NOTEBOOK

Seabirds on Kakabia Island, Indonesia, May 2022

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Pulau Kakabia is a small island, located in Sulawesi Tenggara, Indonesia (Figure 1). It measures 1.24 km on its longest axis (north to south) and 0.56 km at its broadest, encompassing an area of approximately 0.45 km^2 with a perimeter of c.3.33 km. There is no permanent human habitation on the island, but fishermen make temporary camps there. One such camp was occupied by two men when we visited the island in May 2022. It is approximately 63 km north-east of the nearest permanently inhabited island, Kalaotoa in the Selayar Regency of South Sulawesi. It is known to be one of only six islands supporting significant numbers of Pelecaniforme seabirds in the Flores and Banda Seas (de Korte & Silvius 1994, de Jong 2011).

We visited Kakabia Island (Plate 1) for six hours on 3 May 2022, spending one hour ashore in a deep bay on the north-east side of the island, and the rest of the time observing the north and west coasts from the *pinisi Ombak Putih* moored about 300 m offshore, or from a skiff running within 50 m of the west coast. We took notes on the species and numbers of all birds encountered. The east coast of the island was not inspected. Because this is a potentially important site for seabird breeding, most of our attention was concentrated on seabirds, but notes were also kept of any landbirds sighted incidentally. While ashore, areas just above the high tide mark were scanned for mammal footprints and/or droppings.

During our approach to the island from the north-west (bearing 240°), we watched continuously from first light (05:30) until we reached a position about 300 m off Kakabia at 09:50, except for the period from 07:30–08:00. During our departure towards the west-north-west (bearing 280°), we watched continuously from 15:40 to 17:40 (near dark). On both transects we counted all birds within a 300 m strip on either side of the boat. Nearly all birds sighted were in flight, making it impossible to accurately estimate densities (Tasker 1984). However, density indices were estimated in 10-minute periods, equivalent to approximately 2 km of travel at the vessel's cruising speed of 12 km/h.

Figure 1. Map showing the position of Kakabia and the nearest inhabited landmass, Kalaotoa Island, within the Flores Sea. The inset (A) shows a close-up of Kakabia Island. The red line shows the course of our cruise close to shore.

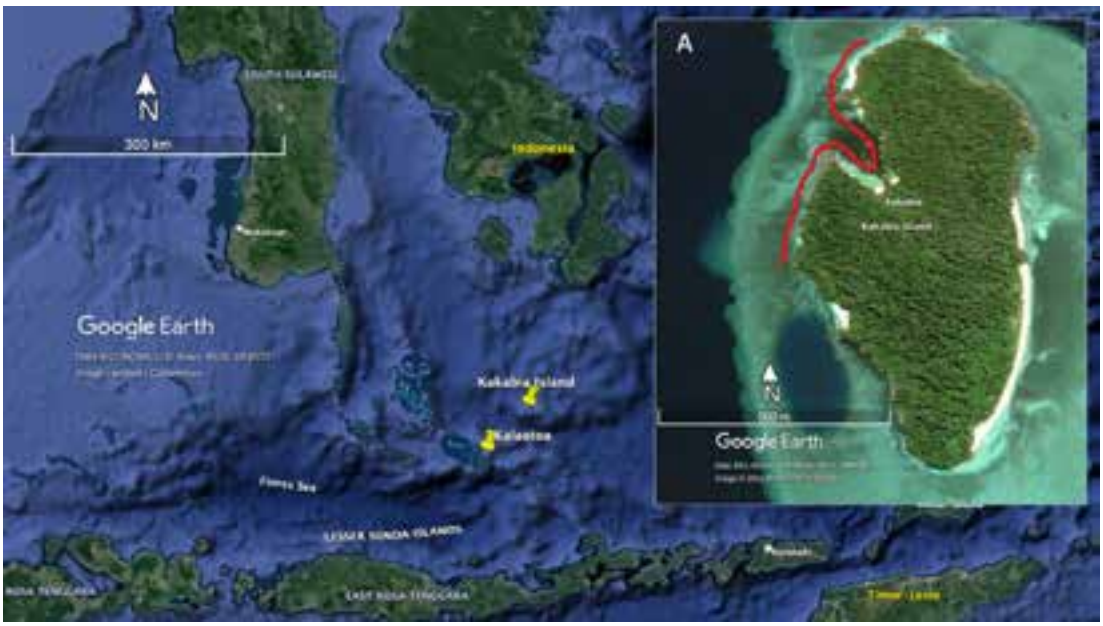

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Plate 1. Kakabia Island, Indonesia, from onshore, May 2022.

Habitat

Kakabia is a coral island with a broad fringing reef. Although altitude was not determined, it appeared to be <50 m at its highest point. Inspection of the island on Google Earth shows it to be entirely covered by dense tropical rainforest, showing no signs of any logging or cultivation, although small areas near the north-west cove may have been cleared at one time. The fringing vegetation was extremely dense, preventing us from accessing the interior of the island. Much of the north-west coast comprises low limestone cliffs, created by uplifted coral. These are riddled with solution cavities that provide excellent potential nest sites for ground-nesting seabirds. No sign of land mammals was found.

Species accounts

White-tailed Tropicbird *Phaethon lepturus*

One seen at sea 40 km north-east of the island.

Great Frigatebird *Fregata minor*

An estimated 80 birds were circling over and near the island, but none was seen to land. All appeared to be in immature plumage (Plate 2), with varying amounts of white on the head and breast. None showed any sign of a red gular pouch.

Masked Booby *Sula dactylatra*

Two sighted at sea within 10 km of Kakabia Island.

Red-footed Booby *Sula sula*

Recorded on both the approach to and the departure from Kakabia, with the first sightings approximately

Plate 2. Two immature Great Frigatebirds *Fregata minor*. Kakabia, May 2022.

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Plate 3. Red-footed Booby *Sula sula* perched in the crown of a tree. Kakabia, May 2022.

44 km from the island. In total, 665 were counted during the approach transect, including a maximum flock of 450 counted in an area 8 km north-east of the island. Most birds were actively feeding. Only 105 were counted during the departure transect, in 13 flocks, with all but two flocks flying towards the island. On arrival, we estimated a combined total of 400–600 birds in the air over the island or perched in the crowns of trees (Plate 3). Some birds in the canopy were sitting on nests; at least 12 nests were visible from the north-west cove. However, contents could be discerned in only two, both of which contained small, downy chicks. Some birds appeared to be sitting very low in the nest, suggesting that they were incubating.

Brown Booby *Sula leucogaster*

Only one was seen during the approach and departure transects, but 15 were seen at sea close to the island, and about 150 either flying over the island or perched on rocks on the coast. Four nests (Plates 4 & 5) were seen on flat areas at the top of the low cliffs, all with single chicks, two of which were fully feathered, with only a little down on the head and appeared almost ready to fly. The other two were almost adult sized, but still mostly covered in down.

Brown Noddy *Anous stolidus*

Forty were seen flying close to or over the island, including two flying over the canopy carrying sticks. None was seen on a nest.

Bridled Tern *Onychoprion anaethetus*

At least eight pairs were occupying potential nest sites on the low cliffs (Plate 6), but no evidence of eggs or chicks was seen. Another 10 were perched at the edge of the cliffs.

Black-naped Tern *Sterna sumatrana*

Eleven pairs were perched in sheltered cavities within the low cliffs; no eggs or chicks were seen.

Plate 4. Brown Booby *Sula leucogaster* with downy chick. Kakabia, May 2022.

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Plate 5. Brown Booby with downy chick. Kakabia, May 2022.

Pacific Reef Heron *Egretta sacra*
Two seen along the shoreline.

Blue-tailed Bea-eater *Merops philippinus*
Approximately 40 were seen scattered along the shore, perching on bushes and low branches.

Collared Kingfisher *Todiramphus chloris*
One was perched 5 m above the water on a low cliff.

Black-naped Oriole *Oriolus chinensis*
At least 15 were present in the crowns of low trees close to the shore.

Discussion

Approximate numbers of seabirds breeding on Kakabia were given by de Korte & Silvius (1994), based on reports up to 1989. They estimated breeding populations (pairs) of 30–100 Brown and Masked Boobies, 1,500–3,000 Red-footed Boobies, 100–200 Great Frigatebirds, 10–20 Black-naped Terns and 20–40 Bridled Terns. The island was said to support a 'large colony' of Great Frigatebirds as recently as 1997 (Coates & Bishop 1997, quoted in Gauger Metz & Schreiber 2020). Brown Noddy was listed as a possible breeder.

Given the incomplete coverage of the island, it is not possible to provide estimates for total populations of seabirds on our visit. Our observations suggest that numbers of Brown Boobies and Black-naped and Bridled Terns remain similar to those reported by de Korte & Silvius (1994), but that numbers of Red-footed Boobies and especially Great Frigatebirds have probably diminished. We saw no evidence of breeding by frigatebirds. Given that the breeding cycle of the Great Frigatebird lasts approximately 7 months, and that we saw no adult-plumaged males, it seems unlikely that more than a few Great Frigatebirds now breed at Kakabia. Similarly, we saw no Masked Boobies on or over the island. Given that this species is now quite rare in Indonesian waters (J. Eaton *in litt*. 2022), it may have disappeared altogether as a breeder on Kakabia.

The low cliffs that appeared to be the favoured breeding place of Brown Boobies and the two terns extend only about two-thirds of the way around the island. Extrapolating the numbers of birds counted on the closely observed part of the north-west coast suggests that it is unlikely that the island supports more than 100 pairs of any of these ground-nesters. No estimate of Brown Noddies was possible, but the relatively small numbers seen suggest that this species is also represented by fewer than 100 pairs. It was listed as a possible breeder by de Korte & Silvius (1994) but the fact that we saw some carrying nest material suggests that they do breed. Red-footed Boobies continue to be the most numerous breeder and the numbers of birds seen at sea and on the island suggest a total breeding population of at least several hundred pairs.

Judging from the size of the Brown Booby nestlings, they were 80–100 days old, meaning that they hatched in late January or early February (Schreiber & Norton 2020). Assuming an incubation period of 42 days, eggs were probably laid in December, earlier than records from Johnston Atoll in the central Pacific (Schreiber & Norton 2020). Red-footed Boobies seemed to be somewhat later, as no large chicks were seen. Laying probably took place in March, similar to the schedule at Johnston Atoll (Schreiber *et al.* 2020). Observations during the approach to and departure from the island suggested that most Red-footed Boobies foraged within 40 km of the island, returning there at night to roost.

By the standards of colonies elsewhere, the numbers of seabirds breeding on Kakabia Island is small. Moreover, none of the species breeding there is considered to be globally threatened. However, as one of a very small number of such colonies in Indonesian waters, it deserves serious protection as the extirpation of colonial seabirds from only a few islands could cause a significant range contraction for the species involved. On our visit, we saw no

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Plate 6. Pair of Black-naped Tern *Sterna sumatrana*. Kakabia, May 2022.

signs of serious threats to the breeding seabirds, although de Korte & Silvius (1994) mention the presence of rats, almost certain to be present where a fishing camp exists. De Korte (1989) referred to possible exploitation of phosphate (guano) deposits on the island, something that occurred in the early part of the twentieth century (de Korte & Silvius 1994). Mining would create a significant threat to most species, but there was no evidence of any such activities at present. Continued monitoring of seabirds at this site appears warranted.

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