Tasmanian Bird Report 40

July 2020

BirdLife Tasmania, a branch of BirdLife Australia
Editor, Wynne Webber

birdlife
TASMANIA

The Tasmanian Bird Report is published by
BirdLife Tasmania, a regional branch of BirdLife Australia

Number 40 © 2020

BirdLife Tasmania, GPO Box 68, Hobart, Tasmania, Australia 7001

ISSN 2208-4282

Production of this edition of the Tasmanian Bird Report has been supported by Hobart Airport, the Tasmanian Fire Service, the Australian Bird Environment Foundation, and our parent body, BirdLife Australia. We thank them all for their help.

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Editorial

This is the third *Tasmanian Bird Report* in which we publish a report on 'The state of Tasmania's birds' (SoTB). During preparation of the 2016–17 report we were all saddened by the death of Nick Ramshaw, whose contribution to the creation of these reports has been inestimable.

Warren and Sue Jones have joined the subcommittee of BirdLife Tasmania that prepares the SoTB report. As you will have noted, this edition of the bird report is very late coming out. This must, I admit, be laid solely at my feet. Family sickness and concerns have kept me from completing work on the editing and layout until quite recently, and for this I am sorry. However, it does make clear some of the problems that can arise for an organisation such as ours where all the work is done by volunteers: when something goes awry, we often do not have a back-up person ready to step in. Thus, I do urge anyone who can spare time and expertise to join the volunteers who keep the work of BirdLife Tasmania rolling along.

As ever, to make regular reports that track populations of the State's birds, reliable population records are needed. We ask that anyone who would enjoy taking part begins to take surveys for Birdata (http://birdata.birdlife.org.au/) where new data is entered and feedback is given. The Birdata website includes explanations and instructions for how you can use the portal.

The tables of the summer and winter wader counts for 2017 up to and including 2019 are included on pages 66–84. This brings the count data up to date, and the next bird report is currently being planned for publication later in 2020.

The Bird Report is a vehicle for publication of papers by researchers and amateur bird-watchers from around the state, as well as for releasing reports that have been completed for various interests: governmental, NGO and commercial. We strongly encourage members and researchers to submit papers.

Wynne Webber
Editor
Tasmanian Bird Report

State of Tasmania's birds, 2016–17

Mike Newman, Sue Drake, Sue Jones, Warren Jones, Nick Ramshaw, Andrew Walter, Wynne Webber and Eric J. Woehler, a subcommittee of BirdLife Tasmania

Introduction

The third State of Tasmania's Birds (SoTB) follows the previous style in providing an ongoing commentary on the status of Tasmania's terrestrial birds based on survey data submitted to BirdLife Australia's Birdata program.

The first section of this report provides an overview of survey data submitted to the General Birdata program for the fiscal year 2016–17, which highlights obvious differences in the year-on-year results and compares current data with ten-year averages. This broad screening highlights priorities for more detailed evaluation. For instance, in our last report we highlighted the Musk Lorikeet, *Glossopsitta concinna*, as one of the few species that appears to have increased during the last 20 years. In this issue the Musk Lorikeet is one of the four case studies and that provides a more substantial evaluation of Birdata records for this species. Another case study examines fluctuations in occurrence of Horsfield's Bronze-Cuckoo, *Chalcites basalis*, in Tasmania: fluctuation in its presence appears to be driven by climatic conditions on the mainland. A comparison of the two Tasmanian Whistlers, *Pachycephala* sp., and an in-depth look at the status of the Dusky Woodswallow, *Artamus cyanopterus*, raise concerns about the impact of the prevalent protracted period of dry conditions in Tasmania on bird populations.

We continually seek to improve and expand the scope of SoTB, where necessary drawing on studies and programs that complement Birdata. Opportunities include improved coverage of all Tasmanian species, not just the terrestrial species, the group most comprehensively targeted by the General Birdata program. To address these limitations the authors hope to include a feature article that provides an overview of the breeding populations of our coastal shorebirds in the next issue: this article will provide population estimates as opposed to population trends. The goal of Birdata monitoring is to track changes in population sizes; however, for most species it is only possible to trend the trajectory of populations of unknown size. Another opportunity is to make the feedback provided by SoTB more immediate. This issue reports on the fiscal year 2016–17, a lag of two years from the time of data collection. Improvements in Birdata submission make it feasible to reduce that lag to one year, and that is the aim for the next SoTB.

The body of the report seeks to inform a general audience with minimal comment on methodology and statistical detail. The captions to the figures and tables provide basic information for readers wishing to gauge the strength of supporting information. Readers who seek more information on the methodology and analysis are referred to appendix A (page 11).

Survey statistics

In 2016–17, a total of 2199 surveys were recorded in Birdata, an increase of 402 compared with the previous period (table 1). The SoTB report for 2015–16 noted the rise can be attributed to more searches of both 2 ha/20 min and 500 m area survey types. There was a small decrease in 5 km area searches and a marked decrease (271 to 148) in incidental records, suggesting that the regular cohort of observers are switching to surveys rather than incidental records of 'interesting species' as their usual form of recording. The number of observers submitting records increased by only one from 2015–16, and the total number of 10 minute cells surveyed did not change significantly (table 1), which suggests that these changes are probably due to regular contributors altering their data-recording behaviour.

The Tasmanian data reported here were extracted from the Birdata portal on 25 March 2019 using the General Birdata program. A total of 177 species were recorded in Birdata for Tasmania, which included waterbirds, marine and vagrant species (compared with 197 in 2015–16). This report considers only the 97 terrestrial species recorded during 2016–17 (the same as in 2015–16). Appendix B (page 14) summarises the Birdata statistics for these terrestrial species for 2016–17, and compares them with matching statistics for the ten-year period 2006–16. For species with >50 records, the total number of records in 2016–17 was expressed as a ratio of the ten-year average. Reporting rates (RR, see appendix A for definition) for each species in 2016–17 were calculated based on the total number of records and, separately, for both 2 ha/20 min and 500 m area search surveys with comparable data provided for the

ten-year period between 2006 and 2016. RRs for an individual species are not necessarily similar between the two survey types. Most often, as might be expected, a species' RR for the more constrained 2 ha/20 min surveys is lower than for 500 m area searches: for example, RR in 2016–17 for Green Rosella, *Platycercus caledonicus*, is 31.9% for 2 ha/20 min surveys but 50.1% for 500 m area searches, while for Tasmanian Scrubwren, *Sericornis humilis*, the corresponding figures are 12.6% and 26.7%.

Table 1: *Comparison of 2016–17 statistics with previous year and previous 10 years. [* denotes average annual value; ** ten-minute grid squares; T = terrestrial.]*

	A 2016–17	B 2015–16	C 2006–16
All Surveys	2199	1797	1759*
2 ha/20 min	958	623	371*
500 m area	774	589	453*
5 km area	196	226	242*
Incidental	148	271	585*
Other types	123	88	108*
Contributors	59	58	309
Total cells surveyed**	165 (T 146)	160 (T 155)	397 (T 349)

Most frequently recorded species

The ten most frequently recorded species were identified by their RRs for all records and are presented in table 2, with the top ten birds for 2015–16 for comparison. The three most frequently reported species remain unchanged, although the Superb Fairy-wren, *Malurus cyaneus*, displaced the Forest Raven, *Corvus tasmanicus*, to fill the number one position. The Grey Fantail, *Rhipidura fuliginosa*, remains in third position. The Striated Pardalote, *Pardalotus striatus* (number 8 in 2016–17), is an interesting addition to the Top Ten list, reflecting the unusual over-wintering of Striated Pardalotes in Tasmania during that recording period. The Striated Pardalote is included at the expense of the Common Starling, *Sturnus vulgaris* (number 10 last time), leaving the Common Blackbird, *Turdus merula*, as the only introduced species in the Top Ten. Most changes in RR for the nine species on both lists are probably not statistically significant, but it is perhaps worth noting that the RR for the Masked Lapwing, *Vanellus miles*, one of our more conspicuous species, dropped from 35.7 to 28.7%. This could reflect a change in the proportion of surveys carried out in open areas as opposed to forest and woodland in the 2016–17 period.

Table 2: *The top 10 birds recorded in 2016–17 and 2015–16.*

Top 10 birds, 2016–17	RR(%)	Top 10 birds, 2015–16	RR(%)
Superb Fairy-wren	57.2	Forest Raven	57.8
Forest Raven	55.0	Superb Fairy-wren	55.5
Grey Fantail	50.8	Grey Fantail	50.3
Yellow-throated H'eater	48.9	Yellow-throated H'eater	48.6
Brown Thornbill	44.2	Grey Shrike-thrush	40.7
Grey Shrike-thrush	41.5	Green Rosella	40.7
Green Rosella	39.7	Brown Thornbill	40.2
Striated Pardalote	31.8	Common Blackbird	36.4
Common Blackbird	30.4	Masked Lapwing	35.7
Masked Lapwing	28.7	Common Starling	30.9

Endemic species

Three of Tasmania's endemic species — Black-headed Honeyeater, *Melithreptus affinis*, Tasmanian Thornbill, *Acanthiza ewingii*, and Yellow-throated Honeyeater, *Nesoptilotis flavicollis* — are amongst those species that have a substantially increased RR in 2016–17 compared with 2006–16 (i.e. RR ratio ≥ 1.5, see following discussion). This may reflect an increase in abundance or, alternatively, increased numbers of surveys being carried out in their preferred habitat. Two endemics — Yellow-throated Honeyeater and Green Rosella (RR ratio = 1.4) — actually appear in the Top Ten list (see table 2). Records remain strong for Tasmanian Scrubwren, *Sericornis humilis* (391 records compared with an average of 282.7 for 2006–16), Tasmanian Native-hen, *Tribonyx mortierii* (420 records versus 415.9 in 2006–16), and Yellow Wattlebird, *Anthochaera paradoxa* (551 records versus 458.9 for 2006–16). Strong-billed Honeyeaters, *Melithreptus validirostris*, seem to be holding their own (175 records compared with 136), as are Black Currawong, *Strepera fuliginosa* (206 records versus 222), and Dusky Robin, *Melanodryas vittata* (217 versus 203.6).

In contrast, in 2016–17 there were only seven records for Forty-spotted Pardalote, *Pardalotus quadragintus*, compared with the ten-year average of 25.3. Scrubtit, *Acanthornis humilis*, had an RR of only 1.2% (27 records, with a ten-year average = 36.6): this low RR most probably reflects under-reporting from wet forest compared with dry forest. With low numbers of records overall for Scrubtit, the decrease in record numbers compared with the average is probably not significant. As discussed later, the Tasmanian Boobook, *Ninox leucopsis*, was the most commonly reported nocturnal species in 2016–17 with 20 records, but this must be compared with its ten-year average of 37.4 records. Records are lower than the ten-year averages for both the Tasmanian migratory obligate breeders, Orange-bellied Parrot, *Neophema chrysogaster* (one record only in 2016–17) and Swift Parrot, *Lathamus discolor* (20 records).

Nocturnal birds

As has been the case in previous years, nocturnal birds continue to be under-reported because surveys are typically carried out in daylight. This carries through even though the Tawny Frogmouth, *Podargus strigoides*, for example, is readily identifiable by its call, and yet there were only 7 records in 2016–17. The most commonly recorded nocturnal species in this period was in fact the Tasmanian Boobook, for which there were 20 records (RR = 0.9).

Species not recorded in 2016-17

The following species did not appear in Birdata records for Tasmania in 2016–17, but were recorded during the previous ten-year period: California Quail, *Callipepla californica*; Stubble Quail, *Coturnix pectoralis*; King Quail, *Synoicus chinensis*; Barn Owl, *Tyto alba*; Sacred Kingfisher, *Todiramphus sanctus*; Superb Lyrebird, *Menura novaehollandiae*; Olive-backed Oriole, *Oriolus sagittatus*. As for 2015–16, the Superb Lyrebird is probably the most surprising member of this list, given that anecdotal accounts of this species' range expansion in Tasmania are fairly common, and its known occurrence in several parts of the state that are popular with recreational visitors (e.g. Hastings Caves and Mt Field National Park). Some species may indeed be observed but not recorded in Birdata.

Long-term trends

It is difficult to identify long-term trends confidently using these data. One confounding factor is that not all areas are surveyed in any one reporting period. Tasmania's landmass includes approximately 397 terrestrial 10' squares. Over the ten years 2006–16, approximately 88% of these have been sampled, but only 37% of terrestrial squares were surveyed during 2016–17. Thus, different suites of squares contribute data to each yearly report. This highlights the value of ongoing effort to repeatedly sample the same survey areas over the long-term, which may be facilitated by setting up more shared sites (i.e. survey sites shared by multiple observers). As an example, case studies 3 and 4 illustrate the value of long-term data sets from the same site(s). In addition, it may be worth identifying non- and under-visited areas and publicising these as a strategy for boosting coverage. If we consider the number of surveys carried out during 2016–17 in each terrestrial Key Biodiversity Area (KBA) in Tasmania (table 3), it is clear that there are large gaps in coverage and that the vast majority of surveys represent the South-east Tasmania KBA.

Nevertheless, examination of the long-term data for 2006–16 does provide some indications of trends at the broad level. In general, a decrease in a species' RR for 2 ha/20 min surveys is mirrored by a decrease in RR for the 500 m area searches, providing some cross-validation of trends. For example, data from both survey types indicate a decrease in records for Fan-tailed Cuckoo, *Cacomantis flabelliformis*: RR for 2 ha/20 min surveys in 2016–17 was 4.7%, compared with 6.2% for 2006–16, and for 500 m area surveys RR was 13.7% compared with 16.8%. For further discussion of analysis and interpretation of survey data, please see appendix A, page 11.

Table 3: *Birdata records for the larger Tasmanian Key Biodiversity Areas, 2016–17. A number of small island KBAs for which there were no surveys were excluded. (AO = Active Observers)*

	All surveys	AO	2 ha/ 20 min	500 m area
Bruny Island	47	6	15	9
South-east Tasmania	538	29	388	86
South Arm	64	1	23	37
Maria Island	1	1	0	1
Melaleuca — Birches Inlet	0	0	–	–
North-west Coast	99	5	11	69
Robbins Passage & Boulanger Bay	10	2	3	7
Hunter Island Group	0	0	–	–
King Island	41	8	27	5
Central Flinders Island	0	0	–	–
Eastern Flinders Island	0	0	–	–
Rubicon Estuary	0	0	–	–
Tamar Wetlands	8	3	0	8
Cradle Mountain	11	3	7	2
Ben Lomond	0	0	–	–
Cape Portland	1	1	0	0
St Helens	0	0	–	–
Douglas Apsley	0	0	–	–
Moulting Lagoon	0	0	–	–

Calculating the ratio of the number of records in 2016–17 compared with the average number of records in 2006–16 also provides an indication of whether a species was more or less abundant than the average for the preceding ten years. This ratio was calculated only for species with a total number of records >50 as it would be less reliable for species with low numbers. Examining these ratios (see table 2 and correcting for the number of observations, which was 20% higher in 2016–17 than for the 10-year average) shows that, for many species with a ratio around 1.2 (e.g. Crescent Honeyeater, *Phylidonyris pyrrhopterus*, Little Wattlebird, *Anthochaera chrysoptera*, Black-faced Cuckoo-shrike, *Coracina novaehollandiae*, and Forest Raven, *Corvus tasmanicus*), the number of records in 2016–17 is similar

to the long-term average, which suggests population stability. A ratio of ≥1.5 suggests higher than average numbers in 2016–17. Some examples are: Common Bronzewing, *Phaps chalcoptera*, Shining Bronze-cuckoo, *Chalcites lucidus*, Pallid Cuckoo, *Heteroscenes pallidus*, Yellow-throated Honeyeater, *Nesoptilotis flavicolis*, Black-headed Honeyeater, *Melithreptus affinis*, Eastern Spinebill, *Acanthorhynchus tenuirostris*, Striated Pardalote, *Pardalotus striatus*, Tasmanian Thornbill, *Acanthiza ewingii*, Brown Thornbill, *Acanthiza pusilla*, Olive Whistler, *Pachycephala olivacea*, Golden Whistler, *Pachycephala pectoralis*, Grey Shrike-thrush, *Colluricincla harmonica*, and Satin Flycatcher, *Myiagra cyanoleuca*. Three of these are Tasmanian endemics, four are summer migrants, and none are introduced species. The apparent increase in 2016–17 could reflect favourable seasons in Tasmania, or, in the case of migrants, on the mainland (see also Case studies 2 and 3).

In contrast, species for which the ratio is ≤0.7 (i.e. suggesting lower numbers in 2016–17 than in the preceding ten years) are: Wedge-tailed Eagle, *Aquila audax*; White-bellied Sea-Eagle, *Haliaeetus leucogaster*; Brown Falcon, *Falco berigora*; Common Greenfinch, *Chloris chloris*; Tree Martin, *Petrochelidon nigricans* (appendix B). Tree Martins are thought to be declining in south-eastern Australia because of loss of nesting hollows due to logging and competition from Common Starlings (Birds in Backyards undated). The single record for the White-throated Needletail in 2016–17 is consistent with the decline in this species' abundance across Australia (Tarburton 2016). The lower RR for Common Greenfinch contrasts with a recent report that at the national level greenfinches are faring much better in response to habitat changes than other introduced seed-eating birds such as goldfinches (Peter, 2018). With three raptors on this list, it is also worth noting that, in the 2016–17 period, the RRs for the Grey Goshawk, *Accipter novaehollandiae*, Brown Goshawk, *A. fasciatus*, and Collared Sparrowhawk, *A. cirrocephalus*, are all 50% or less of average RRs for 2006–16 (RR ratios were not calculated because there were less than 50 records). This initially concerning trend may actually reflect that regular observers are switching from incidental reports of individual species to focusing on more formal surveys. Reporting as Incidental Surveys in Birdata of naturally rare or less easily observed species such as raptors, nocturnal birds, Southern Emu-wren, *Stipiturus malachurus*, and Tawny-crowned Honeyeater, *Glyciphila melanops* (the latter two species having only two records in 2016–17), should, therefore, be encouraged because formal surveys may not pick them up.

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Case study 1: Status of Musk Lorikeet

Mike Newman, Sue and Warren Jones

In the previous issue of the State of Tasmania's Birds (Newman *et al.* 2018) the Musk Lorikeet, *Glossopsitta concinna*, was highlighted as one of three species whose numbers seemed to have increased. Because other small parrots that nest in tree hollows (such as the critically en-dangered Swift and Orange-bellied Parrots, *Lathamus discolor* and *Neophema chrysogaster*) are decreasing, this case study examines Birdata for insight into the apparent success of the Musk Lorikeet.

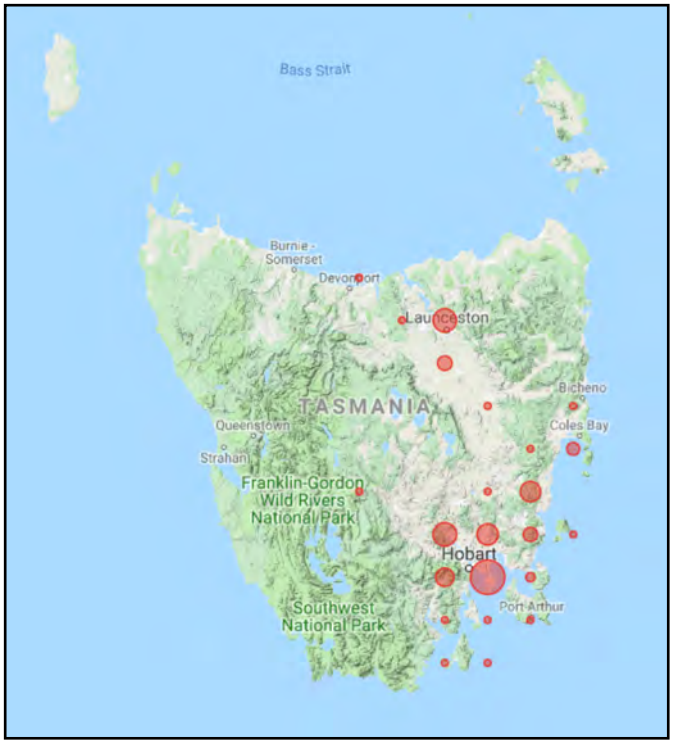

Figure 1: *Distribution of Musk Lorikeet in Tasmania 2010–19 (Birdata — 1285 records extracted 24 April 2019).*

Sharland (1958) described the Musk Lorikeet as a common species found in open forest and gardens, noted that it is particularly fond of fruit, and further stated that it can be seen at almost any time in the Sandford–South Arm district, but chiefly when orchard fruits are ripening. Interestingly, Sharland described the Swift Parrot as being equally common.

The current distribution of the Musk Lorikeet (figure 1) is virtually unchanged from that described by Sharland and, as shown in maps produced by Thomas (1979), the species is primarily confined to the drier regions of the east of the state, with the majority of records from the Hobart area.

In Tasmania the distribution and habitat preferences of the Musk Lorikeet are generally similar to those of the Eastern Rosella, *Platycercus eximius*, and Noisy Miner, *Manorina melanocephala* (Thomas 1979; for contemporary

distributions see Birdata portal). The first Atlas of Australian Birds (Blakers *et al.* 1984) suggested that the aggression of Noisy Miners excluded the Common Starling, *Sturnus vulgaris*, from areas containing nesting hollows suitable for Eastern Rosellas, thus providing them some breeding relief. What was overlooked was that the same line of argument suggests that Musk Lorikeets would also benefit. A further complication is the possibility that these parrot species face a new threat from Rainbow Lorikeets, *Trichoglossus moluccanus*, the numbers of which are increasing rapidly in some areas.

To examine the impact of these interactions on the status of the Musk Lorikeet, we compared the frequency with which these parrot species were recorded in Birdata during two four-year periods nearly two decades apart. Both periods, 1999–2002 and 2015–18, were data rich, which allowed the use of the preferred 2 ha/20 min survey method (see appendix A). The comparison was extended to the Swift Parrot in the expectation that this species had decreased relative to the Musk Lorikeet. The results are shown in figure 2.

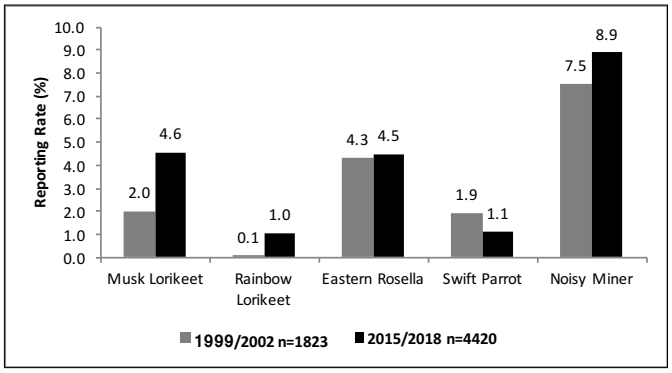

Figure 2: *Comparison of the reporting rates of Musk Lorikeets and four other species in Tasmania for the periods 1999–2002 and 2015–2018 (2 ha/20 min surveys,* n *= number of surveys).*

As anticipated, there was an increase (130%) in the reporting rate (RR) of the Musk Lorikeet between the two periods and a corresponding decrease (42%) in that for the Swift Parrot, which is attributable to significant habitat loss. The increase in RR for the Rainbow Lorikeet (900%) has been dramatic, but it remains less common and less widely distributed than the Musk Lorikeet. In contrast, there were only minor changes in the RRs of the Eastern Rosella and Noisy Miner. These changes are consistent with the previously identified role of the Noisy Miner in protecting the nest hollows of parrots from competitors such as the Common Starling, but possibly also from other species, including the sugar glider, which has been identified as a predator of breeding Swift Parrots (Stojanovic *et al.* 2017).

The results for 500 m surveys were similar to those for 2 ha surveys, and this supports the strength of the preceding conclusions, but both data sets could be subject to bias associated with differences in regional survey effort (see appendix A). To address this possibility, the relative status of the five species was examined using 500 m surveys (appendix A) in three regions of the state where differences in their relative abundance were apparent.

The first area was in the vicinity of Sandford on the South Arm peninsula and the adjacent area north to Cambridge: Sharland (1958) indicated that this was the historical stronghold of the Musk Lorikeet. Musk Lorikeets, Eastern Rosellas and Noisy Miners were the dominant species in this area, while Rainbow Lorikeets were absent and Swift Parrots were seldom recorded (figure 3). Although there was evidence of a substantial decrease in occurrence of the Eastern Rosella (59%), RRs for Musk Lorikeets and Noisy Miners have remained relatively stable over the 20-year period that is under discussion.

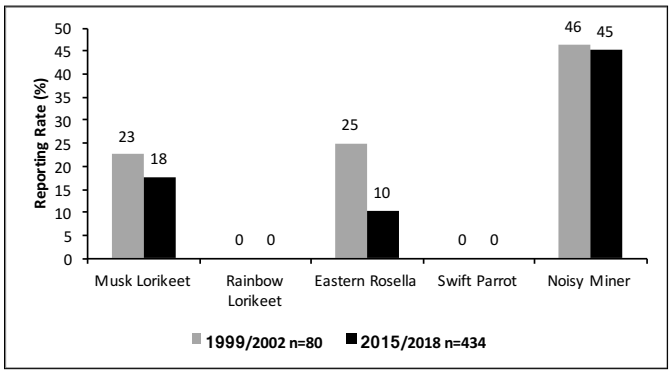

Figure 3: *Comparison of the reporting rates of Musk Lorikeets and four other species in the South Arm area east of Hobart for the periods 1999–2002 and 2015–18 (500 m surveys,* n *= number of surveys).*

In the northern part of the Channel area south of Hobart, from Blackmans Bay south to Margate, Musk Lorikeets, Swift Parrots and Noisy Miners were all scarce (figure 4). The Eastern Rosella was recorded regularly in the absence of the Rainbow Lorikeet in the period 1999–2002, but it was subsequently displaced when the Rainbow Lorikeet became established: by 2015–2018 it had become a scarce species and a 90% decrease in its RR was displayed. Over the corresponding period there was an increase in RR for the Musk Lorikeet, probably because fruit production in the area has increased. However, its RR and implied abundance were well below those in the South Arm area (figure 3).

As there were insufficient Birdata surveys to establish reliable annual trends for the two lorikeet species in the Channel area, we used monthly lists from a suburban garden at Kingston to provide detailed temporal information. These data (figure 5) suggest that the Rainbow Lorikeet was well established in this area by 2009, slightly later than the timing shown in Woehler

(2018). Musk Lorikeet occurrence decreased post-2012, which, as discussed later, is attributable to competition between these species.

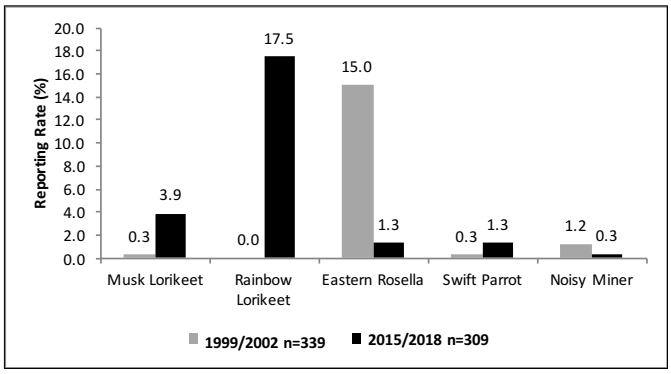

Figure 4: *Comparison of the reporting rates of Musk Lorikeets and four other species in the Channel area south of Hobart for the periods 1999–2002 and 2015–18 (500 m surveys,* n *= number of surveys).*

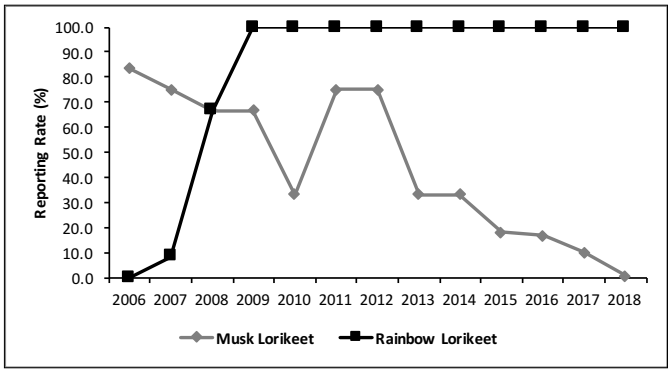

Figure 5: *Annual reporting rate (per cent of months in which the species was recorded) of Musk and Rainbow Lorikeets in a suburban garden in Kingston between 2006 and 2018.*

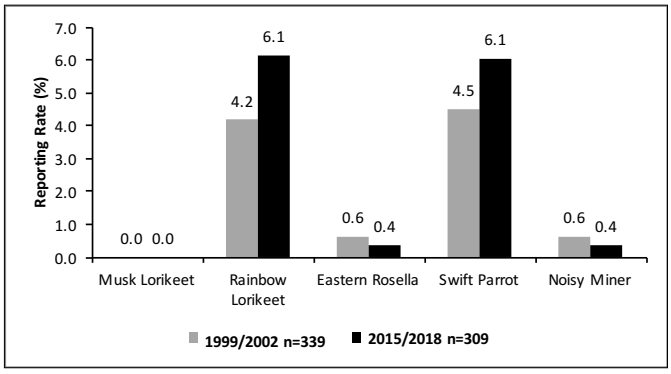

Figure 6: *Comparison of reporting rates of Musk Lorikeets and four other species in coastal north-west Tasmania for the periods 1999–2002 and 2015–18 (500 m surveys,* n *= number of surveys).*

The north-west coast of Tasmania between Wynyard and Devonport is another stronghold of the Rainbow Lorikeet in Tasmania. The Rainbow Lorikeet and the Swift Parrot were more regularly recorded here than the other three species (figure 6), and the Rainbow Lorikeet was well established in this area throughout the 20-year period under discussion.

Conclusions

Musk Lorikeets have maintained their numbers in Tasmania. Areas where RRs are highest (e.g. the Sandford area) are characterised by an abundance of Noisy Miners and Eastern Rosellas. Central to the Musk Lorikeet's success in such areas is the abundance of food associated with the availability of orchards, vineyards and plantings of flowering gums in a park-like environment that provides optimal habitat for Noisy Miners. Musk Lorikeets and Eastern Rosellas are among the few bird species capable of co-habiting with colonies of aggressive miners. The presence of the Noisy Miners may reduce competition for nest hollows from species such as Common Starlings, and possibly from nest predators such as possums and gliders.

Rainbow Lorikeets are increasing in some but not all locations. Areas where the Rainbow Lorikeet is well established are characterised by low levels of Noisy Miners, Eastern Rosellas and Musk Lorikeets. There is evidence that when Rainbow Lorikeets colonise an area both Eastern Rosellas and Musk Lorikeets decrease, and hybridisation between the two lorikeet species has occurred (Woehler 2018). It is interesting that the Rainbow Lorikeet has not expanded its range into the South Arm area during the past decade. This may indicate that Rainbow Lorikeets are not able to cope with the aggression of Noisy Miners and hence nest in areas where vegetation is unsuitable for Noisy Miners.

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Case study 2: Status of Horsfield's Bronze-Cuckoo

Mike Newman

Horsfield's Bronze-Cuckoo, *Chalcites basalis*, is the least common of the four species of cuckoo that are summer visitors to Tasmania. There are years when Horsfield's Bronze-Cuckoo is seldom recorded, the most recent being 2016–17 (figure 7). These annual fluctuations differ from those of the other cuckoo species, which suggests that Tasmania may act as a drought refuge for this bronze-cuckoo when conditions become unsuitable on the Australian mainland.

From late 1996 to mid-2010 drought affected much of southern Australia including Tasmania; this resulted in a prolonged period of dry conditions known as the Millennium Drought (http://www.bom.gov.au/cgi-bin/climate/change/timeseries.cgi?graph=rain&area=tas&season=0112&ave_yr=0). Wetter conditions in south-east Australia between 2010 and 2012 corresponded to an increased occurrence of Horsfield's Bronze-Cuckoo in Tasmania: this may be attributed to an influx of birds following successful breeding in the inland of the southern Australian mainland. The next year with above-average rainfall in inland Australia was 2016, and this appears to have triggered a Tasmanian increase in 2017–2018.

When the Tasmanian population was at low levels, most of the records were from coastal areas in open habitat with relatively few trees. However, as the Tasmanian population increased, Birdata records show an expansion away from the coast, with records from woodland habitat, where its range overlapped with the Shining Bronze-Cuckoo, *C. lucidus* (A. Fletcher pers. comm.).

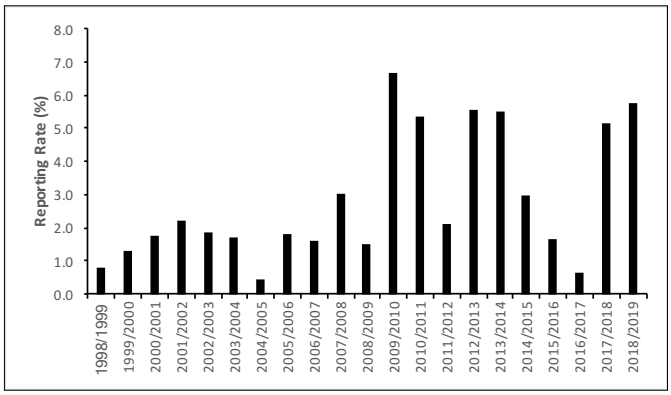

Figure 7: *Variation in RR, the annual reporting rate (500 m Birdata surveys), of Horsfield's Bronze-Cuckoo in Tasmania.*

An Atlas of the Birds of New South Wales and the ACT, Volume 2 (Cooper, McAllan, Brandis and Curtis 2017) supports this proposition, with records indicating that the RR of the Horsfield's Bronze-Cuckoo is higher in inland NSW than in near-coastal areas. Hence, the trends observed in Tasmania might be expected to occur in other coastal areas. Comparison of the annual RRs for Horsfield's Bronze-Cuckoo in Tasmania with the Hunter Region of NSW and near-coastal southern Queensland over the past decade provides support for the stated proposition (figure 8). In all three areas the RR in 2016–17 was at a ten-year minimum followed by an eight-fold or greater increase in the RR in 2017–18.

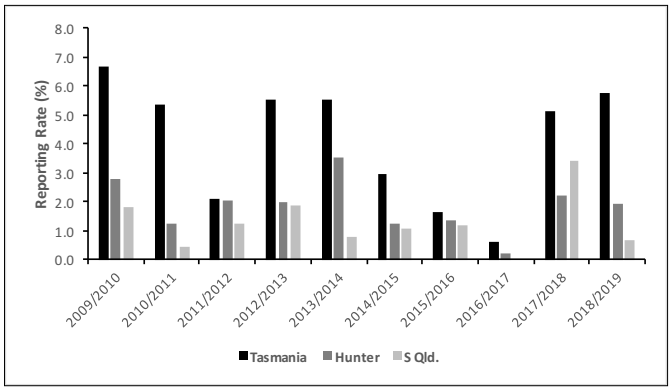

Figure 8: *Comparison of RR, the annual reporting rates (500 m Birdata surveys), of Horsfield's Bronze-Cuckoo in Tasmania with the Hunter Region of NSW and near-coastal southern Queensland.*

Conclusions

In Tasmania, the occurrence of Horsfield's Bronze-Cuckoo appears to be linked to climatic conditions on the Australian mainland, which suggests that Tasmania acts as a refuge during drought in inland Australia.

Case study 3: Status of the Whistlers

Mike Newman, Richard Ashby and Albert Nichols

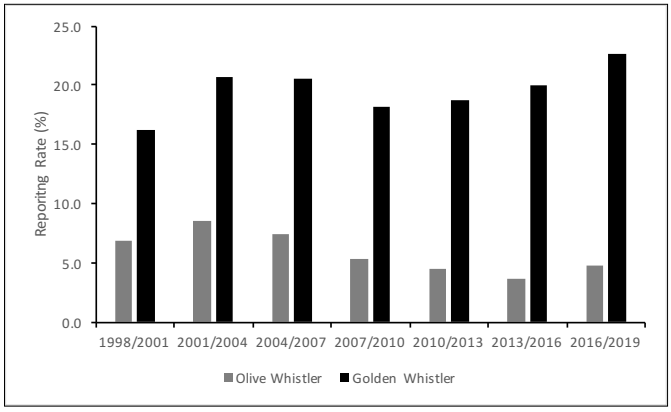

Figure 9: *Reporting rates (RR) of Olive and Golden Whistlers in Tasmania, 1998–2019; all types of Birdata surveys combined.*

Olive Whistlers, *Pachycephala olivacea*, and Golden Whistlers, *P. pectoralis*, are resident species in Tasmania, while there are occasional accidental summer records of the Rufous Whistler, *P. rufiventris*. Birdata records, uncorrected for bias (see appendix A, page 11, for further discussion), suggest that the Golden Whistler has sustained its population status over the last 20 years and may even have increased slightly (figure 9). In contrast, the Olive Whistler, which is less frequently recorded,

may have decreased over the same period. In order to test the validity of these conclusions, long-term data sets at three sites where surveys had been conducted in a systematic manner were evaluated to determine whether similar trends had occurred at all sites.

Woodsong in north-east Tasmania

At the Woodsong site (041.300S: 148.117E) near Goshen in the north-eastern tiers of Tasmania, Albert Nichols conducted Birdata 500 m surveys in dry forest with wet gullies between July 2009 and June 2018. The results show a 40% and 65% decrease in the RRs of the Olive and Golden Whistlers respectively (figure 10).

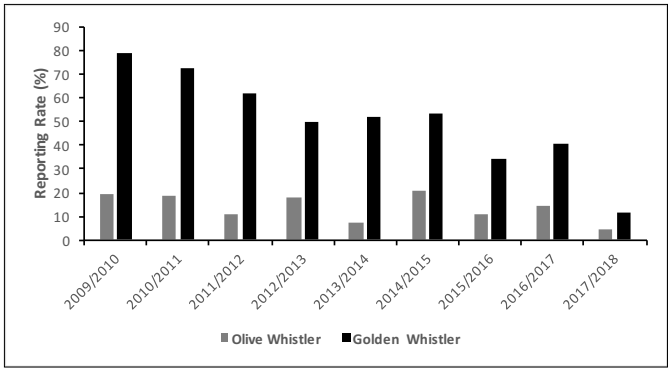

Figure 10: *Annual Reporting Rates of Olive and Golden Whistlers at Woodsong in north-eastern Tasmania between 2009–10 and 2017–18 (Birdata 500 m area surveys of approximately 30 min duration,* n *= 1131).*

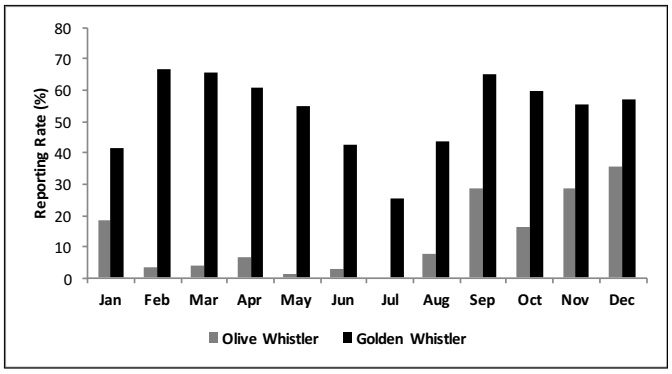

Figure 11: *Monthly variations in RR of Olive and Golden Whistlers at Woodsong in north-eastern Tasmania (Birdata 500 m area surveys of approximately 30 min duration between 2009 and 2018;* n *= 1131).*

At Woodsong, Olive Whistlers were predominantly recorded in spring and early summer, with relatively few records between January and August (figure 11). This suggests that, although Woodsong is at a relatively low altitude (100 m), Olive Whistlers depart after the breeding season, possibly moving to coastal areas where the species is known to occur in heathlands (Ridpath and Moreau 1965). However, it is also possible that they are simply less vocal (see Lawrence, 1952) and thus more difficult to detect outside the breeding season. In contrast, the Golden Whistler was frequently recorded throughout the year, although winter RRs between June and August were lower (figure 11).

Two sites in north-west Tasmania

Richard Ashby has regularly conducted surveys (Birdata 5 km area surveys; typically, of 3 to 4 h duration) since 1999 at Lake Llewellyn (040.934S: 145.567E) and at Cuprona Road (041.100S: 145.983E) in the Blythe River Conservation Area. Golden Whistlers were regularly recorded at both sites, with RR rates of 92.5 and 70.7% at Lake Llewellyn and Cuprona Road respectively. Although some fluctuations in the annual RRs of Golden Whistlers were apparent at both sites, there was no obvious long-term trend at either site (figures 12 and 13). However, a decrease of the order of 50% in the Olive Whistler's annual RR (mean RR 32%) was apparent at Cuprona Road (figure 13), with a smaller decrease of around 20% at Lake Llewellyn (figure 12), where the species was rather scarce (mean RR 11%).

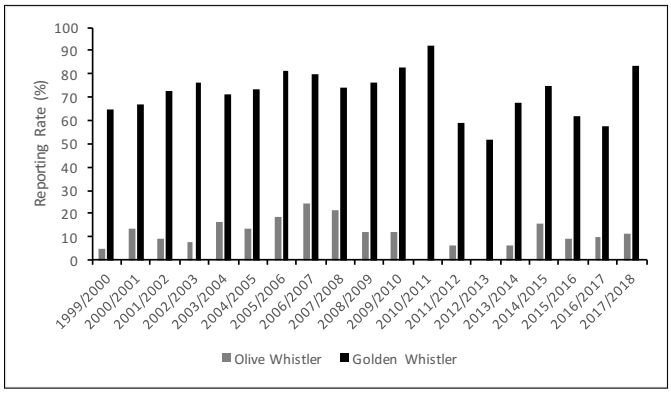

Figure 12: *Variations in annual RR (Birdata 5 km surveys) of Olive and Golden Whistlers at Lake Llewellyn (*n *= 484) in north-west Tasmania between 1999–2000 and 2017–18.*

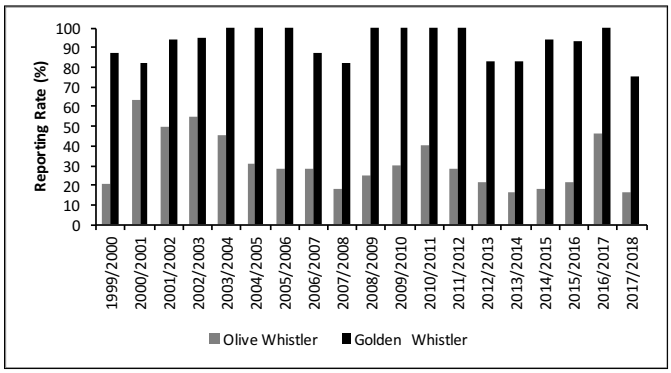

Figure 13: *Variations in annual RR (Birdata 5 km surveys) of Olive and Golden Whistlers at Cuprona Road (*n *= 305) in north-west Tasmania between 1999–2000 and 2017–18.*

The seasonal variations in RRs for both species were generally similar to those at Woodsong (figure 11): Golden Whistlers were recorded regularly throughout the year, and most Olive Whistler records occurred in spring and early summer, but over a slightly extended period from August to January.

Conclusions

Although the Golden Whistler is a regularly recorded species that occurs throughout Tasmania in both dry and wet forests, its observed decrease at Woodsong during the past decade gives some cause for concern. It is possible that such decreases are localised, influenced by drier conditions during the last decade and by fires in surrounding areas, although the Woodsong site was fortunately unburnt.

Birdata does provide evidence of a sustained decrease in the status of the Olive Whistler, which requires further investigation. This species has more specialised habitat requirements than the Golden Whistler since it favours wetter forests. However, as is the case for the Golden Whistler, the observed decrease in RR may reflect drier conditions over the observation period.

It is unclear whether seasonal variations in the RRs of Olive Whistlers are associated with decreased vocalisation outside the breeding season or with post-breeding movement, including altitudinal migration to coastal heathlands. Unfortunately, their high-altitude and coastal habitats receive limited survey effort.

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Lawrence, C.C. 1952. 'Notes on the Golden Whistler in Tasmania'. *Emu*, Austral Ecology, **52**(1): 25–31.

Ridpath, M.G. and Moreau, R.E. 1965. 'The birds of Tasmania: Ecology and Evolution'. *Ibis.* **108**: 348–93.

Case study 4: Dusky Woodswallow

Mike Newman, Richard Ashby and Albert Nichols

Dusky Woodswallows, *Artamus cyanopterus*, are summer visitors with strongly aerial lifestyles. They occur throughout Tasmania in areas where there is suitable habitat, particularly in the drier woodlands of the east coast. In the *State of Australia's Birds* (SOAB) study (Ehmke *et al.* 2015), the decreasing population trends for members of the guild of aerial feeders were attributed to the negative impact of increasing ambient temperatures on insect populations. This case study examines whether the Dusky Woodswallow has decreased in Tasmania.

Seasonal occurrence

Dusky Woodswallows arrive during September and depart in April (figure 14), which is later than most other summer visitors to the state.

Autumn migration

At Woodsong in the north-eastern tiers of Tasmania, monthly RRs peak during April, and that suggests that Dusky Woodswallows are moving through the area, which is approximately 20 km inland from the coast, during their autumn migratory passage. Examination of the actual dates of records (figure 15) supports this conclusion and indicates that most movement occurs in the first three weeks of April. Observations involved fewer than 10 birds, although one flock of 50 was recorded.

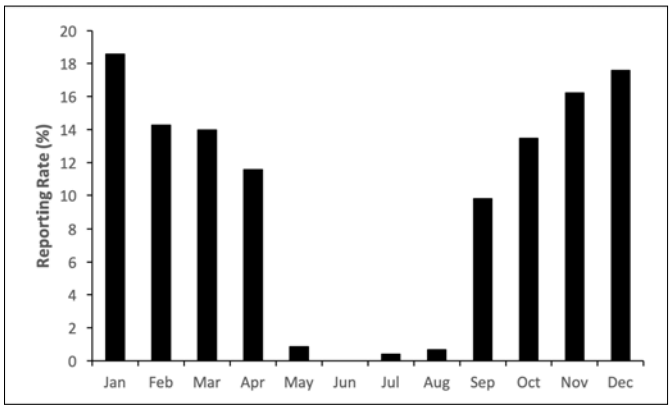

Figure 14: *Monthly RRs (reporting rates) of the Dusky Woodswallow in Tasmania (Birdata 500 m surveys 1998–2019).*

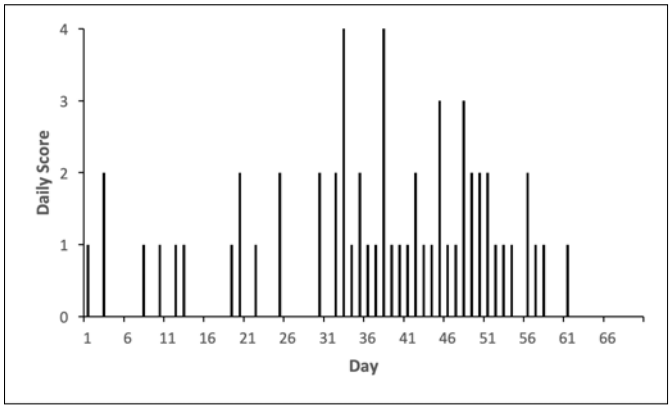

Figure 15: *Timing of autumn passage of Dusky Woodswallows at Woodsong in the north-eastern tiers of Tasmania for the period 2009–10 to 2018–19. (Day 1 = 1 March; Day 61 = 30 April.) Daily score is the number of years that Dusky Woodswallows were recorded during a survey on that date.*

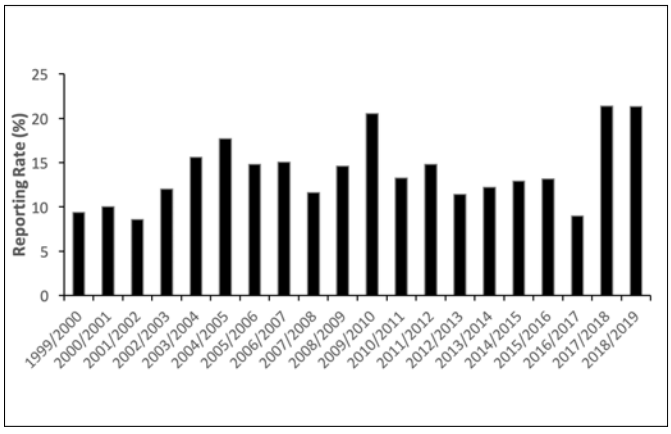

Figure 16: *Variation in the annual RR of the Dusky Woodswallow in Tasmania based on Birdata 500 m surveys for the months September–April (mean RR 14.6%, 1341 observations).*

Temporal trend — regional scale

The 500 m Birdata surveys for the months September to April were used to evaluate variations in the annual occurrence of Dusky Woodswallows. The landscape scale trend (figure 16) has been partially corrected for bias (see appendix A).

The trend for the Dusky Woodswallow is complex (figure 16). Annual RRs ranged from 8.6% to 22.1% with evidence of a sustained decrease over the period 2010–11 to 2016–17 before a 146% increase to the peak level of 22.1% in 2017–18: the RR remained high in 2018–19. The trend shown in figure 16 indicates an overall increase of 28%, but the increase in 2017–18 and 2018–2019 could possibly be associated with survey site bias (see appendix A). Other insectivorous species such as the Welcome Swallow, *Hirundo neoxena*, and Tree Martin, *Petrochelidon nigricans*, did not show such an increase.

Temporal trends at individual sites

Four long-term data sets from consistently conducted surveys were compared with the regional scale trend. In north-west Tasmania, Richard Ashby has monitored sites at Lake Llewellyn and Cuprona Road throughout the last 20 years. In the north-eastern tiers, Albert Nichols has made regular surveys at Woodsong near Goshen. The fourth data set is from five years of surveys by Mike Newman at a site in south-east Tasmania on the South Arm peninsula near Hobart.

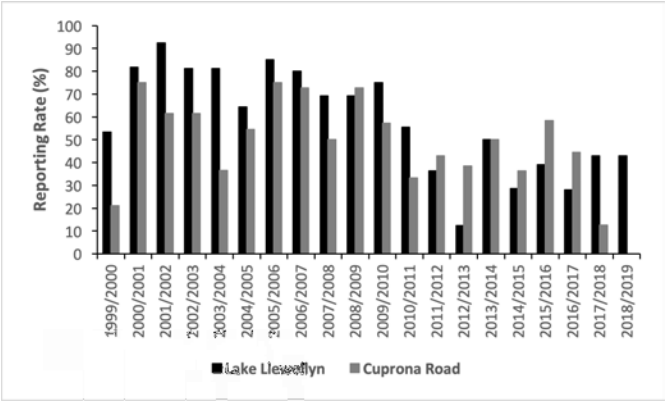

Figure 17: *Variation in annual RRs (September–April) of Dusky Woodswallows in north-west Tasmania at Lake Llewellyn (040.934S: 145.567E; mean RR 55.3%; 338 surveys) and Cuprona Road (041.100S: 145.983E; mean RR 47.8%; 207 surveys). Birdata 5 km surveys, typically of 3 to 4 h duration conducted between September and April.*

At both Lake Llewellyn and Cuprona Road a decrease in Dusky Woodswallows was apparent in the last decade (figure 17). At Cuprona Road the species had become scarce by 2018–19, with no evidence of the increase observed at the regional scale during 2017–18 (figure 16). In contrast, the woodswallows continued to be recorded regularly at Lake Llewellyn, although less frequently.

At Woodsong there was compelling evidence of a sustained decrease. This is in stark contrast to the site in south-east Tasmania on the South Arm peninsula where Dusky Woodswallows increased (figure 18). These two data sets are directly comparable because they involved similar survey types and durations. The high RRs of 70 to 75% at the South Arm site in 2017–18 and 2018–19 corresponded with the regional increase in those years that is shown in figure 16.

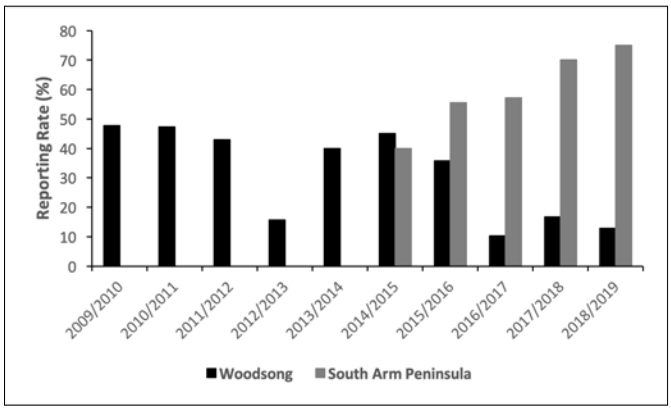

Figure 18: *Variation in annual RRs of Dusky Woodswallows at Woodsong (041.300S: 148.117E) in the north-eastern Tiers of Tasmania (mean RR 29.7%;* n=*934 surveys) and at a site on the South Arm peninsula (042.981S: 147.488E) near Hobart (mean RR 57.1%;* n=*49). Birdata 500 m surveys of approximately 30- and 40-minute duration at Woodsong and South Arm respectively, September to April.*

Conclusions

Assessing the status of the Dusky Woodswallow in Tasmania is challenging. While the regional scale trend provides evidence of an increase, the situation at individual sites is mixed, with evidence of sustained decreases in the north-west and north-east of the state offset by an increase in the south-east. The long-term RR for the Dusky Woodswallow in Tasmania of 9.6% (500 m Birdata surveys) is double that for Victoria in the region surrounding Melbourne (4.7%), suggesting that the dry woodlands of south-east Tasmania are ideal for the species. The movements of Woodswallows tend to be nomadic and it is possible that the observed fluctuations in their numbers in Tasmania are related to conditions on the Australian mainland. On balance, these data suggest that the Dusky Woodswallow in Tasmania is fairly secure.

Reference

Ehmke, G., Cunningham, R., O'Connor, J., Garnett, S., Lau, J. and Herman, K. 2015. *The State of Australia's Birds 2015: Headline Trends for Terrestrial Birds*. BirdLife Australia: Carlton, Victoria.

Appendix A: Survey methods, analysis and interpretation of results

Introductory remarks

After the completion of the second national bird atlas (*The New Atlas of Australian Birds [1998–2001]*, Barrett *et al.* 2003), ongoing collection of Atlas information placed increasing emphasis on monitoring changes in the status of bird populations as well as changes in distribution.

BirdLife Australia branded the project as Birdata and established an online portal for data entry and recovery by participants and community stakeholders. The following notes provide insight into the analysis and interpretation of Birdata.

Survey types

Much of the information submitted to Birdata involves standard surveys conducted in one of the following manners:

1. 2 ha/20 min surveys — observations collected in a 2 ha area in a 20-minute period.
2. 500 m surveys — observations collected within an area of 500 m radius with no defined time limit.
3. 5 km surveys — observations collected within an area of 5 km radius with no defined time limit.

These three survey types are the main sources of data used in the 'State of Tasmania's Birds' analysis. Ideally, observations collected for 500 m and 5 km surveys should be limited to one day. In addition, all species recorded, both seen and heard, must be submitted. Recording the numbers of birds of each species is optional.

4. Incidental surveys are the most important of the other sources of information submitted to Birdata. This survey type is often used to submit information when a seldom-recorded species is seen, or an observation is deemed unusual, such as large numbers of birds or a species present at an unusual time of the year. Incidental surveys often involve only one species and do not provide comprehensive species lists.

Preferred survey types

Survey methods that standardise observer effort (such as the 2 ha/20 min survey) are preferred because they facilitate comparison of surveys between observers and survey sites. The 2 ha/20 min method, which prescribes both survey area and duration, gives the most reliable information for determining changes in bird populations over time and can be related to different habitat types. While 2 ha/20 min surveys, which generate short lists of bird species, are preferred for common species, their value for uncommon species is limited since they provide too few records for statistically meaningful conclusions to be drawn.

All 500 m surveys record observations in an area of 500 m radius and take place over an extended time. A 500 m survey site is 39 times larger than a 2 ha site, and often has increased habitat diversity and, hence, increased bird diversity. Observers conducting 500 m surveys only collect observations from part of that area and typical surveys are of 30-minute to one-hour duration. Hence, while 500 m survey efforts are less uniform than those in 2 ha surveys, they provide more records of uncommon species and are, by default, the preferred survey type for determining changes in the status of uncommon species.

In 5 km surveys, the area sampled is expanded to a 5 km radius, which further increases opportunities for observers to sample various habitat types and record a larger number of species. The variability in observer effort in this survey type prevents results being compared between sites and observers. However, it provides valuable information when repeat surveys are conducted in a consistent manner at a particular site, as will be discussed further.

Waterfowl surveys present different challenges and 2 ha surveys are seldom suitable. Observers need more time to move around larger water bodies, which often exceed 2 ha in size, and to count flock sizes. Using 500 m or 5 km surveys overcomes these issues. If it is impossible to count a whole water body, one can state in Birdata that the area surveyed is restricted to a particular wetland or portion of a large water body.

It is important to report the numbers of particular species, and this is usually possible since many species of waterfowl are often highly visible. Quantitative data can highlight the magnitude of waterfowl movement across seasons in a way that simply recording presence or absence does not do. In addition, abundance data may be used to inform conservation proposals and underpins the designation of protected wetlands. It may also have implications for active management of waterfowl refuges. From this perspective, regular counting of wetlands is strongly encouraged.

Reporting rates

Reporting rate (RR), expressed in percentages, measures how often a species was recorded. For instance, if a species has an RR of 80% at survey site *x*, it shows that the species has been seen on four of every five surveys at site *x*, and indicates that a visitor will probably see that species four times out of five at that location. However, if the RR is 5%, a visitor is unlikely to see the species on a casual visit (i.e. they have one chance in 20).

Interpretation

Birdata has many applications including defining species distributions, providing inventories of local bird populations and identifying long-term trends in species status at the landscape scale.

All survey types, including incidental surveys, provide useful information on species' distributions if survey locations are known. Benchmark historical distributions were recorded at a grid scale of 10′ latitude and long-

itude. Contemporary survey information has been collected more precisely as point locations ever since GPS systems have become widely available.

Arguably, the most valuable data sources are those in which the same observer has made repeated visits to the same survey site over an extended time. These long-term data sets provide useful inventories of local bird populations, as well as valuable information on occurrence trends of individual species over time. However, observers conducting local studies often prefer to use the less constrained 500 m and 5 km survey types, which generate longer species lists and better sample the complete inventory of species at a locality (e.g. a rural property). If their surveys are consistent, changes over time can be reliably identified. However, as discussed in the next section, there are issues in comparing results between survey sites.

Trend analysis

Annual RRs determine changes in the status of species over time. Such trends are based on the presence of a species at a survey site and do not consider how many birds were present. The reason for only using presence data is that it is very difficult to estimate numbers of birds reliably, particularly in habitats with dense vegetation and for birds that are difficult to detect. In establishing trends at the landscape scale, surveys will often involve many observers and different survey sites consisting of various habitats. Consequently, there is often not enough consistency between data sources that involve estimates of species abundance for meaningful comparisons between sites. However, at individual survey sites where the same observer is involved there may be sufficient consistency for conclusions to be drawn about changes in species abundance over time.

When RRs are compared over time the use of 2 ha surveys is expected to provide reliable trends because variation in the survey effort is eliminated (i.e. survey time and area are constant). However, as discussed in the next section, there are other biases that may preclude meaningful analysis at the landscape scale when using results from many survey sites. Hence, unless the biases are corrected, results must be treated with caution. There are ways of decreasing the impact of bias, but the techniques are complex and require specialist expertise (Cunningham and Olsen 2009), which is not locally available. Where possible we have drawn on existing trends generated as part of *The State of Australia's Birds* project (Ehmke 2015) to test tentative conclusions drawn from trends generated without correcting bias.

As mentioned previously, 2 ha/20 min surveys generate short lists and statistically meaningful trends in annual RRs can only be generated when large numbers of surveys have been conducted and species are relatively common. Consequently, for many uncommon species that have low RRs, there are insufficient records.

The RRs for all species are higher in 500 m and 5 km surveys because observers search larger areas over more time and selectively sample a greater variety of habitat types. Collectively these habitats support more bird species than smaller 2 ha survey sites that have uniform habitat. However, the increased variation in survey effort from site to site makes these 500 m and 5 km surveys less reliable for trend analysis.

It is important that 2 ha data are not combined with 500 m and 5 km survey data for trend analysis because of the differences in survey effort and because in some instances 500 m and 5 km survey sites contain embedded 2 ha survey sites (i.e. the data sets lack independence).

Biases

When annual RRs are calculated for a region (e.g. Tasmania), the results from many survey sites are combined. However, the numbers of surveys conducted at individual sites vary considerably depending on whether sites receive single or repeat visits (e.g. monthly). Consequently, some locations and habitat types may be over-represented in the data set. Furthermore, there are differences from year to year in the location of survey sites and in the extent to which repeat surveys are conducted. There are also differences in the abilities of different observers to detect birds and in their familiarity with the survey sites. An observer conducting repeat surveys knows which birds are likely to be present and where they are most likely to be found at the site.

Validation against long-term data sets

The uncertainties associated with trends in regional annual RRs, even when standard surveys are used, have been discussed above. However, when an observer repeats surveys at a site in a consistent manner, these biases are addressed and the trends can be statistically tested. Thus, the conclusions drawn from the broad regional data set can be validated against precise data at specific locations if the location is representative of the regional landscape.

Abundance

As indicated previously, Birdata has the option of recording the number of birds observed and this is particularly important when recording numbers of species that congregate in large flocks. In the Tasmanian Birdata records there are few instances where waterbird counts have been conducted regularly in conjunction with standard surveys at wetland sites. Until this deficiency is rectified it is necessary to rely on data provided by incidental surveys.

Distribution

There is an ongoing need to collect information on bird distributions throughout the state in order to understand

how the ranges of birds are adapting to changes in the natural environment (for instance, climate change and habitat loss) and how various species are responding to changes in land use (such as irrigation and agricultural intensification). All survey methods contribute to determining species distribution. However, in addition to this, Birdata offers us the opportunity to increase our understanding of seasonal distributions and the extent to which altitudinal migration occurs in Tasmania, which is a state that has extensive areas of montane habitat.

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Appendix B: Number of records and reporting rates for terrestrial birds occurring in Tasmania

Common name	2016–17* RR(%) All surveys	2016–17* No. records, all surveys	2006–16** Average no. records, all surveys	Ratio 1 yr/10 yr if >50 records	2016–17* RR(%) 2 ha/20 min	2006–16** RR(%) 2 ha/20 min	2016–17• RR(%) 500 m area search	2006–16** RR(%) 500 m area search
California Quail	0.0	0	0.3	—	0.0	0.0	0.0	0.0
Indian Peafowl	0.1	2	5.6	—	0.1	0.0	0.0	0.3
Stubble Quail	0.0	0	0.3	—	0.0	0.0	0.0	0.0
Brown Quail	0.6	14	30.6	—	0.0	0.5	0.4	2.0
King Quail	0.0	0	0.0	—	0.0	0.0	0.0	0.0
Common Pheasant	0.1	3	3.5	—	0.2	0.0	0.1	0.2
Wild Turkey	0.0	1	1.9	—	0.0	0.1	0.1	0.1
Rock Dove	0.5	11	26.5	—	0.0	0.4	0.1	0.9
Spotted Dove	4.1	91	97.2	0.9	4.0	2.1	3.6	6.3
Common Bronzewing	7.0	153	90.0	1.7	8.5	3.4	6.2	5.3
Brush Bronzewing	4.1	90	89.0	1.0	3.0	2.3	2.3	4.7
Horsfield's Bronze-Cuckoo	0.5	11	35.2	—	0.3	0.8	0.6	3.6
Shining Bronze-Cuckoo	7.6	167	112.9	1.5	4.1	4.2	10.5	8.4
Fan-tailed Cuckoo	9.2	203	204.1	1.0	4.7	6.2	13.7	16.8
Pallid Cuckoo	10.9	239	153.0	1.6	7.0	5.7	14.6	11.8
Tawny Frogmouth	0.3	7	12.2	—	0.1	0.1	0.0	0.5
Australian Owlet-nightjar	0.1	3	3.1	—	0.0	0.1	0.0	0.1
White-throated Needletail	0.0	1	8.6	—	0.0	0.1	0.0	0.4
Tasmanian Native-hen	19.1	420	415.9	1.0	11.9	13.4	21.0	22.3
Banded Lapwing	1.5	34	34.4	—	0.1	0.4	0.1	0.8
Masked Lapwing	28.7	631	727.2	0.9	18.1	23.5	35.3	45.2
Painted Button-quail	0.1	2	5.2	—	0.0	0.1	0.0	0.0
Wedge-tailed Eagle	3.5	77	116.3	0.7	1.2	3.0	2.7	4.8
Swamp Harrier	6.7	148	196.5	0.8	1.8	3.9	8.9	10.4
Grey Goshawk	1.0	23	45.9	—	0.3	0.6	0.0	1.7
Brown Goshawk	0.9	20	43.2	—	0.6	1.1	1.0	2.2
Collared Sparrowhawk	0.4	8	20.2	—	0.1	0.4	0.4	0.9
White-bellied Sea-Eagle	5.5	121	170.1	0.7	1.9	2.8	3.7	8.1
Masked Owl	0.2	4	8.9	—	0.0	0.0	0.1	0.7
Barn Owl	0.0	0	0.2	—	0.0	0.0	0.0	0.0
Tasmanian Boobook	0.9	20	37.4	—	0.0	0.1	0.4	1.5
Azure Kingfisher	0.4	8	7.7	—	0.4	0.1	0.0	0.1
Sacred Kingfisher	0.0	0	0.5	—	0.0	0.0	0.0	0.1
Laughing Kookaburra	26.7	588	456.0	1.3	15.1	14.8	36.4	35.7
Nankeen Kestrel	0.1	3	4.9	—	0.2	0.2	0.1	0.1
Australian Hobby	0.6	13	20.3	—	0.0	0.4	0.5	1.1

*1/7/16–30/6/17 **1/7/06–30/6/16

Common name	2016–17* RR(%) All surveys	2016–17* No. records, all surveys	2006–16** Average no. records, all surveys	Ratio 1 yr/10 yr if >50 records	2016–17* RR(%) 2 ha/20 min	2006–16** RR(%) 2 ha/20 min	2016–17• RR(%) 500 m area search	2006–16** RR(%) 500 m area search
Brown Falcon	3.6	80	164.0	0.5	0.9	3.9	1.8	6.8
Peregrine Falcon	0.5	12	26.7	—	0.2	0.4	0.3	1.5
Yellow-tailed Black-Cockatoo	13.1	289	294.0	1.0	5.7	5.8	14.9	18.8
Galah	5.7	125	127.5	1.0	2.7	1.6	4.6	6.6
Long-billed Corella	0.2	4	18.4	—	0.0	0.2	0.1	1.1
Little Corella	0.3	6	4.7	—	0.1	0.1	0.1	0.2
Sulphur-crested Cockatoo	8.3	182	203.2	0.9	6.5	8.1	5.6	8.8
Green Rosella	39.7	873	631.6	1.4	31.9	31.5	50.1	45.6
Eastern Rosella	4.4	96	107.4	0.9	5.5	4.3	3.6	5.3
Swift Parrot	0.9	20	47.5	—	0.9	1.6	1.2	2.7
Ground Parrot	0.1	3	6.0	—	0.1	0.1	0.0	0.3
Blue-winged Parrot	1.0	21	32.1	—	0.3	1.2	1.3	1.3
Orange-bellied Parrot	0.0	1	4.8	—	0.1	0.1	0.0	0.4
Musk Lorikeet	4.9	108	109.7	1.0	6.1	2.7	4.5	6.5
Rainbow Lorikeet	1.5	34	23.4	—	1.3	0.1	0.6	1.2
Superb Lyrebird	0.0	0	5.1	—	0.0	0.2	0.0	0.3
Superb Fairy-wren	57.2	1258	877.9	1.4	50.2	40.7	70.8	67.3
Southern Emu-wren	0.1	2	9.3	—	0.1	0.2	0.0	0.4
Crescent Honeyeater	20.5	450	370.3	1.2	17.5	18.6	20.5	25.9
New Holland Honeyeater	25.6	562	498.2	1.1	19.9	19.2	30.0	36.9
Yellow-throated Honeyeater	48.9	1075	636.5	1.7	46.0	37.1	58.6	48.8
Strong-billed Honeyeater	8.0	175	136.0	1.3	4.6	3.9	12.4	11.8
Black-headed Honeyeater	20.1	443	303.6	1.5	14.4	11.6	29.6	26.5
Tawny-crowned Honeyeater	0.1	2	19.2	—	0.1	0.7	0.1	1.5
Eastern Spinebill	22.3	491	321.9	1.5	13.5	10.1	30.5	27.2
White-fronted Chat	4.0	89	103.9	0.9	1.9	2.4	4.9	7.2
Little Wattlebird	24.2	533	437.5	1.2	19.1	13.2	25.3	27.4
Yellow Wattlebird	25.1	551	458.5	1.2	14.8	16.3	37.7	36.6
Noisy Miner	9.1	201	146.5	1.4	10.7	8.3	9.0	6.5
Spotted Pardalote	17.6	388	353.4	1.1	21.7	19.8	17.8	24.6
Forty-spotted Pardalote	0.3	7	25.3	—	0.3	1.0	0.1	0.9
Striated Pardalote	31.8	699	351.9	2.0	30.0	20.7	35.5	25.8
Striated Fieldwren	0.8	17	40.2	—	0.3	1.4	0.5	1.5
Tasmanian Scrubwren	17.8	391	282.7	1.4	12.6	10.7	26.7	25.6
Scrubtit	1.2	27	36.6	—	0.7	1.7	1.7	1.9
Yellow-rumped Thornbill	4.6	102	126.7	0.8	3.3	6.3	6.5	6.4
Tasmanian Thornbill	17.8	391	261.6	1.5	15.9	13.4	16.3	15.6
Brown Thornbill	44.2	971	573.2	1.7	40.3	27.2	53.9	41.9

*1/7/16–30/6/17 **1/7/06–30/6/16

Common name	2016–17* RR(%) All surveys	2016–17* No. records, all surveys	2006–16** Average no. records, all surveys	Ratio 1 yr/10 yr if >50 records	2016–17* RR(%) 2 ha/20 min	2006–16** RR(%) 2 ha/20 min	2016–17• RR(%) 500 m area search	2006–16** RR(%) 500 m area search
Black-faced Cuckoo-shrike	13.6	299	245.6	1.2	8.3	7.0	18.1	18.8
Spotted Quail-thrush	0.1	2	12.7	—	0.0	0.2	0.3	2.2
Olive Whistler	6.3	139	79.6	1.7	3.4	2.4	9.7	7.5
Golden Whistler	23.7	522	337.2	1.5	17.2	13.4	31.5	27.9
Grey Shrike-thrush	41.5	913	552.3	1.7	31.4	26.8	56.9	46.7
Olive-backed Oriole	0.0	0	0.2	—	0.0	0.0	0.0	0.0
Black Currawong	9.4	206	222.2	0.9	6.5	8.7	12.9	16.3
Grey Currawong	11.0	241	206.7	1.2	11.8	7.5	8.4	11.2
Australian Magpie	17.0	373	337.7	1.1	11.5	12.4	15.5	15.7
Grey Butcherbird	19.3	425	383.0	1.1	9.6	11.7	26.3	29.9
Dusky Woodswallow	7.5	164	183.3	0.9	5.3	6.2	7.1	13.3
Grey Fantail	50.8	1116	790.2	1.4	44.4	38.8	63.3	60.1
Forest Raven	55.0	1210	972.1	1.2	54.2	50.0	58.2	61.4
Satin Flycatcher	6.3	139	79.3	1.8	3.1	1.6	10.6	8.4
Pink Robin	3.2	71	77.2	0.9	1.7	3.3	4.8	6.0
Flame Robin	8.1	179	147.6	1.2	4.6	6.2	13.0	12.9
Scarlet Robin	13.5	297	293.2	1.0	9.8	12.9	16.1	18.9
Dusky Robin	9.9	217	203.6	1.1	9.7	9.2	8.7	13.8
Beautiful Firetail	1.4	31	55.0	—	0.4	1.4	1.7	3.8
House Sparrow	16.1	354	454.1	0.8	9.1	13.0	13.9	25.7
Australasian Pipit	4.0	88	109.3	0.8	0.7	1.7	3.9	5.8
Common Greenfinch	3.5	77	125.7	0.6	0.8	3.6	3.5	6.0
European Goldfinch	15.1	333	409.3	0.8	7.2	13.6	16.7	23.2
Eurasian Skylark	7.4	163	156.3	1.0	2.7	4.8	5.7	7.1
Little Grassbird	2.8	62	54.2	1.1	1.8	0.9	2.6	3.2
Australian Reed-Warbler	0.5	11	15.0	—	0.0	0.1	1.0	1.4
Tree Martin	3.8	84	127.7	0.7	2.1	5.4	4.4	6.4
Welcome Swallow	27.9	613	573.2	1.1	15.7	22.2	37.2	38.6
Silvereye	26.7	587	510.7	1.1	19.1	16.5	31.6	37.6
Common Starling	25.1	551	626.0	0.9	15.5	24.7	29.6	36.7
Bassian Thrush	1.8	40	49.5	—	0.9	1.2	2.6	5.0
Common Blackbird	30.4	668	619.2	1.1	22.0	21.7	36.8	38.8

*1/7/16–30/6/17 **1/7/06–30/6/16

The implications of fuel reduction burning on birds in south-east Tasmania — a pilot study

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Abstract

Bird populations at six locations near Hobart in south-east Tasmania were monitored over two successive breeding seasons as part of a collaborative project with the Tasmanian Fire Service as part of the State Government's Fuel Reduction Program. The objectives of the pilot study were to determine whether there were discernible differences between the bird populations at different sites and whether results were similar in successive years. The analysis presented in this paper compares the results from one survey site at each location. Sites selected for evaluation represent a range of vegetation types and fire histories.

BirdLife Australia's standard survey method, which involves recording all the bird species seen and heard in an area of 2 ha over a period of 20 minutes, was used. Numbers of birds present were also recorded. Surveys were conducted in the mornings at monthly intervals. Sites were compared using measures of species richness, abundance and differences in the types of species that occurred regularly (reporting rate [RR] > 30%).

The results showed that the survey method provided robust measures of bird diversity and abundance, and of species assemblages. Two sites had been burnt in autumn immediately before surveys began. At both of these sites opportunistic species took advantage of conditions and resources generated by the fires (e.g. ground-feeding species that included Dusky Robin, *Melanodryas vittata*, Scarlet Robin, *Petroica multicolor*, Dusky Woodswallow, *Artamus cyanopterus*, and the elusive Painted Button-Quail, *Turnix varius*).

Now that the methodology is established, the next phase of the project will concentrate on understanding the impacts of fuel reduction burns on bird communities across an extended set of survey sites and assessing the effectiveness of operational strategies for mitigating the impact of these burns.

Introduction

The Tasmanian Government initiated its Fuel Reduction Program in response to the findings of the 2009 Victorian Bushfires Royal Commission and the 2013 Tasmanian Bushfires Inquiry. Formed during 2015–16 across Tasmania Fire Service, Parks and Wildlife Service, and Sustainable Timber Tasmania, the program identifies human settlement areas that are at greatest risk of bushfire impacts under current fuel conditions, and works to define the amount and location of fuel reduction burning that would significantly reduce the potential for bushfire impacts on these settlement areas. The program also seeks to identify and address knowledge gaps, and connect science and operational activity, as well as working on community education and engagement.

This paper reports the preliminary results of a collaborative project between the Tasmanian Fire Service and the Tasmanian Branch of BirdLife Australia. The project seeks to understand how low-intensity planned fire affects bird populations and to identify opportunities to achieve outcomes that protect both property and the natural assets of the surrounding environment.

BirdLife Australia's Birdata project involves the birdwatching community in monitoring the status of bird populations using standard survey methods. Using these standard protocols in this project not only provides additional Tasmanian Birdata, but also allows existing Birdata to be used for comparison. The sites monitored lie within the South-east Tasmania Key Biodiversity Area (KBA), where fire is a crucial threat to the populations of the bird species that support the KBA's nomination. Hence, the collaboration is based on shared goals.

Birds are recognised indicators of environmental quality because they are sensitive to environmental

change (Blair 1999, Sekercioglu *et al.* 2012); diverse and abundant bird populations imply the existence of a healthy ecosystem. Although many studies document trends in avian populations after fire (e.g. Smucker *et al.*, Lindenmayer *et al.* 2016, and Gosper *et al.* 2019), there is little data focusing on Tasmanian woodlands and none that we have found using data collected by citizen scientists. Our project seeks to understand how fast bird populations recover after an area is burnt and whether there are long-term changes to bird populations, as measured by species assemblage and abundance. We also seek to identify the responses, either positive or negative, of individual species following habitat modification by low-intensity fire. For example, are there species 'winners and losers' in both the short term and over the long term? How are different species using the new ecosystem resources provided by the burn?

In this paper we compare the data generated in the first two years of the project at six sites selected to represent a range of fire histories and vegetation types in order to gauge the success of our preliminary studies and the effectiveness of the methodology used.

Methods

Survey sites, 2 ha in size, were selected in areas of known fire history and were surveyed at monthly intervals by a team of six volunteers. Fire history and vegetation characteristics are outlined in the appendix (page 25) for the six sites evaluated in this paper.

Each surveyor was allocated an area with a set of survey sites and each worked independently; all were highly experienced with Tasmanian birds. Each survey involved recording bird species present, both seen and calling, in a 20-minute period, including an estimate of the minimum numbers of individuals for each species. Surveys began soon after fuel reduction burns were conducted at six of the 16 sites monitored. Other sites varied from 2 to 19 years since burns. All survey results were submitted to BirdLife Australia's General Birdata archive (entered under the user name TFS Project). The 2 ha 20-minute survey is the Birdata project's preferred survey method. Use of a standard survey method allows comparison with other data sets submitted to Birdata. Surveys were conducted in the morning when birds were active and surveyors avoided inclement weather.

Figure 1 shows the prescribed burn in progress at site HS01 (Huon Road–Strickland Avenue corner) in autumn 2017. The habitat at site SS01 (Mt Nelson Signal Station), approximately six months after the prescribed burn in autumn 2015, is shown in figure 2.

Results

Survey statistics

The results of surveys conducted at six sites with different vegetation types and fire histories are shown in table 1 (page 19) for surveys spanning at least two breeding seasons. The number of species recorded per survey indicates species richness and the total number of birds recorded per survey is a measure of overall bird abundance.

Figure 1: *Prescribed burn at site HS01, Huon Road–Strickland Avenue corner, autumn 2017. © Tasmania Fire Service*

Figure 2: *Habitat at site SS01, Mt Nelson Signal Station, six months after a prescribed burn in autumn 2015. © Tasmania Fire Service*

Reporting rates (RR), the proportion of surveys in which a species was recorded expressed as a percentage value, were used to compare the frequency at which species occurred. The number of species that occurred regularly at each site are compared in table 2.

Site	No. of species RR>50%	No. of species RR>30%
SS01	4	12
HS01	3	9
HR01	3	8
RH04	7	10
LS01	1	5
CH03	3	7

Table 2: *Number of species occurring regularly at 6 survey sites near Hobart, south-east Tasmania. Sites: Lazenby Sand, South Arm, LS01; Mt Nelson Signal Station, SS01; Chimneypot Hill, CH03; Huon Road–Strickland Avenue junction, HS01; Hall Street, Ridgeway, HR01; and Ridgeway Hill, RH04.*

Table 1: *Summary of monthly survey statistics for six sites monitored between March 2017 and June 2019 at locations near Hobart in south-east Tasmania. Survey sites were at Lazenby Sand, South Arm (LS01), Mt Nelson Signal Station (SS01), Chimneypot Hill (CH03), the junction of Huon Road and Strickland Avenue (HS01), Hall Street Ridgeway (HR01) and Ridgeway Hill (RH04).*

	South Arm	Signal Station	Chimney-pot Hill	Huon–Strickland	Hall St Ridgeway	Ridgeway Hill
	LS01	**SS01**	**CH03**	**HS01**	**HR01**	**RH04**
Number of species recorded	27	28	23	33	30	21
Mean number of species/survey	4.09	8.96	5.92	7.33	6.56	7.76
Standard Deviation	2.04	2.77	2.46	1.90	1.75	3.08
Range of number of species	1–8	3–13	2–12	4–11	3–10	3–13
Mean number of birds/survey	6.96	23.08	12.23	13.87	10.09	22.81
Standard Deviation	3.93	10.06	5.82	4.93	3.80	10.22
Range of number of birds	1–16	7–43	4–24	6–25	4–21	8–44
Number of surveys	23	24	26	30	25	21
Years since burnt (at 1/7/2017)	0	2	19	0	0.5	19

Table 3: *Comparison of the types of commonly occurring species ranked according to increasing frequency of occurrence at six 2 ha surveys sites for species with RRs exceeding 30%. Survey sites were at Lazenby Sand, South Arm, LS01, Mt Nelson Signal Station, SS01, Chimneypot Hill, CH03, the junction of Huon Road and Strickland Avenue, HS01, Hall Street, Ridgeway, HR01, and Ridgeway Hill, RH04.*

	SS01	HS01	LS01	CH03	HR01	RH04
Yellow-throated Honeyeater (5)*	100.0	—	39.1	53.9	64.0	85.7
Brown Thornbill (4)	95.8	70.0	—	92.3	—	71.4
Forest Raven (5)	33.3	80.0	56.5	76.9	64.0	—
Superb Fairy-wren (4)	75.0	53.3	—	38.5	—	100.0
Striated Pardalote (4)	50.0	—	43.5	30.8	44.0	66.7
Yellow Wattlebird (3)	—	36.7	—	34.6	—	71.4
Green Rosella (3)	66.7	—	30.4	—	—	38.1
Grey Fantail (3)	37.5	36.7	—	—	36.0	—
Scarlet Robin (2)	—	—	—	—	36.0	71.4
Grey Shrike-thrush (3)	—	40.0	30.4	—	36.0	—
Silvereye (2)	—	46.7	—	—	—	42.9
Black-headed Honeyeater (2)	45.8	—	—	—	—	38.1
Grey Currawong (2)	45.8	—	—	—	32.0	—
Crescent Honeyeater (2)	41.7	—	—	34.6	—	—
Golden Whistler (1)	—	—	—	—	72.0	—
Strong-billed Honeyeater (1)	—	—	—	—	—	52.4
Tasmanian Scrubwren (1)	—	50.0	—	—	—	—
Dusky Robin (1)	—	43.3	—	—	—	—
Eastern Spinebill (1)	33.3	—	—	—	—	—
Spotted Pardalote (1)	33.3	—	—	—	—	—

*Number of survey sites with species present at RR >30%.

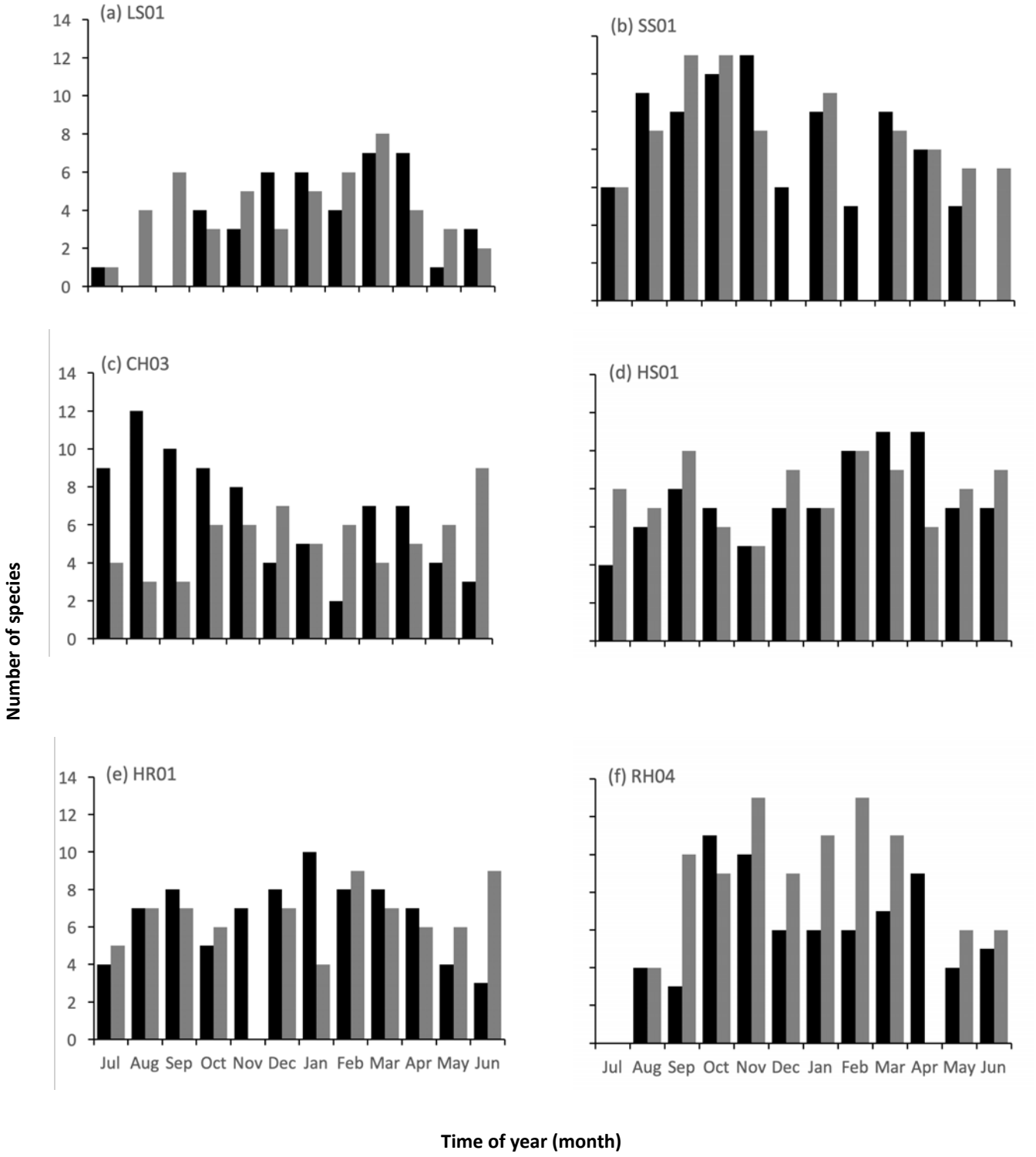

Figure 3: *Monthly variations in species richness as indicated by the number of species per survey at survey sites (a) Lazenby Sand, South Arm, LS01, (b) Mt Nelson Signal Station, SS01, (c) Chimneypot Hill, CH03, (d) Huon Road–Strickland Avenue, HS01, (e) Hall Street, Ridgeway, HR01, and (f) Ridgeway Hill, RH04. Missing bars represent missing surveys. [Black bars denote 2017–18 values; grey bars denote 2018–19 values.]*

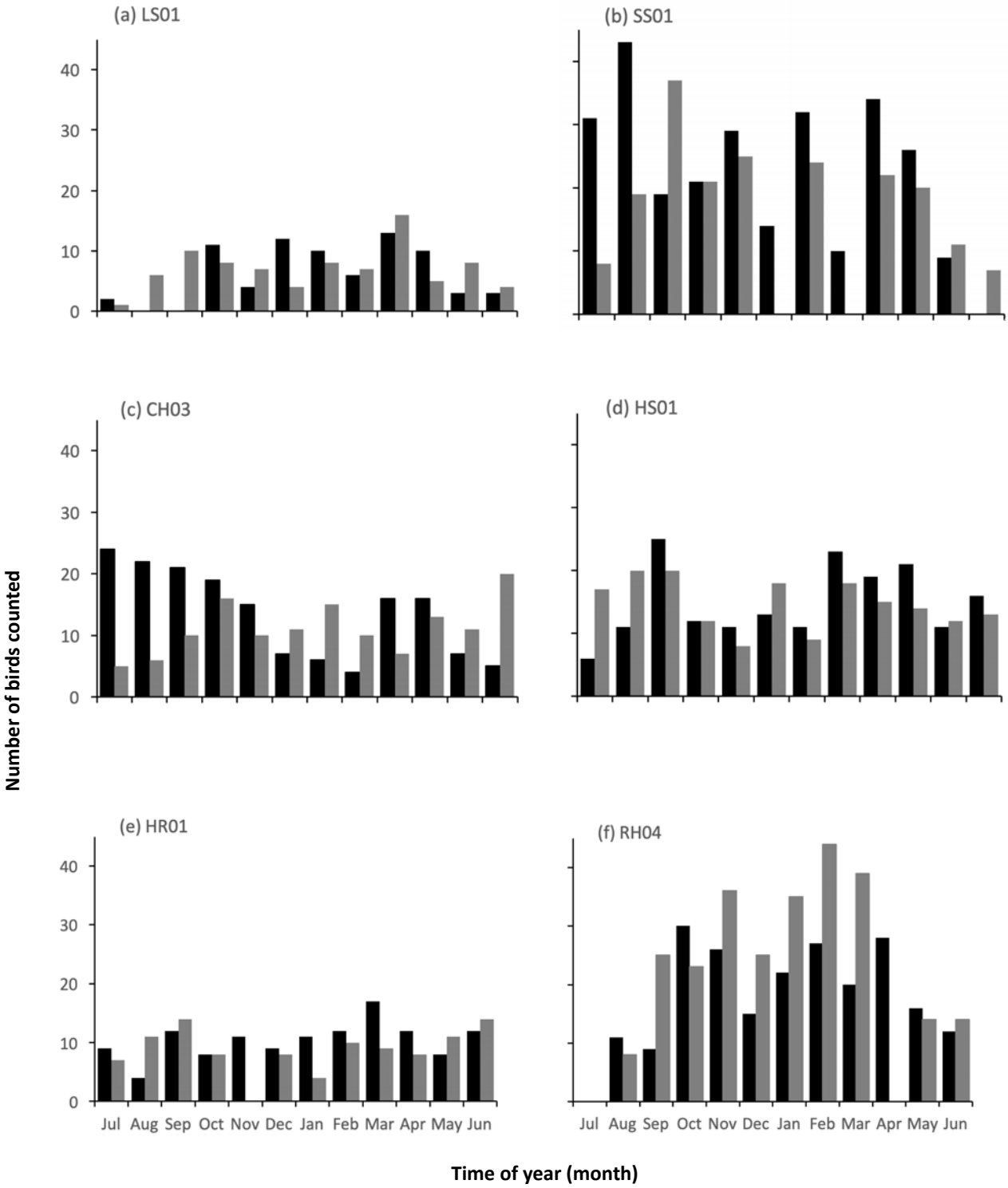

Figure 4: *Monthly variations in the abundance of birds at survey sites (a) Lazenby Sand, South Arm, LS01, (b) Mt Nelson Signal Station, SS01, (c) Chimneypot Hill, CH03, (d) Huon Road–Strickland Avenue, HS01, (e) Hall Street, Ridgeway, HR01, and (f) Ridgeway Hill, RH04. Missing bars represent missing surveys. [Black bars denote 2017–18 values; grey bars denote 2018–19 values.]*

Monthly variations in species richness

Comparisons of the monthly variations in species richness as indicated by the number of species per survey for 2017–18 and 2018–19 are shown in figure 3, parts (a) to (f), page 20.

Monthly variations in species abundance

Comparisons of the monthly variations in abundance as indicated by the number of birds counted per survey for 2017–18 and 2018–19 are shown in figure 4, parts (a) to (f), page 21. These data show the minimum number of birds present because not all birds present are detected during surveys.

Comparison of species richness and abundance

Differences between annual species richness and annual species abundance between sites and years are compared in figures 5 and 6 respectively.

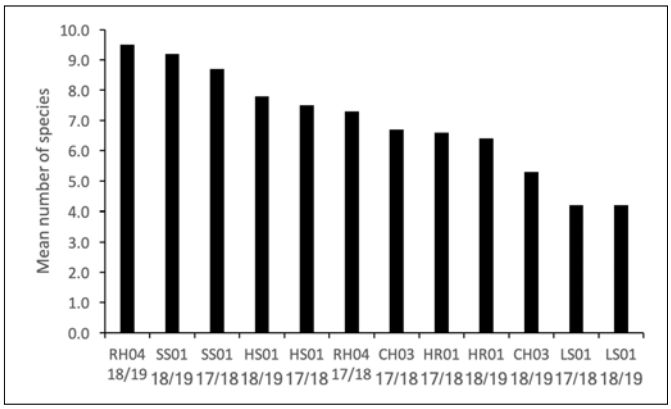

Figure 5: *Mean annual richness of species for 2 ha/20-minute Birdata surveys conducted at monthly intervals at six sites near Hobart in south-east Tasmania ranked in order of decreasing species richness.*

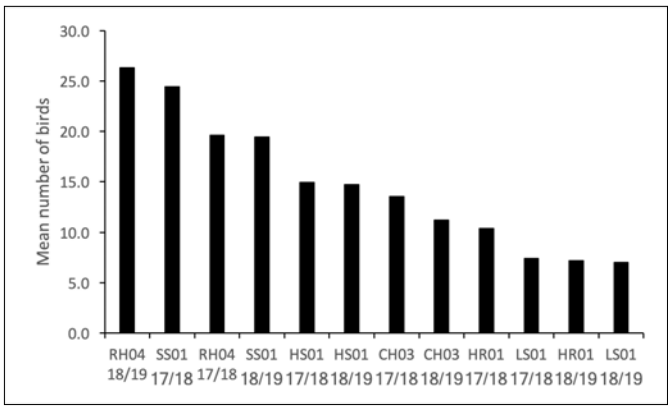

Figure 6: *Mean annual abundance of birds for 2 ha/20-minute Birdata surveys conducted at monthly intervals at six sites near Hobart in south-east Tasmania ranked in order of decreasing abundance.*

Species accumulation curves

Species accumulation curves for the six sites are compared in figure 7. Surveys conducted before July 2017 were ignored to eliminate the seasonal differences in the timing of successive surveys.

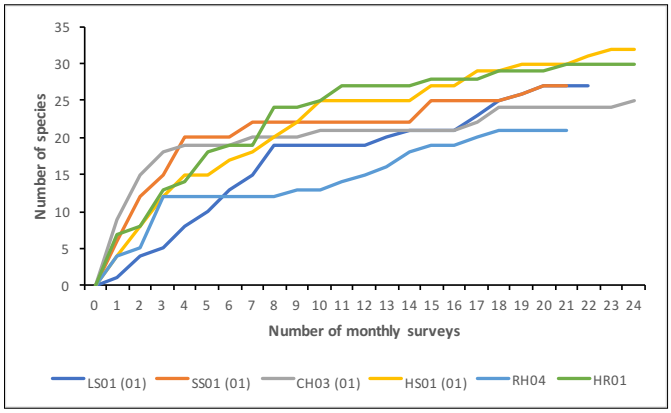

Figure 7: *Species accumulation curves for surveys at six sites beginning in July 2017 and conducted at approximately monthly intervals.*

Bird assemblages

Difference in bird assemblages at individual sites are shown in table 3, page 19.

Discussion

A key objective of the pilot phase of the project was to determine whether the methodology involving monthly 2 ha/20-minute Birdata surveys would provide profiles of local bird populations that could be used to evaluate the impacts of planned low-intensity burns. Assessment of two years' data shows that such surveys provide measures of annual diversity (number of species), abundance (number of birds), and bird assemblages at the survey sites.

Monthly variations

There are advantages, for reasons discussed later in this paper, in assessing bird populations during the breeding season (Newton 2013), which is between September and December for most species in Tasmania. During breeding, bird movements are localised and summer breeding visitors (e.g. Satin Flycatcher, *Myiagra cyanoleuca*, and the Cuckoos, Cuculidae) are present. In addition, many species are more vocal and easily detected when establishing and defending territories at the start of the breeding season. In autumn and winter birds forage more widely and often form mobile mixed foraging flocks (Bell 1985, Newman 2015) that periodically glean areas making local distributions patchy. Tasmania's location at the southern extremity of the Australian region eliminates the complication of winter visitors that have bred at more southerly locations. However, the survey sites are located in a mountainous area and a number of species are altitudinal migrants (e.g. Crescent Honeyeaters, *Phylidonyris pyrrhopterus*) that may move to and through the survey sites after breeding at higher altitudes.

The monthly variations in species richness (figure 3) indicate interesting differences between sites, which may be indicative of their importance to bird populations. For instance, species richness peaked in autumn at the

low altitude South Arm site, LS01, figure 3(a), which suggests that the site was relatively unimportant as breeding habitat but was used post-breeding season by species that had dispersed after nesting elsewhere. At the mid-altitude site HS01, figure 3(d), species richness peaked during the breeding season and in autumn, post-breeding, whereas at site SS01 the post-breeding season peak was more pronounced. Sites HR01 and CH03 had generally similar monthly profiles with high species richness in autumn and winter, which suggests that they may be important to altitudinal migrants, while site RH04 had a peak in April 2018 that was possibly associated with the presence of a mixed foraging flock at the time of that survey.

The monthly comparisons demonstrate the seasonal importance of different survey sites and habitat types. Indeed, the numbers of altitudinal migrants may be regulated by mortality in the winter months when food resources are scarce, rather than during the breeding season (Newton 2013). Hence, monitoring survey sites throughout the year is vital to understanding the holistic impact of fuel reduction burns on local bird populations.

In general, the monthly profiles of bird abundance (figure 4) were similar to those of species richness (figure 3), as was expected (Recher 1985).

Diversity and abundance

Again, in general, the diversity of birds using a site as measured by the mean annual number of species per survey was consistent between years. Using this measure, diversity was greatest at site SS01 and least at LS01 (figure 6). The exception was site RH04, which had the highest ranking of all the sites in 2018–19, but was ranked third in 2017–18 behind sites SS01 and HS01. The reasons for this difference are unclear.

Bird abundance increased with species richness and the rankings of sites according to annual abundance were similar to those for diversity (figure 7). Sites SS01 and RH04 (23 birds/survey) supported more than three times the number of birds found at site LS01 (7 birds/survey).

While high mean annual numbers of species and birds/survey demonstrate that a site is regularly used by multiple species, these measures do not necessarily imply that the greatest variety of species use that site, as is discussed in the next section.

Species list length

The number of species recorded at the survey sites was surprisingly similar, ranging from 21 to 33 (table 1), given the differences between vegetation type and fire history between the sites (see the appendix).

Surprisingly, the shortest list was for site RHO4, which had not been burnt for 19 years. Remarkably, the highest number of species was recorded at site HS01 where the surveys were made over the two-year period immediately after a fuel reduction burn. Similarly, the 27 species recorded at site LS01 immediately after burning exceeded expectations because it had the lowest species richness (species per survey) and abundance (birds per survey) of the six sites (table 1). This counter-intuitive result is reflected in the anomalously low rate of accumulation of species compared to the other sites (figure 5) and the lower RRs of species (tables 1 and 3). For example, only one species had an RR exceeding 50% compared with three to seven species at the other sites. At site LS01 most species were recorded occasionally as opposed to regularly, and 30% were recorded for the first time in the second year after the burn. As will be discussed later, the number of species recorded at these sites may be bolstered temporarily by species exploiting resources generated by the burn. These results show how important it is to continue surveying over an extended period (> one year).

Species assemblages

During this study 20 species were recorded at RRs >30% in at least one of the six survey sites. Species that occur regularly at a site provide insights into that site's importance to local bird communities (e.g. food availability). Changes in RRs of commonly occurring species may indicate the habitat at the site has changed.

There were differences in the number of species occurring regularly (table 2) as exemplified by the extremes of 12 species with RR >30% at site SS01 compared with 5 species at site LS01. It is encouraging that these differences were similar in both years of data collection (unpublished results).

There were also differences in which species occurred regularly (table 3) with no species having an RR >30% at all six survey sites.

The following examples provide insights into how differences in the commonly occurring species may relate to habitat differences between survey sites. Superb Fairy-wrens, *Malurus cyaneus*, occurred at RRs of 70% and 100% at sites SS01 and HR04, but had RRs of <30% at sites HR01 and LS01. Yellow Wattlebirds, *Anthochaera paradoxa*, were more frequently recorded at sites RH04, HS01 and CH03. Relating such differences to the habitat attributes of sites is the next step in this project.

The arbitrary RR cut-off limit of 30% was set low in order to capture regularly occurring seasonal visitors to surveys sites. Seasonal visitors exceeding this threshold were the Striated Pardalote, *Pardalotus striatus*, normally a summer visitor, and the Crescent Honeyeater, *Phylidonyris pyrrhopterus*, an altitudinal migrant predominantly occurring at the survey sites in autumn and winter. Both these species would rank much higher in table 3 if their RR were increased pro-rata to compensate for the limited period that they were present. The RRs for the Striated Pardalote are probably anomalously high because there was abnormal over-wintering of the species in 2017–18 (Newman *et al.* 2018).

Observer bias

Differences in the abilities of observers to sample bird populations when conducting surveys may affect interpretation when comparing the results of different observers. The data presented in this paper involves six different observers, each assigned one site. Assuming observer biases are systematic (i.e. the bias is constant; see caveat below), they will not affect comparisons of survey statistics between years at individual sites. However, they may affect comparisons between sites, particularly with respect to estimating the number of birds present (e.g. estimating the number of Striated Pardalotes calling in the canopy). However, when observers survey a site repeatedly, they become familiar with birds that are regularly present, their calls and where they are likely to find those species, which may increase the detection of some species in the short-term (i.e. year 1 results may be underestimated).

Several factors mitigate concerns about the impact of observer bias in this study. All the observers were familiar with Tasmanian birds. Furthermore, this study is primarily concerned with variations in regularly occurring and abundant species. While the occurrence of sparse and elusive species, such as Painted Button-quail, *Turnix varius*, might tax the identification skills of some observers, such species are not primary drivers of the statistics used to compare survey site populations (e.g. species richness and the number of commonly occurring species with RRs >30%).

All observers are challenged by the difficulties associated with differences in vegetation cover between survey sites. For instance, it is difficult to see birds when understorey vegetation is dense, which places increasing reliance on calls for identification and exacerbates the difficulty of estimating numbers of birds. An insidious aspect of this source of bias is the possibility that birds may be easier to detect and count immediately after fires when the vegetation is more open.

Post-fire surveys

Surveys at two sites, HS01 and LS01, began immediately after they were burnt. The experience at the two sites was very different. In the absence of pre-burn baseline data, the impact of the burn was assessed by comparison with the contemporaneous survey statistics at the other sites of similar vegetation type. At site HS01 the species richness (mean species per survey) was 82% of the highest level found at the other sites (SS01), and the species abundance (mean birds per survey) was the third highest (table 1). These comparisons suggest that the controlled burn conditions had been successful in limiting the impact on features of habitat that are important to birds, although, in the absence of baseline data, the extent to which the types of species present had changed is unknown. This is consistent with the conclusion of Christensen *et al.* (1985) that a single low-intensity fire makes only small short-term changes to bird populations if the intensity of the fire is low and mid- and upper-canopy layers are minimally affected.

At site LS01, both species richness and abundance were considerably lower than at any other site (table 1). This might suggest that the fire at this site had been more severe. However, the dry White Peppermint woodland of the South Arm peninsula may be naturally inferior bird habitat to the other five sites that are located on the foothills of kunanyi/Mt Wellington.

Opportunistic species

It is well known that some species are attracted to recently burnt areas in order to exploit resources generated by fires (Woinarski and Recher 1997). Examples are quail and finches feeding on seed released by the fire, which may explain the occurrence of the normally elusive and infrequently recorded Painted Button-quail at site HS01. Other ground feeders such as Dusky Robin, *Melanodryas vittata*, Scarlet Robin, *Petroica multicolor*, and Dusky Woodswallow, *Artamus cyanopterus*, that were present at sites HS01 and LS01 may also have benefitted, from both increased availability of food and the creation of a more open understorey, allowing them to forage more effectively. The Forest Raven, *Corvus tasmanicus*, was another species regularly present at recently burnt survey sites.

Future directions

The next step in this project is to relate the survey site species profiles to differences in habitat type and fire history for the extended set of seventeen 2 ha sites that were monitored during the last two years as part of the pilot study. Additionally, the analysis will be extended to another twenty-five 2 ha sites that have been monitored monthly for periods of 2–5 years as part of BirdLife Australia's ongoing population monitoring effort.

This analysis has highlighted the seasonal importance of different habitats to birds. This aspect requires further attention because species such as honeyeaters may be reliant on a single plant species for a short period of the year; e.g. the New Holland Honeyeater, *Phylidonyris novaehollandiae* (Paton 1985).

Conclusions

Evaluation of the results from six selected 2 ha survey sites shows that 20-minute duration Birdata surveys generate data that is useful in characterising local bird populations. Derived comparators included measures of annual species richness, bird abundance and the assemblage of commonly occurring species (RR>30%). There was good correspondence in the results for two successive years at each site.

Sampling at monthly intervals throughout the year highlighted the seasonal movements of bird populations that would have been missed if survey campaigns had been limited to the breeding season when local populations are more stable.

Results for site HS01 in wet sclerophyll forest for surveys conducted over a two-year period that immediately followed a low-intensity fuel reduction burn in

autumn demonstrated the ongoing presence of a diverse and relatively abundant bird population. Unfortunately, in the absence of baseline data, it is not known to what extent there had been changes in the types of species present before and after the fire.

At both sites that were monitored immediately after planned low intensity burns, species such as the Forest Raven, Dusky Woodswallow, Dusky and Scarlet Robins were attracted to the more open habitat and ground foraging opportunities created by the fire. The scarce and normally elusive Painted Button-quail was another beneficiary.

These preliminary findings need to be tested on an expanded set of survey sites with increased emphasis on relating the structural and vegetation attributes of each site to their bird populations. This may provide important insights into how fuel reduction programs can be managed to sustain vegetation structures and diversity essential to local bird populations.

Acknowledgments

We thank Louise Mendel for her enthusiastic interest in and support for this project. Andrew Silcocks assisted in setting up the TFS Project account in Birdata and provided ongoing support in data administration. Michael and Cecily Lazenby are thanked for allowing access to the Lazenby Sand survey site. Sue Jones provided a number of valuable comments on an earlier draft of this paper.

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Appendix

Survey site locations, habitat types and fire history

LS01 — Lazenby Sand, South Arm — Birdata ID 665020 — Coordinates 42.981°S 147.490°E.

White Peppermint grove on ridge surrounded by tea-tree scrub. Burnt autumn 2017. The low-intensity burn had limited impact on the canopy. Ground and shrub layer cover, which is normally sparse, was completely removed.

RH04 — Ridgeway Hill — Birdata ID 708327 — Coordinates 42.919°S 147.302°E.

Dry heathy white peppermint forest. East facing slope on ridgetop. Last burned 1998, Tagg Street fire. Mature to over-mature heath layer, fully thatched Lomandras. Very low levels of bare ground.

CH03 — Chimneypot Hill — Birdata ID 651367 — Coordinates 42.915°S 147.288°E.

Dry heathy white peppermint forest. North facing slope. Last burned 1998, Tagg Street fire. Mature low heath layer, tussocks fully thatched. Up to 10% bare ground as a result of being at the upper end of a north facing slope.

SS01 — Mt Nelson Signal Station — Birdata ID 650336 — Coordinates 42.926°S 147.346°E.

Dry heathy white peppermint forest grading into dry shrubby blue gum. East–south-east facing slope. Prescribed burn autumn 2015. Heath and shrub layers reduced; canopy largely intact. Regrowth vegetation approaching pre-burn cover (approx. 80% and 30–50% respectively).

HS01 — Huon Road–Strickland Avenue junction — Birdata ID 651381 — Coordinates 42.912°S 147.273°E.

Open dry Stringybark, *Eucalyptus obliqua*, forest. Burnt 1998 as a hot burn associated with the Tagg Street fires. Prescribed burn, autumn 2017. Mixed shrubby/bracken understorey significantly reduced by the prescribed burn. Post-burn, bare ground estimated at 60%+.

HR01 — Hall Street Ridgeway — Birdata ID 679575 — Coordinates 42.922°S 147.290°E.

Dry heathy white peppermint forest on a ridge top. Prescribed burn spring 2016. Adjacent quarries with semi-permanent water. Low heath and grass understory with sparse shrubs and small trees. Bare ground approx. 30%.

Report on avian anvil use along the Mystery Creek Cave track, far southern Tasmania

Stephen Walsh

Introduction

Several avian species around the world are known to use rock anvils to break open gastropods as a food source (e.g. Goodhart 1958, Henty 1986, Woinarski *et al.* 1998). In Australia, pittas (Pizzey 1985, Birdlife Australia) currawongs and Sooty Oystercatchers, *Haematopus fuliginosus* (Nicolakakis and Boire 2002, Erritzoe 2003), are known to use rock anvils to open the shells of native snails. However, for Tasmania there is only one published reference (Bonham, 1996) regarding birds.

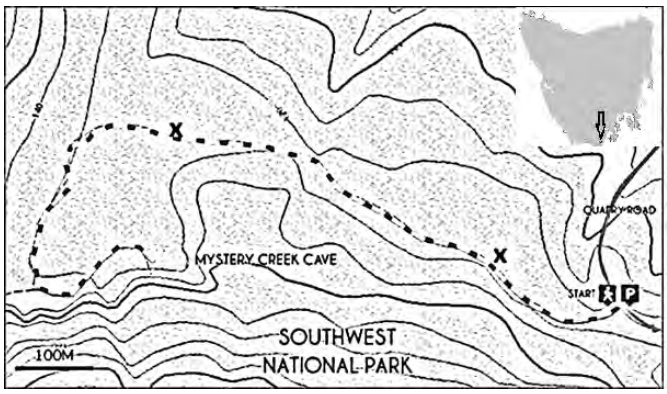

Figure 1: *Map of the Mystery Creek Cave track. 'x' indicates the study transect and extent of main anvil activity.*

In 2003, broken shells of a native land snail, *Caryodes dufresnii*, were observed by the author surrounding a rock anvil at the southern end of South Bruny Island off south-east Tasmania, and, despite several enquiries, no information about a predator was known. Shells and anvils were again observed in January 2017 along the Mystery Creek Cave track (figure 1) which is on the northern side of Marble Hill in far southern Tasmania. The track follows an abandoned railway line leading to a disused limestone quarry that is now part of the Tasmanian Wilderness World Heritage Area. The vegetation type is tall sclerophyll forest that has been logged previously and which has a rainforest understorey. The forest floor is crowded with fallen tree trunks, but very little leaf litter, seedlings or fungi are present due to intense scratching and digging by Superb Lyrebirds, *Manura novaehollandiae*; their scratchings reach over half a metre up live tree trunks where they remove most bark.

Methods

The initial aim of the study was to observe and identify the animal that used the anvils. Following a literature review on rock anvils and Tasmanian snails, contact with Dr Kevin Bonham, a specialist in Tasmanian native snails, identified the likely predator as being the Bassian Thrush, *Zoothera lunulata*. The aim then became to confirm this, find when the predation events were occurring, and count the number of broken shells and anvils in use along a fixed length of track.

The first methodical study along 1.5 km of the track in February 2017 revealed 16 anvils with broken shells, (these shells were later determined to be from previous seasons). After several visits it became apparent that it would be difficult to determine the activity times along such a distance or to make observations of the animals responsible, therefore the study area was reduced to just under 1 km of track where most of the activity occurred (see figure 1). Over two years the numbers of anvils, the numbers of shells at each anvil and the side of the track they were situated on were recorded once a month in relation to several landmarks along the track, and in all weather conditions (gales, very dry, wet, flooding, cold, hot, heavy snow), even when no recent activity had been noted. Observational surveys were undertaken once a week during periods of high anvil use.

Results

Habitat characteristics

With few exceptions, anvils along the track are single angular rocks 16–19 cm in length with an angular corner pointing up. The rocks are all former railway ballast material: angular, white to whitish grey weathered limestone (figures 2 and 3). Some rock has tumbled downslope but no naturally exposed rocks are present in the areas above or below the track, possibly owing to the intense lyrebird activity. All anvils are largely clear of moss and leaves, kept clear by use or in some places

cleared by lyrebirds, with no obstructing sticks, twigs or vegetation. Presence of adjacent raised twigs or leaves appears to disqualify other suitable rocks.

Along the entire track there are rocks that would be suitable as anvils on either side of and in the middle of the track. It was noticeable from the early part of the study period that active anvils were not seen anywhere in the middle of the 2–3 m wide track, nor where the terrain was flat either side of the track, nor where blady grass was present beside the track, nor at the western end of the track, even though many snails have been observed there at night.

Figure 2: *Broken shells around a rock anvil along the Mystery Creek Cave track.*

Figure 3: *Rock anvil on top of the track-side bank. A white wear mark from snail smashing is evident along the top edge of this anvil. Frequent and long-term use of the anvil apparently keeps moss from covering the rock. Some anvils have been exposed or cleared by lyrebird scratching.*

Snail shells

Fresh broken shells had vitreous surfaces: dark brown exteriors often with yellow or light brown bands (see figures 2 and 4) and glossy dark green, bronze, purple, white or mother-of-pearl interior surfaces. Over subsequent weeks, the broken shells became sub-vitreous and exterior surfaces gradually became darker brown. Most shells were broken longitudinally (figure. 4). However, in a few locations, there were some anvils that had several shells broken transversely with the apex broken away. Broken shells remaining from previous seasons were present but not included in data analyses for this study. These had overall dull earthy surfaces with faded brown-grey exteriors and white-grey inside surfaces. Most shells from previous seasons are moved or buried during lyrebird activity or are removed by other animals.

Figure 4: *Longitudinal broken shell.*

Live snails did not appear until at least an hour after it was fully dark, after 6 p.m. in winter. In some sections of track after 11 p.m. there were so many snails that it was difficult to walk without treading on them. In summer (approximately October–March), no live snails were observed even after midnight, probably owing to low humidity conditions at the time.

Birds

Lists of birds present in each survey are provided in Appendix 1. There were four regularly observed bird species large enough to forage and carry, and smash open, a snail, or could swallow a large whole snail once extracted. The four species comprise Bassian Thrush, Black Currawong, *Strepera fuliginosa*, Superb Lyrebird and Grey Shrike-thrush, *Colluricincla harmonica*, although the last was only observed at high canopy level.

Bassian Thrush (and Tasmanian Thornbills, *Acanthiza ewingii*) were observed on several surveys following closely behind individual lyrebirds, occupying a forage point between logs almost immediately after the lyrebird had moved on. Only Bassian Thrushes were observed several times on the track in near darkness (up to three birds on one survey), long past the time when the other species had roosted. Activities included zig-zagging along the track, flipping over leaves and carefully examining crevices under rocks, old logs and between tree roots. When disturbed by humans walking past, the thrush would fly approximately 25 m down the slope and would then recommence foraging, but would not

return to the track.

In 2017 and 2018, anvil activity began around mid-April with just a few broken single shells at anvils on top of the northern raised bank where situated at the top of a slope. This observation seems to be anomalous: no further activity was observed until the end of July. The number of shells and of anvils used more than doubled through September to maxima of 160 broken shells in October (figure 5) and 88 anvils in November. No new activity was noted in December. In 2018, after a similar pattern of predation was initially confirmed, only observations were carried out during surveys.

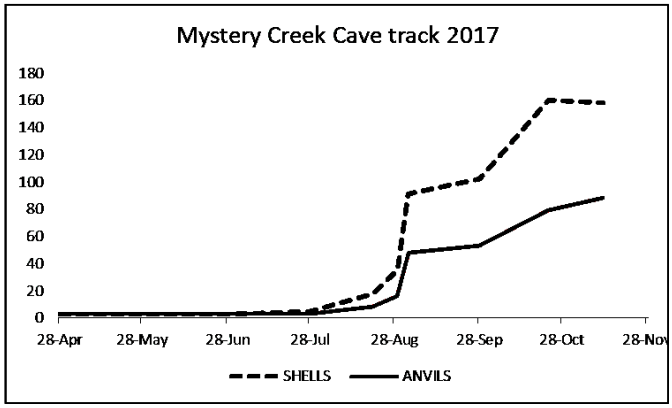

Figure 5: *Cumulative graph of numbers of shells and anvils used during 2017.*

Spatial and temporal patterns

The study area was divided into four roughly equal sections (Section 1 at the eastern end of the track and Section 4 at the western end). The data revealed that the middle of the study area had higher numbers of broken shells than were found at the ends of the track (figure 6, a and b).

At times of maximum anvil activity:

- The increase in number of snail shells averaged over each week at one shell extra per day along the study area.
- In all sections of track, single-shell anvils dominated multiple-shell anvils (figure 7), in fact 50% of anvils only ever had one broken snail shell; the highest number of shells around one anvil was 12.
- From September onwards, anvils occurred on both sides of the track. A few anvils were observed from the start of the track and, in a few places, in the middle of the track.
- In some locations shells were being buried by lyrebird scratching, and in other places shells were being completely removed. Black Currawong were observed scavenging broken shells, carrying them uphill and examining them for several minutes.

Fluorescence of shells

Ultraviolet light is a form of short wave radiation. It is not visible, but when it comes into contact with certain substances it is absorbed or reflected and re-emitted as longer-wave visible radiation or light. Mollusc shells are composed of calcite and will fluoresce under ultraviolet light. Most shells along the Mystery Creek track fluoresce yellow along the entire shell; however, for some the dark brown body whorl fluoresces yellow, whereas the shell apex fluoresces to a much lesser degree (see figure 6b). A few were found in which only the apex fluoresces. Further, yellow bands that could be seen in LED light were not apparent under UV light.

Figure 6a: *Live snail photographed at night under LED light.*

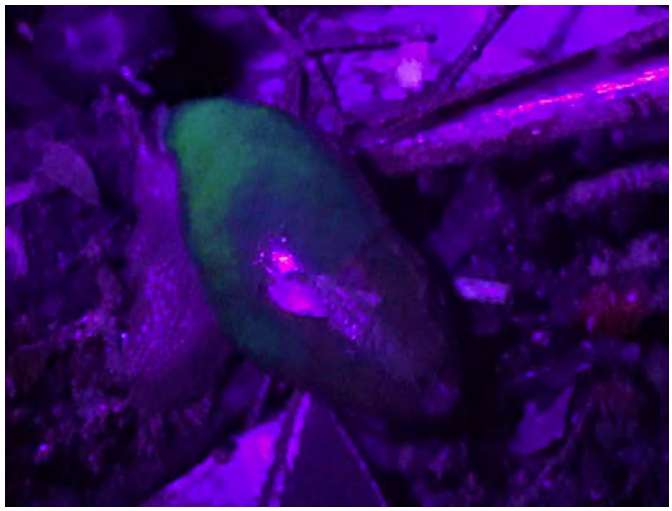

Figure 6b: *A live snail photographed under ultraviolet-B light (395 nm wavelength). In this specimen the dark brown body fluoresced yellow much more than did the yellow bands or shell apex.*

In addition, rock anvils glow bright white under UV light and could be easily located from more than 10 m away; they stood out clearly from the dark background of vegetation, leaf litter and logs.

Other nearby sites

Several kilometres to the south, on the other side of Marble Hill, naturally exposed limestone bedrock occurs; three anvil sites were observed along a 4-km walking track. Furthermore, the nearby Hastings Caves State Reserve to the north was also surveyed for anvil

use because of the occurrence of similar carbonate rocks and forest. Only one anvil was found after several extensive searches; this was on top of a high road bank with snail shells only half the size of those along the Mystery Creek track.

Discussion

The snails are usually active at night and it follows that either (a) they are found by the predator when the snails emerge from cover very late in the day or at night, (b) they are found and excavated from under tree roots, logs and leaf litter by the predator during daylight hours, or (c) they are exposed by lyrebird activity during daylight hours and then found by the predator. Observations were made a few times after dark, several times in the early morning, but mostly in the late afternoons until it was too dark to see.

The southerly location of Tasmania and the consequent extended sunsets, which are referred to as the 'gloom', describes a gradual fading of visible light that is followed by a period of ultraviolet (UV) light reflected and refracted over the horizon. Snail shells are composed of calcium carbonate and will fluoresce in UV light. When fluorescence is not overwhelmed by visible light shells on the forest floor are visible in the late evenings to any predator with some degree of vision in UV wavelengths. Night observations also included use of UV-B light (395 nm) to determine any fluorescence of the snails and anvils.

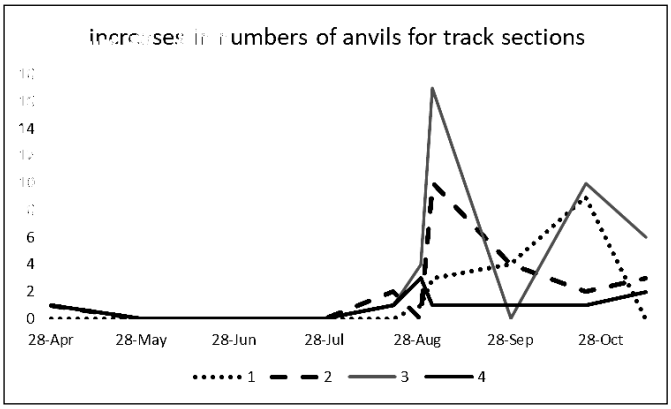

Figure 7: *Graph of the increases in the number of anvils used over time for each of the track sections. Section 1 is located at the eastern end of the study area and section 4 is at the western end. Two periods of increased anvil use are evident: early September (sections 2 and 3) and late October (sections 1 and 3).*

Predator identification

The use of an anvil and the lack of chew marks on the broken snails makes it unlikely that the predator is a species of rat or other mammal. The nocturnal habits of the snails probably eliminates currawongs, Grey Shrike-thrush and lyrebirds as direct predators and/or anvil users. It is possible that lyrebirds may peck at or swallow snails whole but would have no need for an anvil, and crypto-parasitism by currawongs following lyrebirds may occur at times. Bassian Thrush are probably the main snail predator and anvil user (a) owing to their much later foraging regime, and (b) because any raised foliage is not tolerated around anvils, which suggests a small bird rather than a larger one.

The ability to perceive the near ultraviolet part of the light spectrum has been detected in many bird species (e.g. Cahill *et al.* 2000, Rajchard 2009), although those studies investigate and discuss plumage, prey, eggs and dark nest hollows in relation to daylight hours. The inferred ability of Bassian Thrushes to perceive and use ultraviolet light in the evenings when visible light has faded in order to find snails and then anvils has not been previously discussed.

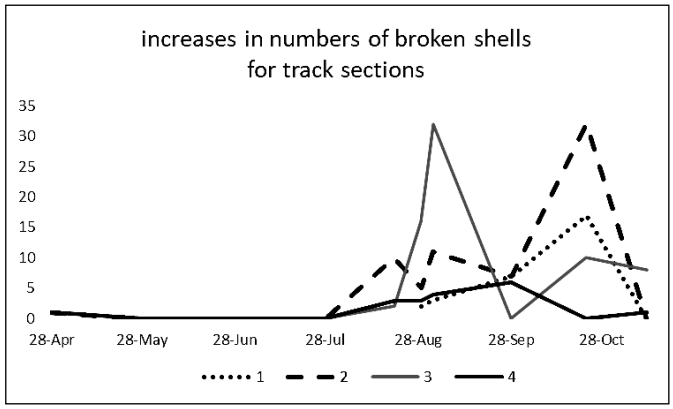

Figure 8: *Graph of the increases in the number of broken shells over time for each of the track sections. As shown in figure 5, there are two periods of increased numbers of broken shells — in early September (section 3) and in late October (sections 1 and 2). However, the October increases for section 2 do not correspond with an increase in number of anvils used.*

The skill of finding and opening snails in Tasmania is not restricted to the Mystery Creek track and its surrounding area. Dr Kevin Bonham wrote that he has also observed rings of broken snails along Mystery Creek track, and has reports of piles of broken shells around Mt Wellington and Blue Tiers (KB pers. comm.). He provided an extract from Bonham (1996) as follows, 'The Bassian Thrush *Zoothera dauma* [*sic*] has been observed eating *Anoglypta* by Sean Blake, a forester who worked in the northeast of Tasmania, and is known to form piles of shells of *Caryodes dufresnii*, a related large snail in various parts of the state' (K. Bonham unpublished observations). Dr Bonham adds that Bassian Thrush may not be the only snail predator and would be very interested in any direct evidence of other animals that are, or have been, observed catching and eating snails.

Further examination of shell and anvil data, and graphing of the increases in data over time in relation to four approximately equal length sections of track (figures 7 and 8) reveal a few interesting trends.

There are two periods of increased snail predation, these being in early September and late October. This

correlates with the breeding period for Bassian Thrush (Simpson and Day 1996) suggesting (a) that extra food is required initially to feed nesting adults and hatchlings, (b) that hatching is staggered for different pairs, or (c) as noted by Goodhart (1958) that snails are taken (by Song Thrush) during two periods when other food is short.

The decrease in activity evident in late September and cessation of activity through November corresponds to periods when much lower or no rainfall was recorded by the author at nearby Ida Bay and may indicate a decrease in availability and activity of snails. This may be in addition to the eventual movement of fledged birds and parents away from the site.

Three different Bassian Thrush were observed on one survey foraging on the track and this indicates that there was more than one breeding pair in the area. Figure 7 shows a significant increase in snail predation towards the east over time. Whether this is due to fledged birds and parents moving in that direction or to staggered hatching times for different nests is unknown.

Figure 8 shows that, for section 2, snail predation increased in October without there being a corresponding increase in number of anvils used, which suggests an increased use of established anvils rather than the single-use anvils that were more common at either end of the study area.

Conclusions

Bassian Thrush are the most likely predators of Tasmanian native land snails during their breeding season. They do so by locating snails and rock anvils in the late evening, and this suggests they have the ability to detect light wavelengths in the near-ultraviolet range.

Acknowledgments

I thank Joanne Woods for bringing to my attention the seasonal absence of snails along the Mystery Cave track which led to the discovery of anvils and broken shells. I also thank Dr Kevin Bonham for kindly providing information about native Tasmanian snails.

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Appendix

Date	Birds observed along Mystery Creek track	Conditions
14/2/17	Black Currawong, Superb Lyrebird, Green Rosella, Tasmanian Thornbill	Dry
21/5/17	Bassian Thrush, Superb Lyrebird, Green Rosella, Tasmanian Thornbill	
24/5/17	Bassian Thrush, Superb Lyrebird, Grey Shrike-thrush, Tasmanian Thornbill, Black Currawong	
2/6/17	Grey Shrike-thrush	Very windy
13/6/17	Grey Shrike-thrush, Superb Lyrebird, Tasmanian Thornbill	Wet
20/8/17	Grey Shrike-thrush, Superb Lyrebird, Tasmanian Thornbill, Black Currawong	Anvil activity
28/8/17	Tasmanian Thornbill, Pink Robin, Golden Whistler (flock), Superb Lyrebird	Very wet
17/9/17	Superb Lyrebird	Wet, fog, snow
25/9/17	Superb Lyrebird, Eastern Spinebill, Striated Pardalote	
28/9/17	Bassian Thrush, Superb Lyrebird, Eastern Spinebill, Striated Pardalote	
9/10/17	Superb Lyrebird, Common Bronzewing, Pink Robin, Tasmanian Thornbill	
2/11/17	Superb Lyrebird, Green Rosella	End anvil activity
27/3/18	Superb Lyrebird, Common Bronzewing, Pink Robin, Tasmanian Thornbill	
10/4/18	Superb Lyrebird, Superb Fairy-wren, Tasmanian Thornbill, Black Currawong, Black-headed Honeyeater, Eastern Spinebill, Grey Shrike-thrush	
24/4/18	Bassian Thrush, Superb Lyrebird, Eastern Spinebill, Tasmanian Thornbill, Superb Fairy-wren	
29/4/18	Bassian Thrush, Superb Lyrebird, Tasmanian Thornbill	
16/5/18	Olive Whistler, New Holland Honeyeater, Eastern Spinebill, Superb Fairy-wren, Tasmanian Thornbill, Grey Shrike-thrush	
3/6/18	Superb Lyrebird, Tasmanian Thornbill, Black Currawong, Black-headed Honeyeater, Grey Shrike-thrush	Minor anvil activity
7/6/18	Superb Lyrebird, Tasmanian Thornbill, Yellow-throated Honeyeater, Grey Shrike-thrush	
20/6/18	Yellow-throated Honeyeater, Grey Fantail, New Holland Honeyeater, Superb Lyrebird, Silvereye, Green Rosella, Black-headed Honeyeater	
25/6/18	Superb Lyrebird, Tasmanian Thornbill, Brown Thornbill, Green Rosella, Grey Shrike-thrush	
12/7/18	Superb Lyrebird, Tasmanian Thornbill, Yellow-throated Honeyeater, Black-headed Honeyeater, Black Currawong	Minor anvil activity

Shorebird and tern populations, Prosser River, 2017–18

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Executive summary

The dredging and channelisation of the Prosser River in 2017–18 had a significant impact on the breeding populations of resident shorebirds, which resulted from the loss of intertidal foraging habitat and increased disturbance to nesting birds. The breeding populations and breeding success of resident shorebirds were lower than before the dredging and channelisation of the Prosser River.

There was less impact on the breeding population of Fairy Terns because their preferred foraging habitat — in the backwater off the Prosser River adjacent to the Orford Important Bird Area (IBA) — was maintained. However, the increased disturbance from recreational activities is believed to have resulted in the desertion of the Fairy Tern colony later in the season; this resulted in complete breeding failure for the season.

Future surveys and monitoring are critical to assess the long-term impacts to the international values of the IBA. The results detailed in this report from the 2017–18 season provide an assessment of the initial response to the dredging and channelisation of the Prosser River by the resident shorebirds and small terns nesting in the IBA.

Figure 1: *Nesting Fairy Terns, Prosser River 2017–18.*
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Introduction

A large sandbar of approximately 3 ha that lies inside the mouth of the Prosser River comprises the Orford (Tasmania) Important Bird Area (IBA). It is shown in figure 2 (further details: http://datazone.birdlife.org/site/factsheet/orford-(tasmania)-iba-australia). The IBA supports breeding populations of shorebirds and small terns. The IBA is also used throughout the year for feeding and roosting by migratory shorebirds from New Zealand and the Northern Hemisphere. The sandbar is a Public Reserve under the Tasmanian *Crown Land Act* 1976 and is leased to the Glamorgan Spring Bay Council. It is managed by the Council in partnership with the Parks and Wildlife Service and with support from BirdLife Tasmania and the Orford Community Group.

In 2015, the Tasmanian Government through Marine and Safety Tasmania (MAST) proposed to dredge and channelise the mouth of the Prosser River to provide better access for recreational users.

Two options for the channel alignment were canvassed. One was to follow the Prosser River using the existing alignment, and the other was to follow the existing rockwall to the north of the IBA. This second option would have seen the loss of the tidal lagoon known locally as the Backwater on the northern shoreline of the IBA and the conjunction of the IBA with the northern tip of Millington's Beach.

The dredging proposal was submitted to both the Tasmanian Resource Management and Planning Appeals Tribunal (RMPAT) for assessment under State legislation, and to the Federal Department of the Environment and Energy for assessment under the Federal *Environmental Protection and Biodiversity Conservation (EPBC) Act 1999*.

Extensive discussions were held between MAST and BirdLife Tasmania with respect to the timing of the dredging operations, the route for the dredging and the need for surveys and monitoring of the shorebirds and

terns on site to assess the potential impacts to the breeding populations of, and nonbreeding visitors to, the Orford IBA.

Rains during the winter of 2016 shifted the mouth of the Prosser River slightly southward and deepened its channel into Prosser Bay to the east. The dredging commenced in the second half of 2017 and followed the course of the Prosser River mouth in mid-2017 in order to minimise the volume of material to be dredged. Approximately 70 geo-textile bags, approximately 20 m long and 5 m in diameter were to be used to channelise the mouth of the Prosser River.

In 2017 BirdLife Tasmania was commissioned by MAST to undertake monitoring of the resident and migratory shorebirds and of the small terns at the mouth of the Prosser River during the 2017–18 breeding season (nominally September to March), following the dredging and channelisation.

The focal resident shorebirds for the surveys and monitoring comprised Hooded Plover, *Thinornis rubricollis*, Red-capped Plover, *Charadrius ruficapillus*, and Australian Pied Oystercatcher (hereafter Pied Oystercatcher), *Haematopus longirostris*. In addition, two species of small terns, Fairy Tern, *Sternula nereis*, and Little Tern, *S. albifrons*, were included in the survey as these two seabird species share many ecological requirements of the focal resident shorebird species, and the threats they face. All species had been previously recorded from the IBA. The surveys were comparable with resident shorebird surveys elsewhere in Tasmania (e.g. Woehler 2013, 2015, 2018, Woehler and Ruoppolo 2013a and b, 2014) to ensure consistency in data collection and analyses.

The objective of the surveys and monitoring was to obtain data on the resident shorebirds' and small terns' breeding populations during the 2017–18 season that would allow an assessment of the impacts associated with the dredging and channelisation of the mouth of the Prosser River. Of particular concern were the populations of Hooded Plovers and Fairy Terns since both are EPBC-listed Threatened species. The 2017–18 data would be compared to previous surveys to provide a measure of the immediate response(s). Further surveys and monitoring in the 2018–19 season and beyond will be critical to assessing the long-term impacts of the dredging and channelisation of the mouth of the Prosser River.

Figure 2: *Google Earth image of the mouth of the Prosser River, Orford, Tasmania. The image was captured in 2017 before dredging and channelisation began on the site. The large sandbar at the top (north) of the image comprises the Orford IBA.*

Methods

2017–18 surveys of the Orford IBA

The resident shorebird surveys followed the standardised survey method used throughout Tasmania — in brief, a linear transect is walked along the foreshore, with the centroids of breeding territories of resident shorebirds mapped with a GPS as they were encountered. The foreshore was scanned with binoculars at the starting point, then often throughout the survey (at approximately 100 m intervals) to ensure the location of breeding shorebirds and terns was known before breeding territories were entered to ensure minimal disturbance to breeding birds.

All GPS data were captured with a Garmin *eTrex* 30 12-channel GPS receiver in real time. The coordinates of breeding territories' centroids and any nests encountered were recorded as UTM coordinates based on the WGS 84 datum and converted to latitude °S and longitude °E for mapping. The linear distances surveyed per visit were calculated by Garmin software for each foreshore survey.

No nest searches were made, but nests were encountered on the survey route as a result of tide height, geomorphology, etc. All efforts were also made to avoid disturbing feeding shorebirds at the water's edge. Where nests with eggs or chicks were encountered, the GPS coordinates of the nest were captured in preference to the breeding territory centroid on the foreshore.

Weather conditions during the surveys were recorded at the start of each survey, and any change in conditions during the survey was recorded when observed (e.g. changes in wind strength or direction).

The timing of the surveys coincided with the shorebird breeding season (nominally, September to March inclusive) in Tasmania. The Orford IBA surveys will contribute to the ongoing BirdLife Tasmania project that aims to GPS map and census breeding populations of resident beach-nesting shorebirds and small terns statewide to establish contemporary baseline data on breeding populations of resident shorebirds and small terns, and their distribution and population status where comparable historical data exist.

The Orford IBA shorebird surveys meet the *Survey Guidelines for Australia's Threatened Birds: Guidelines for Detecting Birds Listed as Threatened under the EPBC Act* (available at http://www.environment.gov.au/epbc/publications/survey-guidelines-australias-threatened-birds-guidelines-detecting-birds-listed-threatened)

Historical survey data, Orford IBA

Breeding season surveys of resident shorebirds around Tasmania have been conducted and coordinated by BirdLife Tasmania (formerly the Bird Observers' Association of Tasmania [BOAT] and Birds Tasmania) between 1982 and 1996 inclusive (Newman and Patterson 1984, Holdsworth and Park 1993, Woehler and Park 1997).

Resident shorebirds in the Orford area were counted during these early surveys, and these data and other breeding season survey and mapping data have been included in this report in order to contribute to a regional synthesis of the resident shorebird populations occurring in the Prosser River and the Orford IBA.

Fewer data are available for the migratory shorebirds that use the Orford IBA. These records have been extracted from the BirdLife Tasmania database, and comprise records since 1941. These data have been summarised (see below).

Results

Resident shorebirds

Surveys were undertaken between 21 August 2017 and 14 February 2018 (table 1, figure 3). A total of 10 visits was made, with GPS and census data collected on seven visits. The visits on 27 December 2017, 1 January and 14 February 2018 were initially to confirm nesting by Fairy Terns, and then to monitor breeding effort once the colony was established.

Figure 3: *Two Hooded Plover fledglings, Orford IBA, December 2017. ©Eric J. Woehler*

Hooded Plover

A maximum of 4 breeding pairs was observed in the IBA during the 2017–18 season (table 1). The maximum count of Hooded Plovers was 18 on 25 December, which included 2 fledged chicks and a flock of 8 nonbreeding birds on the eastern beach (figure 3). The 2 fledglings were the only evidence of successful breeding by Hooded Plovers in the IBA in the 2017–18 season; no Hooded Plover nests were encountered during the surveys.

Red-capped Plover

A maximum of 5 breeding pairs was observed in the IBA during the 2017–18 season (table 1). The maximum count of Red-capped Plovers was 14 on 22 September 2017. Two nests were encountered during the surveys, one with 2 eggs on 22 September 2017 and one with 3 eggs on 30 November 2017 (figure 4). No chicks or fledglings were observed in the IBA in the 2017–18 season during the 10 visits, which suggests that productivity was nil fledglings.

Figure 4: *Red-capped Plover nest, Orford IBA, November 2017. ©Eric J. Woehler*

Pied Oystercatcher

A maximum of 7 breeding pairs was observed in the IBA during the 2017–18 season (table 1 and figure 5). The maximum count of Pied Oystercatchers was 15 on 30 November 2017. An abandoned nest with 1 egg was present on 20 October; two other nests with 2 eggs were observed on the same day (figure 6). A nest with 2 eggs was present on 25 December. The pair on the north-west arm of the spit, closest to the car park on the opposite shore, produced 2 flying chicks (figure 7), although only one was still with its parents in mid-February 2018. Chicks were inferred from the behaviour of one adult using the 'broken wing' display extensively on 30 November; no other chicks or fledglings were observed in the IBA in the 2017–18 season, suggesting the total productivity was 1 fledgling from 3 active territories.

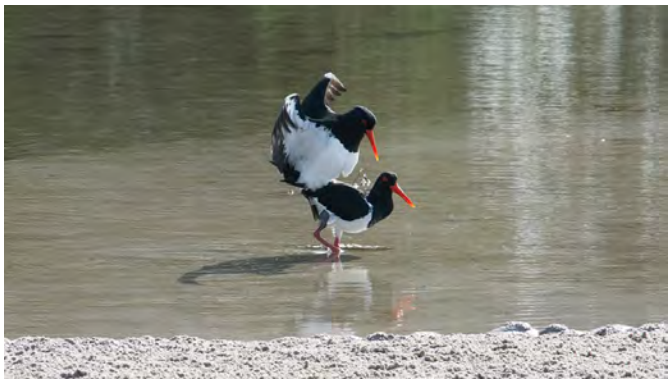

Figure 5: *Pied Oystercatchers copulating, Orford IBA, September 2017. ©Eric J. Woehler*

Figure 6: *Pied Oystercatcher nest, Orford IBA, October 2017. ©Eric J. Woehler*

Figure 7: *Pied Oystercatcher fledgling feeding in the backwater, Orford IBA, December 2017. ©Eric Woehler*

Table 1: *Survey data, Orford IBA. The numbers of breeding pairs (= territories) of resident shorebirds are shown per visit. HOPL = Hooded Plover, RCPL = Red-capped Plover, PIOY = Pied Oystercatcher, FATE = Fairy Tern, LITE = Little Tern. No mapping was undertaken on the 27 December 2017, 1 January and 14 February 2018 visits, which were to confirm nesting by Fairy Terns initially, then to monitor the breeding effort once the colony was established. Species' breeding pairs maxima are highlighted. The numbers of individuals present on each visit are also shown.*

Date	Breeding pairs/territories				Numbers of individuals present			
	HOPL	RCPL	PIOY	FATE	HOPL	RCPL	PIOY	FATE
21/08/17	3	2	4		10	7	6	
13/09/17	4	3	6		9	6	12	
22/09/17	1	5	4		6	14	10	
20/10/17	2	4	7		10	7	14	
30/11/17	2	3	7		7	6	15	
25/12/17	4	1	5	3	18	2	12	14
27/12/17				9				29
01/01/18				12				17
02/02/18	3	1	3	14	6	2	7	25
14/02/18				1				3

Small terns

A small Fairy Tern colony established in the IBA in late December 2017. The first observations occurred on 25 December, when 14 birds were observed; 3 were sitting on nests, some were flying around the site or roosting on the sand adjacent to the colony, and 2 terns were observed to be returning to the colony with fish for incubating females (figure 8). Two courtship feedings and copulations were also observed.

Two days later, there were 27 Fairy Terns present with 9 birds sitting on nests. A number of terns were observed to attack a Pied Oystercatcher that had walked into the colony. One tern was seen to fly into the colony with a fish for his partner. The entire colony was disturbed by the overflight of a drone over the IBA and Millingtons Beach during the survey at approximately 08:55 local (UTC+11).

On 1 January 2018, there were 12 nests estimated to be present in the colony. Not all nests were visible from the vantage point outside of the colony; some males were observed to drop into the colony behind vegetation with fish prey. The terns in the colony were very active, with birds vocalising during territorial disputes and with their partners. Terns were also observed to mob Hooded Plovers close to and within the colony.

The colony reached its maximum on or around 2 February 2018, when 14 nests and 25 adults were present. Several birds were observed to fly into the colony with fish prey, and several terns were observed roosting on the wet sand approximately 30 m from the colony. A significant disturbance to the colony was averted when 2 women with a dog were seen to approach the colony from the west having ignored all the signs about restricted access and a prohibition on dogs in the IBA.

The colony was abandoned sometime thereafter. Only one Fairy Tern chick was present at the site on 14 February. Both parents were observed to feed the chick. The chick could not fly and it is unlikely that the chick would have survived to fledging. Based on the observations, it is believed that the colony produced nil fledglings in the 2017–18 season. It is believed that extensive disturbance to the nesting terns, potentially from recreational fishers, dog-walkers and their dogs, people, or all of these, were responsible for the formerly active colony to be abandoned sometime in early February 2018.

Figure 8: *Adult Fairy Tern returning with fish to the colony, Orford IBA, December 2017. ©Eric J. Woehler*

Migratory shorebirds

Only one species of migratory shorebird was reported from the IBA during the 2017–18 surveys. Red-necked Stints were observed on three occasions: 1 on 13 September, 13 on 22 September and 17 on 20 October (figure 9). It is believed that these birds were on their southward migration to the Derwent or Pitt Water–Orielton Lagoon IBA in south-east Tasmania.

Disturbance to nesting birds

A number of observations indicate disturbance to the nesting shorebirds and terns occurred inside the IBA throughout the 2017–18 season:

- fresh dog tracks were present inside the exclusion fence on the eastern foreshore on 21 August;
- fresh dog prints were present at the north-eastern extent of the backwater on 30 November;
- extensive mountain bike tracks were present on the sand at the south-western extent of the spit on 30 November;
- recreational fishers were regularly and frequently observed walking along the bags despite extensive signage and flagging tape meant to exclude them from accessing the foreshore construction area;
- a drone was flown over the spit and Millingtons Beach on 27 December that disturbed the entire colony of terns; and
- 2 women and an off-lead dog were present inside the fenced and signed exclusion area on 2 February, and were stopped from walking through the Fairy Tern colony with their dog by EJW.

It is believed that these observations reflect the *types of disturbance* to nesting shorebirds and terns in the Orford IBA. Anecdotal records and discussions with PWS and Council staff supported an assessment by the author that there had been an increase in the human recreational use of the IBA throughout the summer months, resulting in an *increased frequency and intensity of disturbance* to nesting shorebirds and small terns. It is believed that the tern colony was abandoned sometime in early February, almost certainly as a result of disturbance to the nesting birds.

Figure 9: *Red-necked Stint, Orford IBA September 2017. ©Eric J. Woehler*

Discussion

The intra- and inter-species asynchrony in breeding phenologies of the resident shorebirds and terns required frequent visits to survey breeding efforts and to monitor the breeding populations over the 2017–18 season. The data collected during the 2017–18 surveys will build on the existing data for the IBA, and will contribute to future assessment of the effects of dredging and channelisation on the shorebirds and terns.

Figure 10: *BirdLife Tasmania survey effort, 2017–18, Orford IBA Tasmania. Base image is Google Earth, captured in 2017 before dredging and channelisation had begun.*

Population status and trends

1. Populations

Comparison of the 2017–18 data on breeding effort with similar data for the four seasons between 2013–14 and 2016–17 shows the Hooded Plover breeding population decreased from a mean of 6.3±1.5 pairs (n = 3 seasons) to 2 pairs, a decrease of 4 pairs or 66% of the earlier mean effort. Similarly, the Red-capped Plover breeding effort decreased from a mean of 5.0±0 pairs (n = 3) to 1 pair, a decrease of 4 pairs or 80% of the earlier mean effort.

The Pied Oystercatcher breeding effort (3 pairs in 2017–18) was 2 pairs fewer than the mean of 6.3±0.6 pairs (n = 3), a decrease of 3 pairs or 50% of the earlier mean effort. Breeding territories of Pied Oystercatchers in Tasmania are believed to be at a premium (Newman 1992) and are typically held by resident birds for life (Taylor *et al.* 2014). The Fairy Tern breeding effort in 2017–18 (14 pairs) did not differ from previous breeding efforts (16.3±5.6 pairs, n = 4 for the period 2007–08 to 2016–17).

The substantial decrease in breeding by Red-capped Plovers in the IBA may be at least partly explained by the species being less coastal-obligate for nesting and feeding compared to Hooded Plovers and Pied Oystercatchers. Red-capped Plovers are able to nest inland away from the coast, and will abandon coastal areas when disturbed or under adverse conditions.

The resident Hooded Plover breeding population (8 breeding pairs in 2015–16) represented approximately 0.5% of the estimated population of the vulnerable-listed Eastern Hooded Plover (http://www.environment.gov.au/biodiversity/threatened/species/pubs/66726-conservation-advice.pdf) and met the criterion for national significance. The lower breeding population in 2017–18 (4 breeding pairs, ≥18 individuals) still meets the criterion for national significance.

The resident Fairy Tern breeding population (≥20 breeding pairs, ≥56 individuals [40 adults and 16 chicks in 2015–16]) represented more than 1% of the estimated 5000 or fewer Fairy Terns in Australia (http://www.environment.gov.au/biodiversity/threatened/species/pubs/82950-conservation-

advice.pdf). This breeding population at the mouth of the Prosser River was of international significance. The lower breeding population in 2017–18 (14 breeding pairs, ≥29 individuals) is more than 0.1% of the population, and meets the criterion for national significance.

The Prosser River colony of Fairy Terns is the southern-most known colony of the species in Australia, and as such meets the criteria for recognition as an *Important Population* under the EPBC Act.

2. Initial assessment of impacts of the dredging and channelisation

It is believed that the dredging and channelisation of the Prosser River adversely affected the breeding effort of all three species of resident shorebirds to an unknown and species-specific degree. The decrease was greatest in Red-capped Plover (80% compared to earlier mean breeding population), with similar decreases in Hooded Plover and Pied Oystercatcher (66% and 50% respectively).

Much of these losses can be attributed directly to the immediate loss of foraging habitat during the 2017–18 breeding season on the south and south-east foreshore of the IBA as a result of the placement of the bags (figure 11, page 42).

There are no pre-channelisation data on breeding productivity (i.e. breeding success) for the resident shorebirds in the Orford IBA, as previous survey efforts were undertaken to establish annual breeding population sizes. The lower breeding population of Pied Oystercatchers and the decreased breeding effort (eggs laid) at the Prosser River in 2017–18 are further (presently unquantifiable) evidence of the impacts of the channelisation.

Under favourable circumstances, Pied Oystercatchers' productivity approaches 1 juvenile/breeding pair per annum (Newman 1992). The single fledgling from 3 pairs is consistent with results at other disturbed sites (Taylor *et al.* 2014). Higher breeding success is critical to maintaining populations. The Orford IBA was identified on the basis of supporting high population densities of resident shorebirds before the channelisation. The increased disturbance from human recreational activities in the IBA poses a risk to these internationally recognised values.

The loss of intertidal sand substrate from the placement of the bags removed approximately 35–40% of the intertidal foraging habitat. With decreases in all three species exceeding this loss of foraging habitat, an argument could be made that the smaller species (Hooded Plover 66% loss and Red-capped Plover 80% loss) were affected disproportionately.

The apparent lower loss of Pied Oystercatcher breeding territories is at least partly due to the distribution of their territories in the IBA, with 3 pairs foraging in the backwater, and 3 foraging on the Prosser Bay foreshore (BirdLife Tasmania unpubl. data).

The backwater has habitually been used by foraging Fairy Terns during breeding seasons, and was used extensively during the 2017–18 season following the establishment of the colony and following the part completion of the dredging and channelisation of the Prosser River.

The backwater has seen a change in its tidal regime — the channelisation of its entrance off the Prosser River (figure 12, page 42) has resulted in an increase in the water flow into the backwater, and an associated increase in the energy of these flows. The extent to which this change has altered its productivity and its capacity to support breeding and migratory shorebirds and terns will take further surveys to discover.

Previously, the backwater had a lower tidal regime and was often brackish; under these conditions it provided a nursery area for small fish on which the terns foraged. The increased water flow is likely to result in an increase in the salinity of the backwater, potentially influencing the fish species present — including but not limited to a reduction in their abundance, a decrease in species diversity, a change in species composition, or any combination of these.

The use of dredged sand to fill the bags, and to backfill on the landward side of the bags is believed to have resulted in anoxic decomposition of the meiofauna in the sand. On the visit on 30 November, a strong smell of sulphur was noted along the seawall on the southern shore of the IBA, emanating from the bags and from the adjacent backfill. The anoxic decomposition would have reduced the local productivity and prey availability, and likely would have discouraged foraging by shorebirds until the suphur had dissipated.

3. Nests' placement and intra-specific interactions

Observations on 22 September 2017, and then onward, recorded nests of Pied Oystercatchers and Red-capped Plovers farther inland away from the foreshore than in previous years. Some nests were well within the sparse Marram Grass, *Ammophila* spp. While the sample size is small for the IBA in 2017–18, the experience from extensive earlier surveys over previous years in the Orford IBA and elsewhere in Tasmania led to this subjective assessment. It is believed that the disturbance associated with the noise and movements from the vehicles accessing the IBA foreshore contributed to this behavioural shift.

The loss of intertidal foraging habitat on the southern and south-eastern foreshore of the IBA led to numerous observations of intra-specific aggressive interactions. Extensive runways of Pied Oystercatcher tracks, which were oriented approximately northwest/southeast across the spine of the IBA were observed from 30 November onwards. Several well-used runways had been made by Pied Oystercatchers walking between the foreshore behind the bags on the Prosser Bay foreshore and the backwater to access foraging habitat.

There is a strong preference in Pied Oystercatchers to

nest in an exposed location to minimise the risk of predation of the incubating adults (Newman 1992). The shift in nest locations observed in the 2017–18 breeding season and the aggressive interactions suggest the oystercatchers were likely nesting in sub-optimal or unsuitable locations. This is likely to manifest in a decrease in the resident population, likely as a result of lower breeding success in future seasons.

The attempted foraging on the backwater foreshore by Pied Oystercatchers nesting on the Prosser Bay foreshore resulted in extensive and frequent intra-specific aggressive interactions between the 'resident' oystercatchers whose territories included the backwater and the 'intruding' oystercatchers looking to feed there. Several adult oystercatchers were observed crossing the IBA in both directions. One instance of a resident pair of Pied Oystercatchers attacking the chick of an 'intruding' pair that was taking their chick to feed in the backwater was observed (EJW pers. obs.). Such attacks can lead to the deaths of chicks, further reducing the breeding success of the resident population.

Conclusions, predictions and recommendations

Impacts on the international values of the IBA

The area used by breeding shorebirds and terns at the mouth of the Prosser River is less than 2 ha. As such, it has supported one of the highest densities of breeding shorebirds and terns in Tasmania (BirdLife Tasmania, unpubl. data), and may well have supported the highest density of these species in Tasmania before the dredging and channelisation of the Prosser River in 2017–18.

The IBA was listed in 2009 (Dutson *et al.* 2009) on the basis of the Fairy Tern population meeting two of the IBA criteria: A1 (Globally Threatened Species) and A4i (waterbird congregation). A threat assessment for the IBA identified, 'shipping lanes' as a Level 2 threat to the Fairy Tern population in the Orford IBA. Annual monitoring of the Orford IBA is now critical to assess the impacts on the international values of the IBA.

Any loss of the Fairy Tern colony from the area will see the Orford IBA listed as an *IBA in Danger* (http://datazone.birdlife.org/site/ibasindanger, box 1, page 42).

Conservation of Fairy Terns

Two options for the alignment of the Prosser River were considered by MAST, and the alignment chosen adopted deepening of the existing mouth of the Prosser River, rather than the dredging and channelisation through the backwater (figures 13 and 14, pages 42 and 43). The conservation of Fairy Tern foraging habitat in the backwater was instrumental in the selection of the alignment for dredging. The breeding success of Fairy Terns is enhanced when their foraging habitat is close to the colony.

Based on the analyses presented here, the dredging and channelisation of the Prosser River in 2017–18 had a significant impact on the breeding populations of resident shorebirds resulting from the loss of intertidal foraging habitat. The impact to the breeding effort of Fairy Terns resulted from the increased recreational use and associated disturbance to the nesting terns by people attracted to the site by the channelisation and dredging operations.

The maintenance of their preferred foraging habitat in the backwater off the Prosser River adjacent to the Orford IBA saw the terns return to the IBA, establish the colony in December 2017, and subsequently lay eggs and produce chicks. It is unknown what caused the abandonment of the colony, but Fairy Terns are well known to abandon colonies following disturbance.

Annual surveys and ongoing monitoring are critical to assess the long(er) term impacts to the international values of the IBA.

Predictions and foci for further studies and monitoring

Based on the observations detailed herein and the initial analyses of the data from the 2017–18 breeding season, the following predictions are offered as foci for further studies and monitoring of the IBA.

1. The loss of 35–40% (2017–18 estimate) of intertidal foreshore foraging habitat will likely see a permanent loss of breeding populations of shorebirds, and the establishment of a new equilibrium in terms of resident shorebirds' populations and the intertidal prey resources available.
2. It is unlikely that numbers will return to pre-dredging and channelisation numbers until the intertidal foraging habitat is regained.
3. The permanent loss of intertidal foraging habitat may result in a loss of one or more of the resident shorebirds breeding in the IBA, decreasing the species diversity of the IBA. There may also be a loss of migratory shorebird species using the IBA. Alternatively, the species diversity will remain but the numbers of resident and migratory shorebirds present in the IBA will decrease (as per prediction 1 above), and the breeding productivity (breeding success) of the remaining pairs may be greatly decreased.
4. The altered flow regime into the backwater is likely to have altered the productivity of the backwater and its capacity to support shorebirds and terns. A long-term decrease in the productivity of the backwater could see a decrease in the breeding population of Fairy Terns and their breeding productivity.
5. Further annual surveys and monitoring are required to assess the long(er) term impacts on the shorebirds. Pied Oystercatchers can live for more than 30 years, and one possibility is that the resident species will maintain their territories but with lower annual breeding success due to reduced prey resources.
6. Aggressive interactions will decrease as the resident populations decrease to a new equilibrium.
7. Rising sea-levels over the predicted lifetime of the

bags (c.25–30 years) will contribute more variability to this dynamic location in terms of intertidal foraging habitat extent and productivity.

8. Increased human recreational use of the seawalls will see an increase in land-based disturbance to nesting shorebirds and terns. There is extensive evidence of recreational users ignoring signs, fencing and other restrictions, and significant effort will be required to reduce the recreational uses of the IBA.
9. Council's recognition of the IBA as a bird sanctuary is welcomed, and will form the basis for future conservation measures within the IBA. A formal management plan for the IBA and adjacent areas should be developed to ensure the conservation of the IBA's bird values. Consideration should be given by Council and PWS to increasing the conservation status of the IBA through a change in land tenure. Ongoing efforts by all stakeholders to engage with, and educate visitors to the IBA would be beneficial.
10. It is likely that increased recreational boating and jet-ski use of the channel will see increased water-based disturbance to nesting shorebirds and terns.
11. It is possible that breeding shorebirds displaced by the loss of intertidal feeding habitat will relocate to the Millingtons Beach Spit on the south side of the Prosser River. If so, this will see an increase in conflict between dog owners and the conservation measures required to protect the shorebirds. Annual surveys of Millingtons Beach are required to determine if shifts occur, and the numbers and species involved. The Hooded Plover is already listed as a *Threatened Species* (Vulnerable) under State and Federal legislation, and further efforts may be required to conserve breeding efforts on Millingtons Beach.

It is clear from the analyses presented here that further annual surveys and monitoring of the resident shorebirds and Fairy Terns are required to assess the long-term impacts on the Orford IBA. The resident shorebirds and terns are all long-lived birds, with life spans between 10 and 35 years. Long-term data are critical to assess the long-term impacts of the dredging and channelisation. Ongoing studies must collect data on annual breeding productivity, and, where possible, data on the causes of breeding failure.

The dredging and channelisation of the Prosser River was not completed before the beginning of the 2017–18 shorebird and tern breeding season. Work on site ceased in early October 2017, and is expected to resume to completion during the 2018 winter. The loss of several of the bags used in the channelisation of the Prosser River (figure 15, page 43) has led to an extended period of construction. A number of bags have been placed adjacent to the alignment in the hope of closing gaps that appeared following the placement of the bags (figures 15 and 16, pages 43 and 44). Whether these bags remain in situ or are removed is unknown at the moment; should they remain, it is unknown what effects they may have on adjacent intertidal foreshores.

Acknowledgments

BirdLife Tasmania thanks Kath Hitchcock (PWS) and Mel Kelly (GSBC) for their support and encouragement of BirdLife Tasmania's surveys and monitoring. Justin Foster (MAST) initiated discussions and commissioned the surveys and monitoring during the 2017–18 season. Comments from Mel Kelly, Mike Newman and Priscilla Park improved an earlier draft. This report was presented to Marine and Safety Tasmania (MAST), Glamorgan Spring Bay Council (GSBC) and Parks & Wildlife Service Tasmania (PWS) in July 2018.

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Figure 11: *Prosser River, 30 November 2017. ©Eric J. Woehler*

Figure 12: *Backwater entrance off the Prosser River, 30 November 2017. ©Eric J. Woehler*

A1. Globally threatened species

Criterion: The site is known or thought regularly to hold significant numbers of a globally threatened species.

Notes: *The site qualifies if it is known, estimated or thought to hold a population of a species categorized by the IUCN Red List as Crititcally Endangered, Endangered or Vulnerable. In general, the regular presence of a Critical or Endangered Species, irrespective of population size, at a site may be sufficient for a site to qualify as an IBA. For Vulnerable species, the presence of more than threshold numbers at a site is necessary to trigger selection.*

A4. Congregations

Criterion: The site is known or thought to hold congregations of ≥1% of the global population of one or more species on a regular or predictable basis.

Notes: *This criterion can be applied to seasonal (breeding, wintering or migratory) congregations of any waterbird, seabird or terrestrial bird species. Sites can qualify whether thresholds are exceeded simultaneously or cumulatively, within a limited period. In this way, the criterion covers situations where a rapid turnover of birds takes place (including, for example, for migratory landbirds).*

Box 1: *Details of IBA criteria for the Orford IBA. Full details are available at http://datazone.birdlife.org/site/factsheet/orford-(tasmania)-iba-australia.*

Figure 13, page 42, bottom: *Indicative map showing approximate alignment for the northern option for dredging and channelisation, Prosser River, 2017–18. Source: MAST.*

Figure 14, above: *Indicative map showing approximate alignment for the southern option for dredging and channelisation, Prosser River, 2017–18. Source: MAST.*

Figure 15: *Gaps in the constructed channel at the mouth of the Prosser River, 30 November 2017. ©Eric J. Woehler*

Figure 16: *Bag placed adjacent to main channel alignment to seal a gap between bags (Maria Island in the background), 30 November 2017. ©Eric J. Woehler*

Appendix

Summary of observations of resident and migratory shorebirds and small terns, Orford IBA, 1941–2016 (BirdLife Tasmania unpubl. data). EPBC data from environment.gov.au/cgi-bin/sprat/public/sprat.pl.

Species		Data range	Max. count	EPBC status
Bar-tailed Godwit	*Limosa lapponica*	1957–2009	4	**Vulnerable** (*baueri*). Marine, migratory (Bonn, CAMBA, JAMBA, ROKAMBA)
Common Greenshank	*Tringa nebularia*	2009	4	Marine, migratory (Bonn, CAMBA, JAMBA, ROKAMBA)
Curlew Sandpiper	*Calidris ferruginea*	1998	1	**Critically Endangered**. Marine, migratory (Bonn, CAMBA, JAMBA, ROKAMBA)
Double-banded Plover	*Charadrius bicinctus*	1951–2016	2	Marine, migratory (Bonn)
Red-necked Stint	*Calidris ruficollis*	1974–2016	50 (2003) 40 (2016)	Marine, migratory (Bonn, CAMBA, JAMBA, ROKAMBA)
Little Tern	*Sterna albifrons*	1978	'Present'	Marine, migratory (Bonn, CAMBA, JAMBA, ROKAMBA)
Fairy Tern	*Sterna nereis*	1941–2016	≥40 (2004) ≥56 (2016)	**Vulnerable** (*nereis*). Marine
Hooded Plover	*Thinornis rubricollis*	1948–2016	≥11 (2009) ≥16 (2016)	**Vulnerable** (*rubricollis*). Marine
Red-capped Plover	*Charadrius ruficapillus*	1948–2016	≥28 (2006) ≥10 (2016)	Marine
Pied Oystercatcher	*Haematopus longirostris*	1948–2016	≥12 (2009) ≥14 (2016)	Nil

Shorebird values at the Meredith River, Swansea

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Executive summary

The Meredith River mouth is of conservation significance for shorebirds. The area is the management responsibility of Crown Land Services in accordance with the Tasmanian *Crown Lands Act 1976*. The conservation significance largely arises from its connection with the adjacent Moulting Lagoon Ramsar site, which is of international and national significance to resident and migratory shorebirds. It is one component of a local network of coastal feeding and roosting habitats used by resident and migratory shorebirds depending on the tide, prevailing winds and weather conditions, and on human disturbance. It is critical that shorebirds have alternative sites available to them if their preferred feeding or roosting sites are unavailable due to high tides, poor weather and disturbance arising from human recreational activities. An increasing recreational human presence at the mouth of the Meredith River poses the greatest risk to resident breeding and migratory shorebirds.

Figure 1: *Male Red-capped Plover in flight. © Eric J. Woehler*

Location

The mouth of the Meredith River is approximately 1 km north of Swansea at the western end of Nine Mile Beach and the Dolphin Sands community (figure 2). The area's tenure is Crown Land under the management of Crown Land Services in accordance with the *Crown Lands Act 1976*. The river is part of a complex of coastal foreshores that are associated with the adjacent Moulting Lagoon Ramsar site. The river mouth is highly dynamic, changing its configuration as a function of storms and winter erosion, all tides, and normal weather events such as rainfall and hence river flow. BirdLife Tasmania (formerly the Bird Observers' Association of Tasmania and Birds Tasmania) have an extensive data set of woodland, wetland and shorebird observations from 1976 when members became aware of the area's shorebird and wetland bird values through to the present.

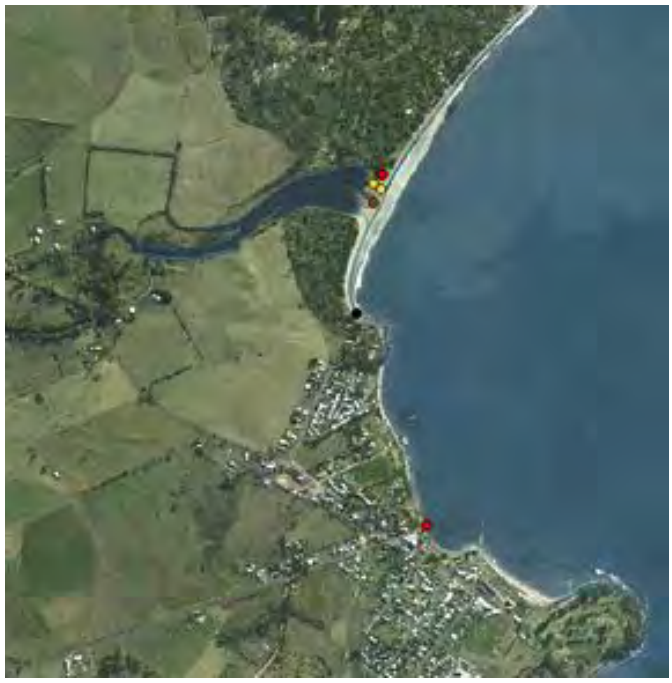

Figure 2: *Satellite image showing the mouth of the Meredith River and the township of Swansea. Yellow symbols show Hooded Plover breeding territories (including nests), red symbols (Pied Oystercatcher), black symbol (Sooty Oystercatcher) and brown symbol (Red-capped Plover), based on BirdLife Tasmania field surveys in 2002, 2007 and 2015.*

Shorebirds recorded

Table 1 (page 47) lists the species of shorebirds recorded by BirdLife Tasmania at the mouth of the Meredith River from December 1976 to the present. A total of six resident species has been recorded on site, but breeding records (nests, eggs or chicks) are only known for three species: Hooded and Red-capped Plovers and Pied Oystercatchers (figure 2, table 1).

Three other resident species have been recorded but not nesting (Black-fronted Dotterel, Sooty Oystercatcher and Fairy Tern). The habitat present at the mouth of the Meredith River, suggests Black-fronted Dotterels are likely to nest there during suitable conditions.

Two Critically Endangered species (Curlew Sandpiper and Eastern Curlew) have been recorded at the mouth of the Meredith River (table 1). The observed numbers are relatively low, but reflect their low population status throughout south-east Tasmania (BirdLife Tasmania, unpubl. data).

In total, 11 EPBC-listed shorebird species have been recorded at the river mouth (table 1), comprising eight migratory and three resident breeding species.

Discussion

Based on the shorebirds observed at the mouth of the Meredith River, including breeding records of resident species (figure 2) and of migratory shorebirds from the Northern Hemisphere (table 1), BirdLife Tasmania has identified the mouth of the Meredith River to be of significance for shorebirds. This significance largely arises from its connection with the adjacent Moulting Lagoon Ramsar site, which is of international and national significance to resident and migratory shorebirds (Woehler and Ruoppolo 2014).

It is appropriate to recognise the mouth of the Meredith River as one component of a local network of coastal feeding and roosting habitats used by resident and migratory shorebirds depending on the tide, prevailing winds and weather conditions, and on the human disturbance regime. It is critical that shorebirds have alternative sites available to them if their preferred feeding or roosting sites are unavailable due to high tides, poor weather and disturbance arising from human recreational activities.

An increasing recreational human presence at the mouth of the Meredith River poses the greatest risks to resident breeding and migratory shorebirds. Recreational horse and motorbike riding have the potential to destroy nests and eggs, and to kill chicks of nesting species. Recreational dog walking disturbs nesting, feeding and roosting shorebirds, and dogs off leash disturb shorebirds and are known to take eggs and chicks (BirdLife Tasmania unpubl. obs).

Recommendations

Based on the shorebird species present at the mouth of the Meredith River and the threats they face, BirdLife Tasmania recommends the following actions in the short term:

- ongoing surveys and low-level monitoring by BirdLife Tasmania to obtain contemporary population data for resident and migratory shorebirds, and for these survey data to be made available to Crown Land Services (CLS), and other relevant agencies including PWS and Glamorgan Spring Bay Council (GSBC);
- consideration be given by CLS for the need for updated and new signs on the shorebird values (for instance, the interpretation sign at the southern side of the bird sanctuary [on the walking track from the Shaw Street access] needs to be replaced);
- consideration by CLS in consultation with PWS and GSBC be given to the need for a new Dog Policy sign at the fork in the access track from the end of Cambria Drive;
- all land managers give support for community involvement in monitoring, educational activities and temporary fencing and signage as required;
- consideration by CLS in consultation with PWS and GSBC be given to the need for a new Dog Policy sign at the access track between 151 and 137 Cambria Drive; and
- consideration be given to erecting signage prohibiting the riding of motorbikes and horses within the bird sanctuary.

The signage and an associated community education effort (e.g. an information sheet sent out with rates notices) will address the primary threats to shorebirds in the area that arise from recreational activities. Regular reviews of the area and its shorebird values will be required in light of the dynamic nature of the foreshore due to storms and erosion, tides and weather events.

Reference

Woehler, E.J. and Ruoppolo, V. 2014. *Resident and Migratory Shorebirds of the Moulting Lagoon Game Reserve Ramsar Site*. Report to NRM South and PWS, May 2014. BirdLife Tasmania Technical Report. 2014: 04. 29 pp.

Table 1: *Shorebird species recorded at the mouth of the Meredith River by BirdLife Tasmania, December 1976 to present (n = 14). R/M column indicates whether a species is resident (R) or migratory (M); B denotes breeding recorded for a resident species at the mouth of the Meredith River (figure 2, page 45). The conservation status of five species under the EPBC Act is shown (C End = Critically Endangered, Vul = Vulnerable) as is their inclusion on the Marine and Migratory Species' appendices to the Act. The maximum numbers for each species are shown. The two species listed as Critically Endangered are highlighted.*

Shorebird species		R/M	EPBC Thr	EPBC Mar	EPBC Mig	Max #s
Common Sandpiper	*Actitis hypoleucos*	M		X	X	2
Ruddy Turnstone	*Arenaria interpres*	M		X	X	1
Curlew Sandpiper	*Calidris ferruginea*	M	C End	X	X	8
Red-necked Stint	*Calidris ruficollis*	M		X	X	210
Red-capped Plover	*Charadrius ruficapillus*	B		X		37
Black-fronted Dotterel	*Elseyornis melanops*	R				7
Sooty Oystercatcher	*Haematopus fuliginosus*	R				2
Pied Oystercatcher	*Haemotopus longirostris*	B				2
Grey-tailed Tattler	*Heteroscelus brevipes*	M		X	X	4
Bar-talied Godwit	*Limosa lapponica*	M	Vul	X	X	19
Eastern Curlew	*Numenius madagascariensis*	M	C End	X	X	4
Fairy Tern	*Sterna nereis*	R	Vul	X		10
Hooded Plover	*Thinornis rubricollis*	B	Vul	X		6
Common Greenshank	*Tringa nebularia*	M		X	X	152

Shorebird values at Bagot Point, Dolphin Sands

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Executive summary

Bagot Point is of conservation significance for shorebirds and small terns. The Bagot Point area is the management responsibility of Crown Land Services in accordance with the Tasmanian *Crown Lands Act 1976*. The conservation significance largely arises from its connection with the adjacent Moulting Lagoon Ramsar site, which is of international and national significance to both resident and migratory shorebirds. It is one component of a local network of coastal feeding and roosting habitats used by resident and migratory shorebirds depending on the tide, prevailing winds and weather conditions, and on the human disturbance regime. It is critical that shorebirds have alternative sites available to them if their preferred feeding or roosting sites are unavailable due to high tides, poor weather and/or disturbance arising from human recreational activities. The push to allow vehicular access to Bagot Point for launching boats poses the greatest risk to both of the resident breeding and migratory shorebirds.

Figure 1: *Pied Oystercatcher feeding in shallows.*
© Eric J. Woehler

Location

Bagot Point is the easternmost point of Nine Mile Beach, approximately 13 km NE of Swansea on Tasmania's east coast. It is located at the mouth of the Moulting Lagoon Game Reserve, a Ramsar wetland of international significance (Woehler and Ruoppolo 2014). The shape and extent of Bagot Point is variable because of the interaction between downstream flows out of Moulting Lagoon and marine waves and tides.

Figure 2: *Satellite image showing Bagot Point, the mouth of Moulting Lagoon and Swanwick and Sandpiper Beach. Symbols show breeding territories (including nests): Hooded Plover (yellow), Red-capped Plover (Brown) and Pied Oystercatcher (red). The green symbol shows the approximate centre of a Fairy Tern colony. All data from BirdLife Tasmania field surveys in 2002–03, 2007–08, 2011–12 and 2015–16.*

Bagot Point is within the Bagot Point Coastal Reserve, which is managed by Crown Land Services, and its boundary coincides with that of the Moulting Lagoon Game Reserve and the Moulting Lagoon Important Bird Area (Dutson *et al.* 2009).

The entrance of Moulting Lagoon is narrow, typically of the order of 90–100 m in width (figure 2). The township of Swanwick is situated to the east of the entrance of Moulting Lagoon, opposite Bagot Point, and Sandpiper Beach is a small sandy beach on the Swanwick foreshore (figure 2). The data for Swanwick have been included in the analyses reported here because the two sites, Bagot Point and Swanwick, are used interchangeably by resident and migratory shorebirds and small terns. Sandpiper Beach is within the Coles Bay Conservation Area and is managed by the Parks and Wildlife Service in accordance with the Tasmanian *National Parks and Reserves Management Act 2002*. Disturbance at either will result in birds moving to the other site.

Shorebirds and terns recorded

Table 1 (page 51) lists the species of shorebirds and terns recorded from Bagot Point and Sandpiper Beach by BirdLife Tasmania between February 1981 and the present [*October 2018*]. A total of four locally resident species have been recorded from the two beaches, but breeding records (nests, eggs or chicks) are only known for three species: Hooded and Red-capped Plovers and Pied Oystercatchers (figure 2 and table 1). Sooty Oystercatchers have been observed, but no breeding has been recorded at either Bagot Point or Sandpiper Beach.

In total, 13 species have been recorded at Bagot Point and Sandpiper Beach. This includes five EPBC-listed species. There are seven resident (local and Australian) breeding species and six migratory species (table 1).

Fairy and Little Terns have been recorded at Bagot Point, and the presence of fledglings on 7 January 2012 suggested that breeding may have occurred there. A solitary Little Tern was present on the same day, and may have been involved in a breeding attempt with a Fairy Tern, as mixed-species pairs are known from Tasmania (E.J. Woehler unpubl. data) and elsewhere (Cox and Close 1977, Ross *et al.* 1999). In light of these observations, the elevated conservation status of Fairy Terns under the *EPBC Act 1999*, and the suitability of Bagot Point as breeding habitat, a precautionary approach is warranted, and Bagot Point should be considered as a breeding site for Fairy and Little Terns in Tasmania in the absence of disturbance during the breeding season.

Six migratory Northern Hemisphere shorebird species have been recorded at Bagot Point and Sandpiper Beach. These are Ruddy Turnstone, Curlew Sandpiper, Red-necked Stint, Grey-tailed Tattler, Bar-tailed Godwit and Eastern Curlew (table 1). Of these, Curlew Sandpiper and Eastern Curlew are listed as Critically Endangered under the *EPBC Act 1999*.

The maximum counts of 110 Pied Oystercatcher and 112 Sooty Oystercatcher are 0.9% and 1.0% respectively of the global estimates for these species (Wetlands International 2012a, b, Hansen *et al.* 2014, Taylor *et al.* 2014). These counts meet the criteria for Bagot Point and Sandpiper Beach to be of international significance for the two species (1% of global population estimates).

The maximum count of 20 Hooded Plovers exceeds the 0.1% criterion (6 birds), and establishes Bagot Point and Sandpiper Beach to be of national significance for the species (>0.3% of the global population), and represents 0.67% of the EPBC-listed Eastern subspecies.

The maximum count of 30 Eastern Curlew is close to the criterion of 0.1% of the East Asian–Australasian Flyway population estimate of 35,000 birds (Hansen *et al.* 2016). Meeting this criterion would establish Bagot Point to be of national significance for this Critically Endangered species.

Discussion

Bagot Point and Sandpiper Beach are of conservation significance for resident and migratory shorebirds. The two adjacent sites support two species of shorebird at numbers meeting the international significance criterion and two species of shorebird whose numbers meet or are close to the national significance criterion. It is appropriate for the responsible land managers (CLS and PWS respectively) to manage Bagot Point and Sandpiper Beach on the basis of the area meeting these international and national criteria.

The international significance of the adjacent Moulting Lagoon was recognised in its listing as an Important Bird Area (IBA) in addition to its status as a Ramsar wetland of international significance (Dutson *et al.* 2009, Woehler and Ruoppolo 2014). It is likely that there is movement of resident and migratory shorebirds and terns between the Moulting Lagoon IBA/Ramsar wetlands and Bagot Point and Sandpiper Beach (Woehler and Ruoppolo 2014). These movements reinforce the need to manage Bagot Point and Sandpiper Beach in recognition of their international significance.

It is appropriate to recognise Bagot Point and Sandpiper Beach as components of a local network of coastal feeding and roosting habitats used by resident and migratory shorebirds depending on the tide, prevailing winds and weather conditions, and on the human disturbance regime. It is critical that shorebirds have alternative sites available to them if their preferred feeding or roosting sites are unavailable due to high tides, poor weather and/or disturbance that arises from human recreational activities.

In particular, increasing recreational human presence at Bagot Point poses the greatest risks to resident breeding and migratory shorebirds. Recreational dog walking disturbs nesting, feeding and roosting shorebirds, and off-leash dogs disturb shorebirds and are

known to take both eggs and chicks (BirdLife Tasmania unpubl. obs.). The push to open Bagot Point for boat launching has the potential to destroy nests and eggs, and to kill chicks of nesting species.

Recommendations

Based on the shorebird species present at Bagot Point and Sandpiper Beach, and the threats they face, BirdLife Tasmania recommends the following actions in the short term:

- ongoing surveys and low-level monitoring by BirdLife Tasmania to obtain contemporary population data for resident and migratory shorebirds, and for these survey data to be made available to Crown Land Services (CLS), and other relevant agencies including PWS and Glamorgan Spring Bay Council (GSBC);
- support by all land managers for community involvement in monitoring, education and engagement activities, and for improvement of existing barriers and signage as required; and
- support for a prohibition of vehicular access to Bagot Point.

The signage and an associated community education effort (e.g. information sheet sent out with rates notices) will address the primary threats to shorebirds in the area arising from recreational activities. Regular reviews of the area and its shorebird values will be required in light of the dynamic nature of Bagot Point due to storms and erosion, tides and weather events.

Acknowledgments

Our thanks go to Mel Kelly, Glamorgan Spring Bay Council, who commissioned this synthesis and review.

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Table 1: *Shorebird and tern species recorded at Bagot Point and Sandpiper Beach by BirdLife Tasmania between February 1981 and October 2018 (n=13). R/M denotes whether a species is Resident or Migratory. Breeding territories for resident species are shown in figure 2. The conservation status of five species under the EPBC Act is shown ('C End' is Critically Endangered, 'Vul' is Vulnerable) as are their inclusion on the Marine and Migratory Species' appendices to the Act. The maximum numbers for each species are shown. The two species listed as Critically Endangered are highlighted.*

Shorebird species		**R/M**	**EPBC Thr**	**EPBC Mar**	**EPBC Mig**	**Max #s**
Ruddy Turnstone	*Arenaria interpres*	M		X	X	10
Curlew Sandpiper	*Calidris ferruginea*	M	C End	X	X	10
Red-necked Stint	*Calidris ruficollis*	M		X	X	160
Red-capped Plover	*Charadrius ruficapillus*	R		X		38
Sooty Oystercatcher	*Haematopus fuliginosus*	R				112
Pied Oystercatcher	*Haemotopus longirostris*	R				100
Grey-tailed Tattler	*Heteroscelus brevipes*	M		X	X	1
Bar-talied Godwit	*Limosa lapponica*	M	Vul	X	X	14
Eastern Curlew	*Numenius madagascariensis*	M	C End	X	X	30
Little Tern	*Sterna albifrons*	R		X	X	1
Caspian Tern	*Sterna caspia*	R		X	X	3
Fairy Tern	*Sterna nereis*	R	Vul	X		18
Hooded Plover	*Thinornis rubricollis*	R	Vul	X		20

Little Penguin adoption of under-road culverts, Bruny Island, 2017–18

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Executive summary

As part of the Department of State Growth's Bruny Main Road upgrade project, seven under-road culverts and associated penguin fences were installed at the Neck colony before the 2017–18 Little Penguin, *Eudyptula minor*, breeding season. As the numbers of returning penguins increased and as the breeding season progressed, so did their adoption and use of the culverts, so that, by the end of the season in January 2018, very few birds were recorded with the cameras placed along the fence line on the roadside. Based on the data available, which is presented in summary here, BirdLife Tasmania believes that the installation of culverts under the Bruny Island Main Road, associated roadside fencing and minor modifications throughout the summer resulted in the adoption and use of the culverts by Little Penguins during the 2017–18 breeding season. The estimated penguin breeding population for the Neck in 2017–18 was 380 pairs, an increase of approximately 65% over the estimated breeding 230 pairs in 2016–17. The results obtained in this study serve as a useful guide for future construction projects involving wildlife.

Figure 1: *Little Penguin at the d'Entrecasteaux Channel entrance of Culvert 3, 17 October 2017. © Eric J. Woehler*

Introduction

The Department of State Growth delivered the Bruny Island Main Road Upgrade Project between July and November 2017. The project involved sealing a 2.5 km stretch of road and installing a new sealed car park. The project involved significant investigation into the flora and fauna of the area, particularly the Little Penguin colony at the Neck. The design and implementation of the road and car park upgrade was managed to minimise impacts to the mixed species Little Penguin and Short-tailed Shearwater, *Ardenna tenuirostris*, colony, and to facilitate ongoing use of the habitat by penguins in particular.

As part of the Bruny Main Road upgrade, four circular 750 mm diameter culverts were placed under the newly sealed section of road at the Neck specifically to facilitate Little Penguins access to the colony at the Neck. An additional three circular 375 mm diameter under-road culverts were also placed for drainage purposes (figure 2). Another culvert was installed to allow drainage from the car park, but the entrance was covered with wire mesh to prevent penguins entering.

In addition to the penguin culverts along Bruny Main Road, penguin fencing was also erected on both sides of the road (colony side and d'Entrecasteaux Channel side) for approximately 800 m to prevent Little Penguins gaining access to the road. The fences were installed along the roadside shoulder, at a greater elevation than the under-road culverts.

All culverts were fitted with a small (225 x 100 x 75 mm) solar-powered LED light at both ends in order to slightly illuminate the entrances. The LED lights were attached to the ceiling of each culvert just inside the entrance. The lights installed were 'Solar Magic' 40 lumen SMD LED arrays. The lights contain two rechargeable batteries and the unit is triggered automatically at dusk and remains on until dawn or until the batteries are discharged.

The decision to use of culverts to facilitate Little Penguin access to their colony was based on the advice and experience of Dr P. Agnew at the Blue Penguin Colony at Oamaru, New Zealand. At Oamaru, a 25 m long culvert 450 mm diameter was installed under the road approximately 100 m from the main colony in 2016. The culvert was installed to reduce the numbers of penguins crossing the road leading to the Oamaru Blue Penguin colony's Visitor Centre.

This report presents a brief summary of the results of monitoring that was implemented to assess the adoption of the under-road culverts at the Neck by the Little Penguins. The monitoring was conducted by BirdLife Tasmania and began on completion of the penguin fencing in October 2017. The report also details modifications that were made during the monitoring period in light of observations made by the BirdLife Tasmania field personnel.

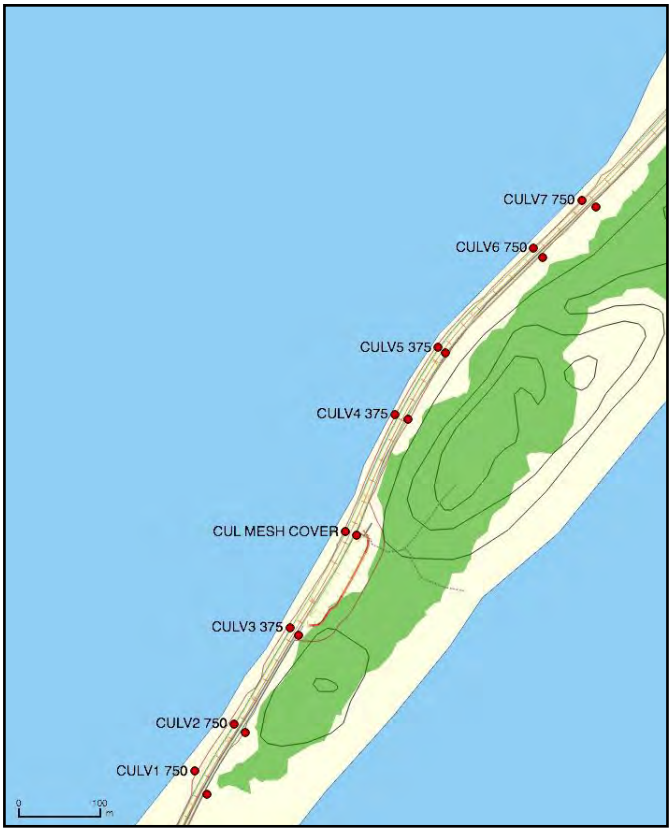

Figure 2: Map showing the Bruny Island Neck colony (green polygon), the Bruny Island Main Road and car park (lower centre), the locations of the eastern (colony) and western (d'Entrecasteaux Channel) entrances of culverts 1 to 7 (south to north) and surface contours (10 m increments). The numbers for each culvert denote their internal diameter (e.g. CULV 1 750: Culvert 1 has 750 mm diameter); contour interval is 10 m and scale bar shows 100 m. Note that it is believed that GPS noise is responsible for the wayward position data for the colony entrance to culvert 1.

Methods

Figure 2 shows the location of the Neck colony, the Bruny Island Main Road and the locations of the culverts. The culverts were numbered 1 (southernmost) to 7 (northernmost), and excluded the one car-park culvert whose ends were blocked with mesh.

BirdLife Tasmania monitoring began on Monday, 16 October 2017, for two nights. This involved two or three observers on site along the Bruny Island Main Road between 8.00 p.m. and 11.00 p.m. (AEDST), recording all penguins and Short-tailed Shearwater observations and vocalisations at the Neck colony and on the Bruny Island Main Road itself. Observers alternated between sitting close to culverts to record penguins and walking back and forth between culverts 1 to 7 (figure 2).

Based on the low numbers of penguin observations made on those two initial nights, it was decided to use camera traps to record the movements of penguins at culvert entrances and at the roadside fence lines. Monitoring using camera traps was undertaken in five phases (table 1, page 56) between 24 October 2017 and 1 February 2018 inclusive, in approximately 7–10 day periods. The use of camera traps greatly expanded the time period for monitoring the penguins' adoption of the under-road culverts and their associated behaviours.

The camera trap units were DigitalEye™ Trail Cameras fitted with Sony DSC–W190 and Sony DSC–W55 cameras modified with motion-activated infrared flash and infrared sensors. The cameras deployed at the culverts were fixed to star pickets or wooden stakes with cameras positioned between 400 and 750 mm off the ground and aimed at culvert entrances.

The cameras deployed on the fence line were fixed to steel poles supporting traffic signs, set at ground level and aimed along the fence line. Cameras were programmed to take pictures (triggered by movement within roughly 2 m of the camera) between sunset and sunrise, and images were either colour or black and white. Images were approximately 4MB in size.

[Tables 1 and 2, and figures 3–8 are on pages 56–60.]

Results

Summary of effort

Surveys and monitoring of the culverts and fences was undertaken on a total of 41 days between 16 October 2017 and 1 February 2018. Camera traps were used from 24 October 2017 onwards; before then, two or three BirdLife Tasmania field personnel were present within the construction footprint during the evenings of 16 and 17 October 2017.

On 8 November 2017, nine cameras were deployed on one or both entrances of all culverts except culvert 2. The cameras were typically deployed for a week at a time, with varying degrees of success in obtaining images as a number of cameras malfunctioned for a number of reasons during their various deployments.

Images from approximately 220 camera trap-nights were obtained from cameras positioned at six of the seven culverts and at three points along the north-western fence line along Bruny Island Main Road between 24 October 2017 and 1 February 2018, which is hereafter referred to as the 'study period'.

Little Penguin colony dynamics

At the start of field observations in October 2017 there were very few penguins present in the colony. Very few

footprints were observed on the northwestern foreshore (d'Entrecasteaux Channel) and no vocalisations were heard from the colony or from the foreshore. Fresh penguin splash (guano) was observed at the seaward entrance of culvert 3 and by the newly constructed fence line on the morning of 17 October 2017, which indicated penguins' presence ashore during the night.

Images from the trap cameras showed an increased number of penguins at the culverts during November and December (figure 4), with peak numbers recorded at the culverts in early to mid-December 2017.

The timing (phenology) of the penguin colony at the Neck was similar to that of colonies being monitored in the Derwent Estuary by BirdLife Tasmania (BirdLife Tasmania unpubl. data). A subjective assessment of the colonies' phenologies in the Derwent River and at the Neck indicated similarities in relative abundances of birds ashore and in the timing of the breeding effort. It is believed that the construction of the road and car park had no noticeable impact on the colony dynamics for the 2017–18 season (Woehler 2017a).

Further supporting this subjective assessment is the colony estimate derived from BirdLife Tasmania's annual monitoring of the Neck and Whalebone Point colonies on Bruny Island (Woehler 2017b). The penguin population at the Neck colony was estimated to be approximately 380 ±40 breeding pairs, up from the 230 ±20 breeding pairs in the Neck colony in 2016–17 (Woehler 2017b). The 2017–18 breeding population estimate is approximately 65% higher than the 2016–17 estimated penguin breeding population at the Neck (BirdLife Tasmania unpubl. data).

Use of culverts

The lights in the culverts' entrances exhibited variable illumination due largely to dust settling on the solar panels, which reduced their efficacy in charging the internal batteries. Some arrays failed to operate following installation while others were weak and lit the entrances quite poorly. Cleaning solar panels improved lighting at the entrances by the LED arrays. Thus some culverts were poorly lit and some LED arrays failed: it is believed that the penguins adopted and subsequently used the two culverts closest to historical access points to the colony (culverts 3 and 4), rather than favouring culverts that were illuminated (see below).

The height between the beach and culvert entrances increases from north (culvert 7) to south (culvert 1), with the d'Entrecasteaux Channel entrance of Culvert 1 more than 5 m above the beach at low tide. It is believed that this elevation discourages penguins from using the culvert, given the limited data available.

Fresh penguin splash was present in culvert 1 on 17 October, three sets of penguin footprints were present in Culvert 7 on 24 October, and numerous footprints were observed amongst the culverts on the evening of 25 October. These observations suggest relatively rapid adoption and use of the culverts by the penguins as the breeding season commenced.

Culverts 3 and 4 (opposite the new car park and closest to the previous car park) were the two culverts that penguins used most frequently over the study period. These two culverts were placed closest to two main access points to the colony for penguins on the d'Entrecasteaux Channel aspect of the colony. It is expected that these culverts will remain the primary access routes under the roadway.

The periods of 7–14 December 2017 and 24 January–1 February 2018 inclusive provide the best comparative data on the relative uses of the culverts and penguins recorded along the fence line (figure 4). The period coincided with the peak and a decrease in penguins attending the colony during the study period, with the peak in numbers recorded using three culverts (38 on 9 December 2017) similar to the peak in numbers of penguins recorded along the fence line (10 on 10 December 2017). The much lower numbers of penguins recorded along the fence line in January 2018 is believed to reflect the adoption and usage of the culverts by penguins during the breeding season.

Overall, the use of culverts increased during the study period based on the camera data (figure 4), reflecting both the increase in penguins breeding in the colony over the study period and their adoption of the culverts. It is impossible to separate the relative contribution of these factors based on the data available. Based on the experiences at Oamaru, once the penguins had accepted and adopted the culvert as an access route to the colony, they willingly used the culvert with less hesitation over time (P. Agnew pers. comm.); a similar situation is expected to occur at Bruny Island. Illumination of the seaward end of the culvert at Oamaru was found to reduce the hesitation of penguins in entering the culvert (P. Agnew pers. comm.).

Efficacy of roadside fencing and modifications made

The fencing was constructed along the roadside edge on both sides of the road to prevent penguins' access to the road. The fence line is typically 1 m or higher in elevation between the culvert entrances, and, if the penguins 'miss' the entrances on arrival and departure, they continue up the riprap until they encounter the fence, where they were observed and recorded walking along the fence line outside of the road surface.

Several modifications were made to guide the penguins towards the culvert entrances at both ends and to encourage their adoption and use of the culverts:

- a square 'return' was added to the ends of the fences that guided the penguins through 180° back towards the culvert entrances within the fencing area (figure 5);
- sand and small gravel was added to the culvert entrances as a transition from the riprap to the smooth concrete of the culverts (figure 6);
- the riprap material was slightly rearranged below the culvert entrances with beach sand placed to form a pathway that directed penguins towards the culvert

entrances (figure 7);
- rocky 'guides' were constructed from the roadside fence line to the culvert entrances on the riprap to divert penguins to the culvert entrances on the d'Entrecasteaux Channel side of the road (culverts 3, 4, 5, 6 and 7; figure 8); and
- all rock 'guides' were subsequently replaced with posts and fencing material identical to that used along the roadside; this was done by PWS/pakana services.

These modifications increased the efficacy of the culverts and their adoption by the penguins.

Handling and ushering of penguins

Members of the construction crew located a few penguins on the roadside in mid-October, shortly after the fencing was completed. The penguins were picked up and placed on the d'Entrecasteaux Channel side of the fence (P. Vertigan pers. comm.). A total of eight penguins was observed along the d'Entrecasteaux Channel fence line on the evening of 16 October, and all were ushered into the nearest culvert (P.V. and R.B. pers. obs). Three penguins were ushered into culverts on the evening of 17 October. Thereafter, no penguins were handled by the BirdLife Tasmania field team for the remainder of the study period. Ushering was used only for a brief period at Oamaru following the installation of the culvert (P. Agnew pers. comm.).

Other species observed on camera

The camera traps recorded an additional five species at the culvert entrances and along the fence lines (table 2). The species comprise Tasmanian Pademelon, Eastern Quoll, Cat, Common Brushtail Possum and Rabbit, and were recorded on 21 instances. It is believed that the brushtail possum and cat(s) were investigating the culverts while on foraging trips to and around the penguin–shearwater colony. No predation events were recorded, and no images of these species carrying carcasses were made.

Nocturnal patterns in penguin observations

The camera trap images apparently show a greater level of penguin activity at the culverts when birds depart the colony and head to the d'Entrecasteaux Channel compared with those that use the culverts when arriving at the colony, based on the times involved. This interpretation is based on 'arrival' times being inferred to occur following dusk and extending to the early hours of the following morning (e.g. 1.00 a.m.), and 'departing' birds recorded in the hours before dawn. Further investigations, including tracking studies, would provide additional data to confirm whether the inferred arrival/departure periods are appropriate, or if some other factor(s) may be involved.

Conclusions and recommendations

Limitations to the study

In light of the camera malfunctions, the data shown in figure 4 represent the minimum numbers of penguins present at the culverts and along the fence line. Had all the cameras worked on all nights, it is highly likely that additional penguins would have been photographed at the entrances of the culverts and along the fence line. Further, had additional cameras been available for deployment, more intensive monitoring of the fence line and all culvert entrances would have been possible, which would have provided additional data to allow a more complete synthesis of the numbers of penguins using the culverts and reaching the fence line throughout the study period.

Adoption of culverts, efficacy of roadside fencing

This is the second time culverts have been placed under a roadway in Tasmania to facilitate access to a breeding colony of Little Penguins. The earlier effort was at Eaglehawk Neck by the Tasman Council, but no studies were undertaken to assess the use of the culvert there. Anecdotal records suggest the penguin colony on the inside of the road has persisted to the present.

The Bruny Neck colony is thus the only colony in Tasmania (and believed to be second only to the Oamaru colony in New Zealand) where observations have been undertaken following the installation of under-road culverts for Little Penguins.

Despite the low number of cameras (see above), it is clear that the penguins have adopted the culverts under the Bruny Island Main Road to access the colony from the d'Entrecasteaux Channel. Details on the rate of adoption and use are unavailable, but, by the end of January 2018, approximately 3.5 months after the culverts' installation, it is clear they are being used and that very few penguins are being recorded along the fence line (figure 4).

Modifications to the fences (curved returns at the ends of fences), the placement of rock and fence guides from the fences to the culverts' entrances and the spreading of sand and gravel in culverts' entrances all contributed to the penguins' adoption of the culverts.

The illumination of the entrances by the LED arrays likely contributed, but based on the limited data available (several arrays failed to operate), it is unclear to what extent these lights aided in the adoption of the culverts. Based on the experience at Oamaru, where illumination reduced the hesitation by penguins in entering the 25 m culvert, it is likely illumination for the shorter (9 m) culverts at Bruny Island may not have been as critical (P. Agnew pers. comm.).

The culverts and fences were installed before the 2017–18 breeding season, so penguins were confronted with the new infrastructure on their return to the colony landing site(s) on the d'Entrecasteaux Channel side of the colony. As the numbers of returning penguins increased as the breeding season progressed, so did their adoption and use of the culverts so that, by the end of the season in January 2018, very few birds were recorded along the fence line on the roadside.

Further evidence in support of the adoption of the culverts by the penguins is the estimate for the annual breeding population of penguins in the colony. The breeding populations of Short-tailed Shearwater and Little Penguins have been monitored annually at the Neck and Whalebone Point on Bruny Island since 2011–12 (Woehler 2017b). The estimated penguin breeding population for the Neck in 2017–18 was 380 pairs, an increase of approximately 65% over the (relatively low) estimate of 230 pairs in 2016–17 (BirdLife Tasmania unpubl. data).

Based on the data available (presented in summary here), BirdLife Tasmania believes that the installation of culverts under the Bruny Island Main Road, associated roadside fencing and associated modifications resulted in the adoption and use of the culverts by Little Penguins during the 2017–18 breeding season. With the infrastructure in place, it is expected that penguins not yet experienced with the culverts and fencing will follow experienced birds in future, with fewer novice birds arriving at the colony and encountering the culverts and fencing over time.

Consideration should be given to modifications for the d'Entrecasteaux Channel entrances to culverts 1 and 2. At present, there appears to be minimal Little Penguin activity at these culverts, likely due to their relatively high elevation above the foreshore. Providing easier access over the riprap is likely to result in greater penguin use of these culverts at the southern end of the Neck colony.

Minor modifications to the guides leading to the culvert entrances over the riprap may be required over the 2018 winter following periods of high seas. It is not expected that further modifications are required for the roadside fencing at this point beyond adding curvature to the 'returns' (figure 5). Minor maintenance involving replacing sand in the culverts' entrances may be required if it has been washed away. Conversely, culvert entrances that are filled with vegetation or sand following poor weather will need to be cleared to ensure that penguins can use the culverts.

The results obtained in this study serve as a useful precedent and guide for future construction projects involving wildlife, particularly Little Penguins throughout their range. The penguins' relatively rapid adoption and use of the culverts following their installation was facilitated and encouraged with fencing and minor on-ground modifications made during the breeding season. The costs associated with the culverts and fencing were negligible with respect to the total cost for the road sealing, thereby eliminating any impediment to their inclusion in similar projects elsewhere.

Acknowledgments

Our thanks to Dr Philippa Agnew, Oamaru Blue Penguin Colony, for her willingness to share her knowledge and experience of penguin culverts. Jill Jones (Department of State Growth) initiated the study and supported the project beyond its original time frame. Brendan Moore (Andrew Walter Construction) strongly supported BirdLife Tasmania's involvement in the project; he and his construction team adopted all recommendations made by BirdLife Tasmania on site during the study period. pakana services modified the fences and culvert access guides.

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Table 1: *Camera monitoring of culvert use by Little Penguins, Bruny Island Neck 2017–18. Cul 1 to Cul 7 denotes the seven culverts (south to north, see figure 2). E denotes a camera placed on the eastern (colony) end of the culvert, W denotes a camera on the western (d'Entrecasteaux Channel) end of the culvert. All fence cameras were deployed on the d'Entrecasteaux Channel (W) side of the Bruny Island Main Road. Fence 1 was adjacent to Cul 3 and faced north, Fence 2 was opposite the northern end of the newly constructed car park (approx. 5 m north of Cul Mesh Cover) and faced south, and Fence 3 was adjacent to Cul 4 and faced south.*

Phase	Start	End	Cul 1	Cul 2	Cul 3	Cul 4	Cul 5	Cul 6	Cul 7	Fen 1	Fen 2	Fen 3
1	24/10	31/10			EW	EW						
2	08/11	15/11	W				W	E	EW			
3	15/11	22/11								W	W	W
4	07/12	14/12			EW	EW			EW	W	W	
5	24/01	01/02			EW	EW				W	W	

Table 2: *Other species recorded on cameras at the Bruny Island Neck colony during the study period 24 October 2017 to 1 February 2018 (see table 1, page 56, for dates of camera deployments).*

Species	Date(s) recorded, 2017–18
Tasmanian Pademelon	12/11/17; 12/12/17
Cat	26/10/17; 10/11/17; 14/11/17; 07/12/17; 08/01/18; 26/01/18
Common Brushtail Possum	28/10/17; 09/11/17; 10/11/17; 13/11/17; 14/11/17; 15/11/17; 08/12/17; 12/12/17
Eastern Quoll	13/12/17; 14/12/17
Rabbit	29/01/18

Figure 3: *Photograph showing Little Penguin in culvert 3 on 26 October 2017. Photograph © BirdLife Tasmania (image DSC02092.jpg).*

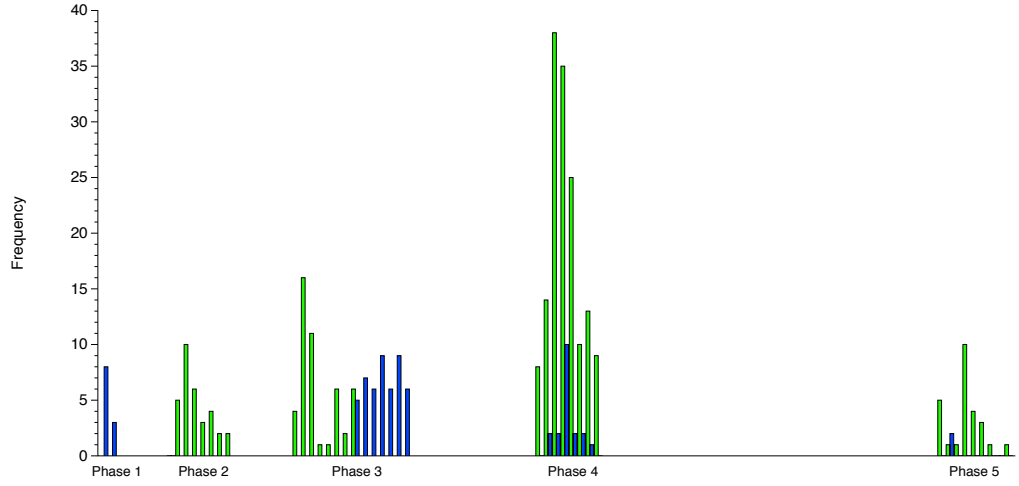

Figure 4: *Graph of the frequencies of Little Penguins photographed at culverts (green bars) and along roadside fence lines (blue bars), Bruny Island Neck colony 2017–18. (See table 1 for dates of monitoring phases.)*

Figure 5: *Photograph showing the square 'return' that was added to the ends of the fences to guide the penguins through 180° back towards the culvert entrances within the fencing extent. Photograph ©2018 Peter Vertigan*

Figure 6: *Photograph showing the sand and small gravel that was added to the culvert entrances as a transition from the riprap to the smooth concrete of the culverts. A camera trap is shown in situ. Photograph ©2018 Peter Vertigan*

Figure 7: *Photograph showing the path through the rearranged riprap material below the culvert entrances with beach sand placed to form a pathway to direct penguins towards the culvert entrances. Photograph ©2018 Peter Vertigan*

Figure 8: *Photograph showing the rocky 'guides' that were constructed from the roadside fence line to the culvert entrances on the rip rap to divert penguins from the fence line to the culvert entrances on the d'Entrecasteaux Channel side of the road. Photograph ©2018 Peter Vertigan*

Oddities of behaviour and occurrence

Compiler: Wynne Webber, BirdLife Tasmania

Introduction

This section comprises reports of unusual, previously unreported, rare or interesting behavioural characteristics, as well as unusual occurrences of species in Tasmania.

We have previously said that the *Tasmanian Bird Report* should record behavioural traits that in themselves are insufficient to make up an essay or note: such information increases knowledge about species found in Tasmania, and unusual sightings may become more regular, even developing into natural range extensions for some species. It then becomes the job of researchers to discover what such phenomena mean. What effect is climate change having? What is the purpose of particular behaviours? How does this greater knowledge improve our understanding of species' ecological and habitat needs?

Unfortunately there are only a few entries for the *Tasmanian Bird Report 40*. This is particularly noticeable since this report is almost a year late in going to press. I thank those who have made contributions, and ask that anyone who has a contribution for TBR41 submits it as soon as possible: the next report will be going into pre-press very soon.

Northern Shoveler, *Anas clypeata*, a new sighting for Tasmania

Margaret Bennett, Currie, King Island

On a trip to the north of King Island on Sunday, 10 November 2019, at 9.45 a.m., I visited Bob Lagoon. The day was heavily overcast and blowing a gale-force westerly. Bob Lagoon is nestled behind the coastal dunes approximately 3 km inland east of Yellow Rock Beach and 28 km NNE of Currie The lagoon is well sheltered from the prevailing westerly winds.

There were many swans present, which I expected, and numerous other birds. Using my binoculars, I identified some Shoveler-type ducks. Their beaks appeared to be those of Shovelers, but one bird had a large patch of white feathers on his breast. I first assumed it was a hybrid with some other waterfowl. I managed to snap a couple of photographs before the ducks disappeared into the reeds.

I thought no more of this bird, until several days later when I downloaded the photos. To my surprise, these ducks looked to be Shovelers, but not the Australasian Shovelers, *Anas rhynchotis*, that are seen on the island in low numbers. I was beginning to think I had seen a new bird for King Island — a Northern Shoveler. Several days later this was confirmed. Not only was it a new species for King Island, but the first record for Tasmania. The Northern Shoveler is widespread in the Northern Hemisphere, normally migrating during the Northern winter to Africa, Borneo and the Philippines.

Figure 1: *Northern Shoveler, Bob Lagoon.*
© Margaret Bennett

Kelp Gulls nesting in unusual site

William E. Davis, Jr., Professor Emeritus, Boston University, Boston, Massachusetts, USA, and
Peter B. Brown, (ret.) Department of Primary Industries, Parks, Water and Environment, Hobart

On 5 December 2018, we visited Gould's Lagoon north of Hobart and saw a pair of Kelp Gulls, *Larus dominicanus*, nesting on a metal sculpture depicting a group of flying swans (figure 2). The swans provided a nesting platform 4 m above the surface of the lagoon and about 10 m from shore. At 11.30 a.m., one of us (WED) walked to the shoreline at the nearest point to the nest to photograph and observe the nesting gulls. A young chick swam around near the base of the sculpture but was not visited by the adult gulls (figure 3). Both adults were, however, aggressive, and flew at WED together, passing within 2 m on four occasions, while a single adult made one pass. The adults settled down after

about 10 minutes and perched on the nest.

Kelp Gulls are a relatively new arrival in Australia, the first confirmed sighting recorded in New South Wales was in 1943 (McGill 1943, 1955). The first Tasmanian sighting was in 1942, and the first breeding record occurred in 1943 (Wolfe 1969). They are now seen along all but the west coast of Tasmania.

Figure 2: *The metal swan sculpture upon which the Kelp Gulls nested. © William E. Davis*

Kelp Gulls are colonial ground-nesting birds and utilise widely various nesting substrate from beaches above high-tide level to grassy slopes, on top of rocks, even to being recorded nesting on roofs of buildings and wharf sheds (Higgins and Davies 1996). They have been recorded nesting as single pairs. Nonetheless, this isolated nesting pair with the nest located on a small platform over a water surface seems quite unusual. Colonial breeding Kelp Gulls defend the area immediately around the nest and the size of the area they defend depends on the density of breeding pairs with pairs nesting farther from each other defending larger areas (Higgins and Davies 1996). Thus the 'isolation' of this breeding pair may have contributed to the large size of the area defended and their aggressive behaviour towards WED.

Figure 3: *The chick below the nest. © William E. Davis*

Having a chick swimming around below the nest may also have stimulated the aggressive behaviour. On several subsequent visits to Gould's Lagoon by PPB, the latest on 11 April 2019, a single adult Kelp Gull was observed perching on the nest platform on the sculpture.

We thank Eric Woehler for his helpful comments on the manuscript.

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Foraging by Grey Shrike-thrush

David Cameron and Wren Fraser, Lune River

Today [*24 August 2019*] with this sleety weather I was alerted to a foraging Grey Shrike-thrush (*Colluricincla harmonica*) around our house and outbuildings. By observation and experiment I determined that it was actively searching for and successfully feeding on galleries of spider-wasp nests (most likely *Auplopus* sp.). As you would know, these wasps parasitise web-building spiders and store them in mud galleries having laid an egg per chamber. Often they place more than one spider per cell. They seek crevices under bark, gaps in buildings, folded cloth and other sites including the ports on my brushcutter muffler! The shrike-thrush was actively probing around, working folded fabrics, cracks and such, and, when presented with a gallery I found under a barrel lid, promptly worked it over. The spiders were just about sucked dry and the soon to pupate wasp larvae were being readily consumed. These birds don't miss a trick!!

Figure 4: *The picked-over remnants of the spider-wasp's nest.*

Poimena Reserve, Glenorchy, bird records: 2006–09

Bob Holderness-Roddam, BirdLife Tasmania

Abstract

This paper is offered as a starter rather than a main course. The author kept a record of birds sighted and heard during regular visits to Poimena Reserve in Austins Ferry for the years 2006–09. No attempt was made to walk transects, nor to visit specific plots. Rather, records were kept for the reserve as a whole and results were totalled for each week, enabling the establishment of a benchmark and year-by-year comparisons. Even over such a short time, there was a noticeable decline in some species, which was possibly related to an increase in other species. These results may prove of value to future researchers in this location.

Location

Poimena Reserve is in the Glenorchy City suburb of Austins Ferry in southern Tasmania (Australia), and is owned and administered by the Glenorchy City Council. It has been registered as Land for Wildlife since 2002. Latitude: 042°46'50" S; Longitude: 147°14'45" E.

Map reference: Tasmania 1:25 000 series, sheet 5026 (edition 2) New Norfolk, 1986. Grid ref. 198633. Also sheet 5226 (edition 2) Richmond, 1986. Grid ref. 200633.

Vehicle access to the reserve is via Wakehurst Road, Austins Ferry, and there are several pedestrian access points to the reserve — primarily from Chatterton Court, Newitt Drive, Erskine Street and via footbridges from Mason Street. There is also a walkway to Sunshine Road between numbers 5 and 7 Acacia Court.

General description

Poimena Reserve is a low hill, grading from 8 m above sea level at Roseneath Park, Main Road, to 119 m at the summit. The area is just over 29 ha.

Roseneath Rivulet runs along the southern boundary. The southern slope is basically natural bush, with some mature blue gums. Understorey consists of blanketleaf, casuarinas, wattles and weeds — notably cotoneaster, blackberry, boneseed, radiata pine and a small quantity of gorse. Council cut down a lot of the introduced radiata pine trees in the late 1990s. At about the 80 m contour this bush gives way to open parkland, which is dotted with eucalypts and wattle trees. This continues to the top, where there are two council reservoirs and a lookout.

A footpath extends north east from the twin reservoir tanks to a paddock area, which is surrounded by light, weedy, regrowth scrub. Two mature White Gums, *Eucalyptus pulchella*, have been fenced just outside their drip lines to permit native groundcover and understorey to regenerate.

The area where the bush meets the parkland is serviced by a car park, toilets and gas BBQs. Council removed several wood-fired BBQs in 2018 in response to concern about the removal of dead trees and living vegetation for fuel. The eastern slope starts at Roseneath Park on Main Road and continues as grassland up along Wakehurst Road (where a small residential development, Roseneath Place, intrudes) to the car park area.

The geology is mainly Jurassic age dolerite (Stephen Forsyth, pers. comm.). Such information may be important, as the soil derived from the geology strongly influences the vegetation, which in turn may influence the presence of some bird species. (Corbett, n.d.).

Climate

There are no climate records as such for the Glenorchy area. Instead we must rely upon those for Hobart, recorded at the old Bureau of Meteorology site at Ellerslie Road, Battery Point.

The warmest month is January, with a mean daily maximum of 21.7°. The highest recorded maximum is 40.8°; the mean daily minimum is 12°; and the lowest recorded minimum is 3.3°. Conversely, the coldest month, July, has a mean daily maximum of 11.7°; highest recorded maximum 22.1°; mean daily minimum 4.6°; and lowest recorded minimum −2.8° (Bureau of Meteorology, 2019). However, personal experience is that the area is subject to heavy frosts at times.

Poimena Reserve falls within the 600–700 mm annual average rainfall range in the lower Derwent Valley, and is exposed to strong wind, particularly from the north and north west. This results in severe wind damage to vegetation in more open areas.

Methodology

Poimena Reserve was accessed primarily on foot, either via Wakehurst Road or through Roseneath Park along a trail that began alongside Roseneath Rivulet before ascending through bush to the car park and BBQ area. From there the reserve summit was accessed, before travelling to the upper paddock and surrounding weedy bush. Alternatively, if access was via Wakehurst Road, the return was frequently down through the bush to the Roseneath Rivulet track.

Time of day varied, from early morning to after sunset, including the occasional overnight bivouac. The length of visits varied from about 30 minutes to half a day. Annual visit numbers were:

- 2006, 223 over 50 weeks
- 2007, 199 over 49 weeks
- 2008, 151 over 52 weeks
- 2009, 150 over 50 weeks

All bird sightings and identified calls were recorded in A5 diaries. In addition to the species listings for each visit, the author recorded weather details, including cloud cover and temperature.

Species identification was primarily through Watts (2002), which was chosen because it is Tasmania specific. Other references included Slater (1970 and 1974). Bird calls were identified with the assistance of Stewart's CD (2001), which was used in a Sony diskman. The author also recorded bird calls onto a digital recorder provided by Sarah Lloyd.

In the event that a bird could not be identified, a Sony handycam was used to record the bird for subsequent replay on a TV set, using the zoom facility. In addition, expert advice was sought from Denis Abbott and Don Knowler, both of whom accompanied the author on different occasions.

The weekly sightings were subsequently placed on an Excel database. The original diaries have been retained to enable the number of sightings for each week to be checked if required.

Results

Over the four-year period, a total of sixty-one different bird species were identified. The full list of species observed during this time is in the appendix. This compares with the 'over 70' recorded by David Cowie (pers. com.). These ranged from the single occasions on which several White-throated Needletails, *Hirundapus caudacutus*, Swift Parrot, *Lathamus discolor*, and Tasmanian Boobook, *Ninox leucopsis*, were sighted, to the virtually weekly sightings of the introduced Common Blackbird, *Turdus merula*.

Endemic species

Several endemic species were either resident or regular visitors. These were Green Rosella, *Platycercus caledonicus*, Yellow Wattlebird, *Anthochaera paradoxa*, Yellow-throated Honeyeater, *Lichenostomus flavicollis*, and Tasmanian Native-hen, *Tribonyx mortierii*. Observed less frequently were the Black-headed Honeyeater, *Melithreptus affinis*, and Dusky Robin, *Melanodryas vittata*.

Migrant species

Summer migrants included Dusky Woodswallow, *Artamus cyanopterus*, Black-faced Cuckoo-shrike, *Coracina novaehollandiae*, Blue-winged Parrot, *Neophema chrysostoma*, Striated Pardalote, *Pardalotus striatus*, Welcome Swallow, *Hirundo neoxena*, Pallid Cuckoo, *Heteroscenes pallidus*, Fan-tailed Cuckoo, *Cacomantis flabelliformis*, Shining Bronze-Cuckoo, *Chalcites lucidus*, and Horsfield's Bronze-Cuckoo *Chalcites basilis*. (The Pallid Cuckoo is a regular summer resident, whilst the others were seen or heard less frequently.)

Birds of prey

The Brown Falcon, *Falco berigora*, was probably the most frequent species, along with the Brown Goshawk, *Accipter fasciatus*. However, Peregrine Falcons, *Falco peregrinus*, and their kills (white racing pigeons) were also seen fairly often. I have four observations of Wedge-tailed Eagles, *Aquila audax*, in the top part of the reserve. One, a juvenile, was present for at least 30 minutes on 19 May 2005. Glenorchy City Council Natural Areas Coordinator, Alli Coombe, reported a pair engaged in possible scouting for food resources in the top paddock on 27 July 2010.

There were three records of a Grey Goshawk, *Accipter novaehollandiae*, and several Swamp Harrier, *Circus approximans*, were noted.

Other species

Other species that were regulars or residents included Brown Thornbill, *Acanthiza pusilla*, and Yellow-rumped Thornbill, *Acanthiza chrysorrhoa*, Spotted Pardalote, *Pardalotus punctatus,* Eastern Rosella, *Platycercus eximius*, Silvereye, *Zosterops lateralis*, Superb Fairy-wren, *Malurus cyaneus*, Grey Shrike-thrush, *Colluricincla harmonica*, Grey Fantail, *Rhipidura fuliginosa*, Common Bronzewing, *Phaps chalcoptera*, Australian Magpie, *Gymnorhina tibicen*, Forest Raven, *Corvus tasmanicus*, and Grey Butcherbird, *Cracticus torquatus*. Honeyeaters are represented by the New Holland Honeyeater, *Phylidonyris novaehollandiae*, Black-headed Honeyeater, Crescent Honeyeater, *Phylidonyris pyrrhopterus*, Little Wattlebird, *Anthochaera chrysoptera*, and Noisy Miner, *Manorina melanocephala*. (At least some of our Silvereyes appeared to over-winter here.)

Regular visitors included Green Rosella, Scarlet Robin, *Petroica multicolor*, Yellow-tailed Black-Cockatoo, *Zanda funereus*, Sulphur-crested Cockatoo, *Cacatua galerita*), and Musk Lorikeet, *Glossopsitta concinna*.

Less frequent visitors included Eastern Spinebill, *Acanthorhynchus tenuirostris*, Grey Currawong, *Strepera versicolor*, and Golden Whistler, *Pachycephala pectoralis*.

As mentioned, the principal aim of these records was to provide a benchmark against which future bird sightings could be compared. Given the relatively short duration of this study (four years), it would be

unrealistic to observe any statistically reliable trends in species numbers. However, ten species exhibited a noticeable decline in weekly sightings during the time in which recordings were kept, as is illustrated in table 1.

***Table 1:** Species for whom the number of weekly records declined markedly during the survey period.*

Species	2006	2007	2008	2009
Common Bronzewing	19	15	10	6
Dusky Woodswallow	30	20	15	9
Brown Falcon	14	4	8	3
European Goldfinch	44	32	26	9
Common Greenfinch	15	8	6	3
Grey Shrike-thrush	34	25	16	1
Scarlet Robin	14	14	10	3
Silvereye	27	19	21	10
Superb Fairy-wren	33	15	8	5
Welcome Swallow	12	9	9	4

The only species that had a noticeable increase in numbers was the introduced Galah, *Eolophus roseicapilla*. It increased in number of weekly sightings from 2 in 2006 to 12 in 2008 and 8 in 2009. One of these sightings involved an apparent dispute with Eastern Rosellas over a potential nest hole in one of the two recently fenced White Gums in the upper paddock. Casual observations by the author indicate an increase in Galah numbers in the Austins Ferry–Claremont area over recent years.

In the longer term, the recorded first and last arrival dates for both trans Bass Strait and altitudinal migrants may prove useful in tracking the advance of climate change. However, during this period there was no clear pattern to the observed arrival and departure of migrant species.

Discussion and conclusions

Because these observations were made over the comparatively short time of 4 years, it would be inappropriate to draw firm conclusions from the observations. For instance, species recorded as being in decline may have increased again since the study took place. However, if these species continue to decline, there are several factors to consider. These include:

- Climate change, which affects vegetation and invertebrate numbers, which in turn influences food supply for adults and nestlings.
- The increasing amount of residential development on the edges of the reserve in recent years. This has resulted in habitat loss, increased artificial lighting, which disrupts activity, and the likely increase in use of garden herbicides and pesticides. Increased housing also results in more domestic cats and dogs, which disrupt breeding and feeding and predate upon some species (Holderness-Roddam and McQuillan 2014).
- Predation by such species as Grey Butcherbirds.
- Disturbance by aggressive species, particularly Noisy Miners.

No detectable pattern to the arrival and departure of migrant species is evident over the four-year period, but the information in this study may prove of value for comparison in future studies of this location.

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Appendix: List of species recorded 2006–09

Pacific Black Duck
Silver Gull
Rock Dove
Spotted Dove
Common Bronzewing
Horsfield's Bronze-Cuckoo
Shining Bronze-Cuckoo
Fan-tailed Cuckoo
Pallid CuckooWhite-throated Needletail
Tasmanian Native-hen
Masked Lapwing
Brown Goshawk
Grey Goshawk
Swamp Harrier
Wedge-tailed Eagle
Tasmanian Boobook
Laughing Kookaburra
Brown Falcon
Australian Hobby
Peregrine Falcon
Yellow-tailed Black-Cockatoo
Galah
Sulphur-crested Cockatoo
Musk Lorikeet
Green Rosella Eastern Rosella
Swift Parrot
Blue-winged Parrot

Superb Fairy-wren
Eastern Spinebill
Yellow-throated Honeyeater
Noisy Miner
Little Wattlebird
Yellow Wattlebird
Crescent Honeyeater
New Holland Honeyeater
Black-headed Honeyeater
Spotted Pardalote
Striated Pardalote
Yellow-rumped Thornbill
Brown Thornbill
Black-faced Cuckoo-shrike
Golden Whistler
Grey Shrike-thrush
Dusky Woodswallow
Grey Butcherbird
Australian Magpie
Grey Currawong
Grey Fantail
Forest Raven
Scarlet Robin
Dusky Robin
House Sparrow
European Goldfinch
Common Greenfinch
Welcome Swallow
Tree Martin
Silvereye
Common Starling
Common Blackbird

Summer and winter wader counts: 2017–19

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Abstract

Monitoring of migratory shorebirds at roosts in south-east Tasmania began with David Thomas' efforts in the years 1964–68. These counts served to establish a valuable and remarkably early baseline for all later efforts, which now span more than 50 years. Counts in the south-east resumed in 1973 (summer) and 1980 (winter) and have continued since then. Counts in the north-east were begun by Ralph Cooper in 1975 (summer) and 1976 (winter) and have continued since then.

Counts in the north-west began in 1996 (summer and winter) and large teams of counters have continued since then under the coordination of Hazel Britton and Richard Ashby. These sites comprise the Tasmanian 'core' sites for the current national Shorebirds 2020 program organised by BirdLife Australia.A number of other sites around the state are also surveyed, sometimes in summer and in winter, some-times opportunistically as logistics and capacity allow. These data are recorded as 'non-core' sites and are published in separate tables here. This distinction between core and non-core sites simply identifies the long-term sites from more recent sites added during the Shorebirds 2020 project and following; the data from non-core sites are equal in value and contribution to those data from core sites.

Acknowledgments

We thank the ongoing efforts of regional coordinators: Hazel Britton and Richard Ashby (north-west), Ralph Cooper (north and north-east), Liz Znidersic (east) and Sue Drake and Eric Woehler (south-east). Their efforts, over many years, to organise volunteers twice a year to undertake these counts have resulted in the long-term datasets that are available from around Tasmania. We also thank the numerous counters who have contributed to these counts. Some of these people have participated for more than 30 years. We thank them all for their efforts. Our apologies if anyone involved in any count is not listed in the data tables that follow.

BirdLife Tasmania Shorebird Study Group. Summer 2017 wader count

Core Shorebirds 2020 (AWSG) Areas

	Lauderdale	Clear Lagoon	Mortimer Bay	Pipeclay Lagoon *	Calverts Lagoon	South Arm Neck + Arm End Spit	Barilla Bay	Orielton Lagoon / Sorell	Iron Ck - Carlton	Five Mile Beach - Milford	Seven Mile Beach	TOTAL DERWENT	Marion Bay + Little Boomer	TOTAL SOUTHEAST
168 Latham's Snipe												0		0
153 Bar-tailed Godwit	2							57				59		59
150 Whimbrel							4					4		4
149 Eastern Curlew								14				14		14
158 Common Greenshank								16				16		16
160 Terek Sandpiper		D									N	0		0
155 Grey-tailed Tattler		R									O	0		0
129 Ruddy Turnstone		Y									T	0		0
165 Great Knot												0		0
164 Red Knot											C	0		0
166 Sanderling											O	0		0
162 Red-necked Stint	125			104		217	38	220			U	704		704
978 Pectoral Sandpiper											N	0		0
163 Sharp-tailed Sandpiper											T	0		0
161 Curlew Sandpiper											E	0		0
130 Pied Oystercatcher	195		30	140		208	55	48	101	29	D	806	194	1000
131 Sooty Oystercatcher	4			59		48		3	42	1		157	41	198
137 Pacific Golden Plover								47				47		47
136 Grey Plover												0		0
143 Red-capped Plover	15			13		29	9					66	5	71
140 Double-banded Plover	1			10	1	2						14		14
139 Lesser Sand Plover												0		0
141 Greater Sandplover												0		0
144 Black-fronted Dotterel									2			2		2
138 Hooded Plover									1			1	28	29
135 Banded Lapwing												0		0
133 Masked Lapwing	99			120		80	34	71	26	10		440		440
												0		0
Totals for sites >>	441	0	30	446	1	584	140	476	172	40		2330	268	2598

*** total adjusted to reflect regular presence of birds not detected on the count**

Observers>>	OGMN	CH	OGMN	CH	CH	AW PH NR	PB AWi	DA GR MN	ML-S EW	DA GR MN			EJW	
Dates >>				25-Feb-17	25-Feb-17	25-Feb-17	25-Feb-17	25-Feb-17	25-Feb-17	25-Feb-17			25-Feb-17	
Weather>>>				Partly cloudy Wind 10 knots	Partly cloudy Wind 10 knots	Sunny SW breeze < 10km/hr	fine and cool, 10 - 15 knot westerly	10-16C, wind NW/NNW at 15-24 km/h	Sunny, hot, no wind				cool, near calm conditions	

Observers:

AW	Andrew Walter	MN	Michelle Nick
AWi	Alan Wiltshire	NR	Nick Ramshaw
CA	Col Atkins	OGM	Mike Newman
CH	Christine Harris	PB	Paul Brooks
EW	Els Wakefield	PH	Pamela Hinsby
EJW	Eric Woehler	GR	Geoff Rakers
MLS	Mona Loofs-Samorzew	DA	Denis Abbott

BirdLife Tasmania Shorebird Study Group. Summer 2017 wader count

Core Shorebirds 2020 (AWSG) Areas

	Montagu I	Kangaroo I	Shipwreck Pt, Perkins I	Wallaby I	Anthony Beach West	Anthony Beach East	"Bird Pt"	Mosquito Inlet	"5 Islets"	"Knot Point"	**TOTAL NORTHWEST**	Tamar / George Town	Cape Portland, Little Musselroe	Kelso	**TOTAL NORTH/NORTHEAST**	**TOTAL TASMANIA**
168 Latham's Snipe									2		**2**				**0**	**2**
153 Bar-tailed Godwit		9					15		68		**92**				**0**	**151**
150 Whimbrel											**0**	1			**1**	**5**
149 Eastern Curlew											**0**	7			**7**	**21**
158 Common Greenshank							22				**22**		1		**1**	**39**
160 Terek Sandpiper											**0**				**0**	**0**
155 Grey-tailed Tattler											**0**				**0**	**0**
129 Ruddy Turnstone		200	192	4			80		250	4	**730**	3	86	3	**92**	**822**
165 Great Knot											**0**				**0**	**0**
164 Red Knot		30					700		700	45	**1475**				**0**	**1475**
166 Sanderling							8				**8**				**0**	**8**
162 Red-necked Stint		200	1440	15		166	4400		300	12	**6533**		332	392	**724**	**7961**
978 Pectoral Sandpiper											**0**				**0**	**0**
163 Sharp-tailed Sandpiper	9	18		3							**30**		2		**2**	**32**
161 Curlew Sandpiper		10	114				156		108	9	**397**		15		**15**	**412**
130 Pied Oystercatcher	11	89	384	5		270	1	2	37	4	**803**	14	54	166	**234**	**2037**
131 Sooty Oystercatcher	28	83	108	14	64	17	7		56		**377**	2	29	45	**76**	**651**
137 Pacific Golden Plover		200	50	69							**319**		35		**35**	**401**
136 Grey Plover							3		8	28	**39**				**0**	**39**
143 Red-capped Plover		1	75	21		20	12				**129**	1	17	26	**44**	**244**
140 Double-banded Plover			9	2							**11**				**0**	**25**
139 Lesser Sand Plover											**0**				**0**	**0**
141 Greater Sandplover											**0**				**0**	**0**
144 Black-fronted Dotterel											**0**				**0**	**2**
138 Hooded Plover			11			10					**21**		1	2	**3**	**53**
135 Banded Lapwing											**0**		20		**20**	**20**
133 Masked Lapwing	9	2	19	5	4	33			6		**78**	21	27	107	**155**	**673**
Unidentified small waders											**0**				**0**	**0**
Totals for sites >>	57	842	2402	138	68	516	5404	2	1535	102	**11066**	49	619	741	**1409**	**15073**

Observer>>	FW,LW,LH,NH	RA,PV	CM,JT,MH,RC,RH,ST	AR, JR	AF,EW	AP, TB	PA, JH	PH	ML	PB, AD		RBC	RBC	RBC		
Dates >>	11/2/17	11/2/17	11/2/17	11/2/17	11/2/17	11/2/17	11/2/17	11/2/17	11/2/17	11/2/17		24-Feb-17	17-Jan-17	23-Feb-17		
Weather>>>	NE 6-11 kph wind	NE wind 0-5 kph, overcast.	E wind 12-20 kph, overcast.	Wind SE 6-11 kpa	E wind 12-20 kph, overcast.	NE-SE wind 12-20 kph	Overcast,light NE breeze.	NE wind 5-11 kph, overcast.	N'ly wind 12-20 kph. Overcast,mild, some sunny patches.	Mild to warm, overcast,to partly cloudy, light breeze.						

Observers:

AD	Andrew Darby		JH	Jim Hunter		ML	Mona Loofs-Samorzewski		RBC	Ralph Cooper
AF	Anthea Fergusson		JR	Jean Richardson		NH	Noel Hortle		RC	Rees Campbel
AP	Alison Parks		JT	John Tongue		PA	Peter Atkinson		RH	Rob Hamilton
AR	Alastair Richardson		LH	Liz Hortle		PB	Paul Brooks		ST	Shirley Tongue
CM	Col Meyers		LW	Lennice Wilson		PH	Peter Hefferon		TB	Tony Britz
EW	Els Wakefield		MH	Michael Hyland		PV	Peter Vaughan			
FW	Frank Wilson					RA	Richard Ashby			

BirdLife Tasmania Shorebird Study Group. Summer 2017 wader count

Non-Core Shorebirds 2020 (AWSG) Areas

	Moorland Pt, Devonport	Narawntapu NP (NE Arm)	Kingston Pt Perkins I	East Inlet, Stanley	Totals non-core sites NW	Georges Bay, Horseshoe Sands	Georges Bay, Medeas Cove	Georges Bay, Sewage mudflats	Georges Bay, Barway S side Pelican Pt	Beerbarrel Beach	Maurouard Beach N	Maurouard Beach S	**Total Georges Bay**	Scamander Spit / Barway	Dianas Basin	Blanche Beach	Falmouth	Binalong Bay	Jeanneret Beach	Roaring Beach (Southport)	North end Southport Lagoon	Hastings Bay (Lune River)	Lake Dulverton
168 Latham's Snipe					**0**								**0**										
153 Bar-tailed Godwit		4	1		**5**			76					**76**										
150 Whimbrel					**0**			2					**2**										
149 Eastern Curlew		5			**5**	2							**2**										
158 Common Greenshank					**0**								**0**										
160 Terek Sandpiper					**0**								**0**										
155 Grey-tailed Tattler					**0**								**0**										
129 Ruddy Turnstone	80			2	**82**					17			**17**										
165 Great Knot					**0**			5					**5**										
164 Red Knot					**0**								**0**										
166 Sanderling					**0**	70							**70**										
162 Red-necked Stint		180	1	125	**306**	700		80					**780**	40									
978 Pectoral Sandpiper					**0**								**0**										
163 Sharp-tailed Sandpiper					**0**								**0**										
161 Curlew Sandpiper				2	**2**								**0**										
130 Pied Oystercatcher	4	284	520	118	**926**	92	1	20	2	3	5	2	**125**	3			5	0		1			
131 Sooty Oystercatcher	3		52		**55**					7	1		**8**							4			
137 Pacific Golden Plover		6			**6**								**0**										
136 Grey Plover					**0**								**0**										
143 Red-capped Plover		10	39	30	**79**	46						1	**47**	8	7		17						
140 Double-banded Plover			1		**1**	8						1	**9**										
139 Lesser Sand Plover					**0**								**0**										
141 Greater Sandplover					**0**								**0**										
144 Black-fronted Dotterel					**0**								**0**										
138 Hooded Plover			9	2	**11**					1	26	2	**29**			13		0	0	2			
135 Banded Lapwing					**0**								**0**										
133 Masked Lapwing	4	21		60	**85**			2					**2**				2			20		2	120
Unidentified small waders					**0**								**0**										
Totals for sites >>	**91**	**510**	**623**	**339**	**1563**	**918**	**1**	**185**	**2**	**28**	**32**	**6**	**1172**	**51**	**7**	**13**	**24**	**0**	**0**	**27**	**0**	**2**	**120**

Observer>>	JS, MS	AP, FW, HB, PA, TB	AF,EW	HB, JS	LZ IM	AA BH	LZ IM	LZ IM	SB PB	NW KJ	NW KJ		TT JK	TT JK	SP PB	TT JK	AA BH	AA BH	SW		SW	SF	
Dates >>	17/2/21	16/2/21	11/2/17	11/2/21	26/2/17	26/2/17	26/2/17	26/2/17	26/2/17	26/2/17	26/2/17		26/2/17	26/2/17	26/2/17	26/2/17	26/2/17	26/2/17	25-Mar-17		25-Mar-17	19-Feb-17	
Weather>>>	NW wind 20 knts, clear.	ENE wind 12-20 kph,cloud cover 50%	E wind 12-20 kph, overcast.	95% cloud wind W'ly 5-15 kph changing to E'ly	Wind light - from the North. High tide	Wind light - from the North. High tide	Wind light - from the North. High tide	Wind light - from the North. High tide	Wind light - from the North. High tide	Wind light - from the North. High tide	Wind light - from the North. High tide		Wind light - from the North. High tide	Wind light - from the North. High tide	Wind light - from the North. High tide	Wind light - from the North. High tide	Wind light - from the North. High tide	Wind light - from the North. High tide	Partly cloudy		Partly cloudy	Overcast, light wind	

Observers:

AA	Adrian Ashley	JK	Jo King	PA	Peter Atkinson	
AP	Alison Parks	JS	Julie Serafin	PB	Pam Britz	
BP	Beris Hansberry	JW	Joan Ward	SF	Shirley Fish	
CdL	Cath de Little	KJ	Kay Jones	SP	Syb Pyke	
FW	Frank Wilson	LZ	Liz Znidersic	SW	Stephen Walsh	
HB	Hazel Britton	MS	Michael Serafin	TB	Tony Britz	
IM	Ian May	NW	Natalie Walter	TT	Ted Thornley	
JH	Jill Harris					

BirdLife Tasmania Shorebird Study Group. Winter 2017 wader count

Core Shorebirds 2020 (AWSG) Areas

	Lauderdale	Clear Lagoon	Mortimer Bay	Pipeclay Lagoon	Calverts Lagoon	South Arm Neck	Barilla Bay	Orielton Lagoon / Sorell	Iron Ck - Carlton	Five Mile Beach - Milford	Seven Mile Beach	TOTAL DERWENT	Marion Bay + Little Boomer	TOTAL SOUTHEAST
168 Latham's Snipe												0		0
153 Bar-tailed Godwit				1				10				11		11
150 Whimbrel												0		0
149 Eastern Curlew											N	0		0
158 Common Greenshank							1				O	1		1
160 Terek Sandpiper											T	0		0
155 Grey-tailed Tattler												0		0
129 Ruddy Turnstone											C	0		0
147 Banded Stilt														
165 Great Knot											O	0		0
164 Red Knot											U	0		0
166 Sanderling											N	0		0
162 Red-necked Stint	3			18		49		57			T	127		127
978 Pectoral Sandpiper		d			d						E	0		0
163 Sharp-tailed Sandpiper		r			r						D	0		0
161 Curlew Sandpiper		y			y							0		0
130 Pied Oystercatcher	166		50	172		118	28	50	53	29		666	23	689
131 Sooty Oystercatcher				8		18	14	2	6	2		50	32	82
137 Pacific Golden Plover								1				1		1
136 Grey Plover												0		0
143 Red-capped Plover	26			50		22	15					113		113
140 Double-banded Plover	32			61		25	1	27				146		146
139 Lesser Sand Plover												0		0
141 Greater Sandplover												0		0
144 Black-fronted Dotterel												0		0
138 Hooded Plover												0	14	14
135 Banded Lapwing												0		0
133 Masked Lapwing	8			114		15	20	23	17	13		210	40	250
Unidentified small waders												0		0
Totals for sites >>	235	0	50	424	0	247	79	170	76	44		1325	109	1434
Observer>>	MN		MN	CH		AW PH NR	AR JR Awi	DA GR MH DT LF	DK	GR MH			AB	
Dates >>	15/7/17		15/7/17	15/7/17		15/7/17	15/7/19	15/7/17	15/7/17	15/7/17			15/7/17	
Weather>>>	Low wind		Low wind	Fine, mild, some cloud, temp 3/11deg		Light NW wind. High cloud, sunny periods	Clear & sunny, fresh NW breeze	Sunny, 10C, Wind WNW 17k	Sunny, mild	Sunny, 10C, Wind WNW 17k			fine	

Observers:

AB	Amanda Blakney	GR	Geoff Rakers	
AR	Alastair Richardson	JR	Jean Richardson	
AW	Andrew Walter	LF	Lucy Fallon	
AWi	Allan Wiltshire	MH	Mel Hills	
CH	Christine Harris	MN	Mike Newman	
DA	Denis Abbott	NR	Nick Ramshaw	
DK	Don Knowler	PH	Pamela Hinsby	
DT	Deborah Taylor			

BirdLife Tasmania Shorebird Study Group. Winter 2017 wader count

Core Shorebirds 2020 (AWSG) Areas

	Montagu I	Kangaroo I	Shipwreck Pt, Perkins I	Wallaby I	Anthony Beach West	Anthony Beach East	"Bird Pt"	Mosquito Inlet	"5 Islets"	"Knot Point"	TOTAL NORTHWEST	Tamar / George Town	Cape Portland, Little Musselroe	Kelso	TOTAL NORTH/NORTHEAST	TOTAL TASMANIA
168 Latham's Snipe											0				0	0
153 Bar-tailed Godwit											0				0	11
150 Whimbrel											0				0	0
149 Eastern Curlew	N					N		N			0				0	0
158 Common Greenshank	O					O		O			0				0	1
160 Terek Sandpiper	T					T		T			0				0	0
155 Grey-tailed Tattler											0				0	0
129 Ruddy Turnstone	C		81	6		C	12	C			99		15	8	23	122
147 Banded Stilt													9		9	9
165 Great Knot	O					O		O			0				0	0
164 Red Knot	U					U		U			0				0	0
166 Sanderling	N					N	1	N			1				0	1
162 Red-necked Stint	T		139	366		T	143	T			648		34	32	66	841
978 Pectoral Sandpiper	E					E		E			0				0	0
163 Sharp-tailed Sandpiper	D			2		D		D			2				0	2
161 Curlew Sandpiper			35				3				38		2		2	40
130 Pied Oystercatcher		70	225	8	2		7			4	316	31	63	139	233	1238
131 Sooty Oystercatcher		130	20	12			42			66	270	13	40	4	57	409
137 Pacific Golden Plover											0		1		1	2
136 Grey Plover											0				0	0
143 Red-capped Plover			70	25			43				138	10	40	12	62	313
140 Double-banded Plover			36	20			83				139		17	25	42	327
139 Lesser Sand Plover											0		1		1	1
141 Greater Sandplover											0				0	0
144 Black-fronted Dotterel											0		5		5	5
138 Hooded Plover			8								8		59		59	81
135 Banded Lapwing											0		3		3	3
133 Masked Lapwing			2	3			2				7	37	6	185	228	485
Unidentified small waders											0				0	0
Totals for sites >>	0	200	616	442	2	0	336	0	0	70	1666	91	295	405	791	3891
Observer>>		AD, RA	MB,MH,PM,TB	AR, JR	CD, RD		HB,GS		JB	EW, JB, JH		RC	RC	RC		
Dates >>		23/7/17	24/7/17	26/7/17	27/7/17		29/7/17		31/7/17	1/8/17		6/7/17	26/7/17	22/6/17		
Weather>>>		Strong W winds with heavy showers	Strong W winds with heavy showers	Strong W winds with heavy showers	Strong W winds with heavy showers		Strong W winds with heavy showers		Strong W winds with heavy showers	Strong W winds with heavy showers						

Observers:

AD	Alison Dugand		JH	Jim Hunter	
CD	Carol Donaghey		MB	Mike Brakey	
EW	Els Wakefield		MH	Michael Hyland	
GS	Geoff Shannon		PM	Peter Marmion	
HB	Hazel Britton		RA	Richard Ashby	
JR	Jean Richardson		RC	Ralph Cooper	
JB	John Bowden		RD	Richard Donaghy	
			TB	Tom Burke	

BirdLife Tasmania Shorebird Study Group. Winter 2017 wader count

Non-Core Shorebirds 2020 (AWSG) Areas

	Moorland Pt, Devonport	Kingston Pt Perkins I	Narawntapu NP (NE Arm)	Georges Bay, Horseshoe Sands	Georges Bay, Medeas Cove	Georges Bay, Sewage mudflats	Georges Bay, Barway S side Pelican Pt	Beerbarrel Beach	Mauruard Beach N	Mauruard Beach S	**Total Georges Bay**	Dianas Basin	Blanche beach	Falmouth	Binalong Bay	Jeanneret Beach	Roaring Beach (Southport)	Hastings Bay (Lune River)	Lake Dulverton	Southport Lagoon	South Arm Spit residents
168 Latham's Snipe																					
153 Bar-tailed Godwit																					
150 Whimbrel																					
149 Eastern Curlew		4																			
158 Common Greenshank																					
160 Terek Sandpiper																					
155 Grey-tailed Tattler																					
129 Ruddy Turnstone		20																			
147 Banded Stilt																					
165 Great Knot																					
164 Red Knot																					
166 Sanderling																					
162 Red-necked Stint		95					26														
978 Pectoral Sandpiper																					
163 Sharp-tailed Sandpiper																					
161 Curlew Sandpiper																					
130 Pied Oystercatcher		244		3	2	12	57	2	9	4		2	2			1	7	2		2	2
131 Sooty Oystercatcher		104					17	3		4		2				2	2			2	15
137 Pacific Golden Plover																					
136 Grey Plover																					
143 Red-capped Plover		15		1		1	11	1	4	9		2									
140 Double-banded Plover		34					19		1												
139 Lesser Sand Plover																					
141 Greater Sandplover																					
144 Black-fronted Dotterel																					
138 Hooded Plover		14							4	12		4	6		2	2	4				
135 Banded Lapwing																					
133 Masked Lapwing					29	7											24	11	30		
Unidentified small waders											0										
Totals for sites >>	**0**	530	**0**	**4**	**31**	**20**	**130**	**6**	**18**	**29**	**0**	**10**	**8**	**0**	**2**	**5**	**37**	**13**	**30**	**4**	**17**

Observer>>		CD, RD		LZ	SP	LZ	LZ	SP	NW	NW		KJ BH	SP	LB	NA AA	NA AA	SW	SW	SF	CdL	NR
Dates >>		25/7/17		27/7/17	27/7/17	27/7/17	27/7/17	27/7/17	27/7/17	27/7/17	18/2/15	27/7/17	27/7/17	27/7/17	27/7/17	27/7/17	15/7/17	15/7/17	18/7/17	22/7/17	41469
Weather>>>		Strong W winds with heavy showers		Wind NW 10km/hr. incoming tide	Wind NW 10km/hr. incoming tide	Wind NW 10km/hr. incoming tide	Wind NW 10km/hr. incoming tide	Wind NW 10km/hr. incoming tide	Wind NW 10km/hr. incoming tide	Wind NW 10km/hr. incoming tide	Wind WNW 10km/hr. incoming tide	Wind NW 10km/hr. incoming tide	Wind NW 10km/hr. incoming tide	Wind NW 10km/hr. incoming tide	Wind NW 10km/hr. incoming tide	Wind NW 10km/hr. incoming tide	light wind overcast	light wind overcast	Overcast light breeze	Fine, cloudless, cold	fine not much wind

Observers:																					
	AA	Annette Amse				NW	Neil Walter														
	BH	Beris Hansbery				SF	Shirley Fish														
	CdL	Cath de Little				**SP**	Syb Pike														
	KJ	Kay Jones				SW	Stephen Walsh														
	LB	Lorraine Biggs																			
	LZ	Liz Znidersic																			
	NA	Nick Amse																			
	NR	Nick Ramshaw																			

BirdLife Tasmania Shorebird Study Group. Summer 2018 wader count

Core Shorebirds 2020 (AWSG) Areas

	Lauderdale	Clear Lagoon	Mortimer Bay	Pipeclay Lagoon	Calverts Lagoon	South Arm Neck	Barilla Bay	Orielton Lagoon / Sorell	Iron Ck - Carlton	Five Mile Beach - Milford	Seven Mile Beach	TOTAL DERWENT	Marion Bay + Little Boomer	TOTAL SOUTHEAST
168 Latham's Snipe												0		0
153 Bar-tailed Godwit								55				55	4	59
150 Whimbrel												0		0
149 Eastern Curlew							14					14		14
158 Common Greenshank								12				12		12
160 Terek Sandpiper												0		0
155 Grey-tailed Tattler												0		0
129 Ruddy Turnstone												0		0
165 Great Knot		D										0		0
164 Red Knot		R										0		0
166 Sanderling		Y										0		0
162 Red-necked Stint	131			45		7	121	70	51			425	30	455
978 Pectoral Sandpiper												0		0
163 Sharp-tailed Sandpiper												0		0
161 Curlew Sandpiper												0		0
130 Pied Oystercatcher	164		57	73		146	28	11	78	23		580	78	658
131 Sooty Oystercatcher				30		23		1	45			99	44	143
137 Pacific Golden Plover								32				32		32
136 Grey Plover												0		0
143 Red-capped Plover	12					20	23		6			61	1	62
140 Double-banded Plover	2											2	1	3
139 Lesser Sand Plover												0		0
141 Greater Sandplover												0		0
144 Black-fronted Dotterel									2			2		2
138 Hooded Plover									3			3	37	40
135 Banded Lapwing												0		0
133 Masked Lapwing	8			102		52	13	62	13			250		250
Black-yailed Godwit								1				1		1
Totals for sites >>	317	0	57	250	0	248	199	244	198	23		1536	195	1731
Observers>>	MN SK	MN	MN SK	CH	CH	AW PH	AR JR PB ML-S	DA AG GR MH AD	EW KD	GR MH			EJW	
Dates >>	17/2/18	17/2/18	17/2/18	17/2/18	17/2/18	17/2/18	17/2/18	17/2/18	17/2/18	17/2/18			17/2/18	
start time	8:55:00		8:20:00	9:32:00	12:15:00	8:45:00	8:30:00	9:15:00	8:50:00	12:30:00				
duration	50		35	145	25	130	120	240	202	45				
Weather>>>	Overcast, almost complete cloud cover, no rain, 21°C		Overcast, almost complete cloud cover, no rain, 21°C	13-24 deg 90%cloud cover, mild, slight breeze,intermittent gusts of wind	13-24 deg 90%cloud cover, mild, slight breeze,intermittent gusts of wind	Overcast with high cloud; moderate NW wind (~ 10 knots)	Overcast and cool with a strong westerly	17-20C, wind NW 30-41km	Windy overcast 100% cloud	17-20C, wind NW 30-41km			7/8thcloud cover, hazy, cool 16°C, NE winds 0-5kn, 0.3m swell	

Observers					
	AD	Andrew Darby	JR	Jean Richardson	
	AG	Anne Gillian	KD	Karen Dick	
	AR	Alastair Richardson	MH	Mel Hills	
	AW	Andrew Walter	MN	Mike Newman	
	CH	Christine Harris	ML-S	Mona Loofs-Samorzewski	
	DA	Denis Abbott	PB	Paul Brooks	
	EJW	Eric Woehler	PH	Pamela Hinsby	
	EW	Els Wakefield	SK	Steve Klose	
	GR	Geoff Rakers			

BirdLife Tasmania Shorebird Study Group. Summer 2018 wader count

Core Shorebirds 2020 (AWSG) Areas

		Montagu I	Kangaroo I	Shipwreck Pt, Perkins I	Wallaby I	Anthony Beach West	Anthony Beach East	"Bird Pt"	Mosquito Inlet	"5 Islets"	"Knot Point"	TOTAL NORTHWEST	Tamar / George Town	Cape Portland, Little Musselroe	Kelso	TOTAL NORTH/NORTHEAST	TOTAL TASMANIA
168 Latham's Snipe												0				0	0
153 Bar-tailed Godwit			2					22				24	12			12	95
150 Whimbrel								1				1	1			1	2
149 Eastern Curlew			30									30	3			3	47
158 Common Greenshank												0				0	12
160 Terek Sandpiper	N											0				0	0
155 Grey-tailed Tattler	O							1				1				0	1
129 Ruddy Turnstone	T		60	208				130			41	439			16	16	455
165 Great Knot				9				3			1	13				0	13
164 Red Knot	C			2				64			119	185				0	185
166 Sanderling	O							150				150				0	150
162 Red-necked Stint	U		2000	2507			450	600			4	5561		560	325	885	6901
978 Pectoral Sandpiper	N											0				0	0
163 Sharp-tailed Sandpiper	T											0				0	0
161 Curlew Sandpiper	E		3	219				9			8	239				0	239
130 Pied Oystercatcher	D		75	330	87		193	5		71	6	767	18	51	118	187	1612
131 Sooty Oystercatcher			10	120	34		23	12	2	26	26	253		38	55	93	489
137 Pacific Golden Plover			250	155								405				0	437
136 Grey Plover								2			33	35				0	35
143 Red-capped Plover				34	18		57	4	12		3	128		63	21	84	274
140 Double-banded Plover				9								9		5		5	17
139 Lesser Sand Plover								2			1	3				0	3
141 Greater Sandplover												0				0	0
144 Black-fronted Dotterel												0				0	2
138 Hooded Plover				12			4					16			6	6	62
135 Banded Lapwing												0		26		26	26
133 Masked Lapwing			2	66	4		61	3		3	6	145	14	72	76	162	557
Unidentified small waders												0				0	1
Totals for sites >>			2432	3671	143	0	788	1008	14	100	248	8404	48	815	617	1480	11615
Observer>>			MB, MS, PM	CM, RC, KD, MH,JT, ST,	AR, JR	EW, PV, AM	AF, SJ	PA, JH	PH	GS, GW	PB, AD		R+BC	R+BC	R+BC		
Dates >>			30/1/18	30/1/18	30/1/18	30/1/18	30/1/18	30/1/18	30/1/18	30/1/18	30/1/18		29/1/18	6/2/18	28/1/18		
Weather>>>			Fine, moderate S wind	Fine, strong 40 kph SW wind	Fine, SW wind29-39kph	Fine, 12-20 kph SSE wind	Blustery, SW wins 21-29kph	Fine, 40-49 kph SW wind	Fine, moderate SW wind	Fine, 40-49 kph SW wind	Fine, SSW wind 30-39 kph						

Observers:									
	AD	Andrew Darby	GS	Geoff Shannon	MS	Mike Shaw	R+BC	Ralph, Barbara Cooper	
	AF	Anthea Fergusson	JH	Jim Hunter	PA	Peter Atkinson	RC	Rees Campbell	
	AM	Anthea Magnusson	JR	Jean Richardson	PB	Paul Brooks	SJ	Sue Jennings	
	AP	Alison Parks	JT	John Tongue	PH	Peter Hefferon	ST	Shirley Tongue	
	AR	Alastair Richardson	KD	Karen Dick	PM	Peter Marmion	TB	Tony Britz	
	CM	Col Meyers	MB	Mike Brakey	PV	Peter Vaughan			
	EW	Els Wakefield	MH	Michael Hyland	RA	Richard Ashby			

BirdLife Tasmania Shorebird Study Group. Summer 2018 wader count

Non-Core Shorebirds 2020 (AWSG) Areas

	Moorland Pt, Devonport	Narawntapu NP (NE Arm)	East Inlet, Stanley	Kingston Pt Perkins I	Back Banks, Robbins Island	Georges Bay, Horseshoe Sands	Georges Bay, Medeas Cove	Georges Bay, Sewage mudflats	Georges Bay, Barway S side Pelican Pt	Beerbarrel Beach	Maurouard Beach N	Maurouard Beach S	**Total Georges Bay**	Scamander Spit / Barway	Dianas Basin	Blanche beach	Falmouth	Binalong Bay	Jeanneret Beach	Roaring Beach (Southport)	North end Southport Lagoon	Hastings Bay (Lune River)	Lake Dulverton	Dunalley - Steeles Island	
168 Latham's Snipe																						6			
153 Bar-tailed Godwit				4				50					**50**												
150 Whimbrel													**0**												
149 Eastern Curlew		4											**0**												
158 Common Greenshank													**0**												
160 Terek Sandpiper													**0**												
155 Grey-tailed Tattler													**0**												
129 Ruddy Turnstone	76			2						26			**26**												
165 Great Knot													**0**												
164 Red Knot								3					**3**												
166 Sanderling													**0**												
162 Red-necked Stint		140	130	244					110				**110**												
978 Pectoral Sandpiper													**0**												
163 Sharp-tailed Sandpiper													**0**												
161 Curlew Sandpiper													**0**												
130 Pied Oystercatcher		217	88	437	240	5		23	3	12	6	11	**60**	7	4	3	5			4	3			2	
131 Sooty Oystercatcher	2		4	90	33					2			**2**							2	3			3	
137 Pacific Golden Plover		13		44	1								**0**												
136 Grey Plover													**0**												
143 Red-capped Plover		14	10	29					4	1		1	**6**	7	6		20								
140 Double-banded Plover													**0**												
139 Lesser Sand Plover													**0**												
141 Greater Sandplover													**0**												
144 Black-fronted Dotterel													**0**										1		
138 Hooded Plover			4	36							6	9	**15**		3	2		5	3						
135 Banded Lapwing													**0**												
133 Masked Lapwing	30	21	6	2	4		4	3	4	1		2	**14**	2						7		11	132		
Unidentified small waders													**0**												
Totals for sites >>	**108**	**409**	**242**	888	**278**	**5**	**4**	**79**	**121**	**42**	**12**	**23**	**286**	**16**	**13**	**5**	**25**	**5**	**3**	**13**	**6**	**17**	**133**	**5**	**0**

Observer>>	JS	AP,TB,PA, MA,PF	AP, TB	EW, PV, AM	RA, JH	Kay Jones, Beris Hansberry	Syb Pike	Liz Znidersic	Liz Znidersic	Syb Pike	Nat Walter	Nat Walter		Ted Thornley, Jo King	Ted Thornley, Jo King	Syb Pike	Ted Thornley, Jo King	Kay Jones, Beris Hansberry	Kay Jones, Beris Hansberry	Stephen Walsh	Cath de Little	Stephen Walsh	Shirley Fish	Joan Ward, Jill Harris		
Dates >>	30/1/18	2/2/18	30/1/18	30/1/18	30/1/18	15/1/18	15/1/18	15/1/18	15/1/18	15/1/18	15/1/18	15/1/18		15/1/18	15/1/18	15/1/18	15/1/18	15/1/18	15/1/18							
Weather>>>	Calm, Fine	Calm, 50% cloud, Slight E breeze	Fine, SW wind 40-49 kph	Fine, 12-20 kph SSE wind	Fine, moderate SW wind	Wind SSE 10km/hr. incoming tide	Wind SSE 10km/hr. incoming tide	Wind SSE 10km/hr. incoming tide	Wind SSE 10km/hr. incoming tide	Wind SSE 10km/hr. incoming tide	Wind SSE 10km/hr. incoming tide	Wind SSE 10km/hr. incoming tide		Wind SSE 10km/hr. incoming tide	Wind SSE 10km/hr. incoming tide	Wind SSE 10km/hr. incoming tide	Wind SSE 10km/hr. incoming tide	Wind SSE 10km/hr. incoming tide	Wind SSE 10km/hr. incoming tide	lightwind, heavy overcast	Overcast, with heavy rain clouds approaching, slight breeze, cool.	heavy, overcast	overcast, light breeze	Overcast cool day 17deg gentle WNW breeze		

Observers:

AP	Alison Parks
JS	Julie Serafin
JH	John Hammond
MA	Marie Atkinson
PA	Peter Atkinson
PF	Peter French
RA	Richard Ashby
TB	Tony Britz

BirdLife Tasmania Shorebird Study Group. Winter 2018 wader count

Core Shorebirds 2020 (AWSG) Areas

	Lauderdale	Clear Lagoon	Mortimer Bay	Pipeclay Lagoon *	Calverts Lagoon	South Arm Neck + Arm End Spit	Barilla Bay	Orielton Lagoon / Sorell	Iron Ck - Carlton	Five Mile Beach - Milford	Seven Mile Beach	TOTAL DERWENT	Marion Bay + Little Boomer	TOTAL SOUTHEAST
168 Latham's Snipe												0		0
153 Bar-tailed Godwit								8				8		8
150 Whimbrel												0		0
149 Eastern Curlew												0		0
158 Common Greenshank												0		0
160 Terek Sandpiper												0		0
155 Grey-tailed Tattler												0		0
129 Ruddy Turnstone												0		0
165 Great Knot												0		0
164 Red Knot												0		0
166 Sanderling												0		0
162 Red-necked Stint				10			34	9				53		53
978 Pectoral Sandpiper												0		0
163 Sharp-tailed Sandpiper												0		0
161 Curlew Sandpiper												0		0
130 Pied Oystercatcher	191		38	106	9	102	47	38	28	9		568	110	678
131 Sooty Oystercatcher				10		26	14					50	27	77
137 Pacific Golden Plover												0		0
136 Grey Plover												0		0
143 Red-capped Plover				10		22	20			1		53	31	84
140 Double-banded Plover				70		17	51					138	11	149
139 Lesser Sand Plover												0		0
141 Greater Sandplover												0		0
144 Black-fronted Dotterel												0		0
138 Hooded Plover												0	8	8
135 Banded Lapwing												0		0
133 Masked Lapwing	4	5	1	39	2	6	7	48		1		113		113
												0		0
Totals for sites >>	195	5	39	245	11	173	173	103	28	11		983	187	1170

*** total adjusted to reflect regular presence of birds not detected on the count**

Observers>>	MN NC	MN NC	MN NC	CH	CH	AW, PH, MN	AB, MLS	MG, MH, DT, CA, GR, DA	JW, JH	MH, GR			EJW + SB	
Dates >>	16-Jun-18	16-Jun-18	16-Jun-18	16-Jun-18	16-Jun-18	16-Jun-18	16-Jun-18	16-Jun-18	16-Jun-18	16-Jun-18			16-Jun-18	
Start time	8:45:00	8:05:00	8:20:00	11:30:00	14:00:00	10:35:00	10:20:00	11:15:00	9:00:00	11:15:00				
Duration	45	10	20	150	60	125	175	200	165	20				
Weather>>>	Blustery wind and overcast	Windy and overcast	Overcast, gusty winds at south end of beach	Cloudy, mainly fine, light wind 5-12°C	Cloudy, mainly fine, light wind 5-12°C	Moderate NW wind, occ light shower, cold throughout	Cold and easterly wind, some cloud	Wind NW/WNW 26kmh, 11°	Cold, grey windy; 9-11°C	Wind NW/WNW 26kmh, 11°			Cool to cold, NE-NW winds to 20kn	

Observers:

AB	Amanda Blakney	DT	Deb Taylor
AW	Andrew Walter	MH	Mel Hills
EJW	Eric Woehler	MG	Michelle Glover
MLS	Mona Loofs-Samorzewski	CA	Col Atkins
MN	Mike Newman	GR	Geoff Rakers
PH	Pamela Hinsby	DA	Denis Abbott
SB	Sonja Barber	CH	Christine Harris
		NC	Nick Crameri

BirdLife Tasmania Shorebird Study Group. Winter 2018 wader count

Core Shorebirds 2020 (AWSG) Areas

	Montagu I	Kangaroo I	Shipwreck Pt, Perkins I	Wallaby I	Anthony Beach West	Anthony Beach East	"Bird Pt"	Mosquito Inlet	"5 Islets"	"Knot Point"	TOTAL NORTHWEST	Tamar / George Town	Cape Portland, Little Musselroe	Kelso	TOTAL NORTH/NORTHEAST	TOTAL TASMANIA
168 Latham's Snipe	NON-BREEDING MIGRANTS							NON-BREEDING MIGRANTS			0				0	0
153 Bar-tailed Godwit											0				0	8
150 Whimbrel										1	1				0	1
149 Eastern Curlew											0				0	0
158 Common Greenshank											0				0	0
160 Terek Sandpiper											0				0	0
155 Grey-tailed Tattler											0				0	0
129 Ruddy Turnstone			16				2				18				0	18
165 Great Knot											0				0	0
164 Red Knot											0				0	0
166 Sanderling											0				0	0
162 Red-necked Stint			224			8	56				288				0	341
978 Pectoral Sandpiper											0				0	0
163 Sharp-tailed Sandpiper											0				0	0
161 Curlew Sandpiper											0				0	0
130 Pied Oystercatcher	PERMANENT RESIDENTS	78	265	28	12	145	6	PERMANENT RESIDENTS	265	5	804	18	47	110	175	1657
131 Sooty Oystercatcher		55	235	29		50	12		69	56	506	6	11	6	23	606
137 Pacific Golden Plover											0				0	0
136 Grey Plover											0				0	0
143 Red-capped Plover			122			60	41				223	4	77	14	95	402
140 Double-banded Plover			258	90		207	138				693	65	88	19	172	1014
139 Lesser Sand Plover											0				0	0
141 Greater Sandplover											0				0	0
144 Black-fronted Dotterel											0		19		19	19
138 Hooded Plover			12			11					23		82		82	113
135 Banded Lapwing											0		19		19	19
133 Masked Lapwing			2	2	4	18	9		2		37	15	64	104	183	333
Unidentified small waders											0				0	0
Totals for sites >>		133	1134	149	16	499	264		336	62	2593	108	407	253	768	4531
Observer>>		MB,TB,SG	CM,JB,MH,RC,RS,ST	FW,LW	JT,PT	AF,JS	KD,ML,PH		RA, SJ	HB, MS		RBC	RBC	RBC		
Dates >>		13-Jun-18	13-Jun-18	13-Jun-18	13-Jun-18	13-Jun-18	13-Jun-18		13-Jun-18	13-Jun-18		13-Jun-18	11-Jun-18	21-Jun-18		
Weather>>>		NW wind 30+kph. Showers	W wind 6-11 kph.	Slight SW wind at time of count	W wind 6-11 kph.	Light westerly wind.	21+ NW winds,overcast with sunny periods and showers		100% overcast,wind NW wind increasing from 3 to 7okts, occasional light showers.	Wind variable but mostly light westerly during count. Showers.		Not recorded	Not recorded	Not recorded		

Observers:

AF	Anthea Fergusson	JB	Janet Boland	MH	Michael Hyland	RBC	Ralph Cooper
AP	Alison Parks	JS	Julie Serafin	ML	Mona Loofs-Samorzewsk	RC	Rees Campbell
CM	Col Meyers	JT	John Tongue	MS	Madeleine Skerritt	RS	Ramit Singal
FW	Frank Wilson	KD	Karen Dick	PH	Peter Hefferon	ST	Shirley Tongue
GS	Geoff Shannon	LW	Lennice Wilson	PT	Peter Tongue	TB	Tony Britz
HB	Hazel Britton	MB	Mike Brakey	RA	Richard Ashby	TB	Tom Burke

BirdLife Tasmania Shorebird Study Group. Winter 2018 wader count

Non-Core Shorebirds 2020 (AWSG) Areas

	Moorland Pt, Devonport	Narawntapu NP (NE Arm)	Kingston Pt Perkins I	East Inlet, Stanley	Back Banks, Robbins Island	Georges Bay, Horseshoe Sands	Georges Bay, Medeas Cove	Georges Bay, Sewage mudflats	Georges Bay, Barway S side Pelican Pt	Beerbarrel Beach	Maurouard Beach N	Maurouard Beach S	**Total Georges Bay**	Scamander Spit / Barway	Dianas Basin	Blanche Beach	Falmouth	Binalong Bay	Jeanneret Beach	Roaring Beach (Southport)	North end Southport Lagoon	Hastings Bay (Lune River)	South Arm Neck residents	Lake Dulverton
168 Latham's Snipe				2									**0**											
153 Bar-tailed Godwit			1	3									**0**											
150 Whimbrel				7									**0**											
149 Eastern Curlew													**0**											
158 Common Greenshank													**0**											
160 Terek Sandpiper													**0**											
155 Grey-tailed Tattler													**0**											
129 Ruddy Turnstone									2				**2**											
165 Great Knot													**0**											
164 Red Knot													**0**											
166 Sanderling				10									**0**											
162 Red-necked Stint			58										**0**											
978 Pectoral Sandpiper													**0**											
163 Sharp-tailed Sandpiper													**0**											
161 Curlew Sandpiper				52									**0**											
130 Pied Oystercatcher	3	214	568	20		8		17	63	2	4	4	**98**	3	2	0	2	0	2	4	4		7	
131 Sooty Oystercatcher	6	2	148						13	5		3	**21**						1		6		38	
137 Pacific Golden Plover													**0**											
136 Grey Plover				14									**0**											
143 Red-capped Plover		44	128	7		9			22		2		**33**	7	1									
140 Double-banded Plover		157	116								4		**4**	3										
139 Lesser Sand Plover													**0**											
141 Greater Sandplover													**0**											
144 Black-fronted Dotterel				6									**0**											54
138 Hooded Plover			13						1	6	5	8	**20**				2			2				
135 Banded Lapwing				5									**0**											
133 Masked Lapwing	20	25	4	80			111	70	6				**187**	26	2		2		2	14		18		87
Unidentified small waders													**0**											
Totals for sites >>	**29**	**442**	1036	**206**		**17**	**111**	**87**	**107**	**13**	**15**	**15**	**365**	**39**	**5**	**0**	**6**	**0**	**5**	**20**	**10**	**18**	**45**	**141**

ANOTATED

Observer>>	JS	AP, PF, RA, TB	JT,PT	AP, TB		SP, NW	SP	SP, NW	SP, NW	NW	KJ, AM	KJ, AM		**PB**	PB	NW	LB	AA	AA	SW	CdL	SW	MN NC	SF
Dates >>	16-Jun-18	15-Jun-18	13-Jun-18	13-Jun-18		1/7/18	1/7/18	1/7/18	1/7/18	1/7/18	1/7/18	1/7/18		1/7/18	1/7/18	1/7/18	1/7/18	1/7/18	1/7/18	22-Jun-18	23-Jun-18	22-Jun-18	16-Jun-18	08-Jun-18
Weather>>>	80% cloud, 40 kph westerly wind	Sunny light westerly wind	W wind 6-11 kph.	Light NW wind. Overcast with sunny periods.		Wind NNW 10km/hr. incoming tide	Wind NNW 10km/hr. incoming tide	Wind NNW 10km/hr. incoming tide	Wind NNW 10km/hr. incoming tide	Wind NNW 10km/hr. incoming tide	Wind NNW 10km/hr. incoming tide	Wind NNW 10km/hr. incoming tide		Wind NNW 10km/hr. incoming tide	Wind NNW 10km/hr. incoming tide	Wind NNW 10km/hr. incoming tide	Wind NNW 10km/hr. incoming tide	Wind NNW 10km/hr. incoming tide	Wind NNW 10km/hr. incoming tide	Grey, overcast, calm.	Cloudy, slight wind, cool.	Grey, overcast, calm.		Windy, overcast with sunny periods

Observers:

AA	Adrian Ashley	JW	Joan Ward	RA	Richard Ashby	MN	Mike Newman
AM	Ashley Mason	KJ	Kay Jones	SF	Shirley Fish	NC	Nick Crameri
AP	Alison Parks	LB	Lorraine Biggs	SP	Syb Pike		
CdL	Cath de Little	NW	Natalie Walter	SW	Stephen Walsh		
JH	Jill Harris	PB	Pam Bretz	TB	Tony Britz		
JS	Julie Serafin	PF	Peter French				

BirdLife Tasmania Shorebird Study Group. Summer 2019 wader count

Core Shorebirds 2020 (AWSG) Areas

	Lauderdale	Clear Lagoon	Mortimer Bay	Pipeclay Lagoon *	Calverts Lagoon	South Arm Neck + Arm End Spit	Barilla Bay	Orielton Lagoon / Sorell	Iron Ck - Carlton	Five Mile Beach - Milford	Seven Mile Beach	TOTAL DERWENT	Marion Bay + Little Boomer	TOTAL SOUTHEAST
168 Latham's Snipe												0		0
153 Bar-tailed Godwit	4							51				55		55
150 Whimbrel												0		0
149 Eastern Curlew								13				13		13
158 Common Greenshank								11				11		11
160 Terek Sandpiper												0		0
155 Grey-tailed Tattler												0		0
129 Ruddy Turnstone												0		0
165 Great Knot								1				1		1
164 Red Knot												0		0
166 Sanderling												0		0
162 Red-necked Stint	156			72		147	26	140				541	90	631
978 Pectoral Sandpiper												0		0
163 Sharp-tailed Sandpiper								8				8		8
161 Curlew Sandpiper						1						1		1
130 Pied Oystercatcher	167		45	202		176	37	33	186	16		862	93	955
131 Sooty Oystercatcher				41		34			49	4		128	21	149
137 Pacific Golden Plover						7		30				37		37
136 Grey Plover												0		0
143 Red-capped Plover	33				10	24	19	1	12			99	9	108
140 Double-banded Plover	2											2		2
139 Lesser Sand Plover												0		0
141 Greater Sandplover												0		0
144 Black-fronted Dotterel									4			4		4
138 Hooded Plover												0	27	27
135 Banded Lapwing												0		0
133 Masked Lapwing	107		6	221		80	55	165	105	2		741		741
Unidentified small waders												0		0
	469	0	51	536	10	469	137	453	356	22	0	2503	240	2743

NO CONTROL

* 13 EC's observed at both Orielton and Barilla Bay; pre-count visits indicate 13 is total likely population on the day;
** 60 Oystercatchers with heads under wings - estimated 2/3 Pied 1/3 Sooty 5 Mile Spit

Observers>>	TR	TR	MN NC	CH AF	CH AF	MN NC AW PH	AR JR MB PM CM Mho PB	DA AG SW GR BM MH	ML-S EW	GR MH BM			JW JH CR	
Dates >>	23-Feb-19	23-Feb-19	23-Feb-19	23-Feb-19	23-Feb-19	23-Feb-19	23-Feb-19	23-Feb-19	23-Feb-19	23-Feb-19			23-Feb-19	
Weather>>>	Sunny; light to moderate SSE wind turning E		Sunny; light to moderate SSE wind turning E	Fine, Sunny, light winds		Sunny; light to moderate SSE wind turning E	17deg C Sunny with fresh SE breeze	16C Wind SE/SSE 20-26kms	Sunny, few clouds, fairly windy	16C Wind SE/SSE 20-26kms			Mainly fine, high cloud, SE wind to 20 knots	

Observers:				
AG	Anne Gillian			
AF	Annette Fuller	JW	Joan Ward	
AR	Alastair Richardson	MLS	Mona Loofs-Samorzewski	
AW	Andrew Walter	MH	Mel Hills	
BM	Barabara Maccanna	Mho	Mark Holdsworth	
CH	Christine Harris	NC	Nicholas Crameri	
CM	Clarie Marmion	MB	Mike Brough	
CR	Carol Rue	MN	Mike Newman	
DA	Denis Abbott	PB	Peter Brown	
EW	Els Wakefield	PH	Pamela Hinsby	
GR	Geoff Rakers	PM	Peter Marmion	
JH	Jill Harris	SW	Sue Wragge	
JR	Jean Richardson	TR	Tim Reid	

BirdLife Tasmania Shorebird Study Group. Summer 2019 wader count

Core Shorebirds 2020 (AWSG) Areas

	Montagu I	Kangaroo I	Shipwreck Pt, Perkins I	Wallaby I	Anthony Beach West	Anthony Beach East	"Bird Pt"	Mosquito Inlet	"5 Islets"	"Knot Point"	TOTAL NORTHWEST	Tamar / George Town	Cape Portland, Little Musselroe	Kelso	TOTAL NORTH/NORTHEAST	TOTAL TASMANIA
168 Latham's Snipe											0				0	0
153 Bar-tailed Godwit											0				0	55
150 Whimbrel							1				1	1			1	2
149 Eastern Curlew											0	3			3	16
158 Common Greenshank									1		1				0	12
160 Terek Sandpiper						1		NOT			1				0	1
155 Grey-tailed Tattler											0				0	0
129 Ruddy Turnstone		64	19	2					1		86		5	4	9	95
165 Great Knot											0				0	1
164 Red Knot											0				0	0
166 Sanderling		1	1					COUNTED			2				0	2
162 Red-necked Stint	25	800	277	32		163	68		302		1667	4	332	225	561	2859
978 Pectoral Sandpiper											0				0	0
163 Sharp-tailed Sandpiper	12	4									16				0	24
161 Curlew Sandpiper			7								7		2		2	10
130 Pied Oystercatcher	11	71	234	10	8	94	3		45	2	478	14	50	95	159	1592
131 Sooty Oystercatcher	2	29	73			2	58		90		254		36	46	82	485
137 Pacific Golden Plover		215	60	18					1		294		3		3	334
136 Grey Plover									1		1				0	1
143 Red-capped Plover			12	24		20	13		4	1	74		53	12	65	247
140 Double-banded Plover											0				0	2
139 Lesser Sand Plover											0		2		2	2
141 Greater Sandplover											0				0	0
144 Black-fronted Dotterel											0				0	4
138 Hooded Plover			2			10					12		7		7	46
135 Banded Lapwing											0		45		45	45
133 Masked Lapwing	37	2	7	5		45			9	3	108	11	16	36	63	912
Unidentified small waders											0				0	0
	87	1186	692	91	8	335	143	0	454	6	3002	33	551	418	1002	6747

Observer>>	ED,FW	IH,JE,MB,PM,SG, TBu	CM,GS,JS,MH	AR,JR	AM,PV	AF,HB	JH,PA		ML-S, RS	RA, RH		RBC	RBC	RBC		
Dates >>	20-Jan-19	20-Jan-19	20-Jan-19	20-Jan-19	20-Jan-19	20-Jan-19	20-Jan-19		20-Jan-19	20-Jan-19		31-Jan-19	05-Jan-19	30-Jan-19		
Weather>>>	Warm and sunny, mod.SW wind.	Warm and sunny, mod.SW wind.	Warm and sunny, mod.SW wind.	Warm and sunny, mod.SW wind.	Warm and sunny, mod.SW wind.	Warm and sunny, mod.SW wind.	Warm and sunny, mod.SW wind.		Warm and sunny, mod.SW wind.	Warm and sunny, mod.SW wind.						

Observers:

AF	Anthea Fergusson	JE	John Ewington	RA	Richard Ashby	
AM	Anthea Magnusson	JH	Jim Hunter	RB	Rob Hamilton	
AP	Alison Parks	JR	Jean Richardson	RBC	Ralph Cooper	
AR	Alastair Richardson	JS	Julie Serafin	RS	Ramit Singal	
CM	Col Meyers	MB	Mike Brakey	SG	Simon Gates	
ED	Erik Donnachie	MH	Michael Hyland	TB	Tony Britz	
FW	Frank Wilson	ML-S	Mona Loofs-Samorzews	Tbu	Tom Burke	
GS	Geoff Shannon	PA	Peter Atkinson	**Also present:**		
HB	Hazel Britton	PM	Peter Marmion	David Pollington (UPC)		
IH	Ian Hutchinson	PV	Peter Vaughan	Dan Elson (GHD)		

BirdLife Tasmania Shorebird Study Group. Summer 2019 wader count

Non-Core Shorebirds 2020 (AWSG) areas

	Moorland Pt, Devonport	Narawntapu NP (NE Arm)	Kingston Pt Perkins I	East Inlet, Stanley	Georges Bay, Horseshoe Sands	Georges Bay, Medeas Cove	Georges Bay, Sewage mudflats	Georges Bay, Barway S side Pelican Pt	Beerbarrel Beach	Maurouard Beach N	Maurouard Beach S	**Total Georges Bay**	Scamander Spit / Barway	Dianas Basin	Blanche Beach	Falmouth	Binalong Bay	Jeanneret Beach	Roaring Beach (Southport)	Lake Duiverton
168 Latham's Snipe												**0**								
153 Bar-tailed Godwit		8	3	4			30					**30**								
150 Whimbrel												**0**								
149 Eastern Curlew		3										**0**								
158 Common Greenshank												**0**								
160 Terek Sandpiper												**0**								
155 Grey-tailed Tattler												**0**								
129 Ruddy Turnstone	108		45									**0**								
165 Great Knot												**0**								
164 Red Knot												**0**								
166 Sanderling			3				21					**21**								
162 Red-necked Stint		180	135	400	150							**150**	14							
978 Pectoral Sandpiper												**0**								
163 Sharp-tailed Sandpiper			1									**0**								52
161 Curlew Sandpiper												**0**								
130 Pied Oystercatcher	2	317	232	75	12	7	8	48		4	2	**81**		3		5	3			
131 Sooty Oystercatcher		2	30					10		2		**12**	4							
137 Pacific Golden Plover		3	79									**0**								1
136 Grey Plover												**0**								
143 Red-capped Plover	2	20	26	6	6							**6**	5							18
140 Double-banded Plover		1										**0**								
139 Lesser Sand Plover												**0**								
141 Greater Sandplover												**0**								
144 Black-fronted Dotterel												**0**								1
138 Hooded Plover			36	6	5							**5**					4	2	2	
135 Banded Lapwing	30											**0**								
133 Masked Lapwing	18	14		36		81	2		0			**83**				20				115
Unidentified small waders												**0**			0					
Totals for sites >>	**160**	**548**	590	**527**	**173**	**88**	**61**	**58**	**0**	**6**	**2**	**388**	**23**	**3**	**0**	**25**	**7**	**2**	**2**	**187**
Observer>>	GS, JS	AP, HB, JS,TB,PA,	AM,PV	AP,TB	SP	SP	SP, TT, JK	TT, JK	TT, JK	NW	NW		PB	PB	TT, JK	PB	PS	PS	CdL DdL	SF
Dates >>	21-Jan-19	24-Jan-19	20-Jan-19	20-Jan-19	11-Feb-19	11-Feb-19	11-Feb-19	11-Feb-19	11-Feb-19	11-Feb-19	11-Feb-19		11-Feb-19	11-Feb-19	11-Feb-19	11-Feb-19	11-Feb-19	11-Feb-19	04-Mar-19	22-Feb-19
Weather>>>	Calm,smoke haze,no cloud.	Warm,sunny, mod NE'ly	Warm and sunny, mod.SW wind.	Warm and sunny, mod.SW wind.	Wind NNW 10km/hr. incoming tide	Wind NNW 10km/hr. incoming tide	Wind NNW 10km/hr. incoming tide	Wind NNW 10km/hr. incoming tide	Wind NNW 10km/hr. incoming tide	Wind NNW 10km/hr. incoming tide	Wind NNW 10km/hr. incoming tide		Wind NNW 10km/hr. incoming tide	Wind NNW 10km/hr. incoming tide	Wind NNW 10km/hr. incoming tide	Wind NNW 10km/hr. incoming tide	Wind NNW 10km/hr. incoming tide	Wind NNW 10km/hr. incoming tide	Grey, overcast, calm.	Windy, overcast with sunny periods

Observers:

AP	Alison Parks	NW	Natalie Walter
CdL	Cath de Little	PA	Peter Atkinson
DdL	Dave de Little	PB	Pam Bretz
GS	Geoff Shannon	PS	Peter Similie
HB	Hazel Britton	SF	Shirley Fish
JK	Jo King	SP	Syb Pike
JS	Julie Serafin	TB	Tony Britz
		TT	Ted Thornley

BirdLife Tasmania Shorebird Study Group. Winter 2019 wader count

Core Shorebirds 2020 (AWSG) Areas

	Lauderdale	Clear Lagoon	Mortimer Bay	Pipeclay Lagoon	Calverts Lagoon	South Arm Neck	Barilla Bay	Orielton Lagoon / Sorell	Iron Ck - Carlton	Five Mile Beach - Milford	Seven Mile Beach	TOTAL DERWENT	Marion Bay + Little Boomer	TOTAL SOUTHEAST
168 Latham's Snipe												0		0
153 Bar-tailed Godwit								12				12		12
150 Whimbrel												0		0
149 Eastern Curlew									1			1		1
158 Common Greenshank								2				2		2
160 Terek Sandpiper												0		0
155 Grey-tailed Tattler												0		0
129 Ruddy Turnstone												0		0
165 Great Knot												0		0
164 Red Knot												0		0
166 Sanderling												0		0
162 Red-necked Stint	1			21				20	22			64	3	67
978 Pectoral Sandpiper												0		0
163 Sharp-tailed Sandpiper												0		0
161 Curlew Sandpiper												0		0
130 Pied Oystercatcher	221		31	152		131	84	33	146	10		808	123	931
131 Sooty Oystercatcher	10			53		27	21	2	30	12		155	46	201
137 Pacific Golden Plover												0		0
136 Grey Plover												0		0
143 Red-capped Plover	15			42		30	37	5	2	1		132	31	163
140 Double-banded Plover	26			46		12	13	36	12			145	28	173
139 Lesser Sand Plover												0		0
141 Greater Sandplover												0		0
144 Black-fronted Dotterel												0		0
138 Hooded Plover												0	8	8
135 Banded Lapwing												0		0
133 Masked Lapwing	38		28	35	7	23	10	106	11	10		268		268
Black-yailed Godwit												0		0
Totals for sites >>	311	0	59	349	7	223	165	216	224	33		1587	239	1826
Observers>>	MN		MN	CH	CH	AW, PH, MN, NC, GK	AR, JR, PM, CM	DA, GR, JW, JH, SW, CR	ML-S, EW	GR, SW			EJW, JG	
Dates >>	08-Jun-19	dry	08-Jun-19	08-Jun-19	08-Jun-19	08-Jun-19	08-Jun-19	08-Jun-19	08-Jun-19	08-Jun-19			08-Jun-19	
Weather>>>	Fine; low wind		Ideal. Low wind and fine	Fine; light winds Temp 4-16 deg C	Fine; light winds Temp 4-16 deg C	fine; light nor westerly	High cloud; fresh NW wind	11-12C, wind 13-22km/h	Cool, high cloud and some sun, light winds	11-12C, wind 13-22km/h				

Observers:

AR	Alastair Richardson	JG	Jacqui Glencross
AW	Andrew Walter	JH	Jill Harris
CH	Christine Harris	JR	Jean Richardon
CM	Claire Marmion	JW	Joan Ward
CR	Carol Rue	MLS	Mona Loofs-Samorzewski
DA	Denis Abbott	MN	Mike Newman
EJW	Eric Woehler	NC	Nick Cameleri
EW	Els Wakefield	PH	Pamela Hinsby
GK	Gabby Ki	PM	Peter Marmion
GR	Geoff Rakers	SW	Sue Wragge

BirdLife Tasmania Shorebird Study Group. Winter 2019 wader count

Core Shorebirds 2020 (AWSG) Areas

	Montagu I	Kangaroo I	Shipwreck Pt, Perkins I	Wallaby I	Anthony Beach West	Anthony Beach East	"Bird Pt"	Mosquito Inlet	"5 Islets"	"Knot Point"	**TOTAL NORTHWEST**	Tamar / George Town	Cape Portland, Little Musselroe	Kelso	**TOTAL NORTH/NORTHEAST**	**TOTAL TASMANIA**
168 Latham's Snipe											**0**				**0**	**0**
153 Bar-tailed Godwit						1					**1**				**0**	**13**
150 Whimbrel											**0**				**0**	**0**
149 Eastern Curlew			1				1				**2**				**0**	**3**
158 Common Greenshank											**0**				**0**	**2**
160 Terek Sandpiper	NOT	NOT						NOT			**0**				**0**	**0**
155 Grey-tailed Tattler						9				3	**12**				**0**	**12**
129 Ruddy Turnstone			101	16			11			5	**133**	3			**3**	**136**
165 Great Knot											**0**				**0**	**0**
164 Red Knot	COU	COU	8	1				COU			**9**				**0**	**9**
166 Sanderling						13					**13**				**0**	**13**
162 Red-necked Stint	NTE	NTE	184	108			29	NTE		4	**325**		7	2	**9**	**401**
978 Pectoral Sandpiper											**0**				**0**	**0**
163 Sharp-tailed Sandpiper											**0**				**0**	**0**
161 Curlew Sandpiper	RED	RED			2	188		RED			**190**				**0**	**190**
130 Pied Oystercatcher			84	10		30	3		294	4	**425**	21	47	101	**169**	**1525**
131 Sooty Oystercatcher			148	28			30		47	39	**292**		20	13	**33**	**526**
137 Pacific Golden Plover											**0**				**0**	**0**
136 Grey Plover						76					**76**				**0**	**76**
143 Red-capped Plover			37	44	7	360	8			18	**474**		32	36	**68**	**705**
140 Double-banded Plover			337	260						40	**637**		242	41	**283**	**1093**
139 Lesser Sand Plover											**0**				**0**	**0**
141 Greater Sandplover											**0**				**0**	**0**
144 Black-fronted Dotterel						30					**30**				**0**	**30**
138 Hooded Plover			2								**2**		22		**22**	**32**
135 Banded Lapwing						47					**47**		18		**18**	**65**
133 Masked Lapwing				16							**16**	3	57	147	**207**	**491**
Unidentified small waders											**0**				**0**	**0**
Totals for sites >>		0	902	483	9	754	82	0	341	113	**2684**	27	445	340	**812**	**5322**
Observer>>			BR EW MB TB	AR	PM SG	AF JS	CM JH MH		RA	HB		RC	RC	RC		
Dates >>			17-Jun-19	17-Jun-19	17-Jun-19	17-Jun-19	17-Jun-19		17-Jun-19	17-Jun-19		15-Jun-19	20-Jun-19	14-Jun-19		
Weather>>>			Mostly sunny, some cloud,NNW breeze	Mostly sunny, some cloud,NNW breeze	Mostly sunny, some cloud,NNW breeze	Mostly sunny, some cloud,NNW breeze	Mostly sunny, some cloud,NNW breeze		Mostly sunny, some cloud,NNW breeze	Mostly sunny, some cloud,NNW breeze						

Observers:

AF	Anthea Fergusson	HB	Hazel Britton	PM	Peter Marmion
AP	Alison Parks	JH	John Hammond	RA	Richard Ashby
BR	Bruce Robertson	JS	Julie Serafin	RC	Ralph Cooper
CM	Col Meyers	MB	Mike Brakey	SG	Simon Gates
EW	Els Wakefield	MH	Michael Hyland	TB	Tony Britz
GS	Geoff Shannon	MS	Madelaine Skerritt		

BirdLife Tasmania Shorebird Study Group. Winter 2019 wader count

Non-Core Shorebirds 2020 (AWSG) Areas

	Moorland Pt, Devonport	Narawntapu NP (NE Arm)	Kingston Pt Perkins I	East Inlet, Stanley	Back Banks, Robbins Island	Georges Bay, Horseshoe Sands	Georges Bay, Medeas Cove	Georges Bay, Sewage mudflats	Georges Bay, Barway S side Pelican Pt	Beerbarrel Beach	Maurouard Beach N	Maurouard Beach S	**Total Georges Bay**	Scamander Spit / Barway	Dianas Basin	Blanche beach	Falmouth	Binalong Bay	Jeanneret Beach	Cockle Creek	Moss Glen	Southport	Hastings Bay (Lune River)	Arm End residents	Lake Dulverton
168 Latham's Snipe													**0**												
153 Bar-tailed Godwit				2				4					**4**												
150 Whimbrel				1									**0**												
149 Eastern Curlew				4									**0**												
158 Common Greenshank													**0**												
160 Terek Sandpiper													**0**												
155 Grey-tailed Tattler													**0**												
129 Ruddy Turnstone	34		2							5			**5**												
165 Great Knot													**0**												
164 Red Knot													**0**												
166 Sanderling													**0**												
162 Red-necked Stint		4	9	5				9			10		**19**												
978 Pectoral Sandpiper													**0**												
163 Sharp-tailed Sandpiper													**0**												
161 Curlew Sandpiper													**0**												
130 Pied Oystercatcher	2	213	557	40		7	2	21		2	8	3	**43**	3			3	2		4	2	2		6	
131 Sooty Oystercatcher	5		181	22						1	1	2	**4**								2	2		78	
137 Pacific Golden Plover													**0**												
136 Grey Plover													**0**												
143 Red-capped Plover	9	14	89	51		14					10	9	**33**	3			2								48
140 Double-banded Plover		171	403	260		32					1		**33**												
139 Lesser Sand Plover													**0**												
141 Greater Sandplover													**0**												
144 Black-fronted Dotterel													**0**												64
138 Hooded Plover			7	4							10	6	**16**					7							
135 Banded Lapwing	38												**0**												
133 Masked Lapwing	30	24	2	67			87	25					**112**	14			12	4		2	5	9			209
Unidentified small waders													**0**												
Totals for sites >>	**118**	**426**	**1250**	**456**	**0**	**53**	**89**	**59**	**0**	**8**	**40**	**20**	**269**	**20**	**0**	**0**	**17**	**13**	**0**	**6**	**9**	**13**	**0**	**84**	**321**

Observer>>	GS	AP,FW,RA,TB	PM SG	AP GS TB		PS	GH	SP		SP	NW	NW		PB	PB	SP	LB	PS		CdL	CdL	CK	CK		SF
Dates >>	20-Jun-19	20-Jun-19	17-Jun-19	17-Jun-19		21/7/19	21/7/19	21/7/19	21/7/19	21/7/19	21/7/19	21/7/19		21/7/19	21/7/19	21/7/19	21/7/19	21/7/19	21/7/19	15-Jun-19	15-Jun-19	09-Jun-19	09-Jun-19		15-Jun-19
Weather>>>	Sunny, calm	Sunny, calm	Mostly sunny, some cloud,NNW breeze	Mostly sunny, some cloud,NNW breeze		Wind NW 15km/hr. outgoing tide	Wind NW 15km/hr. outgoing tide	Wind NW 15km/hr. outgoing tide	Wind NW 15km/hr. outgoing tide	Wind NW 15km/hr. outgoing tide	Wind NW 15km/hr. outgoing tide	Wind NW 15km/hr. outgoing tide		Wind NW 15km/hr. outgoing tide	Wind NW 15km/hr. outgoing tide	Wind NW 15km/hr. outgoing tide	Wind NW 15km/hr. outgoing tide	Wind NW 15km/hr. outgoing tide		7 deg C, slight breeze, mainly sunny	Cloudy, slight wind, cool.	overcast, no wind, cool	overcast, no wind, cool		Sunny Light wind

Observers:

AP	Alison Parks	GH	Gai Huddleston
FW	Frank Wilson	LB	Lorraine Biggs
GS	Geoff Shannon	NW	Natalie Walter
RA	Richard Ashby	PB	Pam Bretz
TB	Tony Britz	PS	Peter Similie
		SP	Syb Pike

CdL	Cath de Little		
CK	Chrystine Klimek		
SF	Shirley Fish		