealed Cousine to hold a significant proportion of the population of wedge-tailed shearwater breeding in central Seychelles. Both Cousine, Cousin and Aride are granitic islands with a rugged topography (Braithwaite 1984). Perhaps not surprisingly Cousin and Cousine, which are of similar size (28.6 and 25.7ha, respectively), play host to very similar densities of wedge-tailed shearwater: 0.12 pairs per m², for both Cousin and Cousine). Aride, which is much larger (68ha), has a much lower density of 0.03 pairs per m². It is not clear what causes this difference. The forest on Aride has a thicker soil than on both of the other islands (K. Kraaijeveld pers. obs.), which might be less suitable for breeding wedge-tailed shearwater. The other species of shearwater breeding on the Seychelles, Audubon's (*Puffinus lherminieri* Lesson, 1893), however is much more common on Aride than on Cousine (K. Kraaijeveld pers. obs.). It is noteworthy that at the time of the cat eradication program on Cousine Audubon's was the common species and wedge-tailed more scarce, while now the situation is reversed (P. Hitchins, pers. comm.).

In spite of the small sample size, return rates to Cousine appear to be very high and the shearwaters seem to be faithful to their nesting site between years. The Cousine population appears to be significantly longer-legged and -tailed than those sampled by Maclean (1993), but this may well prove to be a difference in measuring technique, especially since the wing lengths do not differ. More interesting is the observation that the same population averaged heavier in 1997 than in 1996. Several factors might account for this difference, for example the earlier sampling date in 1996 (July), which would imply that the shearwaters gain weight during the start of the breeding season. Food supply may also have been better in 1997 than in 1996, which, in view of the generally poor season for lesser noddies, would be surprising. More data are needed to answer these questions.

The results of this study stress the importance of the islands of Aride, Cousin and Cousine for the protection of seabirds breeding in the Seychelles.

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