

Banding studies on Broughton Island: overview of 2017-2022 results

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Banding studies on Broughton Island commenced in June 2017 and have involved visits at approximately quarterly intervals ever since. In the first five years, 856 birds representing twenty species were banded. The majority of individuals (~84%) were Silvereye *Zosterops lateralis*, which is now a common species on the island. Tawny Grassbird *Cincloramphus timoriensis*, Yellow-faced Honeyeater *Caligavis chrysops* and Bar-shouldered Dove *Geopelia humeralis* were the next three most-captured species (comprising ~12% of the total captures).

There is evidence of a permanent or regularly-visiting population of subspecies *cornwalli* Silvereye on Broughton Island, supplemented by seasonal influxes of additional Silvereye including birds of two migratory subspecies *westernensis* and *lateralis*. Some Yellow-faced Honeyeater may also be resident on the island but many others appear to be occasional visitors. Tawny Grassbird adults remain around their territories all year and the recapture rates for some individuals have been high. However, towards the end of their first year, young grassbirds disperse from their natal territory to unknown destinations. The residential status of the Bar-shouldered Dove is uncertain, since only one bird has been recaptured to date.

Immature Osprey *Pandion haliaetus* remained around their nest site for up to one year after fledging. Some birds might have stayed for longer than that, as there were two sight records of five or more birds all within ~1 km from the nest site.

INTRODUCTION

Broughton Island (32° 36' 58"S, 152° 18' 58"E) lies ~15 km north-east of the entrance to Port Stephens in New South Wales and forms part of the Myall Lakes National Park. At its closest point, the island is less than three km from mainland parts of the National Park. In 2009 the NSW National Parks and Wildlife Service (NPWS) removed feral rabbits and rats from the island (Priddel *et al.* 2011). It was expected that there would be changes to the island's vegetation as a result of removal of feral animals, which might lead to changes in the terrestrial bird populations. Consequently, in 2012 NPWS and members of the Hunter Bird Observers Club (HBOC) began a study of terrestrial birds on Broughton Island. All non-seabirds are included in the study i.e. bush birds, shorebirds, waterbirds, birds of prey. A 5-year baseline program identified the resident species and showed that some changes were already underway (Stuart *et al.* 2017).

One of the recommendations from the baseline program was to start a bird trapping and banding

project on the island. It was expected that the banding project would help to quantify population changes and perhaps also lead to behavioural insights. In this report we summarise results from the first five years of the banding project. Subsequent articles will provide more detailed analyses for some of the individual species. Preliminary results for Silvereye *Zosterops lateralis* have been reported previously (Little *et al.* 2020; Stuart 2020; Stuart 2021).

METHODS

In 2017 we obtained approval from the Australian Bird and Bat Banding Scheme (ABBBS) for a project to capture and band terrestrial birds on Broughton Island (ABBBS Authority No. 2899). In 2021 the ABBBS also approved that coloured bands could be applied to certain species. Banding and colour banding of Osprey *Pandion haliaetus* on the island was carried out under a permit held by Dr Greg Clancy (ABBBS Authority No. 536).

The first visit for banding activities was in June 2017. The results reported here are for the period from then

until May 2022. Field trips were at intervals of approximately three months, with their timing and duration governed by weather conditions and personnel availability, and by restrictions intermittently in place associated with the COVID-19 pandemic. Most field trips involved a stay of two nights on Broughton Island, with mist-netting occurring at one set of sites in the afternoon of Day 1 and morning of Day 2, and at a second set of sites in the afternoon of Day 2 and morning of Day 3. In June 2018 weather conditions limited us to a single night on the island, and so that trip involved just two half-days of banding activities. We did not record the specific number of hours of banding activities in each field trip.

Although several methods were used to trap or attempt to trap terrestrial birds, most were caught using mist nets deployed at various locations around the central-western parts of the island. Various types of walk-in traps were trialled. The locations for mist nets or traps were chosen because of observed higher levels of bird activity in a reconnaissance carried out at the start of each field trip. All locations for nets and traps (across all field trips) were within an approximate 500 m radius of one another. However, Osprey chicks were banded at their nest which was located towards the south-western side of Broughton Island, about 2 km from where the main banding activities took place.

A numbered metal band was applied to one leg of all captured birds and their biometric data, brood patch status and moult status were recorded. The following biometric data were recorded for each bird: weight, wing-length, head-bill length and tail length, with the data being obtained using conventional bird banders' equipment. From mid-2021, coloured bands were applied to birds of species covered in the ABBBS Authority.

An important aspect of the banding project was to obtain details about re-trapped birds, as these were considered more likely to be resident on the island or to visit it regularly. A re-trap is defined as being either:

- a bird caught again in a net or trap, allowing its metal band number to be read while the bird subsequently is in hand; or
- a sight record ("visual re-trap") in which the individual bird was able to be unambiguously identified (e.g. from a photograph showing its metal band number clearly, or from seeing its unique pattern of coloured bands).

RESULTS

Twenty species were banded on Broughton Island during 2017-2022, comprising 856 individual birds. The most commonly caught species was the Silvereye; 716 individuals were banded (~84% of the total of all birds caught) and there were 166 re-traps. The number for re-traps includes some individuals that were re-trapped more than once.

The second-most common species to be caught and banded was the Tawny Grassbird *Cincloramphus timoriensis*. In five years, 49 individuals were caught and banded, with 27 re-traps (including individuals re-trapped more than once). **Table 1** summarises the banding and re-trapping results for all species.

Table 1. Numbers for all species banded on Broughton Island 2017-2022 and the number of re-traps of each species. Species are listed by order of the number of individual birds banded.

Species	Individuals banded	Re-traps
Silvereye <i>Zosterops lateralis</i>	716	166
Tawny Grassbird <i>Cincloramphus timoriensis</i>	49	27
Yellow-faced Honeyeater <i>Caligavis chrysops</i>	36	17
Bar-shouldered Dove <i>Geopelia humeralis</i>	19	2
Welcome Swallow <i>Hirundo neoxena</i>	9	0
Brown Quail <i>Synoicus ypsilophorus</i>	7	0
Osprey <i>Pandion haliaetus</i>	5	5
Grey Fantail <i>Rhipidura fuliginosa</i>	5	4
Brown Goshawk <i>Accipiter fasciatus</i>	3	0
Shining Bronze-cuckoo <i>Chalcites lucidus</i>	2	0
Golden Whistler <i>Pachycephala pectoralis</i>	2	0
Red-browed Finch <i>Neochmia temporalis</i>	2	0
Buff-banded Rail <i>Hypotaenidia philippensis</i>	1	0
Fan-tailed Cuckoo <i>Cacomantis flabelliformis</i>	1	0
Sacred Kingfisher <i>Todiramphus sanctus</i>	1	0
Little Wattlebird <i>Anthochaera chrysoptera</i>	1	0
Willie Wagtail <i>Rhipidura leucophrys</i>	1	3
Olive-backed Oriole <i>Oriolus sagittatus</i>	1	0
Eastern Yellow Robin <i>Eopsaltria australis</i>	1	0
Golden-headed Cisticola <i>Cisticola exilis</i>	1	0

Silvereye

An early finding from the banding project was about Silvereye subspecies. Three subspecies, *cornwalli*,

westernensis and *lateralis*, visited regularly, with seasonal changes in abundance of each species (Little *et al.* 2020; Stuart 2021). Birds of subspecies *westernensis* and *lateralis*, which breed in southern Australia and Tasmania respectively, mainly were present in autumn and winter but *westernensis* birds sometimes persisted into early spring.

About 75% of the Silvereeye caught on Broughton Island were *cornwalli* birds (Table 2 summarises the Silvereeye banding data). That subspecies also

dominated the Silvereeye re-trap results. Only *cornwalli* birds were re-trapped during a different year to the one in which they initially were caught and banded. Of the six *westernensis* birds that were re-trapped; four of those events were during the same field visit when they were banded, and the two others in a winter visit after the birds had been banded on Broughton Island in autumn of that same year. No *lateralis* subspecies birds were re-trapped.

Table 2. Silvereeye banding data June 2017 to May 2022.

Silvereeye subspecies	Individuals caught	Individuals re-trapped	Total re-traps	Longest re-trap interval	Oldest known bird
<i>cornwalli</i>	545	116	166	4 years 4 months	5+ years
<i>westernensis</i>	122	6	6	3 months	1+ years
<i>lateralis</i>	49	0	0	–	1+ years

Of the 116 re-trapped *cornwalli* birds, 37 individuals were re-trapped more than once. That included ten birds which were re-trapped three times, and a bird which was re-trapped nine times (it being more than five years old at the most recent capture). All of the *cornwalli* birds were re-captured in mist nets – there were no re-traps based on field sightings. Most of the re-traps occurred within two years of when the bird was banded originally; however, there were 43 instances of longer intervals between banding and re-trapping. The longest interval was four years and four months, which involved two different birds, both of which were first banded in October 2017 and re-trapped in February 2022. A third bird was banded in June 2017 and re-trapped in July 2021 – four years and one month later. All three birds were recorded as adults when first captured i.e., they were at least one year old (Australian Bird Study Association 2020). Thus, they were at least five years old at the time of their most recent re-capture.

All of the *westernensis* and *lateralis* birds were identified as being adults based upon plumage (Australian Bird Study Association 2020). Thus they all were more than one year old; however, that was their minimum age and some birds might have been older.

Tawny Grassbird

Of the 49 individuals caught in mist nets, 26 were identified as juvenile or immature birds i.e., as being one year old at most (Australian Bird Study Association 2020). Four of those 26 birds were recaptured during the five-year study – once on the following day, while two birds were recaptured after

four months (one bird banded in October 2019 was recaptured in February 2020; the other bird was banded in June 2017 and recaptured in October 2017). The fourth bird was banded in January 2020 and re-captured in August that year i.e., about seven months later. All four juvenile/immature birds were recaptured within 30-50 m of the original site of their capture.

Twenty-three older grassbirds were caught and banded, many of them several times (see Table 3 for details). The majority of those birds could not be sexed unambiguously when first captured, because there is an overlap of biometrics for males and females (Australian Bird Study Association 2020). However, after recapture three of the initially-unsexed birds were later identified as males, and one bird as a female.

Prior to the start of the colour-banding program, there were two confirmed resightings of a banded Tawny Grassbird. It was the same bird on both occasions. In photographs taken in October 2019 and November 2020, the band number was legible, for a bird banded in November 2018. Two colour-banded grassbirds have been resighted. A bird colour-banded in February 2022 was resighted two days later, while a bird colour-banded in mid-May 2022 was resighted twice on the following day, and three times in a return visit to the island two weeks later. All re-sightings were from within 50 m of the original capture site.

Table 3. Tawny Grassbird banding data June 2017 to May 2022.

Sex	Individuals caught	Individuals re-trapped	Total re-traps	Longest re-trap interval	Oldest known bird
Male	5	4	16	4 years 4 months	6+ years
Female	3	1	1	1 year 9 months	2+ years
Indeterminate	15	8	11	2 years 4 months	3+ years
Juvenile or immature	26	4	4	7 months	1 year

Yellow-faced Honeyeater

Ten male and 16 female Yellow-faced Honeyeater *Caligavis chrysops* were banded, and also ten birds which could not be sexed (see **Table 4** for details). The unsexed birds were either sub-adults or they had biometric data that fell within the area of overlap for males and females.

Seventeen birds were re-trapped in the 5-year study. Two birds were re-trapped twice; a bird banded in October 2017 was re-trapped in July 2019 and May 2021, when it was 5+ years old; and a bird banded in November 2018 was re-trapped in February 2020 and July 2021, by then it was 4+ years old. Initially that bird was not able to be sexed unambiguously – the re-trap biometrics indicated it was a female.

Table 4. Yellow-faced Honeyeater banding data June 2017 to May 2022.

Sex	Individuals caught	Individuals re-trapped	Total re-traps	Longest re-trap interval	Oldest known bird
Male	10	5	6	3 years 7 months	5+ years
Female	16	7	9	2 years 8 months	4+ years
Indeterminate	10	2	2	2 months	2+ years

Bar-shouldered Dove

The majority of captured Bar-shouldered Dove *Geopelia humeralis* have been males, although four of the 19 birds could not be sexed unambiguously. Only males have been re-trapped. Since May 2021

eleven birds have been colour-banded but as yet there have been no field re-sightings. However, one of those birds was re-captured three months after banding – at the same location where it had been caught originally.

Table 5. Bar-shouldered Dove banding data June 2017 to May 2022.

Sex	Individuals caught	Individuals re-trapped	Total re-traps	Longest re-trap interval	Oldest known bird
Male	11	2	2	3 months	1+ years
Female	4	0	0	–	1+ years
Indeterminate	4	0	0	–	1+ years

Welcome Swallow

Six adult Welcome Swallow *Hirundo neoxena* have been captured – all were identified as males. The other three birds caught were assessed as being juvenile or immature birds based on plumage (in particular, their tail dimensions).

sightings. As yet only one bird has been colour-banded.

Brown Quail

Five adult Brown Quail *Synoicus ypsilophorus* have been banded, and two juveniles. One adult was caught using a walk-in trap; the other six birds were caught in mist nets after having been flushed by an approaching person. There have been no re-

Osprey

Five young Osprey *Pandion haliaetus* were banded and colour-banded; all of them were young birds at a nest located towards the south-western part of the island. The banding was done shortly before the chicks were expected to fledge – in all cases the banding occurred in December. In two breeding seasons, there were two chicks at the nest, and a single chick on another occasion. One colour-banded youngster was re-sighted four times, the latest occasion being 11 months after it had been banded. The one other re-sighting of a colour-

banded Osprey was of a bird seven months after it had been banded. Both of the re-sighted young birds were within 1 km of the nest site and adult birds were in the general vicinity.

Other species

Most other species have insufficient data at this stage of the project to warrant closer analysis. An exception perhaps is the Grey Fantail *Rhipidura fuliginosa*. Five individuals have been banded and colour-banded. One bird, banded in May 2021, was re-sighted twice the following day and twice in the July 2021 field trip, and appeared to be remaining within a territory. However, it was not seen at that territory in any of the subsequent field trips.

DISCUSSION

The frequent re-trapping of Silvereye subspecies *cornwalli* suggests they may be resident on the island, or at least that they visit it frequently. The regular influxes of *westernensis* and *lateralis* birds in autumn and winter, and of *cornwalli* birds in spring (Little *et al.* 2020) shows that movements of Silvereye between the mainland and Broughton Island are common. Because no *westernensis* or *lateralis* birds were re-trapped in a different year to the one in which they were caught and banded, it seems unlikely that individuals from these two migratory species return to Broughton Island. Their arrivals on the island in any year seem to be random occurrences. Also, it seems that they might not spend long periods on the island, because the autumn/winter re-trap ratio has been low (~5% for *westernensis* birds, and 0% for *lateralis* birds).

The frequent re-trapping of young Tawny Grassbird at locations close to where they first were banded suggests that they remained in or near their natal territories in the initial post-fledging period. However, because all the re-traps of young birds occurred within seven months of initial banding, it seems likely that the birds dispersed elsewhere, at ages of 6-12 months. It is not known if they remained on Broughton Island. However, metal bands are difficult for an observer to see, and thus it is possible that some banded young birds established territories elsewhere on the island. In future, the new colour-banding program might clarify the fate of a young Tawny Grassbird, because it will become easier for observers to notice the bands and be able to identify individuals.

In contrast, many adult Tawny Grassbird stayed close to the site where they were caught initially,

and were re-trapped several times. Presumably the mist net lane was within their territory. Some birds recently colour-banded have already had re-sightings; again the locations have been near the site where they were first caught. The exact locations for those re-sightings are being recorded, which may in time generate information about territory sizes.

The frequent re-trapping of Yellow-faced Honeyeater individuals may be evidence that some birds are resident on Broughton Island or at least visit it regularly. However, most birds were only re-trapped once, and about half of the banded Yellow-faced Honeyeater were never re-trapped. This is evidence for the existence of a transient population. Further evidence for that comes from population estimates. In most visits to the island, HBOC surveyors have estimated the populations of each species present (Stuart 2021). Typical estimates for Yellow-faced Honeyeater have been 5-10 birds present during the three-day visit, and the highest estimate has been twelve birds. Since a total 36 birds were banded during 2017-2022, most of those individuals cannot have been present at the same time. The Yellow-faced Honeyeater is a known long-distance migrant (Higgins *et al.* 2001) and it should be easy for individuals to fly across from the mainland for short stays.

Osprey in New South Wales have been reported to lay eggs in the period July to September, and then the chicks to fledge between October and December (Marchant & Higgins 1993). The Broughton Island birds have been consistently late breeders, with the chicks fledging in December each year. The fledged young birds have remained in their natal area for almost a year. There were no sightings of colour-banded birds at any later interval; however, it is uncertain whether or not young birds disperse from the island. For example, five Osprey were recorded within ~1 km of the nest in May 2022 – most were too far away for any bands to be visible (AS pers. obs.). Similarly, in February 2019 (prior to the commencement of any colour-banding activities) there were three young birds at the nest and another five birds within ~1 km of the nest (AS pers. obs.). These records probably did not involve additional breeding pairs – in Australia most Osprey nests are at least 1 km apart and usually they are separated by greater distances than that (Marchant & Higgins 1993).

The 19 banded Bar-shouldered Dove represents a considerable percentage of the island's estimated total population of 40-50 birds. The infrequency of re-traps (including of the eleven colour-banded birds) might mean that the population is much larger

than has been estimated, or that birds move readily between the mainland and the island. In time, this matter may be able to be resolved. We note that the only instance of a recapture occurred just three months after the bird had been banded. In that instance, the bird may have established temporary residence.

The recapture rate for other species is low and there are not yet enough data for any detailed analysis. In future years, as the database of banding and re-traps grows, it should become possible to develop inferences for some of those species, particularly those for which colour-banding permits have been obtained. The permits apply to most terrestrial species found on the island, excepting Silvereye and Yellow-faced Honeyeater which are migratory species and thus excluded (because of the existence of colour-banding projects for them in other parts of Australia).

CONCLUSIONS

Banding studies on Broughton Island are yielding information about some of the species occurring on the island. Most of the individuals caught and banded have been subspecies of Silvereye, in particular the *cornwalli* subspecies. Some of those birds might be resident on the island; at the very least they seem to visit it regularly. Some Yellow-faced Honeyeater may also be resident on the island. A colour-banding component to the project has recently been started – this is expected to accelerate future data collection, through an increased number of visual re-traps.

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