SEABIRD ISLANDS No. 43/1

Raine Island, Great Barrier Reef, Queensland

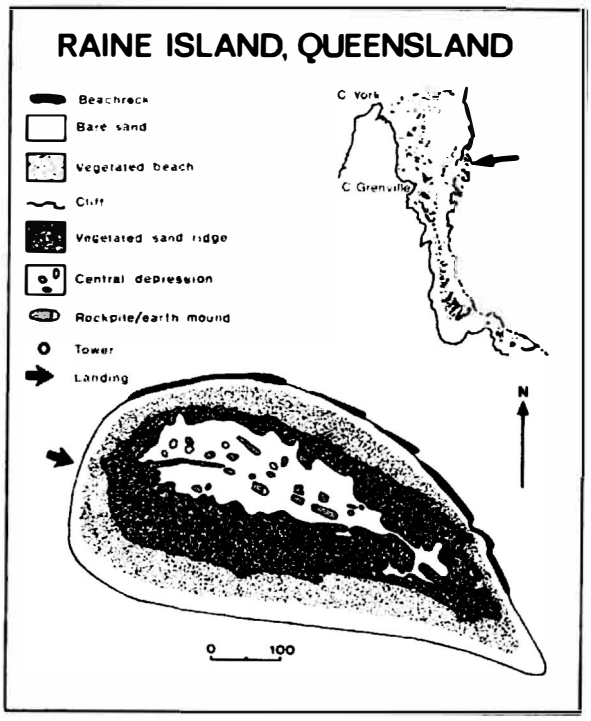
(First Revision, 1986)

The original description of Raine Island (Warham 1977) appeared in *Corella* 1: 45-47, September 1977; it was based on data available to 1961. The revision incorporates additional data available to December 1985.

Location: 11°36'S., 144°02'E.; situated on a small, detached reef on the seaward side of the Great Barrier Reef, 88 kilometres north-east of Cape Grenville, Qld.

Status: A Fauna Refuge, and a Departmental and Official Purposes Reserve under the Trusteeship of the Qld Department of Community Services. Access to the island is now strictly controlled. Permission is required to visit the island, obtainable through the Director, Qld National Parks and Wildlife Service.

Description: About 21 ha; 700 m by 350 m, the island is teardrop shaped with the tip towards the south-east. It can conveniently be divided into four concentric zones. 1. THE BEACH. A wide beach of coral sand slopes steeply up from the reef flat to a crest slightly above the spring high water level, then drops slightly into a depression with some old dune ridges along the southern side. The beach then rises again towards the cliff. The beach slope outside of the crest is unvegetated. The inner area, called the Vegetated Beach, is covered with vegetation for much of the year, except in the summer when thousands of Green Turtles *Chelonia mydas* nest on the beach and in most years remove all vegetation from it. A broken line of coralline beachrock runs along the northern side, below high water level. 2. THE CLIFF. The beach ends abruptly at the base of a low cliff that is cavernous and broken away in many places. The rock is formed by the cementing action of guano phosphates that are leached through the coral sand. Most of the cliff consists of bare rock, to which a few low plants cling in places. 3. THE VEGETATED RIDGE. A ridge of sand with an underlying layer of rock runs around the island, enclosed by the cliff. The height of the ridge is greatest



along its southern portion where it rises to its maximum height of about ten metres above sea level. The entire ridge is covered by a dense, low mat of vegetation rarely reaching a metre in height. 4. THE CENTRAL DEPRESSION. In the middle of the island, surrounded by the vegetated ridge, is a broad, open area, the remnant of the old guano mine. It is almost perfectly flat, with large areas devoid of vegetation and is dotted with mounds of broken rock and earth.

Vegetation is a low mat of grasses, herbs and shrubs in which twelve plant species have been been regularly recorded since 1979. New species occasionally appear on the beach from drifted seeds, but none has ever survived the intense turtle activity each summer. Drifted species include *Barringtonia asiatica, Calophyllum inophyllum* and coconut *Cocos nucifera.* Plants recorded are: Grasses *Lepturus repens, Dactyloctenium aegyptium* and *Elusine indica*; creepers *Ipomea micrantha* and *Tribulus cistoides*; herbs *Boerhavia diffusa* and *Portulaca oleracea*; shrubs *Abutilon indicum, Sesbania cannabina, Achyranthes aspera, Amaranthus leptostachys* and *Cleome viscosa.* The beach vegetation is mainly *Lepturus* grass with scattered *Elusine, Tribulus, Cleome, Sesbania* and *Abutilon.* In most years dense stands of *Sesbania* grow close to the cliff. The cliff is mostly bare rock with a few herbs *Portulaca* and *Boerhavia.* The ridge vegetation is dominated by *Achyranthes, Tribulus, Lepturus* and *Abutilon,* with some *Sesbania* and *Cleome.* The central depression has large areas of almost pure *Tribulus* with some stands of *Sesbania* and occasional other species.

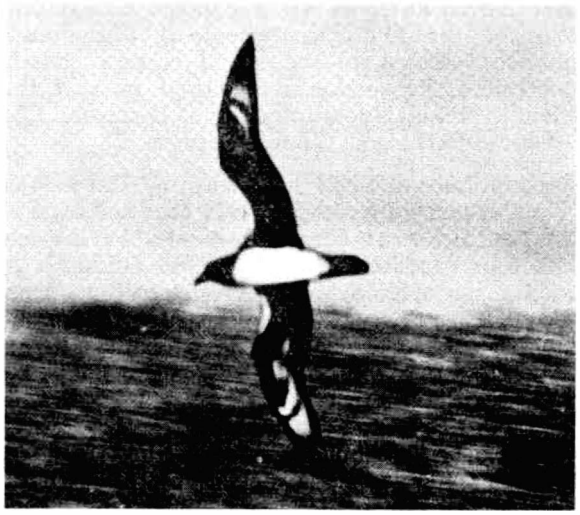
Raine Island should be considered an oceanic island as well as a Barrier Reef island, a situation that is reflected in its seabird fauna. The island is surrounded by waters that exceed 100 fathoms and descend to over 2 000 fathoms to the east.

Landing: by dinghy, from a vessel anchored at the reef edge at the western end of the cay. This anchorage can only be used in south-easterly conditions with wind strengths below 30 knots. In north-westerly, cyclonic or rough conditions, there is no safe anchorage. Local knowledge is essential for safe navigation in the reefs of this area.

Ornithological History: Since the visit of Hindwood *et al.*[2] in 1961, the following events have taken place. In November 1973 an expedition of the Royal Society and universities of Queensland, led by D. L. Stoddart[3], visited the island for five days surveying landform, vegetation and fauna. Since that time Qld National Parks and Wildlife Service officers B. R. King and C. J. Limpus have made visits to monitor vegetation, turtles, and bird populations. These visits were in March 1975, December 1976, December 1977, October/November and December 1979, June and December 1980, June and December 1981, July and November/December 1982, April and July 1983, April, July and December 1984, and in July and December 1985. Further visits are planned. The length of visits has ranged from four days to five weeks. Studies began in 1979 on several species of birds and on Green Turtles. In April 1981, the Raine Island Research Act established Raine Island, Pandora Cay and MacLennan Cay as areas of specific scientific interest and provided for continuing research and conservation. B. Reville studied frigatebird breeding in 1982.

Breeding Seabirds and Status

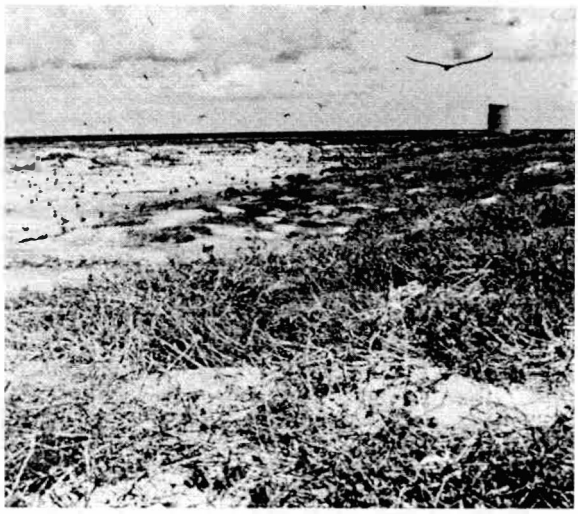
Pterodroma arminjoniana Herald Petrel — Present from about January to at least August. Initially recorded by Warham[5] in February 1959, it was found again on Raine Island by D. Seton in June 1980, and has been present each year since then. The first confirmed record of breeding was made in July 1982[3]. The size of the population is not certain but it appears to be very small (the highest count to date is seven individuals).



• *Herald Petrel in flight over Raine Island.*

Puffinus pacificus Wedge-tailed Shearwater — The most recent population estimate in December 1982 was 5 800 active burrows. Burrows are located over most of the vegetated ridge, on earth mounds in the central depression and in cliff cavities. Eggs are laid in late November.

Sula sula Red-footed Booby — Nesting recorded on all visits with all stages of eggs and young present. Probably breeds all year round with no discernable peak in numbers. The highest count was 76 nests in November 1979. Nests are



• *Part of the central depression with nesting Brown and Masked Boobies and the old beacon in the background at right.*

situated on shrubs of *Abutilon* and *Sesbania* of the vegetated ridge and central depression. Up to 300 juveniles and immatures roost on the shrubs of the ridge.

Sula dactylatra Masked Booby — Breeds from about July to March or April. Eggs are laid about September or October. Almost all nesting is in large colonies in flat, open areas of the central depression. One area within the central depression is occupied by a "club" of about 400 immature and non-breeding birds. About 2 500 pairs breed annually.

Sula leucogaster Brown Booby — A few nesting pairs are occasionally recorded in July but most courtship and breeding starts soon afterwards. Some pairs are still laying in early November. Nesting is on the ground throughout the vegetated area with the lowest numbers on the beach and the highest in the central depression. Large numbers of birds rest by day around the outer beach slope. Over 6 000 pairs breed annually.

Fregata minor Great Frigatebird — Confirmed as a breeding species in June 1980 by D. Seton. Breeding in very low numbers in mid-year, probably with never more than twenty nests. Nest are isolated from one another and occur among the larger groups of *F. ariel*.

Fregata ariel Least Frigatebird — Breeds in mid-year. Courtship begins as early as April, or even in March. By July, courtship is over and nests contain single eggs or downy chicks. In November and December, well-feathered chicks and flying juveniles occupy the nest sites. About 2 000 pairs nest each year.

Nesting is in dense colonies on several of the rockpiles and earth mounds of the central depression and in a series of discontinuous groups along much of the length of the northern vegetated ridge.

Phaethon rubricaudu Red-tailed Tropicbird — Breeds all year with the greatest numbers in mid-year. The number of nests ranges from 21-29 in December to 82-98 in June and July. Nests are scrapes in the sand in the shelter of cliff overhangs and caves, except for a few nests under shrubs above the cliff and on the beach.

Larus novaehollandiae Silver Gull — Breeds in June and July when eggs and young chicks are present. Nests are usually solitary and are placed on the ground under the cover of a suitable shrub or clump of grass on the vegetated ridge. The largest number of nests yet recorded was five in July 1983. Birds are present in small numbers all year with the total number never exceeding thirty.

Sterna sumatrana Black-naped Tern — Breeding in June 1981 and July 1983, on the beach and on open ground above the cliff at the south-eastern tips. The largest colony was 140 nests. Present in small flocks on all visits.

Sterna fuscata Sooty Tern — Breeds in mid-year on all nearby islands, but did not breed on Raine Island from 1980 to 1983. A small number of birds are always present on the island. Previous breeding recorded in "Great numbers . . ."[1]. Breeding colonies were present in July 1983, 1984 and 1985 with up to 600 birds nesting. Nesting is in small colonies of less than 100 pairs, scattered along the vegetated beach of the southern side.

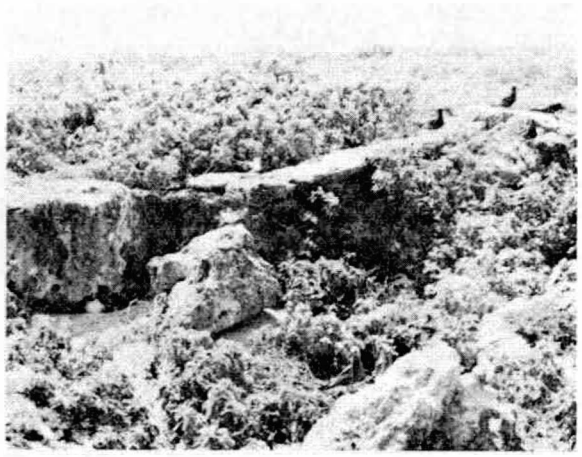
Sterna anaethetus Bridled Tern — Breeds all year in variable numbers, with no discernable summer or winter peak. Up to 150 pairs have been estimated. Eggs have been recorded on all visits. Nests are scrapes in the substrate of holes in the cliff or rockpiles in the central depression, also under rocks, shrubs and other suitable cover. The hollow carapaces of dead Green Turtles

that lie scattered about on the beach and central depression are a popular, though somewhat malodorous, nest site.

Sterna bergii Crested Tern — Breeding in November 1979 in two small colonies, totalling 76 nests. Present in small numbers, generally fewer than 30 birds, on all other visits.

Anous stolidus Common Noddy — Breeds in mid-year, nesting on clumps of *Lepturus* grass over the entire vegetated beach, vegetated ridge and also in the central depression in areas of *Tribulus* and on the rockpiles. In July, 1982, over 17 000 nests were estimated.

There is also an extremely large roosting population of this species and *A. minutus* that may exceed 100 000 birds.



• *Cliff habitat with nesting Red-tailed Tropicbirds, Bridled Terns and Common Noddies.*

Factors Affecting Status

Silver Gulls and resident Buff-banded Rails *Rallus philippensis* predate unattended eggs and small chicks. Rufous Night Herons *Nycticorax caledonicus* confine their predation to turtle eggs and hatchlings, but probably take occasional eggs and chicks of birds. In April 1983 the breeding population of night herons was estimated at 2 000 adults.

No human predation of seabirds and eggs has been recorded for many years, but the activities of the occasional foreign clam-poaching vessels in the area are suspect. Disturbance by infrequent, careless human visitors, whether researchers or illegal tourists, can cause losses of eggs from gull predation. Sometimes low overflights by aircraft cause a brief but massive disturbance. In June 1985 three survivors of a wrecked yacht took refuge on the island, but were evacuated before they had recourse to eating birds and eggs.

From October to April, Green Turtles nest on the island. In an average year the nesting population may be 3 000 to 5 000 females every night from November to February. On the night of 18 December 1984, 11 500 nesting Green Turtles were counted. Their digging removes all vegetation from the 100 m wide beach; most nests of seabirds there (mainly *Sula leucogaster*, with a few *S. sula*, *S. dactylatra*, *Sterna anaethetus* and some *Fregata ariel*) are destroyed before the young fledge; the exception is *F. ariel* whose flying young are able to avoid the wandering turtles. A few turtles manage to cross the cliff and wander through the seabird colony of the central depression until they die, usually the next day, from heat stress. In the summer of 1984, the massive turtle nesting caused large losses in all ground-nesting boobies, and a total loss of tropicbird nests in the cliff. Nesting boobies defend their sites vigorously when disturbed by wandering turtles but numbers of eggs and chicks are usually crushed.

With the exception of tropicbirds, the area enclosed by the cliff contains most of Raine Island's nesting seabirds. Without the protection provided by the natural barrier of the cliffs, nesting turtles would have unrestricted access to all parts of the island and the results would be catastrophic for the seabird nesting.

OTHER VERTEBRATES

Green Turtles nest from October to April; Raine Island is the largest breeding colony in Australia. Hawksbill Turtles *Eretmochelys imbricata* occur rarely. A 1.5 m long Saltwater Crocodile *Crocodylus porosus* was captured by by C. J. Limpus in 1975.

Other Seabirds Recorded

Phaethon lepturus White-tailed Tropicbird.

Sterna bengalensis Lesser Crested Tern — Present, on most visits, in small numbers and occasionally large flocks (the largest flock recorded was 450 in December 1982). In November 1982 a group of 20-30 was roosting in one part of the central depression and a single egg was found but no breeding took place.

Anous minutus Black Noddy — described by Stoddart[7] as being of uncertain status, but it is present as a roosting species. One pair has nested on *Abutilon* shrubs on the southern beach in July of 1984 and 1985. No other nests have been recorded and the species is not regarded as a breeding one on the island. During the day a few may be seen in small groups resting on vegetation. As night approaches, large numbers, together with *A. stolidus*, gather offshore in flight and fly into the island in several streams. This begins about 1700 hours and continues until well after dark, making accurate counting impossible. In July 1981, G. M. Dunnet recorded 23 000 mixed noddies in a two-hour count of one of three streams of birds entering the island. An estimate for the population of over 100 000 seems quite feasible.

This large roosting population is present all year and was previously recorded by MacGillivray[5]. The noddies roost in sometimes mixed flocks over most of the vegetated areas but mostly above the cliff. *A. minutus* roosts on vegetation while *A. stolidus* roosts both on the vegetation and sometimes on the ground.

Banding

First banding: October 1979.

Pterodroma arminjoniana — 14 adults; 9 recaptures at banding place.

Puffinus pacificus — 510 adults; 9 recaptures at banding place.

Sula sula — 272 adults, 126 juveniles, 110 chicks; 58 recaptures at banding place; one recovery from Willis Island and 3 from PNG up to 400 km from b.p.

S. dactylatra — 949 adults, 77 juveniles, 504 chicks; 207 recaptured at banding place, 13 recoveries from PNG up to 830 km from b.p., one at sea 735 km from b.p.

S. leucogaster — 559 adults, 39 juveniles, 931 chicks; 29 recaptured at banding place, 33 recovered from PNG, up to 1 200 km from b.p., one from Irian Jaya also 1 200 km from b.p., one from the Caroline Islands 2 600 km from b.p. and one from Tuvalu 4 000 km from b.p.

Fregata minor — 1 juvenile; no recovery recorded.

F. ariel — 68 adults, 259 juveniles, 9 chicks; no recoveries recorded.

Phaethon rubricauda — 536 adults, 151 juveniles, 127 chicks; 305 recaptured at b.p., one recovered from PNG 255 km from b.p.

Larus novaehollandiae — 4 adults, 3 chicks; one recaptured at b.p.

Sterna anaethetus — 10 adults, 1 juvenile; no recoveries recorded.

S. sumatrana — 5 adults; no recoveries recorded.

Anous stolidus — 400 adults, 4 juveniles; one recovery from GBR and one from PNG 430 km from b.p.

A. minutus — 200 adults; 3 recaptures at b.p.

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Acknowledgements

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