

65th ANNUAL ASSESSMENT OF SHEARWATER BREEDING SUCCESS ON BARUNGUBA, 22–26 MARCH 2024

Harvey D. Perkins, Chris Davey, Penny Beaver, Peter J. Fullagar, David Priddel

A study of the breeding productivity of shearwaters co-existing on Barunguba (Montagu Island) has continued annually since 1960. It had long been thought that only one species of shearwater, the Wedge-tailed Shearwater *Ardenna pacifica*, bred on the island, but in 1960, Short-tailed Shearwaters *A. tenuirostris* were also found breeding, and in 1962 two Sooty Shearwater chicks *A. grisea* were found there (Robinson 1962, 1964). This stimulated ongoing interest in the dynamics of this unique mixed breeding colony.

In this long-term study we measure breeding productivity each year by counting the total number of chicks of each species within three fixed-area study plots. This is completed in late March towards the end of the breeding season. This avoids disturbance to breeding adults and their eggs and minimizes impacts on maturing chicks while still providing robust estimates of chick production.

Barunguba is divided into two parts by a steep gulch and a beach that is passable at all tides. We refer to these two portions as north island and south island. Replanting of the leeward (western) side of south island with taller vegetation, using plants known to have been on the island in the past, has been undertaken by NPWS following systematic control of Kikuyu Grass *Cenchrus clandestinus*. This discontinued program, aimed at restoring seabird nesting habitat, was undertaken progressively between 2001 and 2014 across designated zones. These zones (numbered 1–9 or assigned as Asset A, B or C and Accidental) are used in this report for reference purposes. They are briefly described (condition in March 2013) and shown on a map in Fullagar *et al.* (2013).

Of the three shearwater colony study plots, one is on north island and two are on south island. The north island plot, NISA (293 m²) is at the south-east corner of north island (zone 9); and the two south island plots, SISA (428 m²) and THISA (293 m²) are both at the far northern end of south island (within zone 8). The exact location of each plot is shown in Fullagar and Heyligers (2006). The vegetation on each plot is mapped annually as part of the survey.

Over the 65-year period the surveys have been conducted, only three surveys have been missed: 1961 and 1966 before annual regularity was established, and 2020 which was cancelled due to COVID-19 pandemic restrictions.

Survey results have been published annually since 1998. Until 2021 these were published in *Nature in Eurobodalla* (e.g., Crowley *et al.* 2021). Since the discontinuation of this printed publication, reports are provided on the Eurobodalla Natural History Society website <http://enhs.org.au/articles/>. The format and abbreviations used are consistent across these reports, however, the release from page and printing constraints allows photographs to be included in more recent reports.

General observations of birds and other fauna are also made during the time we are on the island. Bird records for the island up to 1989 were reviewed by Fullagar (1989), but many subsequent records have been added (including through these annual reports, dating back to 1998). For the bird list included in this report, names and taxonomic order follow the latest available IOC World Bird List (Gill *et al.* 2024). Names for other vertebrates follow the Australian Faunal Directory (AFD), butterflies follow Braby (2016), plants follow NSW Flora online (PlantNet).

Survey Team

This year's team comprised Peter Fullagar, Chris Davey, David Priddel, Vanessa Place, Penny Beaver and Harvey Perkins (MIPartners), Melissa Papadimas, Olivia Pitt and Lesley Priddel.

Weather and Habitat Conditions

Monthly rainfall figures (mm) for March 2023 to March 2024 were:

Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
71.2	71.6	39.4	5.0	0	26.7*	9.4	53.4	186.7*	185.1*	40.5*	50.2	66.6

Note* Rainfall values are from Narooma, which are generally higher than on Montagu Island.

Rainfall values from the Montagu Lighthouse station are unreliable with significant amounts of data missing for August 2023 through to January 2024. The period from May to September was quite dry, particularly June and July, but November and December were both exceedingly wet (2 to 2.5 times their averages, accounting for almost half the year's total rainfall).

As for the last few years, the vegetation on all study sites was exceptionally dense and lush. Again, Spiny-headed Mat-rush *Lomandra longifolia* was so dense that it was difficult to locate burrows. Kikuyu Grass has continued to spread alarmingly throughout the island. Compared with 2021 when the kikuyu infestation on SISA covered 50% of the study plot, this year it covered 89%, but to date kikuyu has not spread to THISA or NISA. Kikuyu continues to consolidate along the extensive network of pathways that now criss-cross the island and is rapidly spreading laterally into the surrounding vegetation. Many pathways are no longer mown and, contrary to previous planning decisions, there is no evidence of any action to restrict kikuyu to the pathways. Scarlet Runner *Kennedia rubicunda* continues to thrive on all sites: over the last three seasons it occurred on approximately 54% of SISA and has now increased to 64%. Bracken *Pteridium esculentum* has varied with a coverage of between 36% and 50% but this year has decreased considerably to only 8%. Coastal Morning Glory *Ipomoea cairica* has also continued to increase dramatically in many areas, often smothering other vegetation or covering formerly exposed rock surfaces (Fig 1), but as yet is not present on any of the study plots. Coastal Saltbush *Rhagodia candolleana candolleana* continues to spread. On the other hand, it was evident there has been some attrition of scrubby vegetation on parts of the island, and Coastal Wattle *Acacia longifolia sophorae* had died or was in poor condition in several places.

During the autumn of 2023, SISA was spot sprayed with 'Roundup' (glyphosate) in an effort to control the spread of Kikuyu. The ideal time to spray is during the spring months, but due to the presence of birdlife on the island the use of chemical sprays is restricted to between May and August. The combination of sub-optimal timing and vigorous growth due to wet conditions over summer resulted in the spraying having little to no impact on the kikuyu (Fig. 2). The spraying may, however, have contributed to the considerable reduction in the coverage of Bracken.

Coverage

Due to rough weather, our trip was delayed by three days, reducing our effective time on the island to 4 days. We departed Narooma 9:00 h on Friday 22 March, arriving on the island late-morning. The survey of THISA began at 12:45 h and was completed by 15:50 h. SISA was completed the following day, 23 March (8:45–15:45 h), and NISA completed on 24 March (8:40–15:30 h). Weather conditions for all three days were mild (max 20–21°C), largely overcast with sunny periods, and breezy to windy. Monday 25 March was a calmer, sunnier day (max 22°C) and provided an opportunity to make general observations across south island, but there was no time to do a circuit of north island this year. The return crossing on 26 March was in calm, sunny conditions, permitting a brief cruise around the north-western coast of north island before heading back and arriving at Narooma at 10:30 h.

Survey Results

The results of this year's shearwater survey, with reference to those for 2023, are summarised in Table 1.

Table 1. Number of shearwater chicks and burrows found in three study plots, 2024 (2023 data in brackets)

	NISA	THISA	SISA	Total 2024	Total 2023
Wedge-tailed Shearwater	41 (44)	22 (26)	32 (35)	95	105
Short-tailed Shearwater	16 (23)	23 (33)	16 (29)	55	85
Sooty Shearwater	0 (0)	1 (1)	0 (0)	1	1
All three species	57 (67)	46 (60)	48 (64)	151	191
Number of burrows	157 (113)	128 (95)	138 (99)	423	307
Occupied burrows (%)	36% (59%)	36% (63%)	35% (65%)	36%	62%

The overall density of chicks this year, combining data from the three study plots, was 1,489 chicks per hectare; a decrease compared with the figure from last year of 1,884 chicks per hectare and the long-term average of 1,605 per hectare (1967-2022).

The average weight of Wedge-tailed Shearwater chicks in 2024 was 466 g (range 258–663 g), lower than the 530 g average of 2023, but higher than the two years before that (363 g in 2021, 311 g in 2022). The heaviest average for Wedge-tailed Shearwaters was 537 g in 2015. The average weight of Short-tailed Shearwater chicks in 2024 was 750 g (range 497–1,031 g), higher than the previous three years' averages (570 g in 2021, 677 g in 2022 and 742 g in 2023) and close to the heaviest average of 754 g in 2014.

Wedge-tailed Shearwaters comprised 72% of chicks on NISA, 48% on THISA and 67% on SISA, giving an overall figure of 63%. These percentages are higher than last year for each of the three plots.

General observations of other fauna

Given the shorter time on the island this year, with the first three days taken up predominantly by survey work, only Monday (25th) was available for visiting other parts of the island. All fauna counts are likely reflective of this lower effort. Additionally, the cool, overcast and windy conditions (except on the 25th) influenced activity, particularly insects, and hence recording levels. Stiff winds each evening meant very few insects were attracted to bright white and UV lights set up at the light station for the purpose.

Birds

Thirty-two species recorded this year (inclusive of the 3 shearwaters); 8 eBird lists were submitted.

Brown Quail *Synoicus ypsilophorus*. Reasonably common on south island, along tracks (particularly in the vicinity of the old garden), around the light station, and in lomandra and other scrub, though not as obvious as last year. Also, two birds flushed above the Gut on north island on 24 March. Small young seen by the ranger along the jetty track.

Bar-shouldered Dove *Geopelia humeralis*. A single bird heard call from dense scrub near the nursery on 23 March, and 8 flushed from base of rocks to SW of light station late on 25 March.

- Buff-banded Rail** *Hypotaenidia philippensis*. Less common and conspicuous than last year, but individuals were still seen regularly along paths and/or around light station each day.
- Sooty Oystercatcher** *Haematopus fuliginosus*. No systematic survey was possible, but at least 10 (5 pairs) noted in the usual spots around south island.
- Caspian Tern** *Hydroprogne caspia*. Up to 2 seen most days, either fishing close to shore or resting on rocks.
- Greater Crested Tern** *Thalasseus bergii*. Small numbers seen fishing just offshore most days. Maximum of 6 seen on eastern rocks of north island from boat on departure.
- Silver Gull** *Chroicocephalus novaehollandiae*. Present in low numbers (~2–6) most days, either on rocky shores or at sea just off the island. Maximum of 28 seen on eastern rocks of north island from boat on departure.
- Pacific Gull** *Larus pacificus*. A single juvenile/first-year bird seen cruising up the eastern shore and investigating the survey team at NISA early afternoon on 24 March. Seen again near jetty and at eastern rocks of north island on departure.
- White-faced Storm-Petrel** *Pelagodroma marina*. No surveys conducted this breeding season.
- Gould's Petrel** *Pterodroma leucoptera*. 44 active nests were counted during the 2023-24 season, but only 14 fledglings were noted in March 2024. (Nicholas Carlile *pers. Comm.*).
- Wedge-tailed Shearwater** *Ardenna pacifica*, **Sooty Shearwater** *Ardenna grisea*, and **Short-tailed Shearwater** *Ardenna tenuirostris*. See Table 1 for this year's chick count. Small numbers seen over the ocean to the east some days, and 2 Wedge-tailed Shearwaters seen on the return crossing.
- When banding a chick on SISA, the second last bird of the day (band 162-90416), it was noticed that the leg of this individual appeared intermediate in appearance between *A. pacifica* and *A. tenuirostris*. *A. pacifica* have grey-tinged pinkish tarsi, pale/pink webbing, and white toenails. Conversely, *A. tenuirostris* have grey tibia, largely grey toes and webbing suffused with pink, and dark toenails. The tarsus of *A. tenuirostris* is also broader and flatter than that of *A. pacifica*. These characteristics are used in the field as an initial visual cue to species determination. Tarsus length and culmen length are also recorded as standard and monitored to support initial species attribution. This individual was recorded as *A. pacifica* based on pale toenails. Interestingly, while the tarsus length was typical of *A. pacifica*, the culmen length was typical of *A. tenuirostris*. The bird's appearance was sufficiently distinctive that several photos were taken, but, though discussed on site, there is insufficient evidence to support this individual being considered a hybrid. Hybridisation in shearwaters appears to be rare (Warham 1996). Kuroda (1967) suggests a possible hybrid individual between *A. tenuirostris* and *A. griseus* based on underwing colour and various morphometrics but this remains speculative. To our knowledge, no instance of hybridization between *A. pacifica* and *A. tenuirostris* has ever been reported.
- Australasian Gannet** *Morus serrator*. Several individuals, both immature and adult, seen offshore most days, including on the crossing to the island.
- Little Pied Cormorant** *Microcarbo melanoleucos*. Small numbers seen most days, including a single bird fishing near the jetty on arrival; 1 off the SW corner of south island on 24 March, 2 on southern-most rocks on 25 March, and 2 at jetty bay rocks on departure.
- Little Black Cormorant** *Phalacrocorax sulcirostris*. Small numbers (1–3) on rocks at NE corner of south island most days. Also a flock of 31 flew over south island on the evening of 25 March.
- Great Cormorant** *Phalacrocorax carbo*. Seen all days: at least 7 immature birds on rocks around northern end of south island on 24 March, 2 adults seen at south end of south island on 25 March, and 4 adults on eastern rocks of north island from boat on departure.
- White-faced Heron** *Egretta novaehollandiae*. Two on northern end of south island on 24 March: 1 on rocky promontory, 1 in grassy vegetation (seen from NISA survey site).

Osprey *Pandion haliaetus cristatus*. A single bird flew briefly into the Gulch just after midday 23 March, returning half an hour later for a more extended period (~10 min) of active fishing in the surging waters between north island and south island.

Spotted Harrier *Circus assimilis*. A single bird active over much of south island each day. An interesting encounter with an immature White-bellied Sea Eagle over north island on 23 March in which the inexperienced sea eagle homed in on the harrier initially, apparently with the intent to see it off, only to end up being harassed repeatedly and eventually chased off by the harrier.

White-bellied Sea Eagle *Ichthyophaga leucogaster*. Seen all days. At least four birds (2 immature and 2 adult) seen at various times, including 2 adults on 22 March and 2 immatures and 1 adult on 23 March.

Sacred Kingfisher *Todiramphus sanctus*. An immature bird, presumably raised on the island, seen around the light station on 23 and 25 March. Also an adult in the jetty bay gully on 25 March.

Peregrine Falcon *Falco peregrinus*. Seen most days over north island, two together on 24 March.

Crimson Rosella *Platycercus elegans*. One heard call in wooded area on south island on 25 March.

New Holland Honeyeater *Phylidonyris novaehollandiae*. Common in scrub and wooded areas surrounding the light station and throughout the vegetated belt along the south-west part of south island. Seen all days; maximum of 15 recorded on evening of 25 March, though the current island population is significantly larger than this.

Yellow-faced Honeyeater *Caligavis chrysops*. Reasonably common on south island, mainly in thick scrub and wooded areas, but less common than last year. Maximum number recorded was 5 on 25 March, but total number is likely to be 2–3 times that.

Rufous Whistler *Pachycephala rufiventris*. 1 female recorded on 25 March near nursery shadehouse.

Grey Fantail *Rhipidura albiscapa*. Two on 25 March near nursery shadehouse.

Satin Flycatcher *Myiagra cyanoleuca*. 1 female on 25 March near nursery shadehouse.

Welcome Swallow *Hirundo neoxena*. Seen daily around the light station, over survey plots and generally about the island. Typically 2–4 birds with a maximum of 16 recorded on 25 March.

Little Grassbird *Poodytes gramineus*. Seen and/or heard most days, usually singly.

Golden-headed Cisticola *Cisticola exilis*. Small numbers, usually singly, seen widely scattered across both north and south islands.

Silveryeye *Zosterops lateralis*. Flocks of 6–12 not uncommon around wooded areas; maximum of 84 recorded on the evening of 25 March.

Red-browed Finch *Neochmia temporalis*. Up to 6 recorded several times in scrub and wooded area between jetty track and old garden track.

Mammals

Seals. Both Australian Fur Seals *Arctocephalus pusillus doriferus* and Long-nosed Fur Seals *Arctocephalus forsteri* occur on and around the island. Although no systematic count was conducted, numbers around the key western and northern shores of north island appeared to be up on last year, with a good breeding season evident by good numbers of pups. Numbers of individual seals lolling and basking at sites around the perimeter of south island also appear to be increasing.

Reptiles

Pale-flecked Garden Sunskink *Lampropholis guichenoti*. Seen frequently in lomandra vegetation.

White's Skink *Liopholis whitii*. Seen commonly this year, throughout lomandra vegetation and on rock outcrops.

Frogs

Striped Marsh Frog *Limnodynastes peronii*. Although considered now well established on the island, no adult frogs were recorded. However, several clumps of spawn with eggs at varying stages of development were noted in the well at the kitchen garden, and tadpoles were present in the heavily vegetated water there.

Butterflies

Dingy Grass Skipper *Toxidia peron*. Seen only on 25 March, over much of south island, when conditions were calmer and sunnier.

Cabbage White *Pieris rapae*. Several seen over plots during surveys, others more obvious on 25 March when sunny.

Tailed Emperor *Charaxes sempronius*. Two seen on 25 March – a female flying around scrub near the old kitchen garden, possibly laying eggs on Coastal Wattle *Acacia longifolia sophorae*, and a male perched territorially 4 m high in a tea tree near the granite quarry (Fig. 3b). This species occurs irregularly on the NSW south coast (though records on various citizen scientist platforms suggest it has been more common this season) and this is our first record for the island.

Common Brown *Heteronympha merope*. Two females seen along the Southern Track on 25 March.

Saltbush Blue *Theclinesthes serpentata*. A single individual seen on *Rhagodia* near THISA on 25 March. This is the first time we have recorded this species on the island.

Long-tailed Pea-Blue *Lampides boeticus*. Scarce this year – just 1 individual seen on 25 March.

Common Grass-blue *Zizina Otis labradus*. A few seen most days, but more active and obvious on 25 March when sunny.

Other arthropods

Due largely to unfavourable weather conditions, few arthropods were conspicuous, though large numbers of Black Field Crickets were attracted to the light station on 23 March, and Australian Magpie Moths were commonly seen in flight across south island on 25 March. In summary, three species of spider were recorded (all permanent and common residents on the island), and 43 species of insects (excluding the 7 butterflies listed above): Odonata (1), Orthoptera (4), Blattodea (1), Hemiptera (6), Hymenoptera (4), Neuroptera (1), Coleoptera (3), Trichoptera (1), Lepidoptera (15), and Diptera (7).

Several species not previously recorded on the island were of note:

Slender Green-winged Grasshopper *Aiolopus thalassinus*. Two attracted to lights on 23 March, 1 near old kitchen garden on 25 March (Fig 3a).

Couchgrass Webworm *Faveria tritalis* (Lepidoptera: Pyralidae). One attracted to lights on 23 March.

Ombava *Achyra massalis* (Lepidoptera: Crambidae). One attracted to lights on 23 March (Fig 3c).

Buzara frontinus (Lepidoptera: Erebidae). One attracted to lights on 23 March (Fig. 3d)

Brown Cutworm *Agrotis munda* (Lepidoptera: Noctuidae). One attracted to lights on 23 March (Fig 3e)

Solanum Fruit Fly *Bactrocera cacuminata* (Diptera: Tephritidae). One on jetty track on 24 March (Fig 3f).

Acknowledgments

We are indebted to the NSW National Parks and Wildlife Service, Department of Climate Change, Energy, the Environment and Water, for hospitality while on the island. We thank Amy Harris for arranging our access to and accommodation on the island, Adrian White and Andy Young for transportation to and from the island on ‘*Shearwater II*’, and Anthony Rowsell for assistance while on the island. We appreciate the commitment, interest and passion of Melissa Papadimas and Olivia Pitt as ‘pretty awesome’ members of the survey team. And again, Lesley Priddel provided exceptional catering for us, which is so much appreciated.

Research was conducted under NPWS Scientific Licence 100668 and Animal Ethics Committee permit 170801/01.

References

- Australian Faunal Directory (AFD) <https://biodiversity.org.au/afd/mainchecklist>
- Braby, M.F. (2016). The Complete Field Guide to Butterflies of Australia (Second Edition). CSIRO Publishing, Melbourne.
- Crowley, M.A., Fullagar, P.J. & Priddel, D. (2021). 62nd Annual assessment of shearwater breeding success on Montagu Island, 27 March–1 April 2021. *Nature in Eurobodalla* 35: 57-65.
- Fullagar, P.J. (1989). Birds of Montagu Island, NSW. *Nature in Eurobodalla* 2: 27–35.
- Fullagar, P. & Heyligers, P. (2006). Shearwater colonies on Montagu Island: are they being affected by encroaching Kikuyu Grass? *Australian Zoologist* 33: 476–479.
- Fullagar, P.J., Davey, C. & Priddel, D. (2013). 54th Annual assessment of shearwater breeding success on Montagu Island, 22–28 March 2013. *Nature in Eurobodalla* 27: 63–71.
- Gill, F., Donsker, D. & Rasmussen P. (Eds) (2024). IOC World Bird List (v14.1). doi:10.14344/IOC.ML.14.1. <https://www.worldbirdnames.org/new/>
- Kuroda, N. (1967) Note on the whitish underparts of *Puffinus tenuirostris* and a supposed hybrid between *P. griseus*. *Journal of the Yamashina Institute for Ornithology* 5: 194-197.
- New South Wales Flora Online (PlantNet): <https://plantnet.rbg Syd.nsw.gov.au/floraonline.htm>
- Robinson, F.N. (1962). Shearwaters breeding on Montague Island New South Wales. *Emu* 61: 292–293.
- Robinson, F.N. (1964). The breeding of the Sooty Shearwater on Courts Island, Tasmania, and Montagu Island, N.S.W. *Emu* 63: 304-306.
- Warham, J. (1996) *The Behaviour, Population Biology and Physiology of the Petrels*. Academic Press, London 613pp.

Figure 1. Spread of Coastal Morning Glory *Ipomoea cairica*. This area now covered by Morning Glory (a little to the south-east of SISA) was largely exposed rock face just a few years ago.



Figure 2. Surveying SISA on 23 March 2024, showing the extent and depth of kikuyu now on the plot despite chemical spraying with glyphosate in Autumn 2023.



Figure 3. Some of the insects recorded on Barunguba during the 2024 visit (not previously recorded).



(a) Slender Green-winged G'hopper *Aiolopus thalassinus*
This species is normally scarce along the NSW south coast but appears to have made something of an incursion this season. I (HDP) recorded many individuals along the dunes north of Dalmeny in the week prior to our survey.



(b) Tailed Emperor *Charaxes sempronius* (Nymphalidae)
This species is irregular in occurrence in southern NSW. This male is in typical territorial posture. A female was also seen, possibly laying eggs on coastal wattle near the old kitchen garden.



(c) Ombava *Achyra massalis* (Crambidae)
One of 13 Crambid snout moths that have now been recorded on the island.



(d) an erebid moth *Buzara frontinus* (Erebidae)
The larvae of this moth feed on *Breynia* species. Coffee Bush *B. oblongifolia* grows on some parts of south island.



(e) Brown Cutworm *Agrotis munda* (Noctuidae)
The 3rd *Agrotis* species to be recorded on Barunguba so far, and the 18th Noctuid to date.



(f) Solanum Fruit Fly *Bactrocera cacuminata* (Tephritidae)
Unexpected as far south as Montague Island, despite there being plenty of Solanum bushes on the island.