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SEABIRD ISLANDS

No. 35/1

Cabbage Tree Island, New South Wales

Location: 32°40'S, 152°14'E: One and a half kilometres east of Yacaaba Head, Port Stephens, New South Wales.

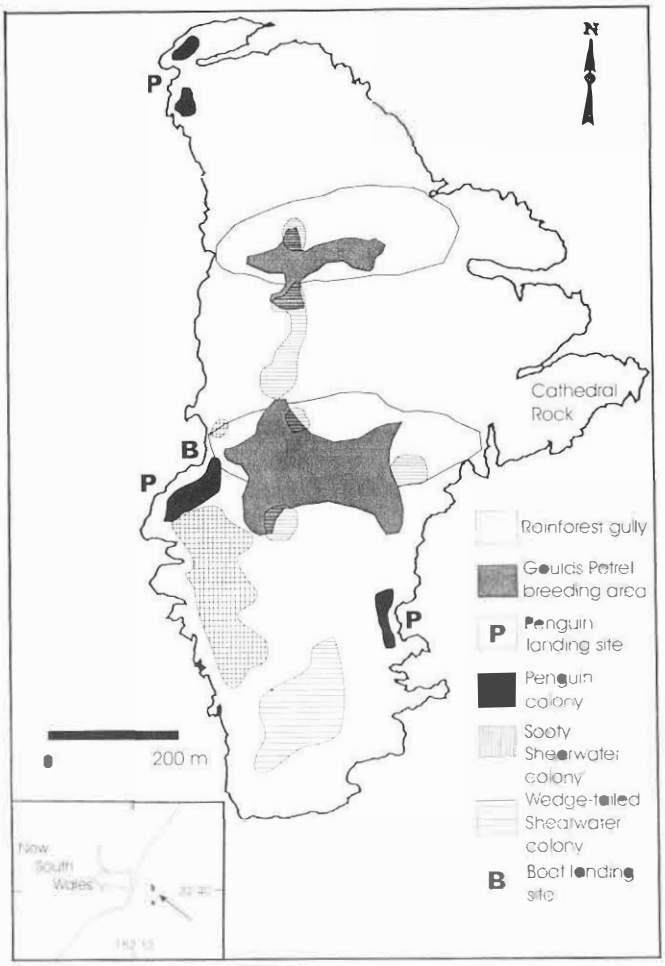
Status: Nature Reserve administered by the NSW Department of Environment and Conservation (formerly the NSW National Parks and Wildlife Service (NPWS)). Proposed for nomination as critical habitat for Gould's Petrel *Pterodroma leucoptera leucoptera*[13]. Entry permit required.

Description: A steeply sloping, wedge-shaped island aligned north-south; 1 000 metres by 490 metres, covering 30 hectares. Steep cliffs of toscanite rise along the eastern side to 123 metres above sea level and are highly fractured along vertical bedding planes. Several basaltic dykes dissect the island with two forming pronounced gullies draining moderately steeply to the western shore. Three rocky islets occur off the southern end, and another to the north. Cathedral Rock, a pronounced pinnacle on the northeastern side, is connected to the island by a boulder field and rock scree. A subterranean dyke on the eastern side of the island has collapsed to form a giant sea-cave 40 metres deep that is accessible with the use of caving ladders. Clay-based soils are skeletal over much of the island, although deep, humic, loam soils occur between the two main gullies.

Rainforest covers much of the western side of the island and dense stands of Spiny-headed Mat-rush *Lomandra longifolia* dominate much of the remainder. Fullagar provided a detailed description of the vegetation present in 1976[7]. Since the eradication of rabbits *Oryctolagus cuniculus* in 1997[20], areas outside the rainforest have become more extensively vegetated, particularly with grasses and herbs. Within the rainforest, regeneration has been patchier, but ferns and established seedlings are now more prevalent than they were previously. More than 150 plant species have been recorded on the island. Those species not mentioned by Fullagar[7] include 17 ferns, 33 herbs and 10 grasses. A herbarium is held by the local office of the Department of Environment and Conservation.

Landing: On a sloping rock shelf at the bottom of the South Gully on the western side of the island. Can be attempted under most conditions when using an inflatable boat.

Ornithological History: The earliest recorded visit by an ornithologist was Hull in 1910[12]. Hindwood and Serventy summarised the early ornithological history of the island to 1941[11]. D'Ombrain visited the island regularly between 1930 and 1974 primarily to observe and band Gould's Petrels[2,3,4]. Fullagar published the first detailed information on this species in 1976[7], including estimates of population size and breeding success together with an assessment of threats. Since 1992, Priddel and Carlile of the NPWS have undertaken intensive studies of the Gould's Petrel, the outcome of which has been a recovery programme that has successfully reversed the decline of this species[16,18,19].



CABBAGE TREE ISLAND, N S W

Recovery actions included the introduction of artificial nest boxes[14], control of predators[13], removal of entangling plants[13], eradication of rabbits[20] and the translocation of near-fledged petrels to Boondelbah Island to bolster a satellite colony of the species[13]. The establishment of a semi-permanent camp on the lower western side of the island helped facilitate this work. Due to the success of the recovery actions implemented for the Gould's Petrel, its conservation status has improved markedly. Previously classified as endangered[8], the species is now regarded, both nationally and internationally, as vulnerable[1,9].

Each year since 1998, NPWS staff and volunteers have made numerous visits to the island to conduct research on the Gould's Petrel and to implement recovery actions. Most visits were of several days duration. Specific visits to survey seabirds were made on 21–24 November 2002, 02–06 December 2002, 13–15 December 2002 and 27 February 2003.

Breeding Seabirds and Status

Eudyptula minor Little Penguin — Nesting in areas of boulders, under *Lomandra* tussocks and in soil burrows wherever access can be obtained from the rocky shoreline, to 30 metres above sea level. Three shoreline landing-points were identified. Regular counts of rafting adults at dusk peak at approximately 140 individuals in November each year (NPWS Wildlife Atlas database 1993–2003). Assuming each rafting bird represents a breeding pair, the estimated population of approximately 140 breeding pairs is marginally less than the 1976 estimate[7] of 'a few hundred pairs'.

Pterodroma leucoptera Gould's Petrel — Cabbage Tree Island is the principal nesting ground of this species[7]; the only other place it occurs is on nearby Boondelbah Island where it breeds in small numbers[17]. Nesting is primarily in rock scree and boulder crevices within the two western gullies dominated by rainforest and Cabbage Tree Palms *Livistona australis*, the feature from which the island obtains its name. Approximately 20 per cent of the population nests outside these gullies[18]. Regular systematic surveys for more than a decade have tracked the recovery of this species. As a result of experimental management action commenced in 1992, the breeding success, then at 20 per cent[19], has increased to an average exceeding 50 per cent[13,19]. The population has also increased since 1992 and is currently estimated at 900 breeding pairs[13,19].

Puffinus pacificus Wedge-tailed Shearwater — This species is more widely distributed than reported previously[7]. The current nesting habitat (1.2 ha) includes a broad area on the lower slopes of the south-western shore, much of the southern end of the island, an area between the two gullies and some small patches of soil within the two gullies. A total of 143 shearwater burrows were counted within the gullies. Outside the gullies, counts within a series of random transects (five transects, each 50 m by 4 m) estimated there to be approximately 2 000 shearwater burrows. Burrow densities within colonies varied from 0.1 to 0.2 burrows per square metre. Excluding those burrows used by Sooty Shearwaters (see below), and using occupancy rates (49.5%) from studies conducted elsewhere[6], we estimate that approximately 1 050 pairs of Wedge-tailed Shearwater breed on Cabbage Tree Island. This estimate is at the lower end of the 1976 estimate of 1 000 to 5 000 breeding pairs[7].

Puffinus griseus Sooty Shearwater — Based on calling from the ground and incidental captures in cage traps (set for rabbits) this species appears limited to the open *Lomandra* patches on the island's western shore. A previously known colony on the north-eastern end of the island[7] could not be relocated. Using estimates of burrow density within the *Lomandra* and the ratio of this species caught in cage traps in relation to Wedge-tailed Shearwaters (4%), the total number of Sooty Shearwater burrows in this habitat was estimated to be about 60. Using occupancy rates (75%) from studies conducted elsewhere[22] a population of approximately 45 breeding pairs was estimated for the island. This estimate is just below the 1976 estimate of 50–100 pairs[7].

Puffinus tenuirostris Short-tailed Shearwater — Despite burrow searches at the last known breeding locality for this species[7] and nocturnal observations to detect vocal individuals during their egg-laying period[21], no evidence could be found of their continued existence on the island.

Phalacrocorax carbo Great Cormorant — Breeds between April and August on Cathedral Rock on the eastern shore. From direct counts 40–50 breeding pairs.

Haematopus fuliginosus Sooty Oystercatcher — One to two pairs regularly nest high up on rocks on the western shore.

Factors Affecting Status

Gould's Petrels have been subjected to heavy predation from Pied Currawongs *Strepera graculina* and Australian Ravens *Corvus coronoides*[18], but these species are now strictly controlled[13]. Gould's Petrels also experience occasional predation from various raptors and owls. Action is taken against these predators only when the number of petrels killed is excessive[13]. Entanglement in the sticky fruits of the Bird-lime Tree *Pisonia umbellifera* has long been a cause of petrel mortality[2,3,11,16] but the recent removal of this native shrub from within the petrel's core nesting habitat has seen this cease[13,18]. Wedge-tailed Shearwater and Little Penguin occasionally fall prey to large raptors such as White-bellied Sea-eagles *Haliaeetus leucogaster* in waters near the island. A pair of Sea-eagles sometimes nest near the western end of the North Gully. This pair and their offspring are frequently seen roosting on the island.

The recent discovery of an ordinance fragment confirms that the island was used as target practice during World War II, as reported by Hindwood[10]. Charred trunks of palms are evidence that fire occurred on the island but there is no record of this occurring in living memory. Continuing regeneration of the vegetation following the removal of rabbits is likely to benefit many terrestrial bird species. Maintaining the island free of exotic predators remains an essential component of the management strategy for the island.

Given the coarseness of the estimates, the apparent decline in the population of Little Penguins cannot be substantiated, although ongoing monitoring is warranted. The decline in the number of Sooty Shearwaters and the total loss of Short-tailed Shearwaters from Cabbage Tree Island could not be explained by any land-based threat, and may be a consequence of long-term changes in the marine environment.

Prickly Pear *Opuntia stricta* is widespread in all areas except within the closed canopy of the rainforest. In 1976, Fullagar noted that although some attempts had been made to control or eradicate this species, it was 'still quite plentiful on the exposed eastern slopes of the island'[7]. Larvae of the moth borer *Cactoblastis cactorum* have been introduced to the island on several occasions in the past. Although the moth is still present on the island, periodic reintroduction may be necessary to ensure it is widely distributed and sufficiently abundant to be an effective means of control. In light of the recent removal of rabbits, targeted control of Prickly Pear may be beneficial for the re-establishment of native flora in some areas.

Bitou Bush *Chrysanthemoides monilifera* occurs primarily on the south-eastern end of the island but isolated patches can be found along the eastern and northern cliffs. Fullagar made no mention of this species in 1976[7], suggesting its establishment and spread may have been recent. Despite some efforts at control during the 1990s, Bitou Bush remains dominant in some areas and biological control or aerial spraying may be needed to contain its spread.

Other Seabirds Recorded

Buller's Shearwater *Puffinus bulleri* was found ashore in 1960[5], again in the early 1990s[15] and several times since then (NPWS Wildlife Atlas database). Little Pied Cormorant *Phalacrocorax melanoleucos*, Little Black Cormorant *Phalacrocorax sulcirostris*, Pied Cormorant *Phalacrocorax varius*, Eastern Reef Egret *Ardea sacra*, Silver Gull *Larus novaehollandiae*, White-fronted Tern *Sterna striata* and Crested Tern *Sterna bergii* have all been seen ashore (NPWS Wildlife Atlas database).

Other Vertebrates Recorded

Eighty-five species of land birds have been observed on Cabbage Tree Island. With the exception of rabbits, which were eradicated in 1997[20], no ground-dwelling mammal has been recorded on Cabbage Tree Island. The Grey-headed Flying-fox *Pteropus poliocephalus* has been observed on the island, and two species of bats have been trapped: Gould's Wattled Bat *Chalinolobus gouldii* and Little Bent-wing Bat *Miniopterus australis* (NPWS Wildlife Atlas database). Four species of reptiles have been recorded, all are relatively common: Jacky Lizard *Amphibolurus muricatus*, Garden Skink *Lampropholis guichenoti*, Three-toed Skink *Saiphos equalis* and Golden Crowned Snake *Cacophis squamulosus* (NPWS Wildlife Atlas database).

Banding

A total of 14 banders have visited the island since 1948, and banded over 8 000 birds.

Eudyptula minor —2 adults.

Pterodroma leucoptera —5 025 adults; 2 967 nestlings. 2 971 recovered on 8 532 occasions on the island; 6 recovered away from the island: 1.6 km SE at Boondelbah Island, 9 km WNW, 45 km W at Seaham, 134 km WNW at Muswellbrook, 145 km SW, and 295 km SSW.

Puffinus pacificus —459 adults; 10 nestlings. 53 recovered on 59 occasions on the island. No recoveries away from the island.

Puffinus griseus —22 adults and 1 nestling. 4 recoveries on four occasions on the island; one recovery away from the island; 1 900 km ESE across the Tasman Sea at Dargaville, New Zealand.

Puffinus bulleri —1 adult; recovered on one occasion on the island. No recoveries away from the island.

Bibliography

1. BirdLife International (2000). 'Threatened Birds of the World'. (Lynx Edicions and BirdLife International: Barcelona and Cambridge.)
2. D'Ombrain, A. F. (1943). The Cabbage Tree Island colony in the 1941-42 season. *Emu* **42:** 156–159.
3. D'Ombrain, A. F. (1964). Four hundred up — the Gould Petrel (*Pterodroma leucoptera*) on Cabbage Tree Island, N.S.W. *Aust. Bird Bander* **2:** 43–49.
4. D'Ombrain, A. (1970). Notes on the Gould Petrel. *Aust. Bird Bander* **8:** 82–84.
5. D'Ombrain, A. and Gwynne, A. (1962). Buller's Shearwater on Cabbage Tree Island, New South Wales. *Emu* **61:** 274–276.
6. Dyer, P. K. and Hill, G. J. E. (1992). Active breeding burrows of the Wedge-tailed Shearwater in the Capricorn Group, Great Barrier Reef. *Emu* **92:** 147–151.
7. Fullagar, P. J. (1976). Seabird Islands No. 35: Cabbage Tree Island, New South Wales. *Aust. Bird Bander* **14:** 94–97.
8. Garnett, S. (1992). 'The Action Plan for Australian Birds'. Report prepared by the Royal Australasian Ornithological Society. (Australian National Parks and Wildlife Service: Canberra.)
9. Garnett, S. and Crowley, G. M. (2000). 'The Action Plan for Australian Birds 2000'. (Environment Australia: Canberra.)
10. Hindwood, K. A. (1944). Cabbage Tree Island as an artillery target. *Emu* **44:** 220.
11. Hindwood, K. A. and Serventy, D. L. (1941). The Gould Petrel of Cabbage Tree Island. *Emu* **41:** 1–20.
12. Hull, A. F. B. (1911). Description of the nest and egg of White-winged Petrel *Estrelata leucoptera*, Gould. *Emu* **10:** 252–253.
13. NSW National Parks and Wildlife Service (2001). 'Gould's Petrel *Pterodroma leucoptera* Approved Recovery Plan'. (NSW National Parks and Wildlife Service: Hurstville.)
14. Priddel, D. and Carlile, N. (1995). An artificial nest box for burrow-nesting seabirds. *Emu* **95:** 290–294.
15. Priddel, D. and Carlile, N. (1995). Buller's Shearwater ashore in New South Wales. *Aust. Birds* **28:** 15–16.
16. Priddel, D. and Carlile, N. (1995). Mortality of adult Gould's Petrel *Pterodroma leucoptera* at the nesting site on Cabbage Tree Island, New South Wales. *Emu* **95:** 259–264.
17. Priddel, D. and Carlile, N. (1997). Boondelbah Island confirmed as a second breeding locality for Gould's petrel *Pterodroma leucoptera leucoptera*. *Emu* **97:** 245–248.
18. Priddel, D. and Carlile, N. (1997). Conservation of the endangered Gould's Petrel *Pterodroma leucoptera leucoptera*. *Pac. Cons. Biol.* **3:** 322–329.
19. Priddel, D., Carlile, N., Davey, C. and Fullagar, P. J. (1995). The status of Gould's Petrel, *Pterodroma leucoptera leucoptera*, on Cabbage Tree Island, New South Wales. *Wildl. Res.* **22:** 601–610.
20. Priddel, D., Carlile, N. and Wheeler, R. (2000). Eradication of European rabbits (*Oryctolagus cuniculus*) from Cabbage Tree Island, NSW, Australia, to protect the breeding habitat of Gould's Petrel (*Pterodroma leucoptera leucoptera*). *Biol. Con.* **94:** 115–125.
21. Schultz, M. A. (1994). A comparison of the breeding ecology of the Short-tailed Shearwater *Puffinus tenuirostris* and the Wedge-tailed Shearwater *Puffinus pacificus* on Montague Island, NSW. Bachelor of Applied Science (Parks, Recreation and Heritage) Honours thesis, Charles Sturt University, Albury.
22. Warham, J. and Wilson, G. (1982). The size of the Sooty Shearwater population at the Snares Islands, New Zealand. *Notornis* **29:** 23–30.

Acknowledgments

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