

SEABIRD ISLANDS

No. 42/1

Tollgate Islands, New South Wales

Location: 35°44'58"S, 150°15'39"E: at the entrance to Batemans Bay, four kilometres east of Denhams Beach on the south coast of New South Wales (NSW).

Status: Nature Reserve administered by the NSW National Parks and Wildlife Service (NPWS), Office of Environment and Heritage. Entry permit required.

Description: The Tollgate Islands comprise two main islets and several small rock stacks. The islets provide breeding habitat for seabirds; the rocks provide roosting sites. The channel between the two islets (180 m wide) is approximately three to four metres deep at low tide.

The southern islet is irregular in shape, 400 metres long, 260 metres wide and 4.9 hectares in area. It includes an elevated, vegetated plateau (56 m asl) of 2.0 hectares bordered by steep cliffs to the south, and a rock outcrop (known locally as The Pinnacle¹, 27 m asl) connected by a sandy isthmus to the north. A pebble beach at the southern end of the islet can be reached from the plateau above.

The northern islet is also irregular in shape, 500 metres long, 190 metres wide and 3.7 hectares in area. It includes two elevated plateaus and five small beaches, several of which are bounded by rocky reefs. The northern plateau (0.6 ha, 44 m asl) and southern plateau (0.5 ha, 55 m asl) are joined by a narrow, steep-sided neck. The largest and most accessible beach is on the western shore. A smaller, pebble beach lies immediately to the north. Another pebble beach at the northern tip of the islet

is accessible only from the western shoreline by a natural wave-cut tunnel that is exposed at low tide. The extensive eastern beach lies within a partially enclosed bay (known locally as "The Dragons Lair") fronted by offshore rock stacks and reefs, and is accessible only from land. The south-western beach is protected by a rocky point but can be accessed from the plateau.

Cliffs and slopes surrounding the plateaus contain only pockets of shallow soil and are dominated by exposed crumbling rock of agglomerates, chert and basalt. Above the beaches, steep scree slopes are dominated by Pigface *Carpobrotus glaucescens* and Scurvy Weed *Commelina cyanea* on west- and north-facing slopes and Seaberry Saltbush *Rhagodia candolleana* on south-facing slopes. Below the plateau, woody shrubs dominated by Coast Wattle *Acacia sophorae* together with the introduced vine Morning Glory *Ipomoea cairica* impede access, as they did in the 1970s¹. The plateau on the southern islet is dominated by thick stands of Spiny-headed Mat-rush *Lomandra longifolia*. Stands of woody shrubs (Lilly Pilly *Acmena smithii*, Coast Wattle and Coast Banksia *Banksia integrifolia*) dominate the cliff lines. On the northern islet, both plateaus are dominated to a lesser extent by Spiny-headed Mat-rush, with the shallow soils on the southern plateau also sustaining a thicket (0.25 ha) of Small-leaved Fig *Ficus obliqua*. Other species not mentioned in the previous description by McKean and Fullagar¹, and including exotic species (*), are:

Cakile maritima, *Kennedia rubicunda*, *Leucopogon parviflorus*, *Alyxia buxifolia*, *Microlaena stipoides*, *Sporobolus virginicus*, *Poa poiformis*, **Senecio* spp., *Plectranthus parviflorus*, *Ficinia*

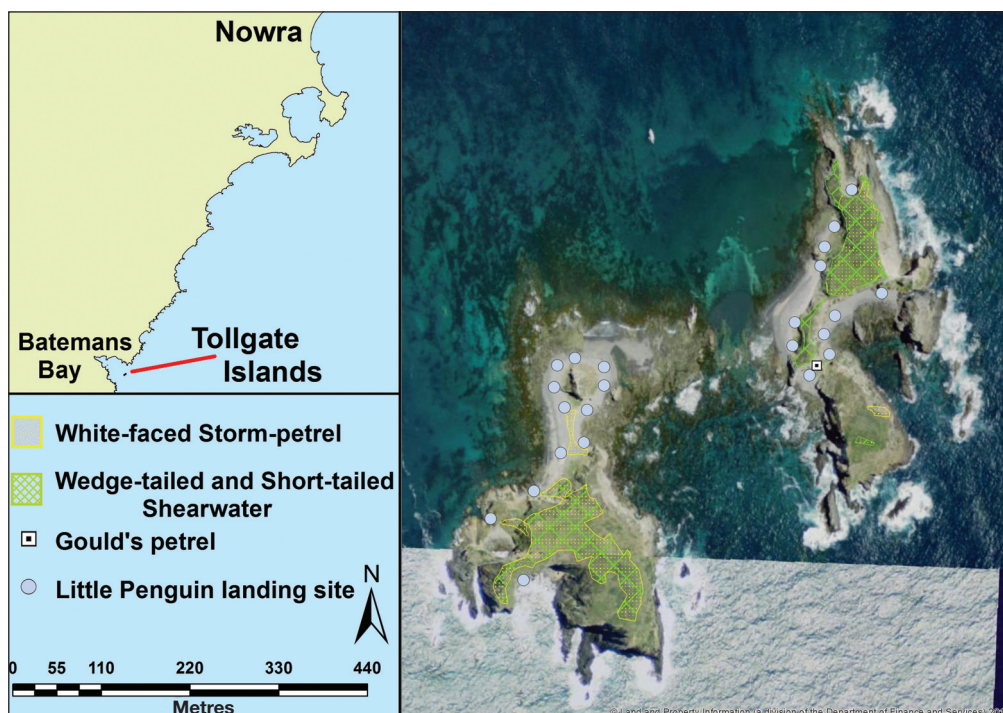


Figure 1. Tollgate Island, New South Wales

nodosa, *Parsonsia straminea*, *Lobelia alata*, *Dichondra repens*, *Calystegia soldanella*, *Actites megalocarpus*, **Chrysanthemoides monilifera*, *Myoporum* spp., **Taraxacum officinale*, *Pelargonium australe*, **Conyza* spp., *Enchylaena tomentosa*, *Westringia fruticosa*, *Pittosporum undulatum*, **Asparagus aethiopicus*, *Livistona australis* and *Tetragonia tetragonioides*.

Landing: Landings can be made easily onto west-facing beaches on both islets. To minimise erosion the use of a rope to assist access to the plateaus on the northern islet is advised.

Ornithological History: McKean and Fullagar¹ detailed ornithological visits to Tollgate Islands up until 1975, predominantly through banding data submitted to the Australian Bird and Bat Banding Scheme (ABBBS). Two pertinent records missing from the previous review¹ are: (1) the observation by J. F. Mann in 1883 that the islands were used by local aboriginal groups for harvesting 'muttonbirds'²; and (2) the application to mine guano deposits in 1905³, which although granted was never enacted because the venture was deemed unprofitable⁴. Since 2000, NPWS staff (in conjunction with the Southern Ocean Seabird Study Association (SOSSA) during 2000–06) made multiple day-visits to the island to monitor the population of Sooty Oystercatcher *Haematopus fuliginosus* as part of the South Coast Shorebird Recovery Program (contact NPWS for annual and SOSSA reports). Additionally, SOSSA noted the absence of Sooty Shearwater *Ardenna grisea* and measured the burrow occupancy of White-faced Storm-Petrel *Pelagodroma marina* (20–25%) in November 2005. ABBBS records indicate that six banders visited Tollgate Islands on 23 occasions since May 1976 to band birds.

During 3–5 December 2012, a team of eight experienced ornithologists visited Tollgate Islands to survey nesting seabirds; four persons per islet. In 2013, the team of eight spent 21–23 September on the southern islet and 23–25 September on the northern islet to assess numbers of breeding Little Penguin *Eudyptula minor* and to map the distribution of seabird burrows.

Breeding Seabirds and Status

Pelagodroma marina White-faced Storm-Petrel – Nest in shallow burrows in various densities on both islets; burrows interspersed mostly with those of Wedge-tailed Shearwater *Ardenna pacifica* and Short-tailed Shearwater *A. tenuirostris*. On the southern islet, burrows occur over half of the plateau (1.0 ha) and along vegetated sections of the isthmus. On the northern islet burrows occur across the northern plateau and on the eastern edge of the southern plateau (0.8 ha). In addition, burrows occur on well-vegetated steep slopes and occasionally on cliffs.

In December 2012, the perimeter of all breeding habitat (identified by the presence of burrows) was mapped using a hand-held GPS (2.7 ha). We surveyed approximately 25 percent of the combined area of occupation on the three plateaus using 16 transects (30 m x 4 m) and counted 343 burrows. Burrow density within these transects was 0.124 burrows per square metre on the southern islet and 0.211 burrows per square metre on the northern islet. On the southern islet we ran an additional transect on the most accessible slope (north-west facing), counting 11 burrows. We also made a direct count of 234 burrows on the isthmus (560 sq. m). In total, we estimated there to be 2830 ± 3406 burrows on the southern islet and 1365 ± 418 burrows on the northern islet.

In December 2012, 70 burrows on the northern islet were examined with a burrowscope (Peep-A-Roo: Sandpiper Technologies, Manteca, CA, USA) to ascertain occupancy. This inspection found adults incubating eggs, as well as chicks ranging from recently hatched to advanced chicks with emerging primary feathers. Approximately 70 percent of burrows were sufficiently deep (> 300 mm) to include a nest chamber, but only 13 percent of all burrows contained an incubating adult or a chick. A second inspection of 30 burrows along the isthmus on the southern islet was made on 22 September 2013 to determine if egg laying had commenced. Eight burrows contained adults without eggs, indicating that breeding here had yet to commence.

Based on the observed occupancy rate (13%), we estimate the total population of White-faced Storm-Petrel on Tollgate Islands (± s.e.) to be approximately 539 ± 120 pairs. This estimate is conservative, as it does not include eggs lost before the survey. McKean and Fullagar¹ estimated there to be 7000–8000 breeding pairs in 1975; if correct, there has been a substantial decline in the population over the last 38 years.

Ardenna pacifica Wedge-tailed Shearwater – Nests on the plateaus and on some slopes; burrows interspersed mostly with those of Short-tailed Shearwater and White-faced Storm-Petrel. Population size was estimated by sampling burrows within a series of 16 random transects (as above). The area of occupation for shearwaters was similar to that of White-faced Storm-Petrel. At the time of the survey, adult birds were incubating eggs. All shearwater burrows within each transect were counted and searched; if occupied, the occupant was extracted and identified. Burrows that were too long to determine if they were occupied were classified as "indeterminable" and assumed to have the same occupancy rate and species ratio as shorter burrows.

In total, the 16 transects contained 400 burrows, of which 155 were occupied, 223 were empty and 22 indeterminable. Burrow density was approximately 0.043 burrows per square metre on the southern islet and 0.108 burrows per square metre on the northern islet. Occupancy rate was 41 percent, and of those birds present, 17 percent were Wedge-tailed Shearwater (southern islet 18%, northern islet 13%). We estimate the total number (± s.e.) of shearwater burrows on both islets combined to be 4181 ± 941, and the population of Wedge-tailed Shearwater to be 288 ± 99 pairs. This is significantly less than the previous estimate of 1200 pairs¹.

Ardenna grisea Sooty Shearwater – In 1976, McKean and Fullagar¹ found a single Sooty Shearwater fledgling on the northern islet and reported the species to be present on Tollgate Islands in small numbers. Additionally, SOSSA banded an adult here in 1999. We listened at night for 28 hours during the time of courtship and incubation to detect vocal individuals; none was heard and we found no other evidence of the continued existence of this species on the island.

Ardenna tenuirostris Short-tailed Shearwater – Nests on the plateaus and slopes, in mixed colonies with mostly Wedge-tailed Shearwater and White-faced Storm-Petrel. Eighty-three percent of shearwaters present were Short-tailed Shearwater. We estimate the population (± s.e.) of Short-tailed Shearwater to be 1427 ± 319 pairs. This is significantly less than the previous estimate of 6500 pairs in 1975¹, although the ratio of Short-tailed to Wedge-tailed shearwaters is unchanged.

Pterodroma leucoptera Gould's Petrel – This species is a cavity nester and suitable nesting habitat—rock scree⁵—is restricted to a few potential sites only. In December 2012, a single egg (51 x 40 mm) of similar appearance, shape and size to that of Gould's Petrel⁶ was found unattended under a sloping rock along the neck that separates the two plateaus on the northern islet. Despite four hours of spotlighting and searches of the same area in September 2013 no petrels were seen on or overflying the islands. We suspect that Gould's Petrel is possibly, attempting to colonise Tollgate Islands.

Eudyptula minor Little Penguin – Nests at low elevations on both islets. On the southern islet it nests on the lower slopes, isthmus and within the cave at the base of The Pinnacle. On the northern islet it nests predominately on the slopes above the beaches, but also occasionally on the northern plateau, where it occupies two percent of large (shearwater size) burrows.

In September 2013, we attempted to count all penguins that came ashore. Counts began at dusk and continued until no penguins arrived during two consecutive 15-min periods (until approximately 2030 hours). Counts were conducted on two nights. On the southern islet the beaches around The Pinnacle proved too difficult to survey effectively, so a count was made of active penguin burrows in this locale. An average of 158 penguins landed each night (southern islet 78 birds \pm 13, northern islet 101 birds \pm 6). During the day we sampled a minimum of 30 occupied nests on each islet (those containing at least one adult or chick) to estimate the proportion of breeding adults ashore. All active nests contained a single incubating or brooding adult. Assuming that all breeding adults would come ashore (to incubate eggs or feed chicks), we calculated that each arriving bird represented 1.0 breeding pair. Including the 20 active nests we found around The Pinnacle (with an additional pair yet to lay eggs), we estimated the nesting population to be approximately 180 \pm 15 pairs. This is considerably less than the previous estimate of 5000 pairs in 1975¹. Neither the breeding habitat nor access to the plateaus is likely to have changed dramatically since 1975. The previous estimate of penguin numbers, made well after their peak breeding in mid-spring, may have been inaccurate and based on information other than counts of penguin burrows or breeding birds.

Factors Affecting Status

Inspection of White-faced Storm-Petrel nests on Tollgate Islands using a burrowscope has provided a rare estimate of burrow occupancy (13%) for this species. SOSSA estimated slightly higher burrow occupancy (20–25%) on the same islands in November 2005 after checking an unspecified number of burrows. Estimates of the population size of White-faced Storm-Petrel on other islands in NSW^{7, 8, 9, 10, 11} have relied on the burrow occupancy (61%) determined from a newly established storm-petrel colony on Fisher Island in Bass Strait¹². These estimates may now need to be reviewed.

McKean and Fullagar¹ reported that hatching of White-faced Storm-Petrel eggs on Tollgate Islands probably commenced in December. The presence of chicks with emerging primary feathers (10–20 days old¹³) in the first week of December 2013 suggests that hatching may occur as early as mid-November and, based on an incubation period of 50 days⁶, the first eggs are probably laid in late September.

The nesting attempt by Gould's Petrel on Tollgate Islands is consistent with other observations of this species expanding its range in NSW^{14, 15, 16} following its successful recovery on Cabbage Tree Island⁵. However, suitable nesting habitat on Tollgate Islands is very limited, so if a population establishes here it is likely to remain small.

White-bellied Sea-Eagle *Haliaeetus leucogaster* and Peregrine Falcon *Falco peregrinus* were observed feeding on the islands, targeting predominantly Wedge-tailed Shearwater and Little Penguin. The remains of four storm-petrels were found under the canopy of Small-leaved Fig and Coast Wattle on the northern islet; the method of dismemberment was indicative of owl predation, although no owl was observed.

Tollgate Islands are close to popular beaches and, despite signage prohibiting landing, members of the public do land on the western beaches. Indiscriminate walking on the fragile plateaus has the potential to severely damage burrows. However, access to the plateaus requires considerable effort, so disturbance to the principal burrowing habitat is likely to be low.

Morning Glory is degrading some cliff-line vegetation and entangling White-faced Storm-Petrels, Wedge-tailed Shearwaters and Little Penguins. Management of this invasive vine is needed to stop this entanglement and prevent further smothering of native vegetation. Bitou Bush *Chrysanthemoides monilifera* is present on the island, but is currently controlled. Without control, this invasive shrub has the potential to dominate the islands, greatly reducing the nesting habitat for shearwaters. McKean and Fullagar¹ noted the presence of Morning Glory in 1976, but made no mention of Bitou Bush.

Other Seabirds Recorded

The dismembered remains of a Common Diving-Petrel *Pelecanoides urinatrix* were recovered from within a Coast Banksia thicket on the southern islet in September 2013 (Australian Museum Registration No. O.75198). This bird may have been among those Common Diving-Petrel wrecked on the NSW south coast in late June 2013 (17 wing specimens; Australian Museum Registration Nos. O.75181 – O.75197 inclusive). Other seabirds observed include:

Anhinga novaehollandiae Australasian Darter
Phalacrocorax carbo Great Cormorant
Phalacrocorax sulcirostris Little Black Cormorant
Phalacrocorax varius Pied Cormorant
Microcarbo melanoleucos Little Pied Cormorant
Pelecanus conspicillatus Australian Pelican
Egretta sacra Eastern Reef Egret
Egretta novaehollandiae White-faced Heron
Haematopus fuliginosus Sooty Oystercatcher (breeding)
Chroicocephalus novaehollandiae Silver Gull

Other Vertebrates Recorded

The Yellow-bellied Water Skink *Eulamprus heatwolei*, previously identified in error as *E. tympanum*¹, was common on both islets. The White-striped Freetail Bat *Nyctinomus australis* was heard at night during both survey periods. A New Zealand Fur Seal *Arctocephalus forsteri* hauled out on the northern tip of the southern islet in September 2013 on days when the survey team was not camped there. The European Rabbit *Oryctolagus cuniculus*, previously present on the northern islet, was eradicated¹⁷ in April 1987 using 1080 laced carrots dropped by helicopter in a joint operation between the Rural

Lands Protection Board (now Local Land Services) and NPWS (Richard Green NPWS, personal communication).

Banding

Data for all banding records (First banding 22 March 1958).

- Pelagodroma marina* – 1371 adults, 309 nestlings and 22 of unknown age with 12 recoveries all at the banding place; the oldest some five years from the banding date.
- Ardeanna pacifica* – 119 adults, 247 nestlings and three of unknown age with six recoveries: one found dead 166 km NNE at Austinmer, NSW; three were captured alive at sea 163 km NNE off Wollongong, NSW; and one dead from an unknown location.
- Ardeanna grisea* – one adult not recovered.
- Ardeanna tenuirostris* – 400 adults, 141 nestlings and 85 of unknown age, with four recoveries: two recovered alive 56 km S at Montague Island, NSW; one dead 53 km SSW at Dalmeny Beach, NSW; and one dead at the banding place.
- Eudyptula minor* – 199 adults and 238 nestlings with 15 recoveries: eight within 25 km of the banding place at ages of up to 10 years; two were 623 km SW at Port Roadknight, Victoria; single recoveries 204 km NNE at Jibbon Beach, NSW; 155 km SSW at Eden, NSW; 76 km SSW at Wallaga Lake Estate, NSW; 66 km NNE at Ulladulla, NSW; and 37 km SSW at Bingie Point, NSW.
- Haematopus fuliginosus* – one adult and four nestlings with three recoveries at the banding place.
- Thinornis rubricollis* – one adult not recovered.
- Strepera graculina* – three adults and no recoveries.

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Nicholas Carlile and David Priddel, Office of Environment and Heritage, PO Box 1967, Hurstville BC, New South Wales 1481.

Chris Lloyd, Wiyanga Pty Ltd, 20 Godfrey Street, Penshurst, 2222.

Phil Craven and Michael Jarman, Office of Environment and Heritage, PO Box 707, Nowra, New South Wales 2541.

Email: Nicholas.Carlile@environment.nsw.gov.au