THE

SUNBIRD

Featuring the QUEENSLAND ANNUAL BIRD REPORT, 2017

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THE SUNBIRD

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The Secretary
PO Box 3784
South Brisbane BC Qld 4101
www.birdsqueensland.org.au
secretary@birdsqueensland.org.au

Front Cover: Male Olive-backed Sunbird © by Paul Jensen

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The Chief Editor for the new Sunbird was **Richard Noske**, supported by an Associate Editorial team consisting of **Jon Coleman** and **Stacey McLean.** This team was responsible for creating the content in the introductory sections, collating and standardising all submissions and conducting editing and proof reading of the final product.

The Editorial team was complemented by a broader Editorial Panel which included **Robert Bush, Rae Clark, David Niland, David Redhead** and **Allison Roberts.** This team helped to define the structure and format of the new journal. They also played a key role in agreeing relevant content and sourcing contacts and potential contributors for both papers and regional accounts.

The idea of a revised and revitalised journal was the brainchild of **Jon Coleman**, who managed the project and facilitated meetings of the Sunbird Development Group. **David Niland** established the templates for authors and data extraction requirements. **Richard Noske** led the review and collation of all papers, regional accounts and introductory sections, and crafted the Annual Report into a standardised readable format.

Regional accounts were created by **Allan Briggs, Bob Black, Paul Grimshaw, Andrew Ley, Stacey McLean, David Niland, David Redhead, Emily Rush, Kath Shurcliff** and **Jon Wren**. **Jon Coleman, Stacey McLean** and **Paul Walbridge** provided specialist papers on banding, birds of prey and seabirds respectively. **Allison Roberts** and **Merrian Kuerschner** undertook production editing on the final artefact with **Rae Clark** providing logistical support, guidance and encouragement throughout.

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PREFACE TO SUNBIRD Vol 48

Richard Noske

Fifty years ago, on 15 October 1969, a group of 33 people met to form the Queensland Ornithological Society (QOS), with the aims of promoting "the scientific study and conservation of birds, by all means possible, with particular reference to the birds of Queensland". As part of achieving the first aim, the Society's Council envisaged the production of a quarterly scientific journal for the publication of papers on all aspects of Queensland ornithology (Straw 1969). Only five months later, in March 1970, the inaugural issue of *The Sunbird* (hereafter, *Sunbird*) was published, ushering in a new era for Queensland ornithology. The only other state with a regional ornithological journal was and still is South Australia, which began publication of the *South Australian Ornithologist* in 1914.

The history of *Sunbird* up to December 2011 was detailed by Rounsevell and Kuerschner (2011), while Noske (2015a) summarised the subjects, authors and geographical coverage of all articles up to December 2013. The journal was published on a quarterly basis from 1970 until 1997 (Volumes 1–27), when it was reduced to three issues per annum from 1998 to 2004 (Volumes 28–33), then two issues from 2005 to 2015 (Volumes 34–45), and finally one issue for 2016 and 2017 (Volumes 46–47). This gradual decline in the number of issues per volume was unfortunately mirrored by the size of each volume, which dropped from an average of 98 pages during the 1990s, to 81 pages in the 2000s, and only 59 pages from 2010 to 2017 (Noske 2015a).

The decline of *Sunbird* largely reflects its reliance on contributions from professional ornithologists (Noske 2015a), and a lack of contributions from QOS members (Rounsevell and Kuerschner 2011). While the vast majority of contributors to the national journal *Australian Bird Watcher* were amateur ornithologists, almost half of the authors of *Sunbird* articles were institution-based scientists, whose contributions, in terms of volume, far exceeded that of amateur ornithologists (Noske 2015a). But as scientists are nowadays obliged to publish papers in journals with high impact ratings, usually involving sophisticated analyses of large sets, the publication of articles concerning the natural history of Australian birds has fallen to birdwatchers and citizen scientists.

Bird distribution and the genesis of annual Queensland bird reports

The distribution of Australian birds was poorly understood until the advent of bird atlases. Storr's (1973, 1984) lists of Queensland birds included verbal descriptions of the ranges of all Queensland species, and a gazetteer, but they did not include maps. Coordinated by the Royal Australasian Ornithologists Union (now BirdLife Australia), the first *Atlas of Australian Birds* (Blakers *et al.* 1984) began only seven years after the inauguration of QOS, spanning the five years from 1977 to 1981. During that period, the percentage of all Atlas sheets and records emanating from Queensland totalled approximately 16% and 19%, considerably less than those from New South Wales and Victoria (Noske 2015a). Relative to the area of each state, the numbers of both surveys and records submitted for Queensland was about a third of those of New South Wales, and 11% of those of Victoria. Twenty years later, the second Atlas (Barrett *et al.* 2003), covering 1998–2002, showed little change in the relative contributions of these three states in terms of their total area (Noske 2015a). In terms of its human population, however, Queensland's contribution to the Atlases was greater than any other state, though "atlasers" were not necessarily Queensland residents. In the first Atlas, the number of surveys per head of Queensland' population was 50% higher than those from either New South Wales or Victoria, and in the second Atlas, it was 70% higher (Noske 2015a). The Queensland Wader Study Group (QWSG), established in 1992 as a special interest group within BQ, contributed 2,765 surveys to the second Atlas (Barret *et al.* 2003. Table 3).

The two atlases dramatically increased our knowledge of the distributional limits of most species found in Queensland, so it is not surprising that the frequency and size of articles in *Sunbird* on this topic

gradually dropped each decade from 23.7% (11.6%) in the 1970s to 7.5% (5.6%) in the 2000s (Noske 2015a). However, between the two atlases, from 1984 to 1992, the journal featured annual QOS Bird Reports, which listed interesting records that had been submitted from all parts of the state over the previous calendar year. In the first of these reports, which detailed records submitted by 70 observers, Stewart (1983) suggested a relationship between the large numbers of waterbirds in the state's southeast and a severe drought, a theme that was later explored empirically by Woodall (1985, 1988). The 1991 QOS Bird Report was the largest, comprising 33 pages, summarising records for 289 species submitted by no fewer than 201 observers, and including two alleged sightings of the Endangered Coxen's Fig-Parrot *Cyclopsitta diophthalma coxeni* (Britton 1992). Sadly, like the latter bird, QOS Bird Reports soon became "extinct" – at least temporarily.

A new emphasis for *SUNBIRD*

At the beginning of 2018, a *Sunbird* Development Group was formed to revive the journal by making it more relevant to modern birding interests, and thus more appealing to a wider audience. The decision was made to resurrect and refine annual bird reports, and to make them the main focus of the revised, "new-look" journal. The reports would be based on eBird records (see below), and grouped into regions. The journal will also feature annual reports of BQ (and other) Specialist Groups. At the same time, it would continue to publish peer-reviewed articles. In view of the costs of hard copy publication, it was also decided that *Sunbird*, like other smaller ornithological journals, would be published online only.

Launched in 2003, Eremaea Birds offered the first open access, online checklist program in Australia and it soon became very popular with both birdwatchers and scientists. In February 2014, Eremaea Birds merged with eBird, originally launched in 2002 by the Cornell Lab of Ornithology and National Audubon Society in USA (Eremaea-eBird 2015). From 2010 to 2014, the proportion of all checklists submitted for Queensland almost rivalled that for Victoria, and was 38% higher than that for New South Wales (Noske 2015b). In spite of its small population relative to the other eastern states, Queensland was the largest contributor, with over three times more checklists per head of population than New South Wales (Noske 2015b). However, in terms of the size of the state, Queensland fared worst, proving that it remains under-surveyed. It is hoped that the new annual Queensland Bird Reports will encourage birders to visit less frequently surveyed regions.

The present report is the first comprehensive annual account of the birds of Queensland across its wide diversity of environments. The report is divided into 15 regions, based on the well-established bioregions, though some smaller units have been amalgamated for the sake of rationalisation.

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QUEENSLAND ANNUAL BIRD REPORT, 2017

Introduction

By Richard Noske, Stacey McLean and David Niland

Scope

The aim of the Queensland Annual Bird Report is to showcase interesting and unusual records of birds in a geographical context. The Bioregion approach was chosen as it is the established biogeographical classification system for biodiversity and associated landscapes in Australia, and offers an ecologically meaningful framework for understanding factors affecting our birds and their habitats. Whilst the Queensland Government Regional Ecosystem framework (QG 2019a) recognises 13 bioregions (Fig. 1), the Queensland Annual Bird Report 2017 considered 15 bioregions. One of the additional two bioregions derives from the division of the unwieldy Brigalow Belt bioregion (45% larger than the next largest bioregion) into two bioregions (BBN and BBS, north and south), as defined in the IBRA7 framework (DEE 2018).

Secondly, Torres Strait is here treated separately from the mainland of Cape York Peninsula, due to its somewhat distinctive avifauna, which in turn reflects its archipelagic physiography and its proximity to Papua New Guinea. Moreover, the IBRA7 framework (DEE 2018) recognises four other bioregions, small sections of which straddle Queensland's borders, but most of which fall outside the state. Thus, in this report, data from the Gulf Fall and Uplands bioregion have been combined with those from the Mount Isa Inlier to form the North West Highlands. Similarly data from the Simpson Strzelecki Dunefields, Darling Riverine Plains and Nandewar bioregions have been amalgamated with those from the Channel Country, Brigalow Belt South, and New England Tablelands Bioregions, respectively. The 15 bioregions vary enormously in size (Table 1), the largest being Mitchell Grass Downs (241,620 km^2) and the smallest being Torres Strait (870 km^2).

Table 1. The 15 bioregions recognised in the Queensland Annual Bird Report, and their eBird statistics for 2017.

Chap.	Acronym	Name	Area (sq km)	No. observers	No. surveys	No. records
1	CYP	Cape York Peninsula	121,700	64	3,411	42,269
2	TSI	Torres Strait Islands	870	8	77	1,001
3	WET	Wet Tropics	19,890	357	7,665	107,936
4	GUP	Gulf Plains	224,840	22	252	6,652
5	EIU	Einasleigh Uplands	116,260	180	1,195	16,267
6	NWH	North West Highlands	67,540	47	360	5,318
7	CQC	Central Queensland Coast	14,640	82	572	9,997
8	BBN	Brigalow Belt North	136,740	131	3,437	65,641
9	DEU	Desert Uplands	69,410	23	149	1,565
10	MGD	Mitchell Grass Downs	241,620	62	430	7,027
11	CHC	Channel Country	232,080	54	315	3,937
12	MUL	Mulga Lands	186,060	75	924	30,063
13	BBS	Brigalow Belt South	215,970	173	1,647	24,978
14	NET	New England Tableland	7,740	107	756	13,618
15	SEQ	South East Queensland	61,500	738	20,126	426,014
		TOTAL	1,716,860		41,316	762,283

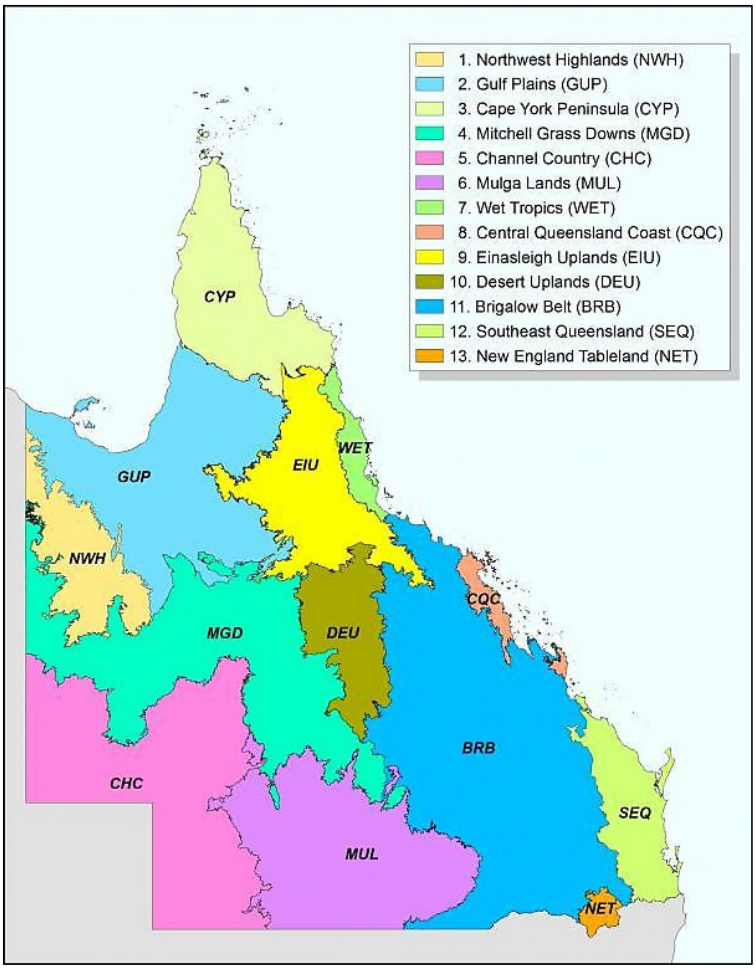

Figure 1. Map showing the 13 main bioregions in Queensland (QG 2019a). In the Qld Annual Bird Report, the Brigalow Belt (BRB) has been divided into northern and southern parts (BBN, BBS), and Torres Strait (TSI) separated from Cape York (CYP). These two additional bioregions are not shown on this map. (BoM 2018)

Bird data sources

Several sources of bird record data were considered for this report, but only one - eBird - was chosen, primarily due to the editors having more familiarity with the data and its extraction from the database. Where alternative data sources were used, they are identified and the use of eBird data in this edition does not preclude the use of other data sources in the future, as the means of accessing those data sources have been established.

A total of 41,316 surveys (lists) containing almost three-quarters of a million (762,283) records were submitted to eBird in 2017. Survey coverage was, as expected, heavily biased towards the major human population centres along the east coast. Indeed over a half (55.9%) of all surveys pertain to Southeast Queensland (SEQ), where 738 observers contributed 20,126 lists. The Wet Tropics (WET) is the second most data-rich bioregion, with 7,665 lists submitted by 357 observers. Together about 70% of all eBird records pertain to these two bioregions, which constitute only 4.7% of the area of the state. The Brigalow Belt North (BBN) bioregion received far more attention than Brigalow Belt South (BBS), with over twice the number of surveys and records of the latter region (Fig. 2). The average number of records per survey (list) for all 15 bioregions was 17.1, though Mulga Lands (MUL) and Gulf Plains (GUP) had exceptionally long survey lists, as reflected in Figure 2.

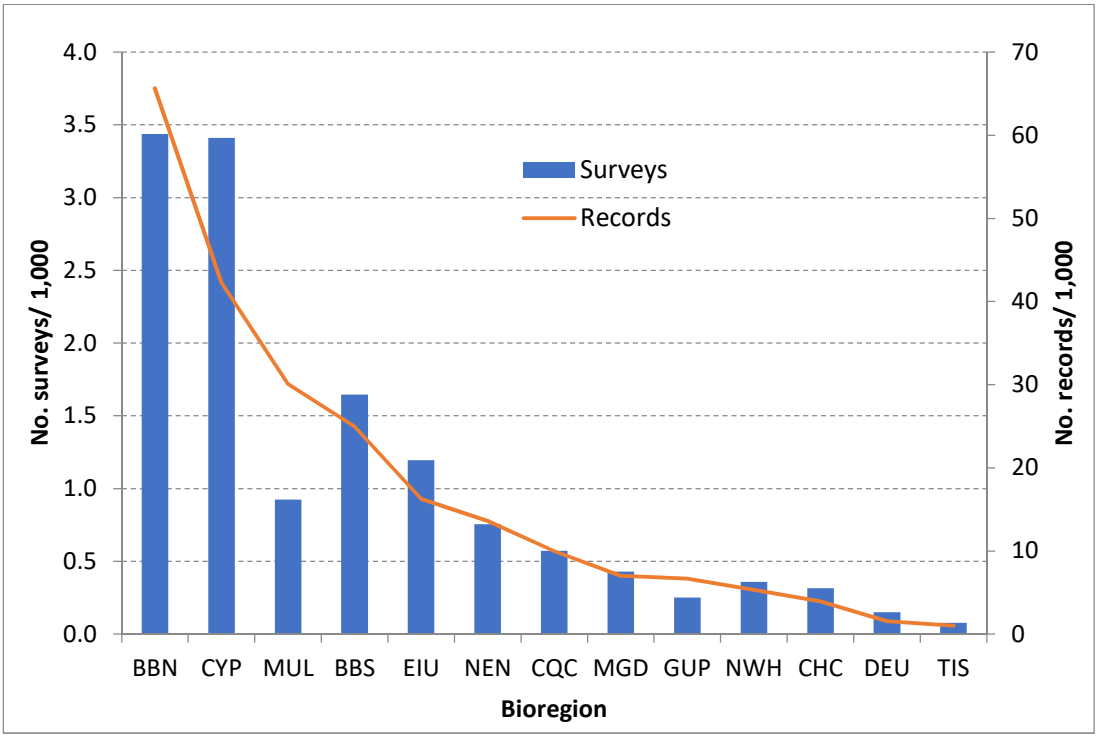

Figure 2. Numbers of surveys and records for 13 bioregions (excluding SEQ and WET) (BoM 2018)

Summary of 2017 bird data

A total of 571 species were recorded in Queensland during the year. Not surprisingly, the highest species tallies came from Southeast Qld (390) and the Wet Tropics (372). Both regions are known to be the most avian species-rich parts of Australia (Gentilli 1992), partly due to the presence of significant areas of tropical or subtropical rainforest and shorebird habitat. A gradual decline in the number of species observed from these two bioregions to the Desert Uplands and Torres Strait bioregions is likely driven by these factors and the size of each bioregion (Fig. 3). These data also highlight that much bird survey effort occurs near major urban or rural centres, along major transport routes, and readily accessible Protected Areas.

Rarities and vagrants

Three submissions were made to the Birds Queensland Rarities Appraisal Committee in 2017, concerning two species of seabirds and one shorebird species. A Little Stint *Calidris minuta* was recorded in October at Burketown Sewage Treatment Works, while on the regular Southport Pelagic trips, Brown Skua *Stercorarius antarcticus* and Bulwer's Petrel *Bulweria bulwerii* were recorded in July and December, respectively. All three records were subsequently accepted by the committee.

The outstanding rarity of the year for the state was the Stejneger's Petrel *Pterodroma longirostris* seen in November during a regular Southport Pelagic trip. This constituted the second record of the species from Queensland and the third for Australian waters. Details of this observation can be found in the Southeast Queensland account (p. 106). Notable distributional records include: a possible extension of breeding range of the Black-winged Monarch *Monarcha melanura*; Oriental Pratincoles *Glareola maldivarum* from Edmonton to Cairns, east of their normal wintering range; and the first record of Long-billed Corella *Cacatua tenuirostris* in Rockhampton.

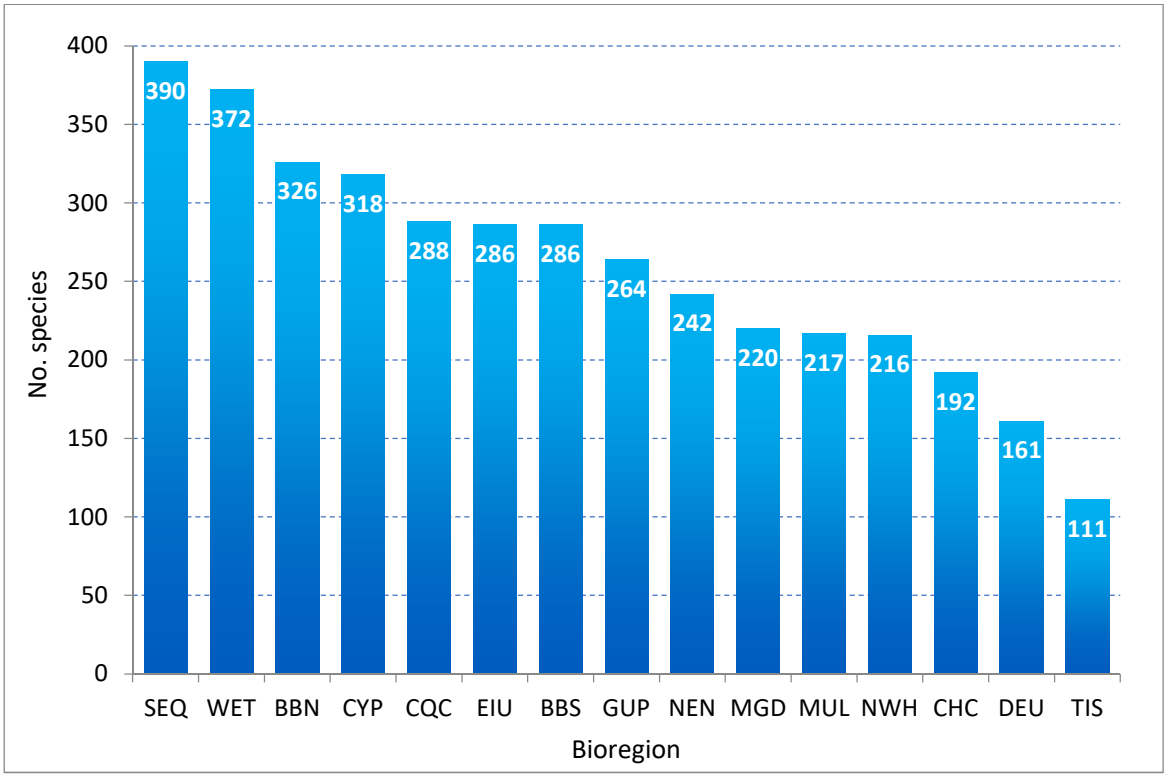

Figure 3. Total number of bird species recorded in each bioregion (see Table 1 for bioregions) (BoM 2018).

Of the 571 species recorded, only 34 (6%) species were reported from all 15 bioregions, while 100 (17.5%) were recorded in a single bioregion only (Fig. 4). The majority (61%) was recorded in seven or fewer bioregions.

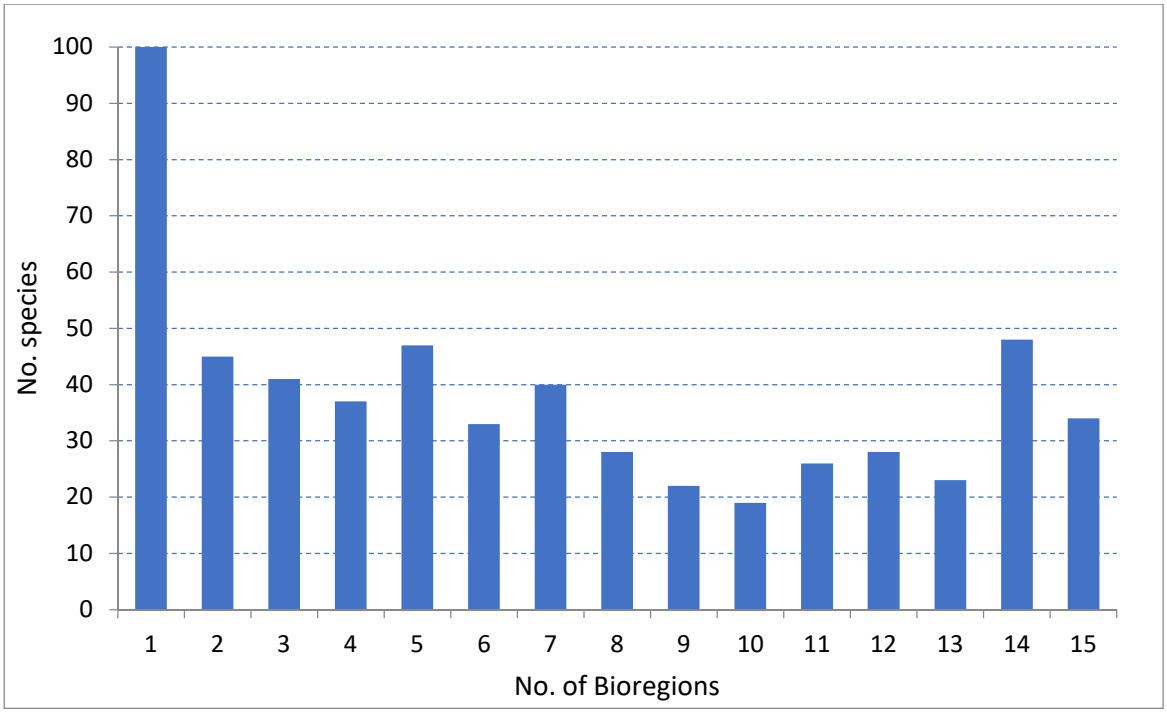

Figure 4. Number of bioregions in which each species was recorded.

Climate

This account of the weather conditions and events in 2017 highlights the range and scale of climatic conditions operating across Queensland's bioregions and impacting bird populations. It is also a timely reminder of the necessity to continue to survey, record, and report on the state of our birds, and the factors driving what we are observing.

Temperature

Average daily temperature in Queensland generally increases from south to north and east to west (Figs. 1, 2). The year 2017 was the warmest to date for Queensland, with a mean daily temperature 1.4°C above average and 0.15°C warmer than the previous record (2005). The hottest day recorded was 47.4°C at Birdsville Airport on 29 December (BoM 2018).

All Queensland bioregions experienced higher than average maximum daily temperatures in 2017, with substantial areas of CHC, MGD, MUL, BBS and SEQ bioregions experiencing the highest-on-to date temperatures (Fig. 3). Similarly, average minimum temperatures in all bioregions were above to greatly above average temperatures. (BoM 2018) The CHC and MUL bioregions recorded highest on record average minimum temperatures (Fig. 4).

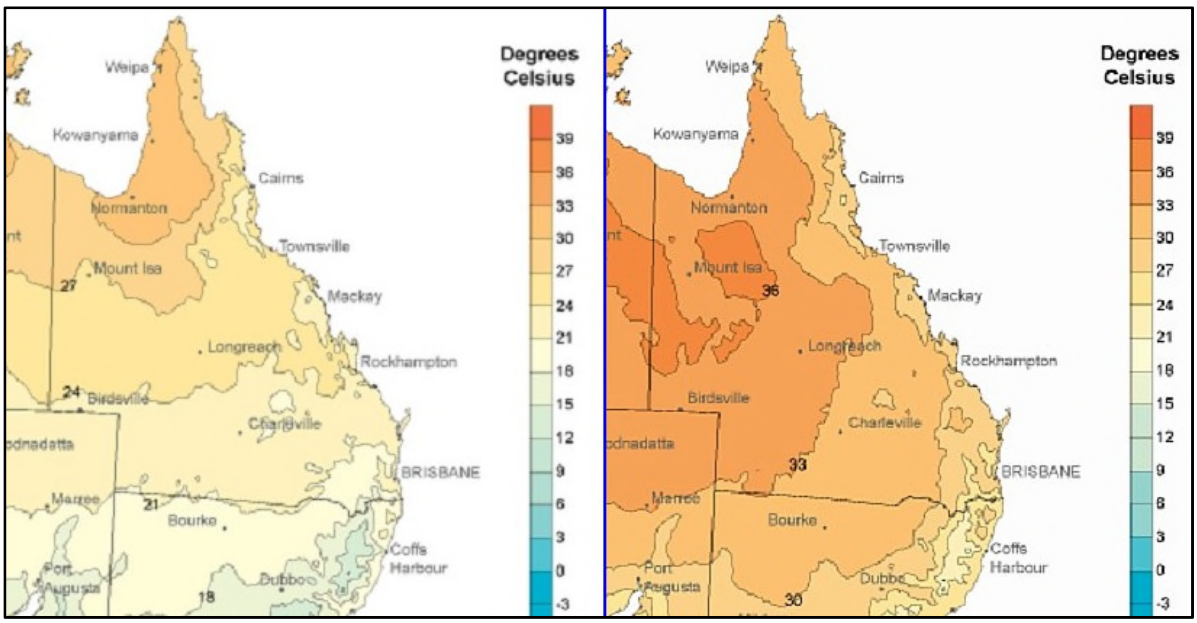

Figure 1. Average daily maximum temperatures during May-September (left) and October-April (right)

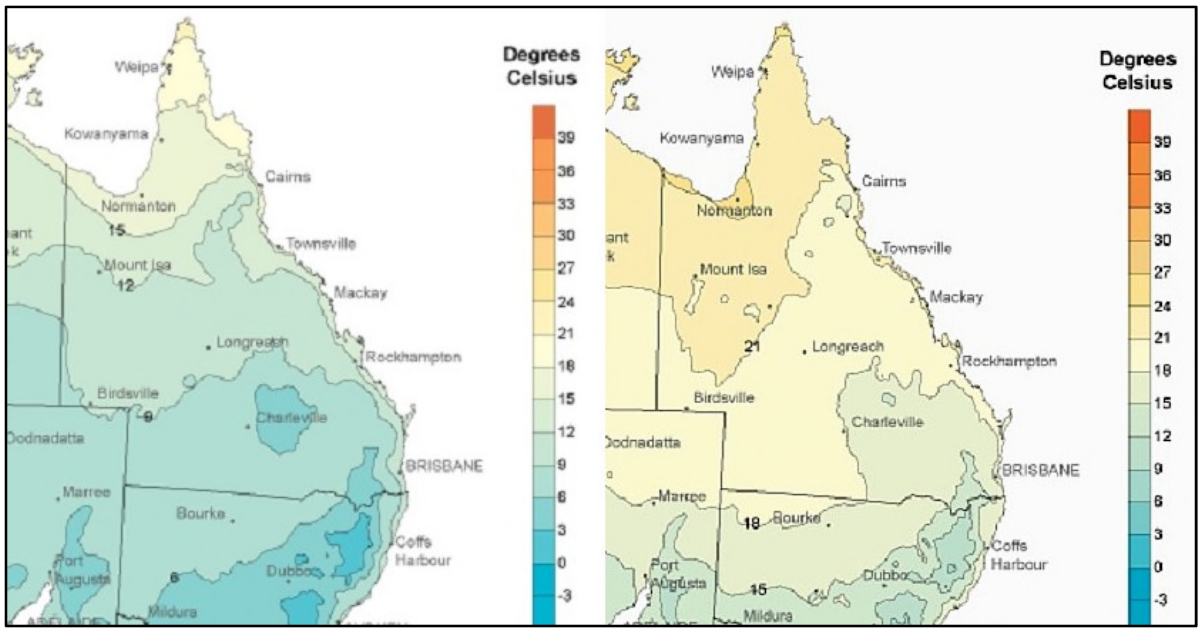

Figure 2. Average daily minimum temperatures during May-September (left) and October-April (right)

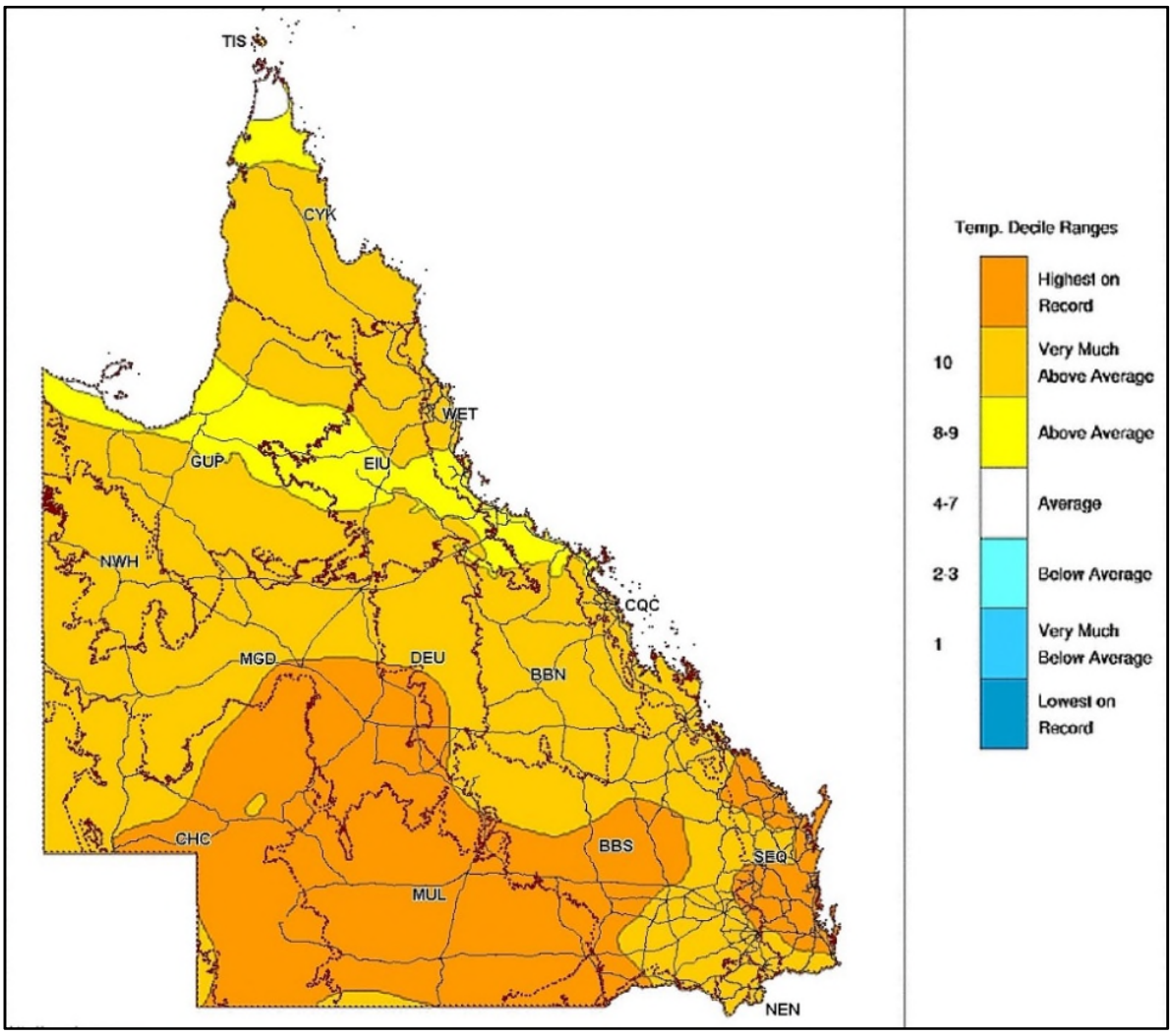

Figure 3. Mean maximum temperatures during 2017, in comparison to long-term average

Rainfall

Rainfall decreases from east to west, and to some extent from north to south, with the westernmost bioregions receiving less than 100mm in the southern wet season (Fig. 5) and CYP experiencing over 2400mm in the northern wet season (Fig. 6). In 2017, many parts of southern central and western bioregions experienced below to greatly below average rainfall, with parts of the MUL bioregion recording lowest on-record annual rainfall totals. Whilst these regions suffered below average rainfall condition, the Gulf Country, northern interior and the east coast south of Bowen received above average rainfall. Many areas in GUP, EIU, CQC and SEQ bioregions experienced above to greatly above average rainfall. (BoM 2019)

Tropical cyclones drove this situation. Severe Tropical Cyclone *Debbie* made landfall near the Whitsunday Islands on 28 March and was largely responsible for the high rainfall experienced in CQC. October was the wettest on record for parts of the Wide Bay and Burnett districts. In February, Tropical Cyclone *Alfred* caused extensive rainfall in the Burketown and Mornington Island regions of the Gulf. Southeast Queensland experienced severe thunderstorms in late December. (BoM 2019)

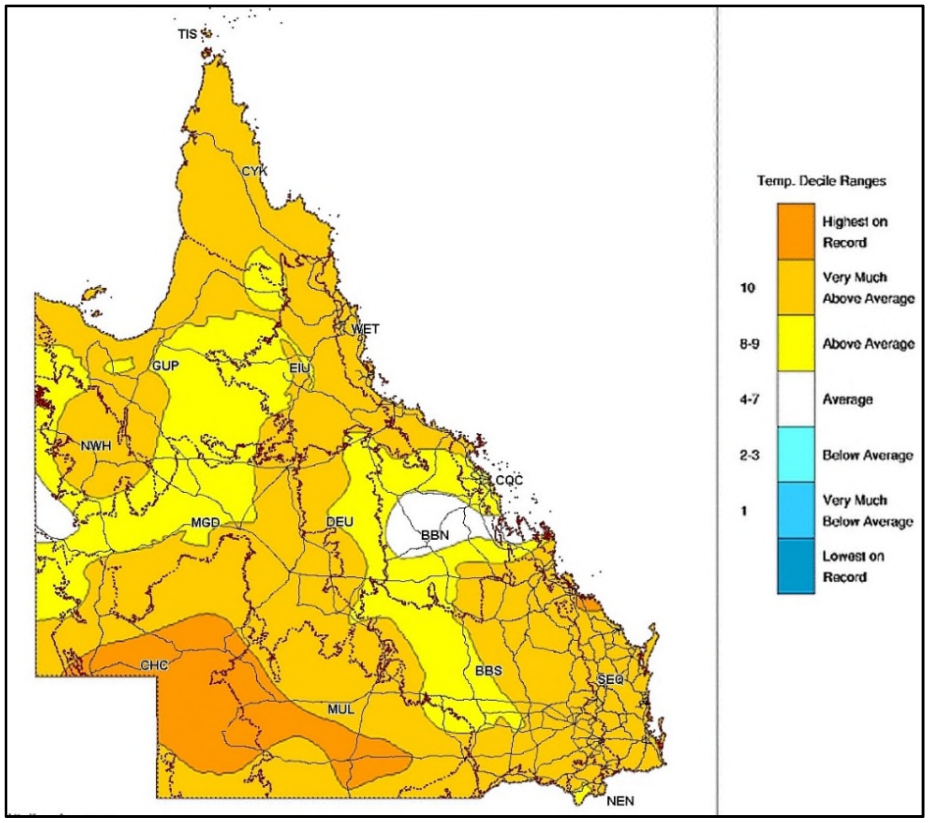

Figure 4. Mean minimum temperatures during 2017, in comparison to long-term averages (1961-1990; BoM 2018)

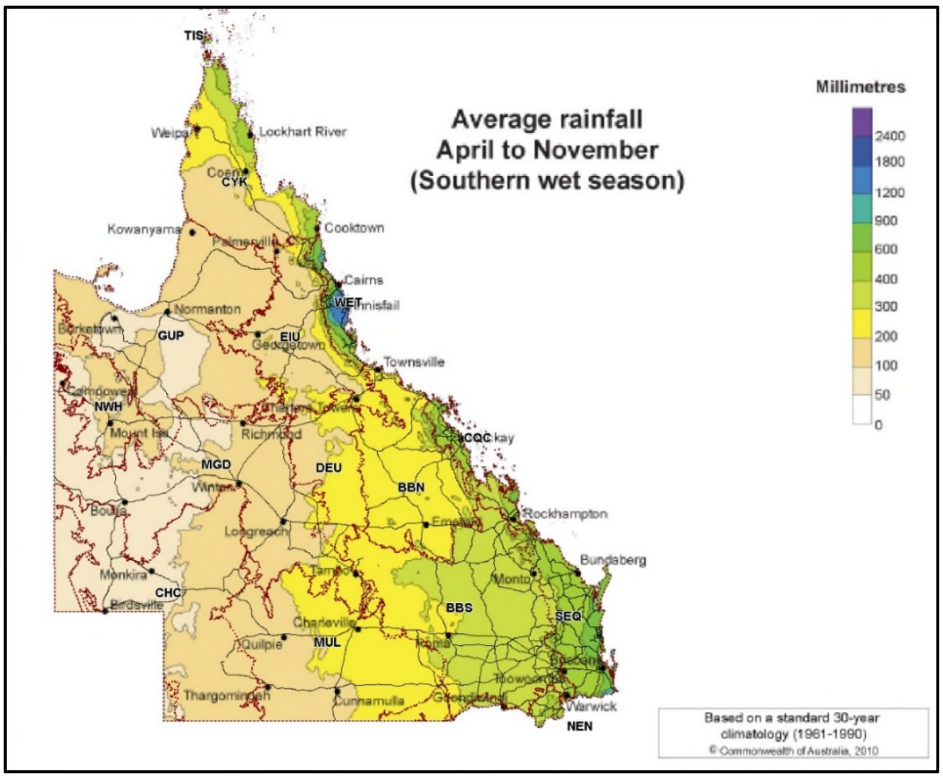

Figure 5. Average "winter"(dry season) rainfall in Queensland Bioregions (1961-1990)

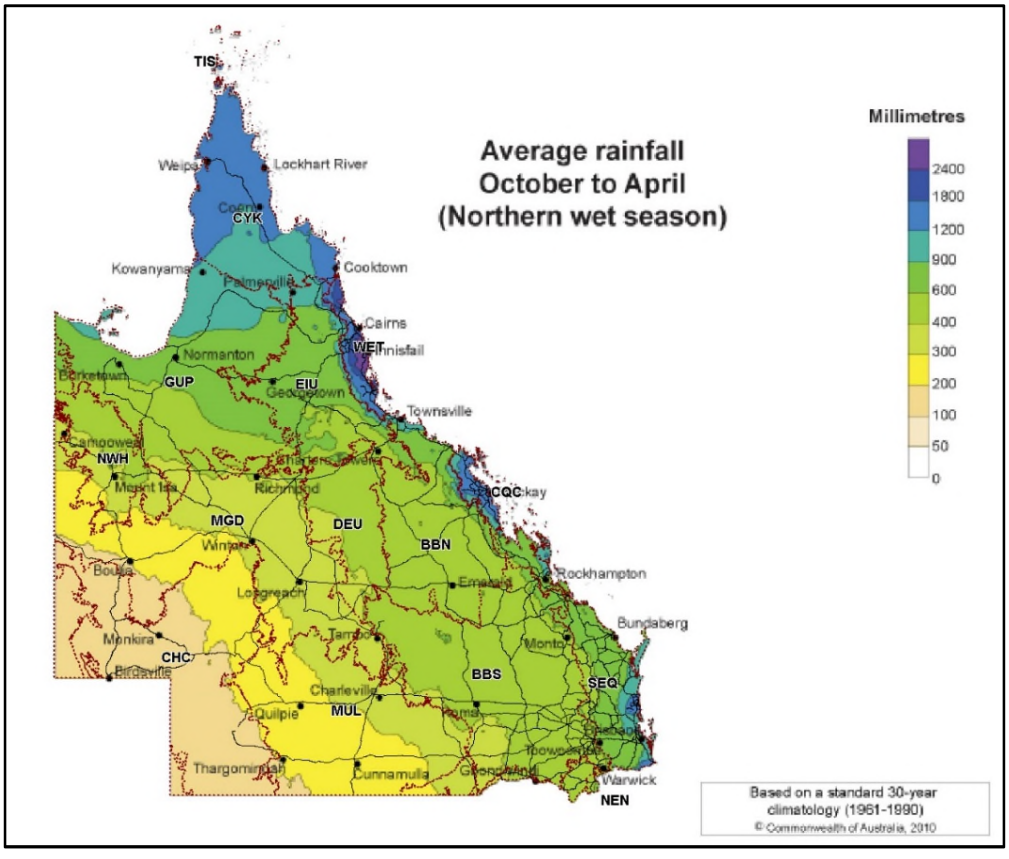

Figure 6. Average "summer" (wet season) rainfall in Queensland bioregions (1961-1990)

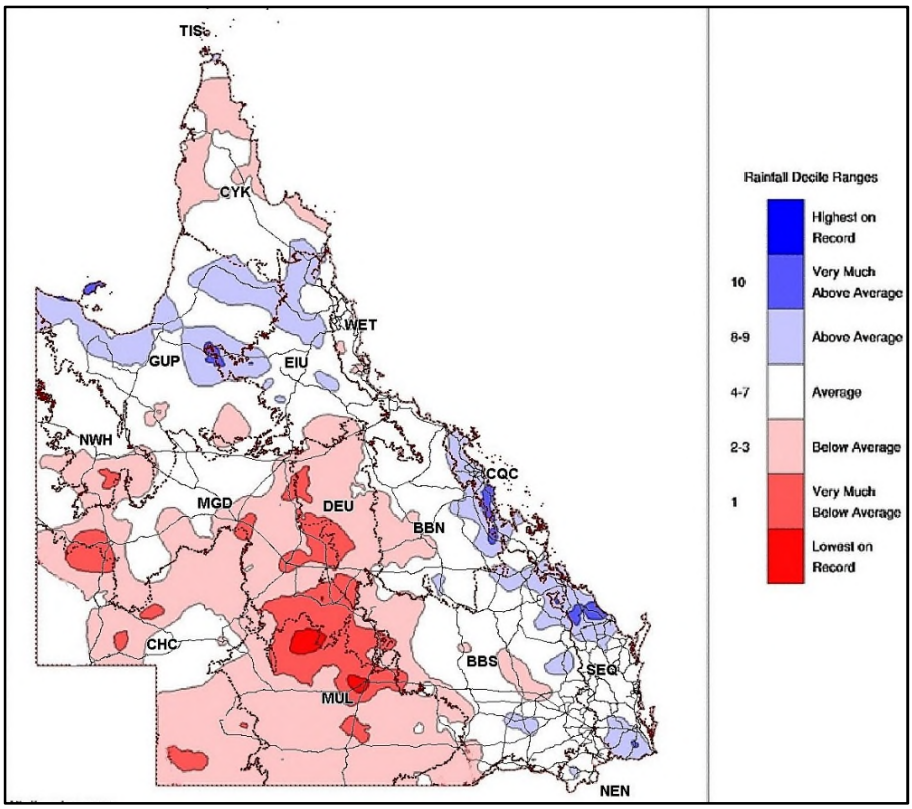

Figure 7. Mean annual rainfall across Queensland bioregions during 2017, in comparison to long-term averages (1961-1990; BoM 2018)

Drought and fire

All bioregions in Queensland experienced some drought conditions in 2017 (QC 2019b), due to the low rainfall across large areas of the state. Southern central and western bioregions, in particular CHC, MGD and MUL, were in continual drought throughout the year. Relatively small areas within CYP, WET and coastal parts of CQC, BBN and SEQ were declared fully or partially in drought in 2017.

Uncontrolled fire affected large areas of natural habitats, some burning for several weeks. Regions impacted include the Jardine River area in Far North Queensland; Byfield National Park and Shoalwater Bay military training lands. Coolum and Caloundra also experienced frequent bushfires across Protected Areas and private lands.

Regional Accounts

The main body of this report comprises chapters dealing with each of the 15 bioregions mentioned above. Each chapter starts with a general account of the geography and key environmental features of the bioregion, and in most cases identifies protected areas or areas important to threatened species or species that are endemic to the bioregion. The bulk of each chapter consists of records of selected species recorded in 2017 in taxonomic order. The selection of species was entrusted to the chapter authors, who were chosen on the basis of their expertise and knowledge of the avifauna of the bioregion in question. The accounts do not describe every species seen in the region, rather they attempt to highlight interesting or unusual records. For some accounts, examples of survey initiatives generating bird records are noted.

A complete list of the birds of all bioregions is provided in the Appendix, which also indicates the reporting rates or relative abundance of each species in each bioregion. Taxonomy and sequence of species follows IOC 8.1 (Gill & Donsker 2018). The regional maps in most chapters show substantial bias in where most birding is conducted in each bioregion. These maps can be used to identify gaps in survey

coverage, and we hope that knowledge of these gaps acts as an incentive for birders to visit and submit records for less well surveyed areas.

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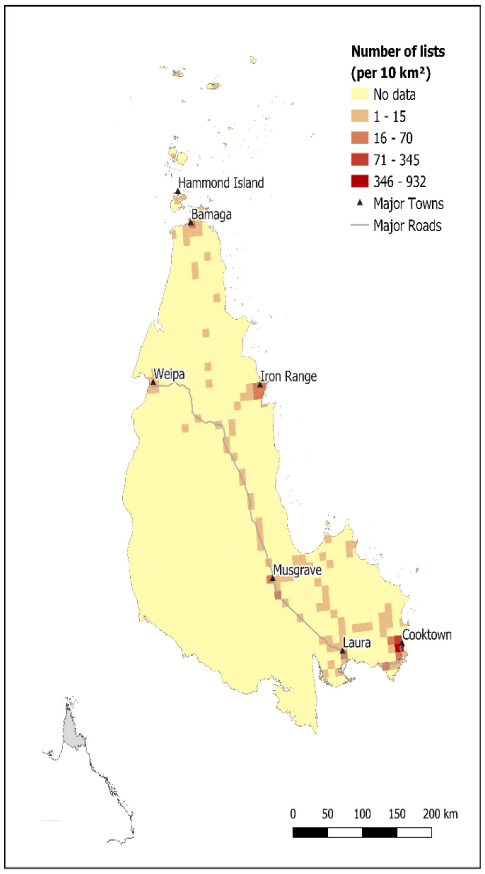
1. Cape York

By Kath Shurcliff



Map of Cape York Bioregion showing eBird survey effort

Golden-shouldered Parrot (Jon Coleman)

Geography

The Cape York Peninsula (CYP) bioregion is the seventh largest such region in Queensland, covering 121,700 km^2 (7.1%) of the state. It has extensive areas of eucalypt-dominated savanna woodlands, heathlands, wetlands and lagoons, as well as grassland plains. The larger rivers include Endeavour, Norman, Kennedy, Edward, Holroyd, Coen, Archer, Pascoe, Wenlock and Jardine. There are several areas with tropical rainforest - Lockerbie Scrub, Iron Range, McIllwraith Range, and small areas around Mt Cook and Mt Webb in the southeast. The latter two are separated from the northern rainforests by the large area of savanna grasslands in Rinyirru (Lakefield) National Park.

The main settlements of the peninsula are, from south to north, Cooktown, Laura, Coen, Lockhart River, Pormpuraaw, Aurukun, Weipa, Bamaga, Seisia. Road access throughout most of Cape York is limited, and severely hampered during the monsoonal wet season. However, an increasing number of birding tours are being organised during the wet, with fly-in access to both Bamaga and Lockhart River, and vehicle hire available on the ground.

Birds of the bioregion

BirdLife Australia (2019a) lists more than 370 species for this region. Endangered or vulnerable species occurring in this region include Southern Cassowary, Red Goshawk, Golden-shouldered Parrot, Buff-breasted Button-quail, Beach Stone-curlew, Palm Cockatoo, Double-eyed Fig-parrot (Macleay's), Eclectus Parrot, Masked Owl (*kimberli* form), Crimson Finch (White-bellied race *evangelinae,* considered a full species by some authorities), Gouldian Finch, and the Rufous Owl (Cape York form *meesi*), which is considered Near-threatened.

As well as the threatened taxa above, there are many taxa that are endemic or near-endemic to Cape York, or are shared only with New Guinea. These include Spotted Whistling-Duck (also recently recorded in Wet Tropics), Marbled Frogmouth (*marmuratus),* Red-cheeked Parrot, Chestnut-breasted Cuckoo (also in Wet Tropics), Yellow-billed Kingfisher, Red-bellied (Papuan) Pitta, Tropical Scrubwren, Green-backed Honeyeater, White-streaked Honeyeater, Tawny-breasted Honeyeater, Black-backed Butcherbird, Magnificent Riflebird, Trumpet Manucode, Black-eared Catbird (form *joanae*), Frill-necked Monarch, Yellow-legged Flyrobin and White-faced Robin.

BirdLife Australia (2019b) recognises four Key Biodiversity Areas (KBAs) on the mainland, and several on islands off the coast. The four KBAs on the mainland are: (1) Moorehead River, with populations of Golden-shouldered Parrots; (2) Lilyvale, encompassing an area of tall eucalypt woodland on sandy soils, in which there is an exceptional density of Red Goshawk nests; (3) Iron Range and McIlwraith Range, the most northerly extent of the Great Dividing Range, supporting large areas of rainforest; and (4) Lockerbie Scrub, located on the northern most tip of mainland Australia. This KBA includes the closed rainforest which acts as a funnel for migratory terrestrial birds moving between Australia and New Guinea via the Torres Strait.

In addition to the KBAs, there are 14 national parks on the mainland of Cape York Peninsula, particularly in the southeast corner and along the eastern coast. Most of these are jointly managed with Traditional Owners' land trusts. Five of these parks have visitor facilities and dry season access, but several have no road or other access. There are also other large areas comprising nature refuges. Thus extensive areas of the Cape York bioregion have some level of conservation protection. The two parks which are frequently visited by birders are Rinyirru (Lakefield) and Kutini-Payamu (Iron Range). The Lockerbie rainforests at the Tip is another popular destination, and is accessible in the wet season by both regular air and ship services.

Frequent uncontrolled bushfires appear to be the most significant threat to the birds and other wildlife of Cape York region (BirdLife Australia 2015). Other threats include feral predators, pigs and weeds. There is also increasing concern about the possibilities of larger-scale agricultural developments involving extensive clearing of the savanna woodlands on grazing properties. On the positive side, there are increasing initiatives to control gully erosion, especially along the eastern river systems that flow into the Great Barrier Reef region.

Cape York includes large tracts of tropical savannas which were reviewed by BirdLife Australia (2015). This review suggests trends of improving populations of all categories of birds, but data are insufficient to confirm these trends. Clearly more surveys are needed.

Notable bird records for 2017

A total of 318 species were recorded in CYP during eBird surveys in 2017. The following annotated list provides details of notable species or records. There were no sightings of the **Buff-breasted Buttonquail** or **Gouldian Finch** in 2017. Most of CYP had below average rainfall in 2017, especially along the eastern coast including the rainforest areas, with only the very southern portions (around Cooktown) having above average falls. Temperatures were very much above average for most of the peninsula, except for the Tip.

Southern Cassowary. One observed at Kutini-Payamu in July, and one immature bird was also briefly observed along Annan River, Cooktown.

Emu. Several records in Rinyirru plains and Artemis Station in May and October through November with a maximum of six birds seen at one time.

Magpie Goose. All observations were restricted to southern part of the region.

Spotted Whistling-Duck. Most records derived from the southern part of the region during the late Dry season and Wet season, from October through April. Although breeding has been recorded in the Daintree area further south, there are still no records of breeding in southern Cape York Peninsula. Also observed in central areas of Cape York at Archer River and Merluna station in May through October, and there were a few observations at the Tip during December and January.

Pink-eared Duck. A few sightings scattered across Cape York in May and October.

Maned Duck. A single record from Rinyirru NP.

Chestnut Teal. One bird observed at top of Cape York in December.

King Quail. A single record near Cooktown in October.

Wilson's Storm Petrel. One exhausted bird seen on a boat off Crab Island, northern Cape York.

Australasian Grebe. Small numbers observed throughout year and region.

Glossy Ibis. A few records from September through December with maximum of seven observed at one time.

Yellow-billed Spoonbill. One record from central Cape York in May.

Great-billed Heron. One recorded at Weipa in October, and one at Cooktown in August.

Pied Heron. All records restricted to immediate coastal localities.

Australian Pied Cormorant. Several records from the Tip, in June and July. One record from Weipa and Kutini-Payamu in October.

Black-shouldered Kite. Several records from Rinyirru NP in June, July and October.

Square-tailed Kite. A single record in September from the Cooktown area, where species is known to be a Dry season visitor.

Pacific Baza. Several records from Cooktown in September, and also observed at Merluna station and Kutini-Payamu in July.

Little Eagle. A few scattered observations across Cape York throughout the year.

Wedge-tailed Eagle. Numerous records from southern part of Cape York, but also several at Tip where there have been few previous records.

Red Goshawk. Near-threatened. Observations restricted to known nesting area near Musgrave, and one additional record from Merluna station.

Swamp Harrier. Scattered records across Cape York throughout the year, including one at Weipa in December, several in Rinyirru during May through July, and one at Cooktown in December.

Red-necked Crake. Numerous records over Wet season months seem to indicate the species has become established around the Cooktown area. The paucity of records from other suitable locations on Cape York probably due to limited surveys during the Wet season months. Also observed at Lockerbie Scrub near the Tip and Kutini-Payamu from January to April.

Pale-vented Bush-hen. Recorded in the Cooktown area only.

White-browed Crake. Recorded in the Cooktown area only, during Wet season and October.

Australasian Swamphen. One bird observed at Cooktown in January only.

Eurasian Coot. Several records from near Weipa and the Tip in October and December.

Sarus Crane. Vulnerable. Several records from central Cape York from July through October with maximum of five birds observed at one time.

Red-backed Buttonquail. Two birds observed near Cooktown in November.

Beach Stone-curlew. Near-Threatened. Numerous records from the Tip south to Cooktown on the east coast, and from Seisia to Weipa on the west coast.

Red-necked Avocet. One sighting of 130 on edge of Princess Charlotte Bay in October. Species rarely seen in CYP.

Red-kneed Dotterel. Observed at several locations from Cooktown to Weipa from April through December. A maximum of 20 observed at one time near Weipa in October.

Grey Plover. Several records in April and October at Weipa, near Seisia, Chilli Beach, and N of Cooktown.

Oriental Plover. Single bird at Cooktown only, in March.

Little Curlew. One bird recorded at Lockhart River in December.

Black-tailed Godwit. Near-threatened. Over 20 birds recorded near Weipa in December, and two other records from Weipa and Chilli Beach in October.

Great Knot. Endangered. Only three records along both eastern and western coasts. The largest flock was ten birds near Weipa.

Sanderling. Observed at two locations on the Tip only, in October.

Terek Sandpiper. Observed at one location N of Cooktown only, in April and December

Wandering Tattler. Recorded once only: S of Cooktown in January and March.

Wood Sandpiper. One bird only: near the Tip in December.

Australian Pratincole. A few records at Cooktown, Rinyirru NP, and Merluna station from May through July, and a record further north at Horn Island in October.

Brown Noddy. Numerous observations of up to 40 birds at Kutini-Payamu NP and Portland Roads during October. Also a single record from Cooktown in January.

Black Noddy. A single bird recorded S of Cooktown and another in Cooktown during April. Several observations of up to five birds around Kutini-Payamu in August, October, and December.

Bridled Tern. Several records from the Cooktown area in March, April and July. Up to eight birds were observed in Kutini-Payamu in October and December.

Common Tern. Three scattered records (Cooktown, Weipa and the Tip) in October and December.

Whiskered Tern. Two records fromfrom Weipa in October and December, and one record each from Kutini-Payamu and Rinyirru.

White-winged Tern. Two records from near Cooktown in March-April.

Rock Dove. Introduced. A few records of a single bird in three locations around Cooktown, but no established population as yet.

Spotted Dove. Introduced. The only location where this species is recorded is in Cooktown, where it is established and breeding.

Common Bronzewing. Observed at four localities in southern part of the region.

Squatter Pigeon. Up to five birds observed near Artemis station in July and August, but not during other months.

Diamond Dove. Two birds were observed at the Tip in June, where species had been recorded in 2015. This location over 200 km from Weipa where they are regularly recorded.

Topknot Pigeon. Two observations from Cooktown in July and August. This appears to be the northernmost limit of the species.

Horsfield's Bronze Cuckoo. Several records from Rinyirru NP and central Cape York.

Shining Bronze Cuckoo. Several records in southeast during April and May, and also at Kutini-Payamu.

Pallid Cuckoo. Several records from June through December in central parts of the region.

Fan-tailed Cuckoo. One record only: at Kutini-Payamu in May.

Oriental Cuckoo. Several records from around Cooktown and one at Kutini-Payamu in January.

Australian Masked Owl. Despite the existence of historical records from Cape York, there are very few recent records, possibly due to difficulty of distinguishing this species from the Barn Owl.

Eastern Barn Owl. A few records from Rinyirru in May and June, and two from central Cape York (Merluna and Kutini-Payamu) in October.

Rufous Owl. A few records from Kutini-Payamu in June and July.

Spotted Nightjar. Several records in May and June with groups of two to 19 in Rinyirru NP, and two reported from Tip in August.

White-throated Nightjar. One record only: at Kutini-Payamu in October.

Australian Owlet-nightjar. Four records from several locations from Rinyirru NP to Kutini-Payamu NP.

White-throated Needletail. A few records in March and December with up to five birds observed at one time.

Pacific Swift. Recorded at Kutini-Payamu NP and Cooktown during the Wet season, mostly in January, with maximum number of 300 observed at one time.

Red-backed Kingfisher. One record from Weipa in May.

Yellow-billed Kingfisher. Numerous records in Kutini-Payamu area and around the Tip throughout the year. One record from Merluna station, central Cape York, in October.

Little Kingfisher. Recorded at several locations from Cooktown to the Tip throughout year.

Black Falcon. Several records in southeast during June and July.

Peregrine Falcon. Two records from Cooktown, another from Kutini-Payamu, and one bird at the Tip throughout the year.

Palm Cockatoo. Numerous records from Kutini-Payamu area and N of Jardine River. Also recorded at Wenlock River, Merluna station, Moreton Telegraph station and Heathlands Reserve.

Little Corella. Three records from Rinyirru NP, with a maximum of 100 birds at one time during October.

Eclectus Parrot. Numerous records from Kutini-Payamu and Portland Roads area.

Red-cheeked Parrot. Numerous record from Kutini-Payamu area and Lockhart River throughout the year.

Golden-shouldered Parrot. Endangered. Numerous records from Artemis station primarily from May through October, and one record in January. In July a flock of 30 birds (the maximum number) included numerous immature birds, indicating successful breeding.

Double-eyed Fig-parrot. Numerous records from Kutini-Payamu and Portland Roads area.

Papuan Pitta. Several records from the Tip in January and December, including a count of 12 over several kilometres. Two records from Kutini-Payamu, including one sighting in June, outside the normal the normal period in Australia.

Black-eared Catbird. Several records throughout the year in the Kutini-Payamu area.

Fawn-breasted Bowerbird. Recorded at Kutini-Payamu, Portland Roads and the Tip.

Brown Treecreeper. One record only: at Merluna. Few records in recent years on Cape York.

Scarlet Myzomela. A few records from southern part of the Cape, around Cooktown and Rinyirru from March through July.

Green-backed Honeyeater. Numerous records from the Kutini-Payamu area throughout the year.

White-streaked Honeyeater. Numerous records from locations from Cooktown north to the Tip throughout the year.

Tawny-breasted Honeyeater. Observations restricted to locations from Archer River north to the Tip throughout the year.

Rufous-throated Honeyeater. Several reported from the Rinyirru area from March through October.

Tropical Scrubwren. Numerous records from rainforest areas on the east coast from Cooktown to the Tip throughout the year. Also, two records from Heathlands Reserve.

White-browed Woodswallow. Two records from Kutini-Payamu in October, after sightings of the species on the Wet Tropics coast.

Black-faced Woodswallow. Three records only: around Rinyirru NP, indicating this species is scarce on Cape York.

Little Woodswallow. Several records from Cooktown to Musgrave area in June and July only, with a maximum of ten observed at one time.

Grey Butcherbird. Several records both S and N of Laura along the Peninsula Development Road from January to November. This suggests they are likely resident in this area.

Black-backed Butcherbird. Records from numerous locations from Laura area to the Tip throughout the year.

Mangrove Golden Whistler. One record from Haggerstone Island off the east coast in December.

Black-faced Monarch. Several records from the Cooktown area from January through May, with most in February. One record N of Rinyirru NP in October, and one at the Tip in August, which was probably a migrating bird.

Black-winged Monarch. At least one record of a juvenile in Cooktown area, indicating that the breeding range of this species now extends to the very southern part of Cape York. Numerous records from the Cooktown and Kutini-Payamu areas from October through May, and one from the Tip in September. No records from June through September.

White-eared Monarch. Several records from the Cooktown area from May through August, and from Kutini-Payamu in both Wet and Dry seasons.

Frill-necked Monarch. Records from several locations around Kutini-Payamu, the Jardine River, and the Tip throughout the year.

Satin Flycatcher. Three records along the coastline in September and October on spring passage, and one observation in March on autumn passage.

Paperbark Flycatcher. Several records from Merluna and two in Rinyirru in July.

Trumpet Manucode. Numerous records from Archer River north to the Tip throughout the year.

Magnificent Riflebird. Numerous records from Kutini-Payamu, the Tip, Merluna station, and Morton Telegraph station throughout the year.

Mangrove Robin. One record only: on small island off Seisia in January.

White-faced Robin. Numerous records from Kutini-Payamu and Lockerbie Scrub throughout the year.

Yellow-legged Flyrobin. Recorded from several localities in Kutini-Payamu and Lockerbie Scrub throughout the year.

J**acky Winter**. Two records only: from Rinyirru NP in July and October.

Horsfield's Bush Lark. One record from Cooktown in April, and a few observations from Rinyirru in June, July and October.

Fairy Martin. Two records from Cooktown and Rinyirru on the same day in July.

Rufous Songlark. Two records from Rinyirru NP in June and July.

Tawny Grassbird. Two records from Cooktown in February and September, one from Rinyirru in June, and one each from Merluna station and Kutini-Payamu in August.

Zitting Cisticola. A record from Port Musgrave N of Weipa in June appears to constitute a new location for this species. Also recorded in Rinyirru NP.

Ashy-bellied White-eye. In December one record from Haggerstone Island off the east coast, and additional records from a small island off Seisia.

Canary White-eye. One record from near Rinyirru NP in July, and another from a small island off Seisia in December, coinciding with an observation of the Ashy-bellied White-eye.

House Sparrow. Introduced. One record of five birds from Lizard Island, but no further observations likely as not established on the island. Previously recorded from Lizard island in 1983, 1999 and 2005. There are established populations at Cooktown and Thursday Island, but no reports from any other locations this year.

Crimson Finch. One record just south of Cooktown, including a juvenile bird, indicating local breeding. This is in the same region where the species was observed ten years ago (pers. comm. from Lewis Roberts). The only large flock reported was of 30-40 birds, including numerous juveniles, in Rinyirru NP in July.

Star Finch. Several records from Rinyirru NP from June to November, with a maximum estimate of 100 birds.

Scaly-breasted Munia. Introduced. A few records around Cooktown. Although the species has been recorded in several locations, particularly in port towns such as Weipa and Bamaga, it is not regularly reported and does not appear to have established breeding populations on the Cape to date.

Australian Pipit. Numerous records around Cooktown throughout the year. Several observations in Rinyirru NP, including two documented records of race *rogersi* in May and July.

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2. Torres Strait Islands

By David Niland, Jon Wren, Greg Malone

Black-necked Stork (Graham Donaldson)

White-breasted Whistler (Vince Bugeja)

Geography

The Torres Strait Islands (TSI) lie within the Cape York Bioregion, but are sufficiently distinct in their avifauna to be treated separately in this report. They represent the northernmost part of Australian territory. The most northerly inhabitated island of Boigu is only 6 km from the the mainland of Western Province of Papua New Guinea. The region is very similar to that defined as the Torres Shire, but the latter includes some areas of the adjoining mainland and excludes many occupied islands which have their own specific Islander Councils. The Shire is located north of the latitude 11°S, and extends over 160 km from north to south between the PNG mainland and the northern tip of Cape York, and c.250km from east to west.

The islands can be grouped into four major clusters: (1) the Western Group of continental high islands, composed of granitic and basalt rocks (Mabuiag, Badu, Moa, Thursday, Horn, Hammond, Prince of Wales and Friday; (2) the Northern Group of low islands, composed of sedimentary deposits, mangrove muds and peats (Boigu, Dauan and Saibai); (3) the Central Group of low sandy islands (Yam, Warraber, Coconut and Masig); and (4) the Eastern Group of high volcanic islands (Murray, Darnley and Stephen). The human population of the islands at the 2016 census was 4500, most of whom live on Thursday Island, the administrative centre.

The islands are either heavily developed or relatively pristine. Urban development on Thursday and Horn Islands continues to increase, but many of the other islands are low-lying and subject to inundation from rising sea levels. The Cane Toad *Rhinella marina* has recently been introduced to Thursday and Horn Islands, as well as some outer islands, after an established colony on Cape York spread to Possession Island since the mid-1980s (TSRA 2019a). Local authorities have initiated a Cane Toad Buster Program but whether it has reduced the impact on wildlife remains unclear.

The Land and Sea Management Unit (LSMU) of the Torres Strait Regional Authority was established to coordinate the delivery of the Environmental Management Programme under the Commonwealth's *Torres Strait Development Plan 2016-2036* (TSRA 2019b). This includes a Traditional Ecological

Knowledge Project in which nine communities on eight islands maintain separate databases for cultural and natural resource information. The Warraberalgal and Porumalgal Indigenous Protected Areas, in the Central Group of islands, include an important seabird rookery on Maza Gulya, where the dua (Common Noddy) and sara (Bridled and Roseate Terns) nest in significant numbers. Management of these Areas is carried out by rangers under the LMSU.

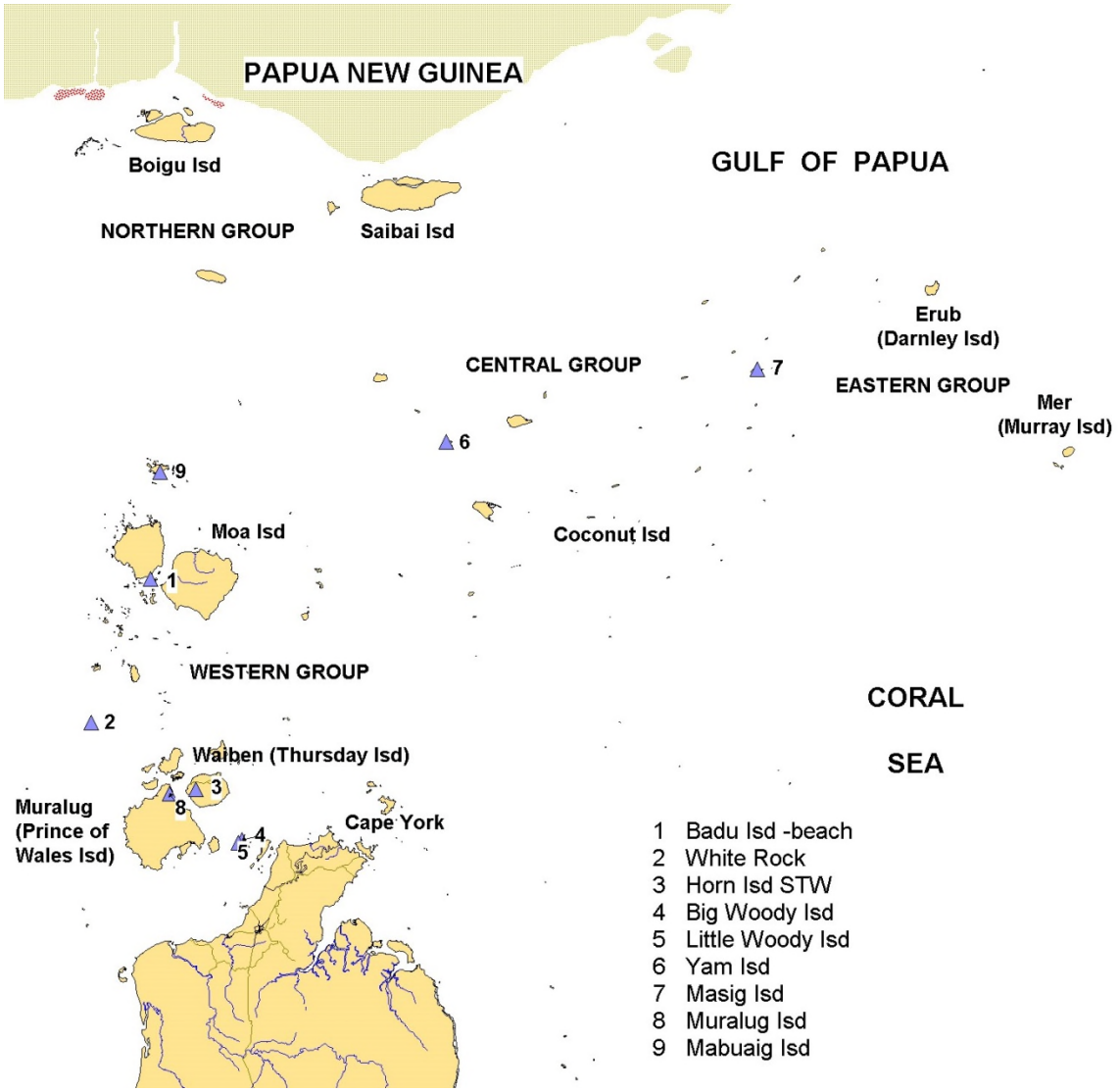

Figure 1. Map of Torres Strait Islands, with locations mentioned in text

The climate is monsoon-tropical, with a wet season from December to April (Kuki season), due to the influence of the rain-bearing monsoon winds from the northwest. On Thursday Island, 94% of the rain falls during this wet season (Gab Titui 2019). During the dry season, from June to October, the winds are reversed, blowing from the south-east (Sager season), possibly providing assistance to migrating birds.

Birds of the bioregion

The avifauna of TSI is similar to that found on the coasts to the north and south, but this region has special significance in being a narrow funnel on the migration route for many species of land birds from eastern Australia (Draffan *et al*. 1983). As the northern islands are only 2 km from the PNG coast, the potential for typically New Guinean species to stray into Australian territory is high. Of the 243 species recorded from the region up until the 1980s, 87 were considered resident, and 73 as migratory, crossing the Strait on a regular or irregular basis (Draffan *et al.* 1983). A number have been added since that study.

Torresian Imperial Pigeons have been counted by researchers at James Cook University over a number of years (Hazel 2019), showing large flocks heading south in the late dry season, but as yet there is no evidence of large flocks returning north after the breeding season. Additional research is necessary to establish if these birds use an alternative route to their non-breeding grounds.

Notable bird records for 2017

A total of 111 bird species were recorded in TSI during eBird surveys in 2017. While the islands close to PNG attract many birders seeking vagrants to Australian territories, no charter trips were made during the year. Some observations were made from the cruise ship 'Dawn Princess', which passed through the Strait on one day in May.

Although 2017 was a hotter and drier year than average for the whole of the state, TSI was little affected. The monsoon rain began in mid December 2016 and continued until April, very much in accordance with the averages. The first four months received c. 1350 mm rain, followed by about 180mm from June to November. The winds were steady from the west from January through March, and steady from the ESE between May and November. (BoM. 2018)

Radjah Shelduck. A group of six on Horn Island.

Pink-eared Duck. At Horn Island STP, 36 birds in November. This species was not recorded in Draffan et al (1983).

Green Pygmy Goose. Three on Horn Island.

Pacific Black Duck. Multiple records, primarily on Thursday Island, but 15 on Horn Island in November.

Grey Teal. At Horn Island STP, 23 birds in November.

Hardhead. Two at Horn Island STP in November. This species was not recorded in Draffan et al. (1983).

Wedge-tailed Shearwater. Recorded from a cruise ship in Gulf of Papua in May.

Australasian Grebe. Nine on Thursday Island in December.

Black-necked Stork. Near-threatened. One on Thursday Island in May.

Straw-necked Ibis. One record each from Thursday, Badu, and Mabuiag Islands.

Glossy Ibis. Two records from Horn Island from July and November.

Royal Spoonbill. On Thursday Island, five in September, and eight in November.

Nankeen Night Heron. One at Little Woody Island in January.

Eastern Cattle Egret. On Badu Island beach, 13 birds in August.

Australian Pelican. Most records of single birds, but five on the beach at Badu Island in August.

Great Frigatebird. Two at White Rock in December.

Lesser Frigatebird. Twelve at Masig Island in July.

Red-footed Booby. Three in the Gulf of Papua in May.

Brown Booby. Many records, with maximum count of 100 at White Rock in December.

Australasian Darter. Many records, with 14 around Thursday Island in June.

Brown Goshawk. One on Thursday Island in July.

Swamp Harrier. One on Thursday Island in July.

Buff-banded Rail. One on Thursday Island in May.

Eurasian Coot. Two on Horn Island in November.

Beach Stone-curlew. Near-threatened. Multiple records of singletons or pairs on Horn, Masig, and Thursday Islands.

Pacific Golden Plover. Counts from Thursday Island include three in January, four in September, and one in November.

Lesser Sand Plover. Multiple records of up to 16 on Thursday Island in January.

Greater Sand Plover. Multiple records of up to nine on Thursday Island, and on Great Woody Island from December through February.

Far Eastern Curlew. Endangered. Three birds on Thursday Island, and one on Badu Island in August.

Curlew Sandpiper. Near-threatened. Two on Thursday Island in February.

Red-necked Stint. Near-threatened. Multiple records of up to 15 on Thursday Island from November through February.

Grey-Tailed Tattler. Near-threatened. Two on Thursday Island in September.

Australian Pratincole. Multiple records on several islands in June through August and October, with a maximum of eleven on Badu Island.

Brown Noddy. Five at White Rocks in December.

Black Noddy. Hundreds observed in May following baitfish at sea in eastern section of TSI.

White Tern. Three observed from a cruise ship in eastern part of TSI in May.

Caspian Tern. Ten on Thursday Island in July.

Sooty Tern. One record from a cruise ship in eastern section of TSI in May.

Roseate Tern. Two observed from a cruise ship in eastern section TSI in May.

Black-naped Tern. Twelve on Prince of Wales Island in December.

Common Tern. Nine at White Rock in December.

Torresian Imperial Pigeon. Multiple records of up to two on Masig Island in June and July, and flocks of up to 150 on Little Woody Island in December. Earliest date of birds (3) passing Prince of Wales Island was 5 August. Many records from Thursday Island from September through January, where arrival coincided with the ripening of Wongai (*Manilkara kauki*) fruit, which is eaten by the pigeons (Hazel 2018).

Channel-billed Cuckoo. Multiple records from Thursday Island in May, July, and November.

Pheasant Coucal. Several records from Thursday Island in May, and from Horn Island in November.

Brush Cuckoo. Multiple records from several islands in December.

Oriental Cuckoo. Two birds seen on both Great and Little Woody Islands in December.

Barking Owl. Several records from Thursday Island from May through December.

Oriental Dollarbird. Recorded on Thursday Island from May through October, as well as one on Yam Island in June, and one on Horn Island in November.

Rainbow Bee-eater. Multiple records from Thursday Island from May through October.

Forest Kingfisher. Five records from Yam and Masig Islands in June.

Torresian Kingfisher. One on Little Woody Island in January.

Sacred Kingfisher. Multiple records of up to four from May through December.

Nankeen Kestrel. Multiple records of a single bird on Thursday Island from May to July.

Australian Hobby. Records from Thursday Island in July and Badu Island in August.

Peregrine Falcon. One on Little Woody Island in January.

Rainbow Lorikeet. Up to 30 on Thursday Island.

Noisy Pitta. One on Little Woody Island in December and January.

Red-headed Myzomela. Twelve counted on Great Woody Island in December.

Black-faced Cuckooshrike. Records from Thursday Island include six in July and two in September.

White-bellied Cuckooshrike. Three on Thursday Island in May.

Grey Whistler. Up to six birds on Little Woody Island in December and January.

Mangrove Golden Whistler. Up to five birds on Little Woody Island in December and January.

Little Shrikethrush. Two on Little Woody Island in December and January.

Spangled Drongo. Many records of pairs, but a flock of 15 observed on Thursday Island in November.

Willie Wagtail. Two on the beach of Badu Island in August.

Spectacled Monarch. One on Little Woody Island in January.

Magpie-lark. Occasional records on Thursday Island, and five on Badu Island beach in August.

Leaden Flycatcher. Records include two on Thursday Island in July and one on Horn Island in November.

Torresian Crow. Up to two recorded from July through November, possibly from Australian mainland.

Mangrove Robin. Up to eight counted on Little and Great Woody Islands in January and December.

Welcome Swallow. Flocks of up to 18 on Thursday Island from May through September.

Canary White-eye. A pair with fledglings on Little Woody Island in January and December. This species is not observed every year in TSI, and was not recorded by Draffan *et al.* (1983).

House Sparrow. Introduced. Common on Thursday Island. Three on Masig Island in June, and four on Badu Island in August, but none on Prince of Wales Island.

Eurasian Tree Sparrow. First recorded at the wharf on Thursday Island in 2013, suggesting boat-assisted immigration. Up to 20 on Thursday Island throughout the year.

Red-browed Finch. Two on Masig Island in July may be the first records for TSI. Not recorded by Draffan *et al.* (1983).

Chestnut-breasted Mannikin. Flocks of up to 20 on Thursday Island, nesting and roosting in Golden Cane Palms adjacent to Torres Hotel. Also recorded from Yam and Masig Islands in June and July.

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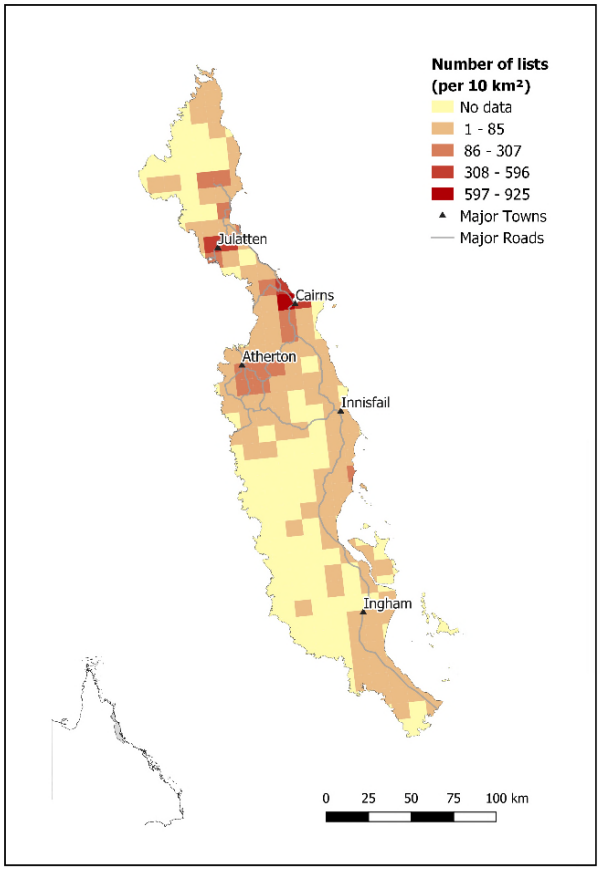
3. Wet Tropics

By Emily Rush



Map of Wet Tropics Bioregion, showing eBird survey effort

Southern Cassowary with chicks (Vince Bugeja)

Geography

The Wet Tropics Bioregion (WET) covers only 1.16% (19,890 km^2) of the state, stretching along the north-east coast of Queensland for some 450 km from Cooktown in the north to Townsville in the south. Forming the core of this bioregion is the Wet Tropics World Heritage Area, which encompasses approximately 894,420 ha of mostly tropical rainforest (DEE 2019). The WET bioregion includes relicts of the Gondwanan forests that covered Australia and Antarctica some 50 to 100 million years ago (UNESCO 2019) making it the oldest surviving rainforest in the world (WTMO 2016). The vegetation is predominately rainforest but includes a mixture of sclerophyll tree species that can occur as emergents or co-dominants within the canopy. Fringing the rainforest are tall, open forests as well as tall, medium and low woodlands (DEE 2019). These unique environments provide the only available habitat for numerous rare species of plants and animals, including 40% of Australia's bird species (WTMA 2016).

The bioregion lies predominantly within the Tropical zone of Australia, featuring a marked wet summer and dry winter, with high annual rainfall totals of 1200-8000mm per year (WTMA 2016). Average mean temperatures in Cairns are 23-31°C in the wet season (November-April) and 19-27°C in the dry season. This is an area of high humidity, at Cairns ranging between 50% at 15:00 hrs in the dry season to 100% at 09:00 hrs in the wet season.

The major towns in WET include Townsville, Innisfail, Cairns, Mareeba, Atherton and Mossman (Fig. 1). Some of the principal river catchments are the Barron, Burdekin, Daintree, Johnstone and Tully Rivers

(QG2019). The distinct features of the Wet Tropics can be attributed to its seasonal monsoonal rainfall, diverse terrain and steep environmental gradients (UNESCO 2019). The terrain is dominated by rugged mountain ranges, tablelands and lowland coastal plains, with elevations ranging from sea level to 1620m asl.

Birds of the bioregion and their conservation

The WET bioregion harbours more than 370 species of birds of which 23 are largely confined to, and 13 are strictly endemic, to the bioregion (WTMA 2016). These endemics include nine upland species - Tooth-billed Bowerbird, Golden Bowerbird, Bridled Honeyeater, Fernwren, Atherton Scrubwren, Mountain Thornbill, Grey-headed Robin, Chowchilla and Bower's Shrike-thrush, as well as four lower altitude species - Lesser Sooty Owl, Macleay's Honeyeater, Victoria's Riflebird and Pied Monarch (WTMA 2016). All of the upland species are at significant risk from future climate change (Garnett *et al.* 2014; WTMA 2016).

The bioregion incorporates over 30 National Parks, most notable of which are Wooroonooran (which encompasses Queensland's two highest mountains, Bartle Frere and Bellenden Kerr), Mt Lewis, Daintree, Paluma Range and Tully Gorge National Parks and the Great Barrier Reef Marine Park, encompassing marine habitats and offshore islands (QG 2019). In addition to these national parks, Birdlife Australia recognises the following five Key Biodiversity Areas (KBAs) within the Wet Tropics region.

Paluma: Encompassing the southern-most portion of rainforest in the Wet Tropics, Paluma supports all of the high altitude rainforest species endemic to the Wet Tropics, making it an important climate change refuge (BirdLife International 2019).

Daintree: encompasses the most intact remaining area of rainforest vegetation from coast to mountain top in the Wet Tropics (BirdLife International 2019).

Coastal Wet Tropics: contains a number of restricted-range lowland rainforest forms, including the Queensland race of the Rufous Owl *Ninox rufa queenslandica* and Beach Stone Curlew (BirdLife International 2019).

Atherton Tablelands: supports a suite of tropical grassland and wetland birds including a substantial number of Magpie Goose during the winter and significant numbers of Sarus Crane (BirdLife International 2019).

Wooroonooran: encompasses the largest tract of tropical rainforest in Australia, covering 514, 491 ha. It maintains populations the biome restricted White-gaped Honeyeater, Yellow Honeyeater, White-browed Robin and Masked Finch (BirdLife International 2019).

Since 2012 there has been an ongoing study of the Torresian Imperial Pigeon through PIPwatch, an online citizen science program that collects data on sightings and nest counts in order to support research and conservation of the species (B. Venables, pers. comm.).

Despite the many protections put in place for the Wet Tropics, long-term monitoring indicates that the biodiversity of the region is declining (WTMA 2016). Major threats to the area include habitat fragmentation, invasive weeds and introduced mammals, including feral pigs, cattle and cats. However, the most significant threat is that of climate change, which is already impacting high altitude species. On average rainforest specialist species have undergone significant declines, while generalist, predominately lowland, species have increased. Particularly vulnerable are upland rainforest specialists, such as the Tooth-billed Bowerbird whose global population size has declined and whose distribution has retracted to higher altitudes since 2008 (WTMA 2016).

The Queensland Government's *Back on Track: Actions for Biodiversity* (DERM 2010) lists the Southern Cassowary, Red Goshawk, Beach Stone-curlew and Little Tern as priority species for the Wet Tropics Bioregion.

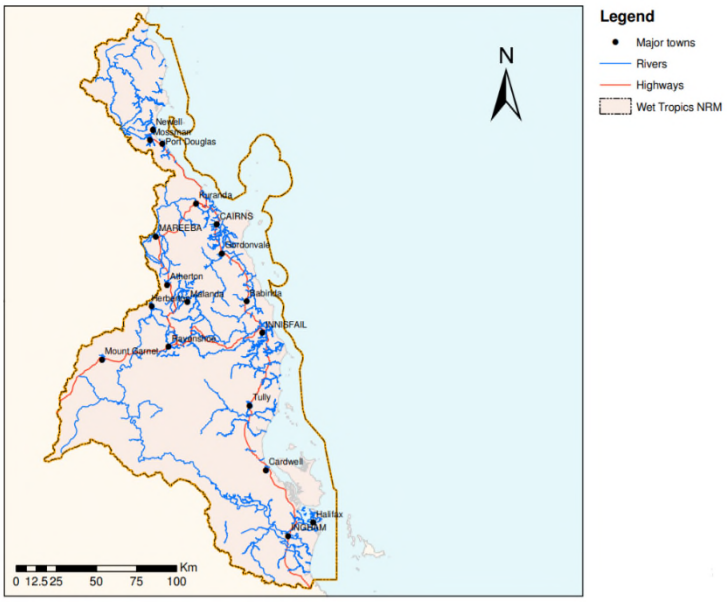


Figure 1. Major towns and rivers of the Wet Tropics Bioregion (DEE 2010**).**

Notable bird records in 2017

In 2017, 372 species were recorded in WET during eBird surveys. A few parts of WET experienced slightly above average rainfall, mainly in January. However with a Mean Annual Rainfall of c.2.5 m, the January rainfall of 850mm over six days in Innisfail was not particularly exceptional. Temperatures were generally well above average in both the wet and dry seasons.

Southern Cassowary. A total of 243 records from many areas.

Magpie Goose. Larger flocks recorded from October through December.

Spotted Whistling-Duck. Recorded almost every month, mostly from the Daintree area.

Wandering Whistling-Duck. Records throughout the area with larger flocks around the beginning of the wet season.

Freckled Duck. Recorded 14 times at Hasties Swamp on the Atherton Tablelands; once in July, seven times in November and six in December, possibly the same individual throughout.

Cotton Pygmy Goose. Total of 48 records, the majority between August and November.

Green Pygmy Goose. Regularly observed throughout the year, mostly from Cattana Wetlands in Cairns.

Stubble Quail. Three records south of Ingham, and one individual recorded at Yungaburra on the Atherton Tablelands.

Wilson's Storm Petrel. One record only: off the coast at Moore Reef in April.

Wedge-tailed Shearwater. Three records on offshore Islands in April, June, and October.

Hoary-headed Grebe. Three records from October to December. A group of ten observed at Crater Lakes in October.

Black-backed Bittern. Five records of individual birds at three locations: Daintree River, Tyto Wetlands and Bromfield Swamp, all during the wet season.

Black Bittern. Recorded throughout the year, but five to seven individuals were observed on the Daintree River cruises over the wet season.

Great-billed Heron. Records sparse from January to March but increased from April to December, mostly from the Daintree area.

Pied Heron. Scattered records from the Atherton Tablelands to Port Douglas throughout the year.

Great Frigatebird. Records from Michaelmas Cay on the Great Barrier Reef, the majority of which came from July to December.

Lesser Frigatebird. Total of 25 records for the year with the majority from Michaelmas Cay.

Masked Booby. Seven records from offshore islands on the Great Barrier Reef, and one record from offshore on Thornton Beach in the Daintree.

Red-footed Booby. Scattered offshore records from Great Barrier Reef, including one record of 24 individuals in January at Michaelmas Cay.

Square-tailed Kite. A total of 27 scattered records from April to December.

Black-breasted Buzzard. Two records, one of a pair, from the Atherton Tablelands.

Little Eagle. Total of 10 records, mostly from the Atherton Tablelands.

Grey Goshawk. Commonly observed in the Cairns area.

Australian Bustard. Total of 16 records from northern end of bioregion.

Red-necked Crake. Several records, mostly from Julatten area.

Pale-vented Bush-hen. Commonly observed across bioregion.

Baillon's Crake. One record at Daintree Village in April.

Spotless Crake. A few records from Ingham to Port Douglas.

White-browed Crake. Recorded throughout the year, but larger numbers during the wet season.

Sarus Crane. Vulnerable. Most records were from the Atherton Tablelands area from June to December. A large flock of 250 was recorded at Mt Hypipamee in September.

Red-backed Buttonquail. Three records only: from Ingham, Cairns and Yungaburra.

Red-chested Buttonquail. Two records during wet season only.

Little Button-quail. One observed on Mt Lewis Road in November.

Beach Stone-curlew. Near-threatened. Recorded throughout region, but the majority from around Cairns and Daintree region.

Red-necked Avocet. Three records from Trinity Beach in Cairns during November, reported by one group of observers.

Double-banded Plover. One to two individuals on Cairns Esplanade from late April to mid-September.

Whimbrel. Flocks in excess of 150 birds recorded in January, March, and April.

Little Curlew. Total of 20 records, primarily in November, all but one from a turf farm in Edmonton.

Far Eastern Curlew. Endangered. Recorded every month, mostly from Cairns Esplanade.

Ruff. One record only: Redden Island, off Cairns, in May.

Broad-billed Sandpiper. Four records, three from Cairns, observed from February to December.

Sanderling. Ten records from Michaelmas Cay in October and November.

Pectoral Sandpiper. One bird observed in Smithfield area of Cairns in January.

Asian Dowitcher. Near-threatened. Two records from Cairns Esplanade in March and July.

Latham's Snipe. Scattered records from the Atherton Tablelands, Cairns, and further north. Up to 49 birds recorded in March and April at Tingira Street boat ramp, Cairns.

Swinhoe's Snipe. One record from Kingfisher Park in October.

Oriental Pratincole. Total of 14 records from Edmonton to Cairns during November. Not normally observed east of Gulf of Carpentaria.

Bridled Tern. A number of records from various offshore Islands, mostly from September to December.

Sooty Tern. Multiple counts of 2,000-3,000 individuals recorded offshore from August to December.

Roseate Tern. Up to 20 birds in September, with a few other records scattered through the year.

Black-naped Tern. Scattered records on Great Barrier Reef, with up to 82 individuals at Agincourt Reef in August.

Whiskered Tern. Scattered offshore records with 100 birds at Mungalla Station, west of Ingham, in November.

White-winged Tern. Six records from Ingham area.

Common Bronzewing. Uncommon in bioregion as normally associated with dry forests, but six records from Tablelands or further north.

Superb Fruit Dove. Commonly observed throughout bioregion.

Rose-crowned Fruit Dove. Commonly observed throughout bioregion.

Torresian Imperial Pigeon. Many records from coastal regions throughout year except July when none were reported.

Pallid Cuckoo. Total of 15 records, primarily from July to November.

Chestnut-breasted Cuckoo. Recorded regularly throughout the year in Julatten.

Fan-tailed Cuckoo. A number of records, mostly from the Atherton Tablelands and Cairns regions.

Oriental Cuckoo. Recorded during wet season only.

Australian Masked Owl. Two records from the Atherton Tablelands area in July and August.

Rufous Owl. Over 60 records, primarily from the Cairns region, mostly from July to September.

Barking Owl. Scattered records from several areas.

Buff-breasted Paradise Kingfisher. Numerous records throughout bioregion from October to April.

Red-backed Kingfisher. Ten records for the year, primarily from Ingham.

Black Falcon. One record from Kingfisher Park at Julatten in September.

Peregrine Falcon. A few records from around Cairns, Atherton Tablelands and Ingham.

Cockatiel. Two records from Cairns CBD and Julatten, but probably refer to aviary escapees.

Glossy Black Cockatoo. Three birds observed at one location at Paluma in May, and another five observed at Paluma in August (author pers. obs).

Eclectus Parrot. Total of 20 records, all but one from Julatten, where thought to be aviary escapees, recorded over 20 years.

Budgerigar. Two records, probably of aviary escapees, including ten birds at Palm Cove in Cairns.

Tooth-billed Bowerbird. Many records from numerous known hotspots including the clearing at Mt Lewis, Mt Hypipamee National Park and the Crater Lakes National Parks.

Golden Bowerbird. Recorded from Mt Hypipamee, Paluma and Mt Lewis throughout the year.

Brown Treecreeper. Total of 14 records, mostly from the Atherton Tablelands, but one at Mossman Gorge.

Banded Honeyeater. Recorded from the Atherton Tablelands, Mt Molloy and Julatten areas, but not during winter months.

White-streaked Honeyeater. Most records from Kingfisher Park, Julatten, in October and November.

Rufous-throated Honeyeater. Most records from around Ingham area in October, but two records from Mt Molloy and Julatten, one in January and the other in October.

Bar-breasted Honeyeater. Five birds recorded from Ingham in February only.

Red-browed Pardalote. Two birds observed at Mt Windsor National Park in February.

Fernwren. Recorded throughout the year, especially from Mt Lewis.

Atherton Scrubwren. Several records throughout the year.

Mangrove Gerygone.Three records only, including one of four birds at Toolakea Beach in February.

Buff-rumped Thornbill. One record of five birds at Mt Lewis in November.

Yellow Thornbill. Five records only, in February, June, July, and November.

Chowchilla. Scattered records, mainly from Mt Lewis, Mt Hypipamee and Paluma.

Yellow-breasted Boatbill. Many records throughout the region.

Masked Woodswallow. Six records from Ingham and Cairns areas, from June to October.

White-browed Woodswallow. Several records from scattered localities in various months, including a flock of 12 in Daintree area during October.

Dusky Woodswallow. Several records from scattered localities in various months, including several at Wondecla State Forest.

Little Woodswallow. One record from near a boat ramp in Cairns during December.

Crested Shrike-tit. A few records from Hasties Swamp and Wondecla.

White-eared Monarch. Over 60 records, scattered across bioregion, peaking in July.

Broad-billed Flycatcher. Three records from Cairns to an area north-west of Cedar Bay in March, April, and June.

Satin Flycatcher. Ten records from Cairns to the Atherton Tablelands, the majority in October.

Australian Raven. Seven records, primarily from Forrest Beach, in latter half of year.

Jacky Winter. A few records from Tablelands, Cairns, and Dindin State Forest, from September to March.

Barn Swallow. Five records from Newell Beach in January and February, and one from Cape Tribulation in December.

Zitting Cisticola. Recorded throughout year around Ingham.

Zebra Finch. Eight records from Ingham to Cairns with one group of 20 at Kamerunga, Cairns, in October.

Blue-faced Parrotfinch. Regularly recorded at Mt Lewis and Julatten. Flocks of 15 or more birds in January.

Pictorella Mannikin. One record of two birds at Mt Lewis in October, east of normal range.

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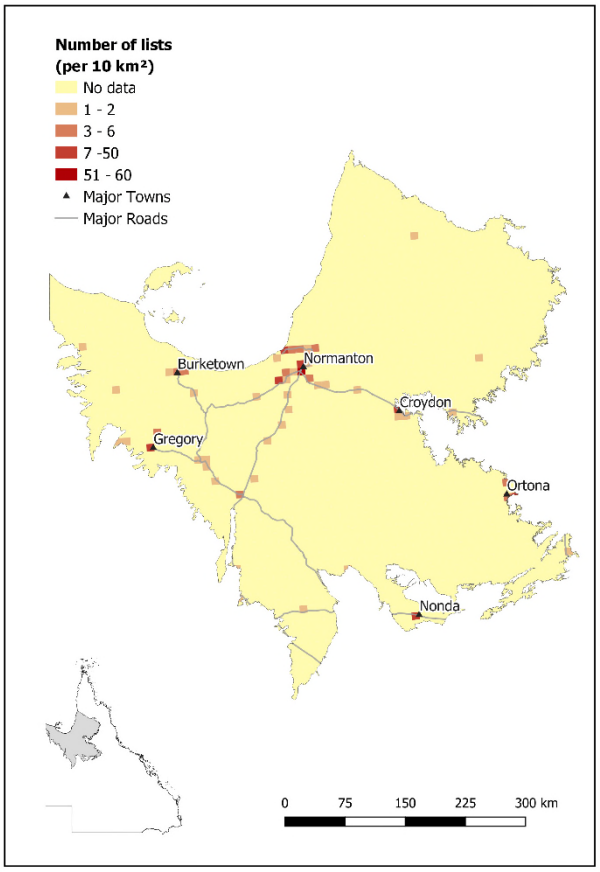
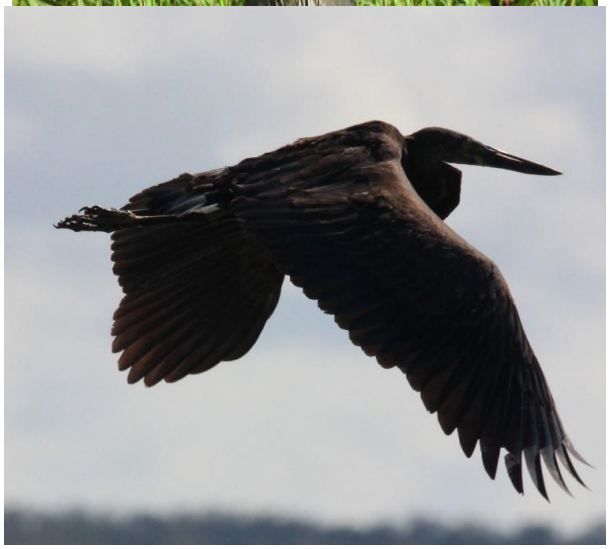
4. Gulf Plains

By Kath Shurcliff



Map of Gulf Plains Bioregion, showing eBird survey effort



Great-billed Heron
Upper (Rae Clark) Lower(Jon Coleman)

Geography

The Gulf Plains (GUP) bioregion is the third largest of Queensland's bioregions, covering 13.1% (224,840 km^2) of the state. It supports extensive mangroves, wetlands, mudflats, grasslands and savanna woodlands extending from the western border of Queensland with the Northern Territory, around the coast of the Gulf of Carpentaria to the western side of Cape York Peninsula. The plains are crossed by several large rivers including the Mitchell, Staaten, Gilbert, Norman, Flinders, Leichardt, Barkly, Albert and Nicholson Rivers. The Plains are generally low-lying but the region does extend south into the headwaters of these rivers.

The GUP bioregion lies mostly within the Tropical and Grassland climate zones (BoM 2019a), experiencing hot, wet summers along the coastal parts, and drier, mild winters inland. The variation from north to south can be seen by comparing the mean annual rainfall and mean temperatures in the wet season at Normanton with those at Julia Creek, which is just outside the southern boundary of the bioregion. Normanton is much wetter than Julia Creek during both the wet season (MAR, 620 and 416mm, respectively) and dry season (49 mm and 26mm). Mean minimum temperatures are higher in Normanton than Julia Creek in the dry season (19^o vs 12^{o}C), but are similar in the wet season. (BoM 2019b)

The main settlements in this region are Croydon, Normanton, Karumba, Burketown and Doomadgee, with Kowanyama in the northeastern section. The two Key Biodiversity Areas in the Gulf Plains region (KBA) are the entire coastline, and Staaten River KBA, which supports a population of Golden-shouldered Parrots. (BirdLife Australia 2019)

There are three other national parks: Finucane NP, north of Burketown, with boat access only; Errk Oykangand NP, northeast of Kowanyama, with vehicle access in the dry season only; and Rungulla NP, in the southeastern section, along the upper reaches of the Gilbert River, with an all-weather access road, but no internal roads or tracks. In addition, there is the Mutton Hole Wetlands Conservation Park at Normanton, and several Nature Refuges in the eastern part of the Gulf Region.

Popular birding localities include Delta Downs wetlands along Karumba road, Normanton wetlands, Karumba mangroves, the Burketown mangroves and wetlands, as well as numerous river and creek crossings along the main development roads. During the wet season, from December to April, the low-lying areas are often flooded,restricting road access, so few birders visit this bioregion at this time.

Management issues in the region include the large-scale Gilbert and Flinders River irrigation proposals, where substantial amounts of water have been allocated. It remains to be seen what impacts these water allocations may have on the important wetland areas further downstream. During late 2015-2016 there was extensive and unprecedented die-off of mangroves along the coast of the Gulf of Carpentaria. There were insufficient data from 2017 to assess whether the mangroves and their bird populations are recovering.

Notable bird records in 2017

In 2017, 264 species were recorded during eBird surveys in GUP. The GUP bioregion hosts most of the mangrove-specialised bird species of Australia, including White-breasted Whistler, Mangrove Golden (Black-tailed) Whistler, Broad-billed Flycatcher, Arafura Fantail and Mangrove Fantail, though one (Chestnut Rail) was not recorded during eBird surveys in 2017. Although the Beach Stone-curlew (Near-threatened) and Gouldian Finch (Near threatened) occur in GUP, neither was recorded in this bioregion during 2017. Bird records of some significance are listed below.

In 2017 the Gulf Plains had average to above average rainfall, with cyclone ‘Alfred’ dumping rainfall large amount of rain in Burketown and surrounding areas in February. The consequent wetlands persisted into April. Temperatures were average or slightly above average for the Gulf region. However, during 2017 R. Reed, an experienced birder, resided in Normanton for several months of the year. His records indicate the importance of the ephemeral wetlands for birds. Roger Jaensch, an experienced wetlands specialist, also visited the region in October and provided information on some rarities to the region. These examples indicate the rewards to be gained if birders make the effort to visit these areas at that time of year.

Bird records of some significance are listed below.

Emu. A few records scattered from east to west from June through October.

Magpie Goose. Most records around Normanton-Karumba wetlands with up to 250 birds seen at once from June through to October.

Plumed Whistling-Duck. Most records from Normanton-Karumba wetlands with up to 250 birds seen at once in April.

Wandering Whistling-Duck. Most records from Normanton-Karumba wetlands with up to 500 birds seen at once in April.

Freckled Duck. One bird at Doomadgee Sewage Works in October.

Pink-eared Duck. Large flocks of over 300 reported around Normanton-Karumba wetlands in April and then again in June. Smaller numbers reported up to November and as far west as Doomadgee.

Maned Duck. Numerous records from the eastern section of region and near Normanton-Karumba.

Cotton Pygmy Goose. A single record of four birds at Croydon in May.

Green Pygmy Goose. Small numbers in wetlands around Normanton-Karumba throughout the year, and a single record as far west as Doomadgee.

Hardhead. A large flock of over 150 reported at Normanton-Karumba in April and then again in June.

Australian Brushturkey. This region is on the western edge of the species distribution. Two birds recorded at Karumba in August, and one record from the extreme eastern edge of the Gulf along the Walsh River.

Australasian Grebe. Numerous observations of up to 30 birds at Karumba in April.

Hoary-headed Grebe. Only three records from southern Gulf area.

Great Crested Grebe. A single bird recorded at Normanton in August.

Glossy Ibis. In November a maximum of 75 birds at one time in the Normanton-Karumba wetlands, and smaller flocks recorded throughout year.

Black Bittern. Two records from the Normanton-Karumba wetlands in April.

Eastern Cattle Egret. Large flocks in the Normanton-Karumba area during April and then again in November. Birdata shows a continuing trend for increasing numbers and locations of this species in the Gulf Plains since about 2005.

Great-billed Heron. A few records from the Normanton-Karumba wetlands in April.

Pacific Reef Heron. A single record at Karumba in April.

Square-tailed Kite. Two records from April and May in Normanton.

Black-breasted Buzzard. Two birds observed in October and November in the Normanton-Karumba area.

Little Eagle. Numerous records throughout year.

Swamp Harrier. A few records from the late wet and early dry seasons from March through June at Normanton-Karumba wetlands.

Spotted Harrier. A few records from April, August, and October around Normanton-Karumba.

Australian Crake. One bird observed at Burketown in October.

Dusky Moorhen. Two birds observed at Karumba in April, and one further south in July.

Black-tailed Native-hen. Numerous records between Croydon and Burketown from April through October, and up to 450 at Karumba in April (R Reed).

Red-chested Buttonquail. One record at Karumba in June.

Red-necked Avocet. Several observations of up to 23 birds between Burketown and Karumba in August. This species appears to be irruptive as there were numerous records in 1999 and the mid-2010s, but few records in other years.

Little Curlew. Two records from near Karumba in May and October.

Long-toed Stint. Two records from the Burketown area in April and October.

Little Stint. One report from Burketown in October, but the record was not submitted to BARC for confirmation.

Pectoral Sandpiper. One record from Burketown in October.

Latham's Snipe. One record from Normanton in August.

Swinhoe's Snipe. One record from Burketown in October.

Wood Sandpiper. Numerous observations of up to five birds at one time recorded between Croydon and Burketown in April, August, and November.

Oriental Pratincole. A flock of 11 birds recorded at Karumba in April.

Black-naped Tern. Six birds recorded at Karumba in August.

Common Tern. Two records of up to five birds from Karumba in April.

Flock Bronzewing. Five birds recorded near Karumba in June.

Spinifex Pigeon. Four records of up to 17 birds from Karumba-Normanton area in April and May.

Torresian Imperial Pigeon. A single bird recorded at Karumba in October.

Pacific Koel. Two records of a single bird in the western part of region in November.

Pallid Cuckoo. One record of a single bird in the western part of region in late November.

Spotted Nightjar. Several records of up to ten birds in Normanton-Karumba area from April through August.

White-throated Nightjar. One recorded at eastern edge of region in August.

Large-tailed Nightjar. One reported from Burketown, but based only on calls and outside the normal range of the species. Requires confirmation.

Pacific Swift. Several records of up to 55 birds in Karumba-Normanton area in April.

Laughing Kookaburra. Several observations at Normanton area throughout the year, and one record from near Kowanyama.

Black Falcon. Several records from Burketown to Normanton during April through August.

Peregrine Falcon. A single record at Karumba in April.

Spotted Bowerbird. Two birds recorded at Burke and Wills Roadhouse in July.

Dusky Myzomela. Three birds recorded at Karumba in May.

Silver-crowned Friarbird. A few scattered records from Normanton to near Gregory Downs.

Crimson Chat. Several records of up to 15 birds along the Burketown-Normanton road during June through August.

Orange Chat. Several records of to 20 birds around Burketown and Karumba during April through August.

Rufous-banded Honeyeater. Several records from Karumba in April and August.

Bar-breasted Honeyeater. One record from Normanton in November, and two records north of Staaten River in July and August.

White-plumed Honeyeater. Two records from the southwest section of the Gulf Plains in July and November, and one record in very southeastern section in June.

Fairy Gerygone. Seven birds recorded in Normanton in May.

Black-backed Butcherbird. A single bird observed southeast of Kowanyama in August.

Pied Currawong. One bird recorded at Normanton in August. This is the fourth sighting of this species in the Gulf Plains.

Ground Cuckooshrike. Several sightings from around the Normanton area from June through August. This species is not recorded every year in this bioregion.

Varied Triller. Several records from around Karumba and Normanton in both April and August, indicating an established population. This species is rarely recorded in Gulf Plains (<0.5% reporting rate, Birdata).

Mangrove Golden Whistler. Two birds observed at Burketown, as well as the usual sightings at Karumba.

Little Shrike-thrush. Two records from Karumba and Burketown in June and July.

Arafura Fantail. Several records from the Karumba mangroves from June through November.

Shining Flycatcher. One bird observed at Karumba in June. There is only one previous record of this species from the Gulf Plains.

Red-capped Robin. In May, one bird observed at Karumba, where it was also recorded in 2001, 2005, and 2010.

Welcome Swallow. Two birds observed twice in Karumba and Normanton in April, and one record south of Kowanyama in August.

Australian Reed Warbler. Up to three birds observed at one time at Normanton in April.

Little Grassbird. Not recorded in bioregion every year, but in 2017 there were numerous records from Karumba throughout the year.

Brown Songlark. One record from south of Burketown in August.

Tawny Grassbird. Three records near Karumba and Normanton in April and June, and one recorded south of Kowanyama in August.

Olive-backed Sunbird. One record southeast of Kowanyama in August.

Star Finch. Not recorded every year in bioregion, but six birds in May 2017 at Karumba.

Chestnut-breasted Mannikin. Two records of up to eight birds near Karumba and Burketown in May and August.

Pictorella Mannikin. Not recorded every year in bioregion, but two observations of 1-2 birds just south of Normanton in June and July, and a third record southeast of Gregory Downs in August

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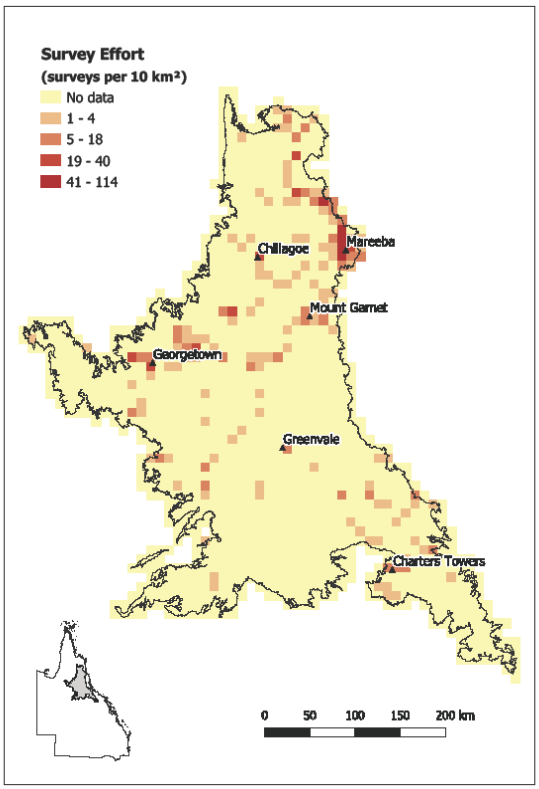
5. Einasleigh Uplands

By Stacey McLean



Map of Einasleigh Uplands Bioregion showing eBird survey effort

Painted Honeyeater (Jon Coleman)

Geography

The Einasleigh Uplands (EIU) bioregion covers an area of over 116,260 km^2, constituting 6.8% of the area of Queensland, and stretches across three climate zones – Grassland, Tropical and Subtropical (BoM 2019a). It forms the 'roof' of northern Queensland, with altitudes ranging from 200m to over 1000m. It straddles the Great Dividing Range from about Cooktown south to Proserpine, and encompasses the headwaters of several rivers including the Normanby, Flinders, Burdekin and Barren (Low 2011).

The EIU bioregion is a recognised biodiversity hotspot area, supporting several endemic or threatened species, and unique habitats. It embraces over 140 regional ecosystems, including a number that are threatened – Gidgee (*Acacia cambagei*) woodland, Brigalow (*Acacia harpophylla*) and Bauhinia (*Lysiphyllum carronii*) open woodland, and semi-evergreen vine thicket (DES 2019a). Several nationally significant wetlands occur in the bioregion, including the Herbert River Gorge, Lake Lucy Wetlands, Spring Tower Complex, and Walters Plains Lake. Regional population centres include Charters Towers, Mareeba, Einasleigh and Chillagoe (DES 2019b). Transport corridors traversing the bioregion include the Kennedy Highway, Gregory Development Road and Flinders Highway. Protected Areas in the bioregion comprise the Chillagoe-Mungana Caves, Bulleringa, Undara Vocanic, Girringun, Great Basalt Wall, and Blackbraes National Parks.

In 2017 temperatures were above to well above average for maximum, minimum and mean recordings. There was little effect on the rainfall and flooding from Cyclone Debbie in March, with rainfall varying from below average in the south to above average in the north (DES 2019b). The Charters Towers and Tablelands Council areas were Drought-declared (QG 2019).

Notable bird records in 2017

The EIU bioregion hosts 19 bird species that were recognised as significant by the *Back on Track* initiative, and state and commonwealth legislation. Noteworthy observations of these and other species recorded in the 2017 are provided below. The following significant species were not reported in 2017: Lewin's Rail, Australian Painted Snipe, Painted Honeyeater or Buff-breasted Button-quail.

Radjah Shelduck. Six recorded at Blackbraes NP in June.

Cotton Pygmy Goose. Small numbers recorded throughout the year. Fifteen recorded at White Springs Dam in May, and a flock of 40-50 recorded at Innot Hot Springs in July.

Black-necked Stork. One to three birds recorded throughout the year, many from Lake Mitchell and the Mareeba Wetlands Reserve.

Square-tailed Kite. Eleven records of single birds centered around the Mareeba Tablelands, seven of which were in the cooler months of May and June.

Grey Goshawk. One bird was recorded at the Mitchell River to the south of Mt Carbine in July, and another observed near the Barron River to the north of Mareeba.

Rufous Owl. Four records of a single bird at the same location between August and December.

Brown Treecreeper. One to six birds observed throughout the year from a small number of locations including Mareeba Wetlands Reserve and Dave's Dam to the north of Mount Carbine.

Black-chinned Honeyeater. Ten records of mostly single birds recorded at multiple locations, including Hervey Range to the west of Townsville and Blackbraes NP, between May and September. There were no reports of the Golden-backed Honeyeater (*Melithreptus gularis laetior*) in the region.

Star Finch. Two birds were observed at Mareeba Wetland Reserve in August.

Black-throated Finch. Up to ten birds were recorded in all months, the majority from Lake Mitchell, Mareeba Wetlands Reserve, and Cumberland Dam. Of 76 records of this species in 2007, 57 (75%) were in EIU. Since 2003, an annual waterhole survey for Black-throated finch has been conducted in the adjacent Townsville Coastal Plain.

Gouldian Finch. Endangered. An observation of three recorded at Mareeba Wetland Reserve in August constitutes the only record of the species in Queensland.

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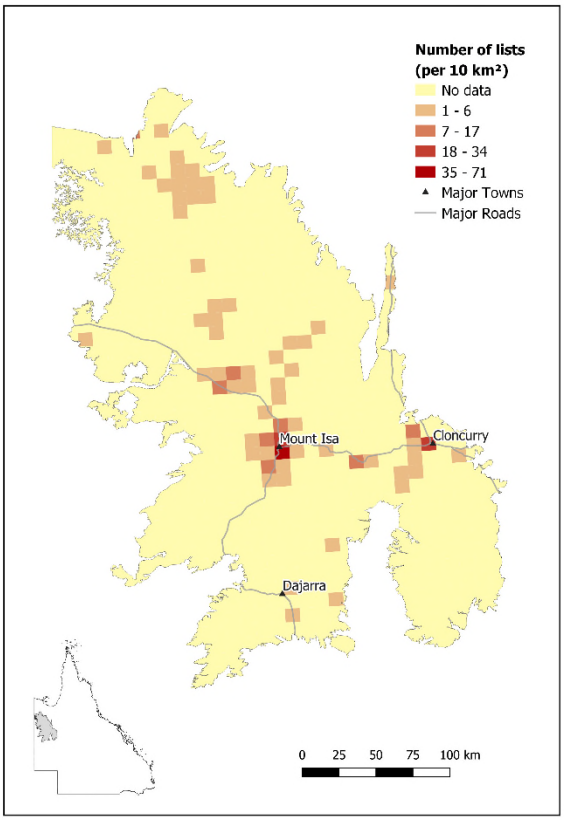
6. North West Highlands including Gulf Fall Uplands

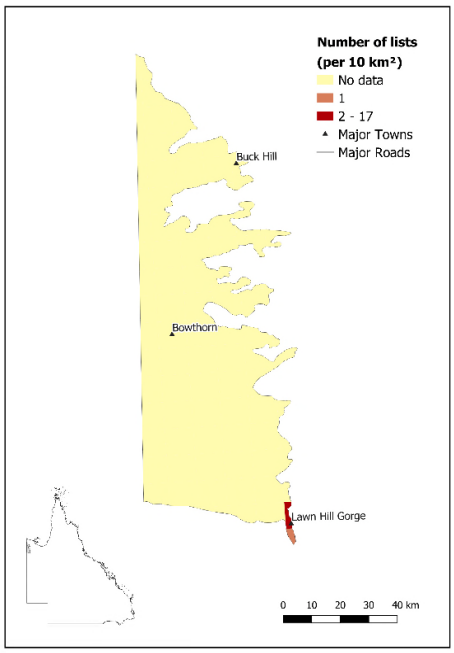
By Stacey McLean



Map of Mount Isa Inlier Bioregion, showing eBird survey effort

Buff-sided Robin (Jon Coleman)

Purple-crowned Fairywren (Jon Coleman)



Map of Gulf Fall Uplands Bioregion, showing eBird survey effort

Geography

The North West Highlands (NWH) bioregion covers some 67,540 km^2 or 3.9% of Queensland, and stretches predominantly across two climate zones – Desert and Grassland (BoM 2019a). It is an elevated, topographically diverse region, incorporating the Commonwealth Government's IBRA version 7 Mount Isa Inlier and Gulf Fall and Uplands bioregions. The NWH bioregion encompasses over 80 Regional Ecosystems, including a number which are threatened – Red Gum (*Eucalyptus camaldulensis*) woodlands, riverine wetland, and Gidgee (*Acacia cambagei*) low open woodland. It also supports nationally significant wetlands, including Lawn Hill Gorge, Lake Julius on the Leichhardt River, Lake Moondarra, and the Thortonia complex of wetlands in the upper reaches of the Gregory River (DES 2019a).

The major population centres of NWH bioregion are Mt Isa and Cloncurry. Transport corridors traversing the bioregion are the Barkly and Boulia-Mt Isa Highways, and Gregory Downs-Camoweal Road. The major Protected Areas are Boodjamulla (Lawn Hill) National Park (2,820 km²) and Camoweal Caves National Park (13,800 ha). Three Nature Refuges occur in the NWH bioregion – Ballara (174,916 ha), Chidna (8,307 ha), and Bullen Bullen (10,239 ha), all supporting habitat for threatened species, including the Gouldian Finch (DES 2019b). Two Key Biodiversity Areas encompass portions of this bioregion: Boodjamulla (37,000 ha) and Buckley River (47,900 ha) (Birdlife Australia 2019).

The NWH bioregion experiences hot summers and mild winters, with most rain falling over the summer months. In 2017, temperatures were above to well above average for maximum, minimum and annual mean. The rainfall was below to well-below average for areas south of Mount Isa and there was only some minor flooding in January (BoM 2019b). All Local Government Areas (Boulia, Burke, Cloncurry, Mckinlay, Mount Isa) were drought declared January to March, and again September to December (QG 2019).

Birds of the bioregion

This bioregion hosts 22 bird species that are recognised as significant by the *Back on Track* initiative (DES 2019a), and Queensland and Commonwealth legislation. Since 2008, periodic population surveys of the Vulnerable Carpentarian Grasswren and Kalkadoon Grasswren have been undertaken to inform land management and other actions to protect important habitat for these species. Volunteers, primarily members of Birdlife Northern Queensland, have been fundamental to the success of these surveys.

In 2017, a total of 217 species were recorded in NWH bioregion by eBirders. The majority of eBird surveys were carried out near major regional centres and associated natural and artificial waterbodies (e.g. Mt Isa and Cloncurry), and Protected Areas (e.g. Boodjamulla (Lawn Hill) National Park). The following endangered species were **not** recorded in NWH in 2017: Red Goshawk, Lesser Sand Plover, Greater Sand Plover, Australian Painted-snipe, Far Eastern Curlew, Great Knot, Curlew Sandpiper, Night Parrot and Gouldian Finch. Other significant species that were not recorded were the Vulnerable Grey Falcon, Major Mitchell's Cockatoo, Princess Parrot, and Near-threatened Bar-tailed Godwit.

Observations of significant and other notable species recorded in the 2017 eBird data are provided below.

Freckled Duck. Seven records for the Cloncurry Wastewater Treatment Plant in May and June, and a single record for Mount Isa Wastewater Treatment Plant (WTP) in March.

Green Pygmy Goose. A count of 68 was recorded for Lake Moondarra in November.

Hoary-headed Grebe. One count of 20 birds was recorded at the Mount Isa WTP in July.

Glossy Ibis. A count of 60 was recorded at the Mount Isa WTP in October.

Letter-winged Kite. One observation of a single bird was recorded for the Leichhardt River in July.

Square-tailed Kite. One single bird was recorded at Calton Hills in June.

Black-tailed Nativehen. Over 70 birds were recorded at the Mount Isa WTP in July and October.

Sharp-tailed Sandpiper. Nineteen recorded at Mount Isa WTP in March.

Spinifex Pigeon. A flock of 50 recorded at McNamara Road, Mt Isa, in July.

Barking Owl. Multiple records for Adels Grove in July, August and October. This likely represents a single or pair of birds that hold this territory.

Varied Lorikeet. A flock of 60 birds recorded near West Thornton Creek in November.

Great Bowerbird. Numerous observations recorded for Adels Grove and around Mt Isa between June and November.

Black-tailed Treecreeper. One to four birds recorded between June and November in several locations, including McNamara Road, Mt Isa and the Cloncurry-Duchess Road.

Purple-crowned Fairywren. Ten observations, mostly of two to three birds, were recorded, with six being from Adel's Grove from July through November.

Carpentarian Grasswren. Vulnerable. A total of 15 observations were recorded, 11 of which were from McNamara's Road outside Mt Isa from June through August. Observations were mostly of two to three birds.

Painted Honeyeater. Vulnerable. One observation of a single bird was recorded for near Camooweal in August.

Apostlebird. A family group of 15 birds was recorded near Cloncurry in April.

Buff-sided Robin. An observation of three birds recorded for the Gregory River crossing, Gregory Downs Station in May.

Crimson Finch. A flock of 80 recorded for the Gregory River near Lawn Hill (Gregory Base) Reserve in November.

Double-barred Finch. A flock of a 100 recorded at Little Archie Creek in August.

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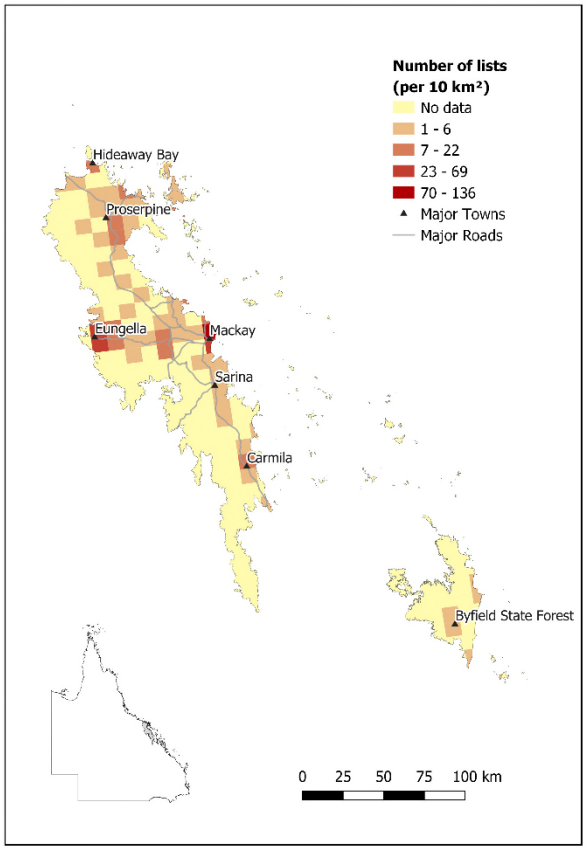
7. Central Queensland Coast

By Bob Black



Map of Central Coast Bioregion, showing eBird survey effort

Regent Bowerbird (Graham Donaldson)

Geography

The Central Queensland Coast (CQC) bioregion, covering merely 0.85% of the state (14,640km^2), is embedded within the large, drier Brigalow Belt bioregion. CQC is divided into two discrete sections: the larger northern portion from N of Proserpine to Clairview, and the smaller southern portion between Shoalwater Bay and Yeppoon. The northern section is bordered to the west by the Clarke and Connors Ranges, which receive a high rainfall and drain into the Proserpine River, Pioneer River and other coastal streams. The southern section includes the Byfield or Coast Ranges, which are drained by Waterpark Creek. The bioregion also includes a large number of offshore islands, including the Whitsunday, Percy and Keppel Groups. The major towns in the Bioregion are Proserpine, Mackay, Sarina and the northern part of Yeppoon.

The Clarke Range supports large tracts of broad-leaved evergreen rainforest and tall eucalypt forest. The flora of these high altitude rainforests has a close affinity with that of North Queensland's Wet Tropics, but contains a number of endemic rainforest species. The Connors and Byfield Ranges also have substantial areas of broad-leaved evergreen rainforest, but these are simpler, showing the effect of species loss over the cold and dry Ice Age periods. These forests have been re-enriched with tree species carried by birds (mostly fruit-pigeons) mainly from the rainforests to the north. They are rich in species of Lauraceae, and are sometimes called Pigeon Forests (Bill McDonald *pers. comm.)*. Savannah woodlands and semi-deciduous rainforests extend across lower and less fertile parts of the bioregion.

The CQC has 1,097 km^2 of listed wetlands, including coastal and estuarine mangrove communities. Nationally important wetlands include Goorganga Plain, Sand Bay, Edgecumbe Bay and Sarina/Ince Bays in the northern section, and Broad Sound, Shoalwater Bay, Port Clinton and Corio Bay in the southern section. Three internationally significant shorebird sites occur in CQC (Geering *et al.* 2007): Pioneer River-McEwens Beach (for Lesser Sandplover, Great Knot and Far Eastern Curlew); Notch Point (for Far Eastern Curlew); and Shoalwater Bay/Broad Sound (for Bar-tailed Godwit, Whimbrel, Far Eastern Curlew, Great Knot, Terek Sandpiper and Grey-tailed Tattler). The CQC encompasses four Key Biodiversity Areas (KBA)(BirdLife Australia 2019): Clarke Range and Repulse Bay-Ince Bay in the northern section, and Shoalwater Bay and parts of Broad Sound in the southern section.

Larger National Parks in the Bioregion are Conway, Whitsunday Islands, Eungella, Cape Palmerston and Byfield. There are also a number of smaller National Parks, including Bluff Hill, Cape Hillsborough and Mount O'Connell. Most of the smaller Whitsunday Islands are also National Parks. A large number of state forests have been established for native timber or both native and exotic pine plantations. The southern area also includes part of the Shoalwater Bay Military Training Area, which is closed to public access. Yet, large areas of the coastal lowlands of CQC have been cleared for sugar cane and pasture, leaving only small remnant 'islands' of native vegetation.

The climate is tropical, with a hot wet season and a warm dry season. About 60% of the rain falls from January to March. This is the wettest part of Central Queensland, with mean annual rainfall varying across the bioregion from 1,300 mm to 2,000 mm (BoM 2019a). In 2017 wet season had higher than average rainfall, with very high rainfall in March, when 830mm fell in Mackay, and 808mm fell at Samuel Hill, in the southern section. Winter was very dry, with less than 20% of the season's average rain. Rainfall in the last three months of the year was about average. Severe Tropical Cyclone Debbie crossed CQC near Proserpine on 28 March and caused extensive damage to the region. It then tracked southeast and brought days of very heavy rain down the CQC. Average maximum monthly temperatures were 1.0–1.8°C above the long-term average across the bioregion for February and March, and 1.5–2.6°C above average for July to October (BoM 2019b).

Notable bird records in 2017

Back on Track initative (QG 2019) identified 25 priority bird species in CQC. The only species endemic to CQC is the **Eungella Honeyeater**. Eleven species are uncommon or rare residents or Australian-breeding migrants. Those that were not recorded in 2017 are Wedge-tailed Shearwater, Red-tailed Tropicbird, Red Goshawk, Grey Falcon, Black-breasted Button-quail, Beach Stone-curlew (an uncommon coastal breeding resident), Australian Painted Snipe, Squatter Pigeon (southern subspecies), Glossy Black-cockatoo (northern), and Powerful Owl. The list also includes seven Northern Hemisphere-breeding migrant shorebirds that are widespread in Australia, and seven species that are are rare vagrants, locally extinct (Black-throated Finch) or based on dubious records.

Bird survey effort was very uneven across the bioregion, with large areas receiving no attention. There were no records of **Australasian Shoveler**, which has been recorded breeding in the region in some years, or of **Pied Heron**, which has been observed south as far as Broad Sound in previous years.

The following account lists species of some significance.

Magpie Goose. Common at many sites, with up to 2,000 counted at Nursery Dam at Yeppoon over much of the year.

Radjah Shelduck. Small numbers widespread, but up to 66 at Notch Point in March.

Cotton Pygmy Goose. A maximum flock size of 65 was at Kinchant Dam in March.

Orange-footed Scrubfowl. Not recorded south of Shoalwater Bay between 1960 and 2008, when one was present for a few months in Byfield, where it has been regularly recorded during the last five years.

Great Crested Grebe. Recorded at Kinchant Dam in March and July, and also at Lake Clive in November; maximum of nine counted.

White-tailed Tropicbird. One recorded at Percy Islands in February. They are normally observed out in reef waters.

Yellow-billed Spoonbill. Single records from Shoal Point in August and Mackay in October.

Black Bittern. One at Keeleys Road at Mackay in April.

Great Frigatebird. Seven observed at McCreadys Creek estuary in March during Cyclone Debbie.

Masked Booby. Recorded at Percy Islands and Mackay in February.

Great Cormorant. Uncommon in CQC, but there were four records at De Moleyns Lagoon, Kinchant Dam, and Conway NP in 2017.

Square-tailed Kite. Records from Byfield in January, Slade Point in April, Salonika Beach in June, and Eungella Township in December.

Little Eagle. Uncommon in CQC, but one recorded at McEwens Beach in May.

Pale-vented Bush-hen. In December one at Mackay Botanic Gardens and one at Finch Hatton.

Baillon's Crake. Two observed at Beaconsfield in September and October.

Black-tailed Nativehen. One observed at Kinchant Dam in March.

Red-backed Buttonquail. Up to ten observed at Eungella in January and November.

Painted Buttonquail. One or two observed at Eungella in January, October and November.

Banded Lapwing. Three records including two at McEwens Beach, two at Bucasia Beach in May, and five at Proserpine Forest in June.

Red-kneed Dotterel. One at Mackay Harbour in August, and one at Cannonvale Beach in September.

Grey Plover. Fifteen observed at Shellgrit Creek in April, and one observed in August.

Double-banded Plover. Up to eight seen at Shell Grit Creek from April to September.

Lesser Sand Plover. Recorded from many sites from August through April, with a maximum count of 123 at Shellgrit Creek in March.

Greater Sand Plover. Present at Shell Grit Creek and McEwens Beach from August through April, with a maximum count of 280 in October.

Oriental Plover. One observedat McCreadys Creek estuary in March.

Whimbrel. Present at many sites throughout the year, but fewer reported in winter. A maximum count of 137 were observed at Shell Grit Creek in October. Some of the birds in the Whitsunday Islands were reported to have a brown rump.

Far Eastern Curlew. Endangered. Present at many sites across CQC throughout the year, but fewer reported in winter. A maximum count of 61 at Shell Grit Creek in September and October.

Bar-tailed Godwit. Near-threatened. Present at many sites from August to May, with a maximum count of 300 at Shell Grit Creek in October.

Black-tailed Godwit. Near-threatened. Oneobserved at McCreadys Creek estuary in March.

Ruddy Turnstone. Observed at McCreadys Creek estuary and Shell Grit Creek from August to April, with up to 85 counted at McCreadys Creek in February.

Great Knot. Endangered. Present from September to April at three sites, with a maximum count of 75 at Shell Grit Creek in March.

Red Knot. Near-threatened. One observed atMcCreadys Creek estuary in March. This species appears to be mostly a passage migrant through CQC, as there are very few summer records.

Sharp-tailed Sandpiper. Recorded from September through February, with a maximum count of 75 at McCreadys Creek estuary in February.

Curlew Sandpiper. Near-threatened. Birds observed at Shell Grit Creek from August to April with a maximum count of 12 in August.

Red-necked Stint. Near-threatened. Birds observed at several sites from August to April, with maximum count of 230 at Shell Grit Creek in February.

Sanderling. Observed at McCreadys Creek estuary, Shell Grit Creek, and Sandy Point in Byfield from September to March, with a maximum count of 21 in November.

Pectoral Sandpiper. Three observed at McCreadys Creek estuary in February.

Latham's Snipe. Recorded in small numbers from August to March at several sites in 2017. In previous years up to 320 birds observed gathering at Broad Sound in March, when on northward passage.

Common Sandpiper. A few records of scattered individuals at McCreadys Creek estuary, Sandfly Creek, and Barwills Creek at Yeppoon.

Grey-Tailed Tattler. Near-threatened. Some birds present all year at many sites, with a maximum count of 145 at Shell Grit Creek in March.

Marsh Sandpiper. Up to eight recorded from February through March at McCreadys Creek estuary.

Common Greenshank. Up to nine recorded from August through February at McCreadys Creek estuary in February.

Brown Noddy. Two observed at McCreadys Creek estuary in March.

Little Tern. Recorded at several sites from October to March, with a maximum count of 1,000 at McCreadys Creek estuary in March.

Fairy Tern. Vulnerable. One observed at McCreadys Creek estuary in March. This record probably refers to the New Caledonian race which has recently been discovered to spend the non-breeding season at Bell Cay in the Swains Group southeast of Mackay (Andrew McDougall, QPWS *pers. comm*.).

Bridled Tern. One at McCreadys Creek estuary in March.

Sooty Tern. Eight at McCreadys Creek estuary in March.

Roseate Tern. Up to 18 at McCreadys Creek estuary in March and April, and 20 at Hideaway Bay in September.

Black-naped Tern. One at McCreadys Creek estuary in March, and four at Bucasia Beach in October.

Common Tern. Up to six observed at Notch Point and McCreadys Creek estuary in March.

White-winged Tern.One at McCreadys Creek estuary in April.

Common Bronzewing. Recorded from Slade Pt and Cape Hillsborough, where up to 16, in May and at Blue Hills in July.

Squatter Pigeon. Six at Hideaway Bay in September, and one at Finch Hatton in October.

Wonga Pigeon. Single birds recorded at Notch Point and Carmilla Beach in March, October, and December.

Torresian Imperial Pigeon. Up to 300 counted between August and April at Notch Point in March.

Pacific Koel. Recorded from September to March. Rarely recorded overwintering in CQC.

Channel-billed Cuckoo. Observed from September to May.

Greater Sooty Owl. One reported from Diggings Road, Eungella, in December. This location is closer to the known distribution of Lesser Sooty Owl, but no comments were attached by the observer.

Large-tailed Nightjar. Present year-round mostly detected in spring, when it is presumed to breed. Recorded at Byfield, Yeppoon, and Hideaway Bay in August.

White-throated Needletail. One at Byfield State Forest in March, and 20 at Airlie Beach Road in December.

Pacific Swift. Three at Airlie Beach in March, and at McCreadys Creek estuary in April.

Buff-breasted Paradise Kingfisher. Recorded at Byfield from November to April with a maximum count of 16 birds.

Little Kingfisher. One at McCreadys Creek estuary in April, and another at Mackay Botanic Gardens in July.

Black Falcon. Three observed at Kinchant Dam in March.

Long-billed Corella. Introduced. Five at Bucasia Beach in May. Populations in coastal towns are believed to be descended from released aviary birds.

Silver-crowned Friarbird. One at Blue Hills in July, near southern limit of range.

White-naped Honeyeater. A winter migrant, recorded at Proserpine Forest in June and Cape Hillsborough in August.

Eungella Honeyeater. This CQC-endemic species was recorded all year in the Eungella area with a maximum count of eight.

White-gaped Honeyeater. Up to ten recorded south to the Proserpine area from June to September.

Fuscous Honeyeater. Three observed at Salonika Beach in June.

Large-billed Gerygone. Up to three recorded at several sites around Shoalwater Bay.

Masked Woodswallow. Three recorded at Keeleys Road at Mackay in May. This species is mostly a winter migrant to north Queensland.

Black Butcherbird. Small numbers throughout the year N of Mackay. CQC constitutes the southern range limit for the species.

Grey Butcherbird. Small numbers at McCreadys Creek, Finch Hatton and Boulder Creek, but the species is generally uncommon in CQC.

Barred Cuckooshrike. Nine recorded at Boulder Creek in October.

Varied Sittella. Only one record of two at Finch Hatton Gorge in November.

Bower's Shrikethrush. One at Conway NP in September, and another at Eungella in November. This species is more commonly observed in the Wet Tropics.

Grey Fantail. Recorded throughout the year at Eungella and some other sites in northern CQC, while at Byfield and other sites in southern CQC, appears to be winter migrant only.

Black-faced Monarch. Recorded at Eungella, Byfield, and other wetter sites from September to May, with maximum count of nine in November.

Satin Flycatcher. One or two at Bucasia Van Park in July as well as Shoal Point and Sandringham Reserve in October. This species is a rare spring and autumn passage migrant.

Apostlebird. Only one record: five birds on the Bruce Highway near Proserpine in December.

Mangrove Robin. Recorded at McEwens Beach in May and October and also at Shoal Point in July. This species reaches its southern limit in CQC.

Lemon-bellied Flyrobin. One record at Keeleys Road, Mackay, in April. This species' range extends south to Broadsound.

Horsfield's Bushlark. Only one record: two at Proserpine Forest in June. This species is widespread in open grasslands, but under-reported.

White-backed Swallow. Eight observed at Kinchant Dam in March.

Little Grassbird. Reported from August to November, with up to three at Beaconsfield in September. Though probably resident in several wetlands, this species is very cryptic when not singing.

Tawny Grassbird. Reported from July to February, with up to three at De Moleyns Lagoon in January. The species is sedentary, but secretive when not singing.

Zitting Cisticola. Two at Sandfly Creek, Mackay, in May. Common on marine plains in CQC, but secretive and hard to distinguish from Golden-headed Cisticola outside breeding season.

Metallic Starling. Recorded from September to April, with a maximum count of 65 at Cannonvale in September.

Common Myna. Introduced. Four at the Mackay Botanic Gardens in December.

Russet-tailed Thrush. Records from Eungella from May to December with a maximum count of two in September.

Scaly-breasted Munia. Introduced. Four at Sandfly creek in Mackay during January, and eleven at Blacks Beach in November.

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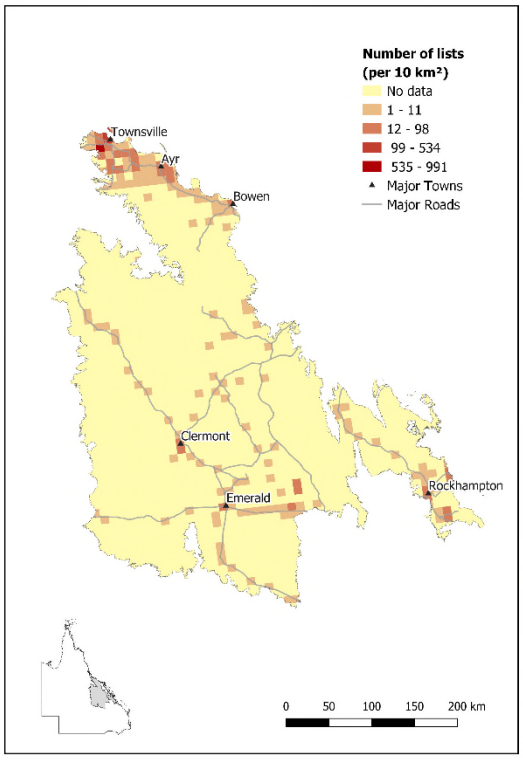
8. Brigalow Belt North

By Allan Briggs



Map of Brigalow Belt North Bioregion, showing eBird survey effort

Capricorn Yellow Chat (Allan Briggs)

Geography

Covering 8% of the state with a total area of 136,740 km², the Brigalow Belt North (BBN) lies largely north of the Tropic of Capricorn, stretching from Townsville in the north, to just north of Gladstone in the south, and southwest to Alpha and northwest to Natal Downs near Belyando Crossing. It contains five catchment areas: Bohle, Lower Burdekin, Lower Fitzroy, Proserpine and Ross catchments (QG 2018). Rundle Range to the north of Gladstone is a range of hills around 280 m above sea level (asl) and is dominated by woodland and dry rainforest (Sattler & Williams 1999). The Berserker Range just west of Rockhampton is mainly open forest and woodland communities dominated by eucalypts, with a large pocket of dry rainforest along Moores Creek and Mt Archer reaching 604 m asl. The Peak Range is a chain of prominent mountains between Moranbah, Clermont and Dysart with Wolfang Peak reaching 572 m asl.

At Homevale north west of Mackay there is a dramatic line of cliffs at the base of which there are open grassy woodlands, notophyll vine forests, dry softwood scrub, open eucalypt forests and brigalow-belah communities (Sattler & Williams 1999). Mt Abbot south west of Bowen reaches 966 m asl and is home to a significant range of regional ecosystems. Mt Elliot, south west of Townsville, reaches a height of 1,210 m asl and nearby Saddle Mountain (1,183 m) supports rainforest above 600 m, semi-evergreen vine thickets, eucalypt forest and grassy slopes interspersed with cycads and grass trees. Coastal areas have rich tidal mudflats, estuaries, beaches, mangroves and patches of beach scrub, a threatened ecosystem. Through much of the remainder of BBN, the vegetation is primarily acacia open forests and eucalypt woodlands and the main rural land use is beef cattle grazing on pastoral leases.

The major coastal population centres in BBN are (from north to south) Townsville, Ayr, Bowen, Rockhampton and Yeppoon, and inland, Clermont and Emerald. Major roads are the Bruce, Capricorn, Gregory, Peak Downs and Flinders Highways. The National Parks wholly or partly in BBN are Curtis Island, Rundle Range, Capricorn Coast, Mount Archer, Mt Etna Caves, Junee, Mazeppa, Nairana, Dipperu, Homevale, Mt Aberdeen, Mt Abbot and Bowling Green Bay. There are also two internationally important Ramsar wetlands in Bowling Green, Shoalwater and Corio Bay areas, as well as 38 nationally important wetlands (QG 2018). BirdLife Australia(2019) has identified three Key Biodiversity Areas in this bioregion: Fitzroy Floodplain and Delta, Shoalwater Bay and Broadsound.

The mean annual rainfall for the BBN from 1890 to 2005 was 590 mm, with most rain falling during the summer months and is very variable. Temperatures are also highly variable with mean minima ranging from 9° to 22°C and mean maxima from 24° to 32°C. Humidity levels during the summer months can be very high. Mean and maximum temperatures for BBN in 2017 were the highest ever recorded. Three Local Government Areas were declared as partially drought stricken (QG 2019). During the early and latter parts of the year, cyclones brought moderate rains and local flooding to coastal areas, but not to most inland areas (BoM 2018).

Birds in the bioregion

Of the eight bird species found in BBN that are listed by *Back on Track* initiative as priority species (QG 2018), two were recorded in 2017 (Black-throated Finch, Capricorn Yellow Chat). The other species are more widespread (Southern Cassowary, Red Goshawk, Beach Stone-curlew, Australian Painted Snipe, Little Tern, Black-breasted Button-quail. BirdLife Capricornia has undertaken a Capricorn Yellow Chat habitat restoration project to remove Rubber Vine *Cryptostegia grandiflora* and Harissia Cactus *Harrisia martini* from breeding areas. Many hectares of habitat have been restored and the project is ongoing. Other activities include monitoring, education and public awareness.

The Black-throated Finch recovery team was established in 2002 and has ongoing habitat protection and restoration, monitoring and public awareness activities in place. They also have management guidelines for the protection and restoration of Black-throated Finch habitat on private property (BTFRT 2008).

The avifauna of Rockhampton was detailed by Longmore (1978) who resided in Rockhampton for 20 months, during 1973–1974, during which time he recorded 255 species. A paper examining avifaunal changes in the region since the 1880s is in the final stages of preparation (Briggs & Noske in prep.).

Notable bird records in 2017

The following account is based on available records in eBird (c.50%), Birdata (c.30%;) and from BirdLife Capricornia (c.20%) for 2017.

Emu. Multiple records throughout the region including five at Gogango,W of Rockhampton, four separate sightings of 14 birds between Rockhampton and Blackwater, seven birds in three separate sightings between Emerald and Clermont, 11 birds in three separate sightings in central BBN, and 36 birds in four separate sightings at Upper Haughton, S of Townsville.

Magpie Goose. Large flocks seen in January,including estimated 5,000 on Stanage Bay Road, N of Rockhampton, 200 at Kinka Wetlands, 1,000 at St Lawrence Wetlands, and 1,500 at Woodstock, SW of Townsville. In June, 1,000 at Alva, S of Townsville.

Plumed Whistling-Duck. Flocks of over 100 observed in greater Rockhampton and Townsville regions, including 160 at Dingo, 200 at Nerimbera, and 140 at Glendale, to W, E and N of Rockhampton, respectively; 100 at Blackwater west of Rockhampton, and 200 at Fairfield Waters Wetland near Townsville. There were also many other observations of up to 60 in coastal areas between Rockhampton and Townsville.

Black Swan. Flocks of over 100 observed including 246 at Lake Mary, W of Yeppoon, and 100 at Kinka Wetlands on Capricorn Coast (both breeding areas) in July and May, respectively; also 300 at Lake Ross Dam, SW of Townsville, in October. Also many reports of up to 50 birds around Townsville and at St Lawrence Wetlands throughout the year.

Freckled Duck. A count of 70 at Murray Lagoon in October. Dry conditions in the west probably forced the ducks closer to the coast.

Pink-eared Duck. Records include three at Rockhampton and 16 at Ross River Dam in October, and 16 at Blackwater in July. Additionally, there were 13 separate records with counts of up to 250 at Cape Cleveland Roads saltpans throughout the year. Dry conditions in the west probably forced the ducks closer to the coast.

Australasian Shoveler. Records include nine at Duck Pond Environmental Reserve, S of Rockhampton, and six at Bluff, W of Blackwater, in March and May, respectively.

Grey Teal. Multiple observations of flocks of over 100, including 650 at Fitzroy Vale, E of Rockhampton in August, 160 at Kinka Wetlands, Capricorn Coast, in May. South of Townsville: 800 at Wunjunga Wetlands in June, 250 at Jerona Road in July, and 4,200 at Wongaloo in August; plus 170 at Bushland Beach, N of Townsville, in December.

Australasian Grebe. Total of 160 counted on Sheep Station Creek, S of Townsville, in May. More commonly observed in small numbers of up to 30 on water throughout BBN.

Straw-necked Ibis. Observations of note include 221 on Stanage Bay Road, N of Rockhampton, in February, and 50 at Ross River Dam, S of Townsville, in December. Smaller numbers on croplands throughout BBN all year.

Royal Spoonbill. Large flocks include 261 at Stanage Bay Road N of Rockhampton, in November, 76 at Comet, W of Blackwater, in January, and 100 at Woodstock, S of Townsville, in November. Smaller flocks of up to 20 present throughout year.

Yellow-billed Spoonbill. Commonly observed throughout BBN, usually 1-3 birds, but 19 at Yarrabee Mine, N of Blackwater, in July and 21 at Wongaloo Conservation Park, S of Townsville, in July.

Black Bittern. Individuals observed at several locations around Townsville throughout the year. One bird reported at Duck Pond Environmental Reserve, S of Rockhampton, in March.

Nankeen Night Heron. A flock of 45 observed at Mt St John Sewage works in Townsville in June.

Eastern Cattle Egret. A total of 420 counted at Stanage Bay Road in April. Commonly observed throughout BBN with flocks up to 80 in grazing paddocks.

Lesser Frigatebird. Multiple observations in coastal areas following Cyclone Debbie in March, including 43 seen flying along the Capricorn Coast, 18 in Rockhampton, and in Townsville, 70 at Soroptimist Point and 50 at Kissing Point.

Little Pied Cormorant. Breeding colonies with 20 nests at Limestone Creek, N of Rockhampton, and 12 nests at Murray Lagoon in Rockhampton.

Australasian Darter. Breeding colony with 40 nests at Limestone Creek, N of Rockhhampton.

Little Black Cormorant. Breeding colonies with 49 nests at Limestone Creek, N of Rockhampton, 24 nests at Murry Lagoon, Rockhampton, and unknown numbers of nests W of St. Lawrence and at Muller's Lagoon, Bowen. Feeding flocks of up to 100 often observed on Murray Lagoon.

Little Eagle. One observed at five locations around Townsville, and another at St Lawrence Wetlands.

Grey Goshawk. Single birds observed around Rockhampton in March, Kinka Beach in May, and at six locations around Townsville throughout the year.

Spotted Harrier. Single birds observed at Rockhampton in November, Bowen Developmental Road in April, Guthalungra in April, and Townsville Town Common in March, plus seven records of an individual at Woodstock, S of Townsville, in February, March, and April.

Black Kite. Single birds and small groups common throughout BBN, but also groups of 50 at Rockhampton rubbish tip throughout the year, 60 at Merinda, S of Townsville, in May, and 60 at Bushland Beach in September.

Whistling Kite. Group of 20 observed at Sanage Bay Road in February.

Buff-banded Rail. Four records S of Rockhampton in April, July, October, and December, and six records around Townsville in March, April, June, and September.

Black-tailed Nativehen. Records include 20 at Fitzroy Vale, E of Rockhampton, in August; N of Blackwater, 62 at Scrubbee Dam in June, and 62 at Jelinbah in August. Also individual birds at Clermont in August and Mingela, S of Townsville, in April.

Eurasian Coot. Large groups of over 100 include 2,500 at Lake Elphinstone, NW of Nebo, and 200 at Kelso, W of Townsville in May, 250 at St Lawrence Wetland in October, and 110 at Lake Mary, W of Yeppoon in July.

Brolga. Two observations of large flocks including 200 on cropland near Clermont in September, and 700 at Wongaloo, S of Townsville, in August. Large numbers tend to congregate on crop paddocks after harvest.

Red-necked Avocet. In June, 100 at Alva, SE of Townsville.

Pacific Golden Plover. A count of 110 at Cape Bowling Green in December.

Red-capped Plover. Counts of 220 at Kinka Beach in September, and 110 at Bushland Beach, N of Townsville, in October.

Lesser Sand Plover. Endangered. Three large flocks recorded: 160 at Bushland Beach in November, 190 at Cungulla Beach in January, and 120 at Little Sheepwash Creek in November.

Greater Sand Plover. Vulnerable. A count of 120 at Cape Bowling Green in November, and 350 at Bushland Beach, N of Townsville, in November.

Far Eastern Curlew. Endangered. Maximum count of 308 between 16 and 18 September, at Broadsound Coast, S of St Lawrence now a KBA. Also a count of 120 at Bushland Beach, N of Townsville, in October.

Black-tailed Godwit. Near-threatened. A flock of 1,400 observed at Cape Bowling Green in December.

Red-necked Stint. Near-threatened. Highest count was 3,000 at Cape Bowling Green in December. Other large flocks include 200 at Bushland Beach, N of Townsville, in March; 185 at Cungulla Beach, S of Townsville, in January; 155 at St Lawrence in September; 114 at Kinka Beach, Capricorn Coast, in November; and 113 at Kinka Wetlands in December

Silver Gull. Large flocks (>100) include 150 at Kinka Beach in September, 164 at Beachmount in May, 130 at Alva in May, and 100 at Townsville Town Common in May.

Gull-billed Tern. Large flocks (>100) include 174 at Fitzroy Vale in August, 200 on Stanage Bay Road in July, 270 at Cape Cleveland Road salt pans in May, and 200 at Beachmount in July.

Caspian Tern. Counts of 40 at Beachmount in July, and 30 at Bushland Beach in April.

Whiskered Tern. Large flocks (>100) include 141 at Fitzroy Vale in August, 150 at Sheep Station Creek in February, and 58 at Murray Lagoon in August.

Squatter Pigeon. Upgraded to Vulnerable in September 2017 update list to 1992 Queensland Nature Conservation Act. Breeding at Kinka Wetlands in May. Regular observations of two to four birds at Marmor, several observations of up to eight birds in central region, and many sightings of up to ten birds in the Townsville area.

Topknot Pigeon. Along the Capricorn Coast, 85 observed at Yeppoon and 70 at Kinka Wetlands. Flocks also recorded around Townsville, with 100 observed at Townsville Town Common in August.

Barking Owl. Many observations around Townsville throughout the year, as well as one observed at Woodbury near Yeppoon in August and one at Emerald in April.

Spotted Nightjar. Mostly W of BBN, but reaches coast in N part of the region. Two at Townsville Town Common in April and one in June; one at Wongaloo Conservation Park in July, and one at Lansdown Station in July.

Large-tailed Nightjar. Regular reports of individuals along Capricorn Coast and around Townsville through summer, as well as at Broadsound in September.

White-throated Needletail. Small numbers in Townsville area in March and April, but 30 counted at Stanage Bay in December.

Pacific Swift. Highest counts: 2,500 at Woodstock and 1,000 at Mt St John in January; 600 at Mt Louisa in January; 210 at Townsville Town Common, and 47 at Blackwater, in February; 100 at Duaringa and 25 at Jelinbah, N of Blackwater, in March; 300 at Lake Ross in April.

Peregrine Falcon. Ten records of single bird around Townsville area through the year.

Cockatiel. Apparently adapting to urban environments as several records from Rockhampton, including 25 at Glenleeand 35 at Kawana North, as well as 69 at Blackwater. Otherwise sparsely distributed throughout BBN region with only 35 additional eBird records for the year.

Red-tailed Black Cockatoo. Regularly observed inland, but many flocks also observed along the coast from Bowen to Townsville, including 100 at Merinda in May and 120 at Oak Valley; along Capricorn Coast, feeding on seeds of pine trees, including 82 at Stanage Bay in August.

Long-billed Corella. Introduced. Six observed at Rockhampton Botanical Gardens in May, constituting the first record of this species in the city. Additionally two observed at Emerald in July and three observations in Townsville during January, February, and July. [Eds. note: see Central Queensland Coast for records even further north]

Sulphur-crested Cockatoo. A resident roosting flock of around 200 at the base of Mt Archer in N suburbs of Rockhampton.

Budgerigar. Large flocks of 368 at Bluff and 250 at Blackwater through the winter months. Eleven also observed near Belyando Crossing in April.

Great Bowerbird. The most southern record was an isolated observation at Marlborough in September. This species is rare south of the latitude of Mackay.

Spotted Bowerbird. Records include four at Bluff in June, six at Blackwater in September, and two at Emerald in April. The most northerly records were single birds at Belyando Crossing in April and October.

Yellow Chat. The restricted-range Capricorn subspecies (*macgregori*) is listed as Critically Endangered and Endangered by the Commonwealth and Queensland Governments. In 2015, the estimated total population was 250–300 birds. In 2017 twelve birds were recorded at Fitzroy Vale, E of Rockhampton, in February, but other populations occur at Twelve Mile Creek, S of Rockhampton, and Torilla Plain, N of Rockhampton.

Yellow Honeyeater. This tropical Queensland-endemic was the tenth most frequently recorded species in BBN. In 2017, the most southerly records were of four birds at St Lawrence in October and one bird at Stanage Bay in August, 50km south and 68km south east of their recorded limit near Carmila (Atlas 1; HANZAB).

Mangrove Honeyeater. This is a trigger species for the Fitzroy Delta and Floodplain KBA, as it is restricted to mangroves, but there were 46 records through the year.

Fairy Gerygone. Observations of note include ten on the Capricorn Coast through the year, six at Lake Ross in April, and nine separate sightings around Townsville through the year.

Grey-crowned Babbler. Large groups observed at Glenlee in July (14), Woodstock in February (12), Alton Downs in August (8) and at Emerald in October (8).

White-breasted Woodswallow. A large group of 200 was seen in Rockhampton in July, and smaller groups of 20–30 at Comet, Bluff and Emerald.

White-browed Woodswallow. Nine records including 12 near Blackwater in March, 80 at Clermont in April, 90 at Glendale in September, and 12 at Lake Ross in October.

Grey Butcherbird. Records of single birds and pairs throughout BBN, but not numerous with only 49 birds recorded for the year in eBird.

Pied Currawong. Becoming well established in urban areas with around 50 records across Rockhampton through the year.

White-winged Triller. Many records (227) but vast majority in N, especially around Townsville, while only only 16 records S of Bowen.

Australian Golden Whistler. A winter migrant to BBN, with only three records in 2017: one at Coowonga in June, one at Molongle Creek in May, and one at Townsville Town Common in August.

Little Shrikethrush. Thirteen birds counted on Reid River in August.

Grey Fantail. A winter migrant with 22 records on Capricorn Coast in May, June, July and August. Six birds were recorded around Rockhampton in May, June and July, and.16 birds around Blackwater in June, July and August.

Spectacled Monarch. A total of 33 records, mostly of singletons, throughout the year in Townsville, but only two records on the Capricorn Coast, in August and September.

Australian Raven. Many records of up to five around Townsville throughout year; 16 observed at Clermont in September.

White-browed Robin. A total of 63 records, all from NE, especially around the Townsville.

Lemon-bellied Flyrobin. A total of 46 records, all fromaround Townsville.

Horsfield's Bush Lark. High count of 14 birds at Blackwater in February; 22 birds around Bowling Green Bay area, and many records of up to seven birds on Townsville Town Common.

Welcome Swallow. Records in the N, between Townsville and Bowen, are predominantly from coastal areas, but in the S, some records are from as far inland as Emerald. High counts of 300 at Beachmount and at Rita Island in June; 100 at Ayr from May through July; 200 at Alva in July, and 100 on Jerona Road in July.

Fairy Martin. High counts include 200 at Emerald in March, 130 at Bluff in April, , 300 at Rita Island in June, and 103 at Stanage Bay Rd in September; many records around Townsville through the year.

Tree Martin. Less common than Fairy Martin, most records are concentrated in coastal areas between Townsville and Bowen, but also 50 recorded at Bluff in July, and 50 at Fitzroy Vale in August.

Brown Songlark. Thinly distributed through BBN, with six records from Ross River and seven from Clermont in February, six at Beachmount in July, and four at Fitzroy Vale in August.

Tawny Grassbird. Most records from Townsville to Ayr, and only a small number from areas further south.

Golden-headed Cisticola. Most records concentrated in coastal areas between Townsville and Rita Island, but only small numbers further south.

Common Myna. Introduced. This invasive species was first recorded in Rockhampton in 2012, and since then has increased in number and spread to rural areas. High counts include 40 at Yeppoon in October and 50 in Rockhampton CBD. No records through central BBN, but many records from Townsville area where the species has been established for much longer.

House Sparrow. Introduced. Small to large flocks recorded in most towns.

Crimson Finch. Many records, including an isolated population along the Isaac River near Clarke Creek; 16 at Sheep Station Creek in May, 10 at Ayr in October, and many reports of up to four birds between Townsville and Inkerman.

Black-throated Finch. The southern subspecies (*cincta*) is Endangered. A total of 23 records, all small numbers in localities SW of Townsville.

Zebra Finch. A total of 220 records, including 100 at Belyando Crossing in April, 55 at Comet in June, 60 at Woodstock in June, 40 at Bluff in July, 43 at Clermont in August, and 65 at Kelso in October.

Scaly-breasted Munia. Introduced. Many records of up to 20 birds around Townsville, but other large flocks include 20 at Glenlee in September, 40 at Frenchville in October, and 50 at Louisa Creek in November.

Australian Pipit. High counts include 43 at Blackwater in February, 32 at Beachmount in June, and 14 at Townsville Town Common in February.

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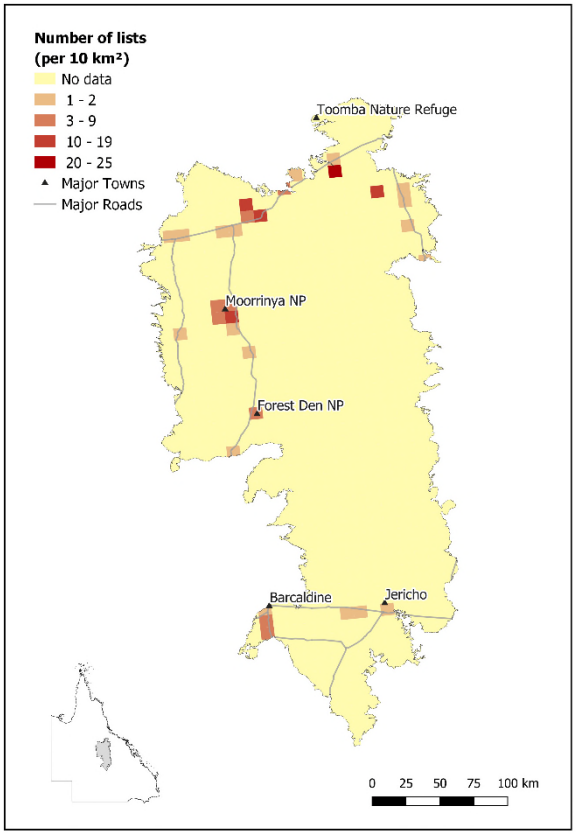
9. Desert Uplands

By David Niland



Map of Desert Uplands Bioregion, showing eBird survey effort

Australian Bustard (Graham Donaldson)

Geography

The Desert Uplands (DEU) bioregion covers 4.04% (69,410 km^2) of the area of Queensland, and stretches along the Great Dividing Range from Barcaldine and Alpha in the south to Pentland and Prairie in the north. It is mainly comprised of sandstone ranges with associated sand plains to the west. There are two internal drainage basins (Buchanan and Galilee Lakes) and some catchments flowing to the east and west. The Belyando and Cape Rivers drain to the east into the Burdekin catchment, while all western watercourses drain into the Thomson River, which continues to Cooper Creek.

The climate of DEU is strongly seasonal, with a distinct wet season from December to March, and a dry season from May to October. Mean annual rainfall is c.500 mm in the west and c.600 mm in the east. Mean maximum temperatures range from 25°C to 33°C, and mean minima from 11°C to 25°C, in the dry season (winter) and wet season (summer), respectively (BoM 2018).

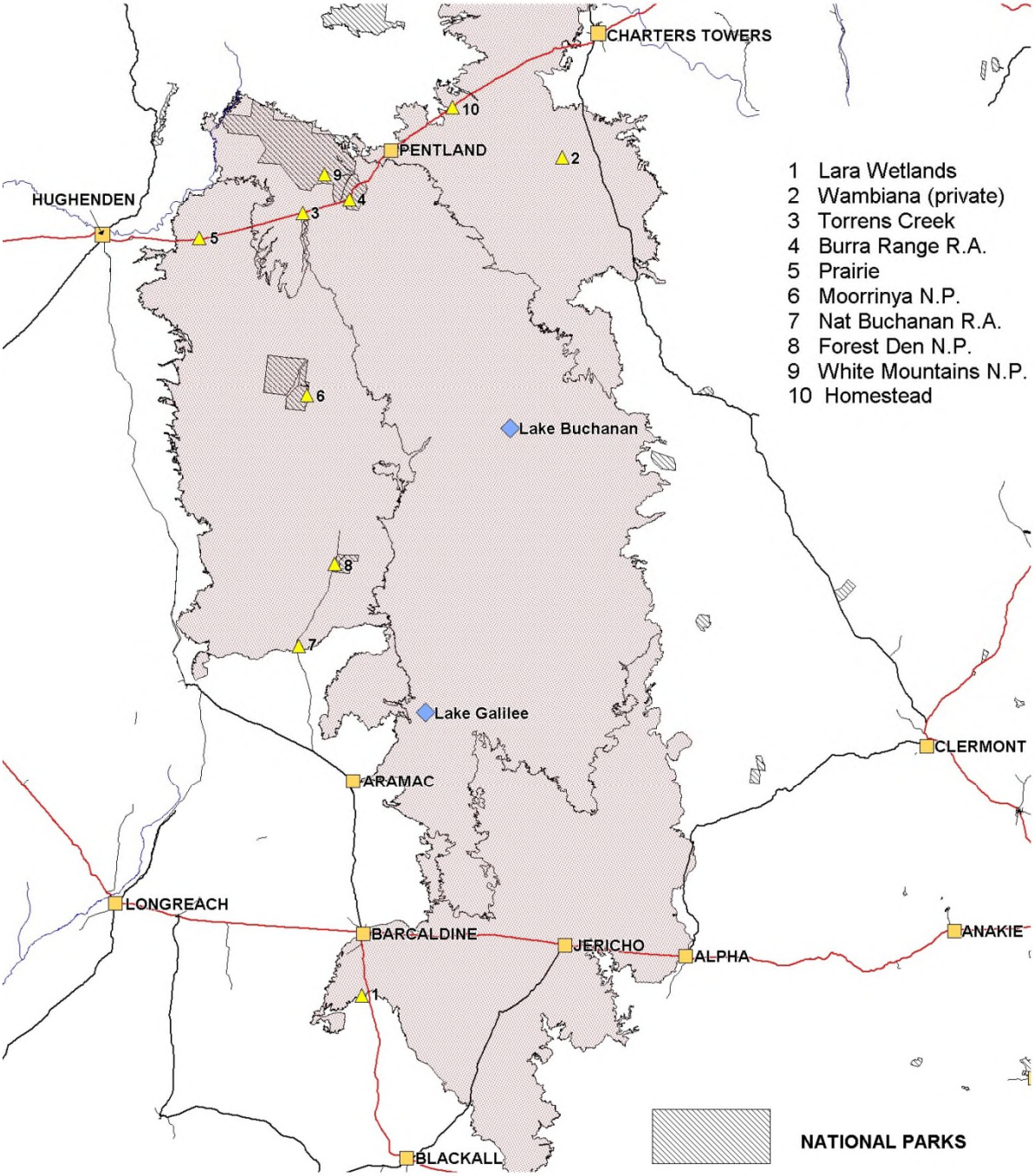


Fig. 1. Map of Desert Uplands bioregion, showing main locations mentioned in the text.

The major towns in the bioregion are Alpha, Jericho and Barcaldine along the Capricorn Highway, and Pentland to Prairie on the Flinders Highway (Fig. 1). There are no north-south road connections, except for the road from Torrens Creek to Aramac. Most of the area is within Charters Towers and Barcaldine Regional Councils, with a small portion of Flinders Regional Council in the north-west.

Protected areas include White Mountains, Moorrinya and Forest Den National Parks. The semi-arid climate and poor soils dictate that the only land use is pastoralism. The major threats to natural habitats are the continued clearing of land for livestock grazing and mines, severe bushfires associated with the planting and spread of Buffel Grass, and the increase in salinity in some soil types.

Notable bird records in 2017

Survey coverage of DEU is limited by its remoteness and harsh climate. About 30 localities were surveyed in 2017, primarily in the cooler months between April and August. Only seven localities were visited during the hot months of November to January. The year 2017 was generally drier than average, and with very little flow in the rivers, but none of this bioregion was declared drought-stricken during the year. Rainfall was well above average in March and October, but drier than average for the remainder of the year. In October, Lake Galilee was partially flooded, accommodating very large numbers of waterbirds, but there was no signs of breeding (Porter *et al.* 2017). The survey did not include Lake Buchanan. Temperatures were similar to long-term averages, and there were no significant bushfires during the year. Reports of several species of honeyeaters at Burra Range and White Mountains NP indicate the presence of a significant source of nectar during April.

Threatened bird species that have been recorded in this bioregion are the Painted Honeyeater (Vulnerable), Southern Squatter Pigeon *Geophaps s. scripta* (Vulnerable) and the Southern Black-throated Finch *Poephila c. cincta* (Endangered, EPBC), but none were reported in 2017. The eastern half of this bioregion has been identified as having significant coal deposits, and many mines have been proposed for development. Six locations are being considered between Pentland and Jericho – Pentland, China Stone, Carmichael, Kevins Corner, Alpha and Galilee. The large development proposed at the Carmichael site has already been recognised as a threat to the survival of the endangered southern race of the Black-throated Finch. Adani Mining submitted a Management Plan for the conservation of the Black-throated Finch to the Queensland and Australian Governments (Moore 2019). It is based on studies carried out since 2011 and proposes an offset area of 33,000 ha, around the area to be mined.

The following bird records in 2017 were considered noteworthy.

Pink-eared Duck. Up to 25 at Lara Wetlands.

Cotton Pygmy Goose. Four recorded at Wambiana in May.

Hardhead. One to five recorded around the region from April and May.

Brown Quail. Six observed at Moorrinya NP in April.

Australian White Ibis. Fifteen at Wambiana in May, and three at Barcaldine in October.

Royal Spoonbill. Four at Barcaldine in October, and seven at Wambiana in May.

Yellow-billed Spoonbill. Single birds recorded from May through October.

Nankeen Night Heron. Seven at Barcaldine in October.

Little Pied Cormorant. One at Wambiana in May.

Little Black Cormorant. Thirty at Wambiana in May.

Australian Pied Cormorant. Fifteen at Wambiana in May.

Great Cormorant. Twelve at Wambiana in May.

Black-shouldered Kite. Two at Wambiana in May.

Square-tailed Kite. One just SW of Barcaldine in September.

Black-breasted Buzzard. One at Barcaldine in October.

Little Eagle. A pair regularly observed at campground in Moorrinya NP during April and July.

Spotted Harrier. One at Wambiana in May.

White-bellied Sea Eagle. One at Wambiana in May.

Australasian Swamphen. Two at Lara Wetlands in May.

Dusky Moorhen. One at Lara Wetlands in May.

Black-tailed Nativehen. Eight to 40 at Lara Wetlands from April throughAugust.

Red-chested Buttonquail. Three at Moorrinya NP in April.

Red-necked Avocet. One at Moorrinya NP in July.

Red-capped Plover. Not recorded during 2017, but reported in 2016.

Black-fronted Dotterel. Up to 14 at Lara Wetlands from April through August.

Australian Pratincole. Thirty observed at Nat Buchanan Rest Area in December.

Pacific Koel. Two at Pentland in December.

Eastern Barn Owl. One at Moorrinya NP in April.

Spotted Nightjar. One at Moorrinya NP in April.

Pacific Swift. Eight flying over Burra Range in April.

Oriental Dollarbird. Three at Barcaldine in October, and also recorded at Prairie in November.

Blue-winged Kookaburra. One at Moorrinya NP in July.

Forest Kingfisher. Two at White Mountains NP in March, and two at Wambiana in May.

Sacred Kingfisher. Three at Barcaldine in October, and one at Moorrinya NP in April.

Black Falcon. One at Moorrinya NP in April.

Peregrine Falcon. One at Moorrinya NP in April.

Galah. Flocks of up to 150 observed at Moorrinya NP during April through July.

Little Corella. About 100 at Barcaldine in July.

Australian Ringneck. Fifteen at Lara Wetlands in May.

Budgerigar. Up to 30 counted at Moorrinya NP in April.

Great Bowerbird. One at White Mountains NP, and two at Pentland, in December.

White-browed Treecreeper. Five at Lara Wetlands in April.

White-winged Fairywren. Four at Moorrinya NP in April.

Pied Honeyeater. One at White Mountains NP in May.

Brown Honeyeater. Many records, including 50 counted at Burra Range in April.

Noisy Friarbird. Thirty at Burra Range in April.

White-eared Honeyeater. One to three at White Mountains NP in March, April, and September.

Rufous-throated Honeyeater. Three at Kooroorinya Falls in September.

Western Gerygone. Two at Lara Wetlands in August, and one at White Mountains NP in September.

Inland Thornbill. Two at White Mountains NP in April and again in May.

Chestnut-rumped Thornbill. Seven at Lara Wetlands in August.

Dusky Woodswallow. Ten at Moorrinya NP in April.

Little Woodswallow. Fifteen at Moorrinya NP in April.

Ground Cuckooshrike. Three at Moorrinya NP in April, and seven at Torrens Creek in July.

White-winged Triller. Two at Moorrinya NP in April, and one at Forest Den NP in December.

Crested Bellbird. Single birds at Moorrinya NP in April, Barcaldine in July, and Lara Wetlands in August.

Australasian Figbird. Three at Pentland in December.

Olive-backed Oriole. Two at Forest Den NP in December.

Leaden Flycatcher. One to two on passage at Burra Range in March and April, and again in September and October.

Little Crow. Five at Jericho in December, and 25 at Moorrinya NP in April.

White-winged Chough. Seven at Barcaldine in October.

Apostlebird. Resident flocks widespread across bioregion with over 100 near Homestead in July.

Horsfield's Bushlark. Two at Moorrinya NP in April.

Brown Songlark. Two at Moorrinya NP in April.

House Sparrow. Introduced. Not recorded in bioregion during 2017 but reported in 2016. Flocks are resident in most western Queensland towns so lack of records may reflect a lack of visits rather than lack of birds.

Zebra Finch. Many records from April through July with up to 100 at Moorrinya NP.

Double-barred Finch. Many records of up to 50 at Moorrinya NP in July.

Chestnut-breasted Mannikin. Not recorded during 2017 but reported in 2016.

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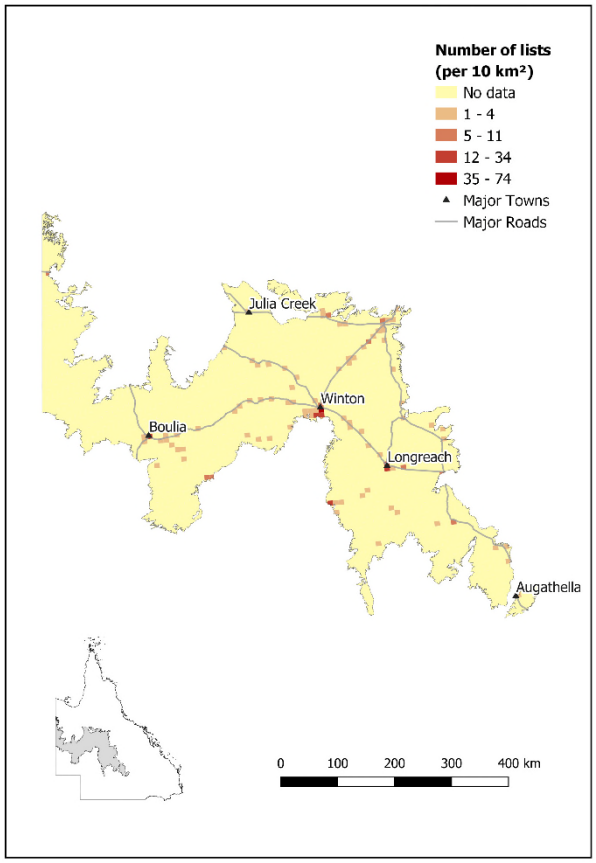
10. Mitchell Grass Downs

By Andrew Ley



Map of Mitchell Grass Downs Bioregion showing eBird survey effort

Grey Falcons (Jon Norling)

Geography

The Mitchell Grass Downs (MGD) bioregion covers 14.1% (241,620 km^2) of Queensland, making it the largest bioregion in the state. The major towns in MGD are Longreach, Blackall, Hughenden and Winton, and the major conservation areas are Astrebla Downs National Park and Lochern National Park, as well as parts of Diamantina National Park and Bladensburg National Park. Sites visited by birders include the Sewage Treatment Plants (STP) at Winton and Longreach.

The MGD bioregion lies predominately in the Desert and Grassland zones, typically experiencing hot, dry summers and mild to cold winters (BoM 2018a). The large geographic extent of this bioregion is reflected in variation in rainfall patterns, from very low rainfall in its arid western parts to summer seasonal rainfall of up to 350mm in its most easterly parts. In 2017, rainfall was below to significantly below average rainfall, and temperatures were generally well above average, especially in the southern half and the rainfall for areas around Longreach and Blackall was well below average (BoM 2018b). Virtually all of the area was drought declared (QG 2019).

Notable bird records in 2017

Following are accounts of selected bird species and occurrences of interest for 2017. These accounts are presented without endorsement and are based on eBird records for the year.

Freckled Duck. Small numbers observed at Winton STP and Longreach STP throughout the year.

Australasian Shoveler. Small numbers observed at Winton STP, Longreach STP and at Noonbah Station.

Blue-billed Duck. One observed at Winton STP during May.

Square-tailed Kite. Two records: one at Bladensburg NP and one in Winton.

Baillon's Crake. Numerous records from Winton STP.

Australian Crake. Numerous records from Winton STP and a few from the Longreach STP.

Red-necked Avocet. One record from Richmond.

Sharp-tailed Sandpiper. Nine records from Winton during September and October, and one from Diamantina NP.

Red-necked Stint. NT. Records from Winton in September and October.

Latham's Snipe. Three records from Winton during October.

Common Sandpiper. One record from Winton STP in October.

Australian Pratincole. A high count of 135 from Vellum Dam area between Winton and Hughenden.

Oriental Pratincole. One record from Vellum Dam between Winton and Hughenden.

Flock Bronzewing. Several records of large numbers, most notably c.3,000 birds in Diamantina NP in April and c.7,000 observed at Boulia in June.

Channel-billed Cuckoo. One record from Longreach STP in December.

Black-eared Cuckoo. Three records of single birds at Lochern NP, the adjacent Noonbah Station, and Winton STP.

Barking Owl. One record from Lochern NP.

Laughing Kookaburra. Records from Barcaldine, Blackall, Isisford and Winton STP.

Forest Kingfisher. One recorded at Longreach STP in October.

Grey Falcon. Several records from Bladensburg NP and Boulia.

Black-chinned Honeyeater. One record from Bladensburg NP.

Slaty-backed Thornbill. One record from Lochern NP.

Common Starling. One record from Longreach in May.

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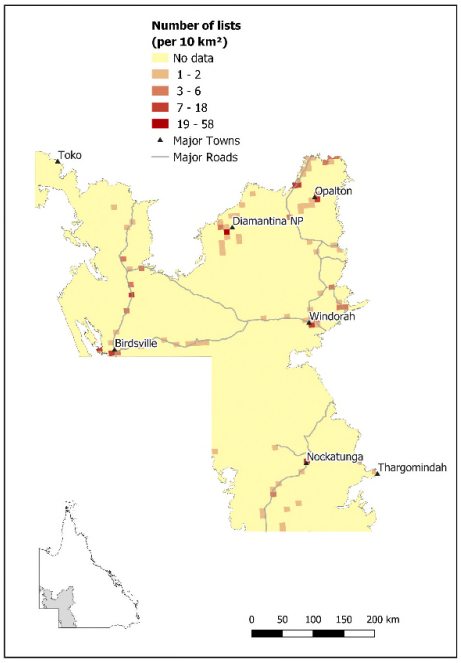
11. Channel Country including Simpson Strzelecki Dunefields

By David Niland



Map of Channel Country Bioregion, showing eBird survey effort

Australian Ringneck (Paul Turner)

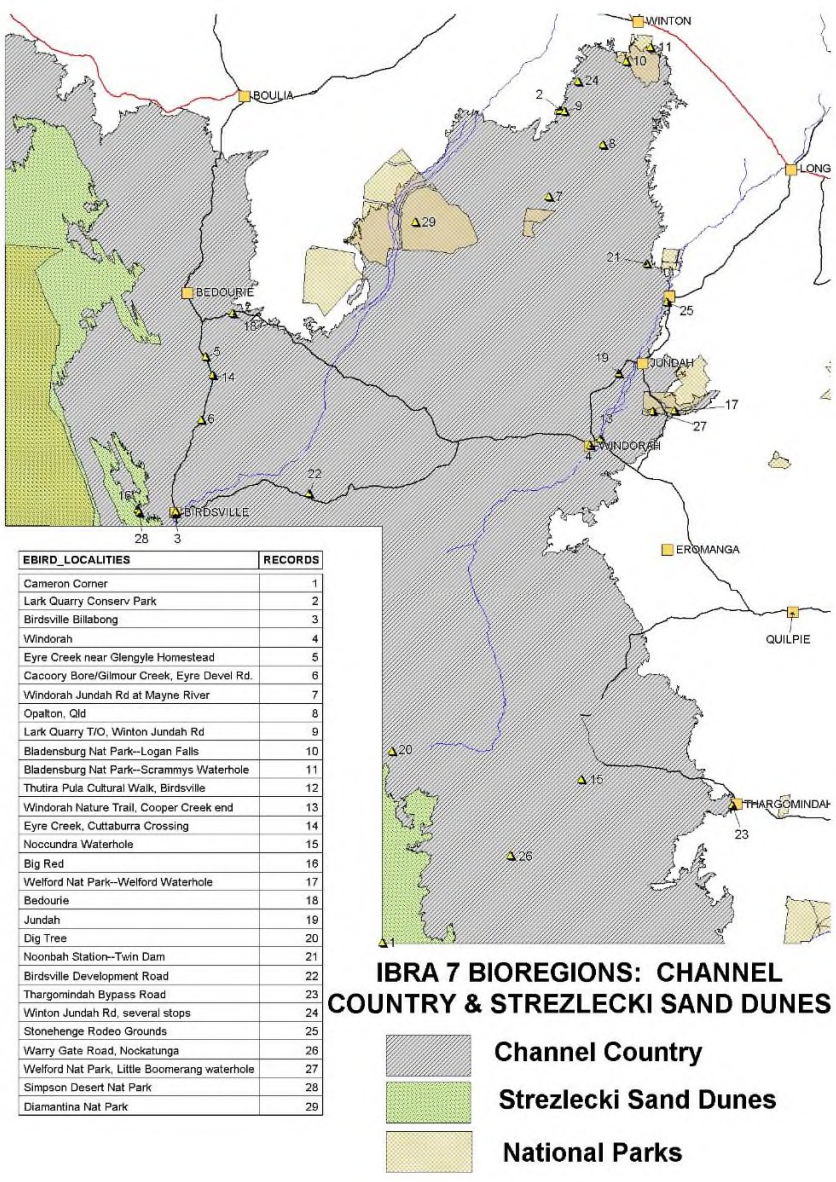
Gibberbird (Vince Bugeja)

Map of birdwatching effort for the Simpson Strzelecki Bioregion, showing eBird survey effort

Geography

Occupying the southwest corner of the state, the Channel Country (CHC) bioregion is the second largest such region in Queensland, covering 13.5% (232,080 km^2). It includes the vast flat alluvial plains of the Georgina, Eyre and Diamantina Rivers and Cooper Creek, which all flow south into the Lake Eyre Basin in South Australia, although the Simpson Desert dunefields along the Northern Territory border are not usually part of the drainage system. Some low ranges along the eastern section support slightly taller vegetation than the low shrublands of the floodplains.

This is the most arid part of Queensland, where annual rainfall is extremely variable, but averages less than 300mm. Temperatures are also highly variable with mean maxima varying from 24° to 35°C, and mean minima from 9° to 20°C (BoM 2018). The extreme heat during summer months discourages birders from visiting at this time.



EBIRD_LOCALITIES	RECORDS
Cameron Corner	1
Lark Quarry Conserv Park	2
Birdsville Billabong	3
Windorah	4
Eyre Creek near Glengyle Homestead	5
Cacoory Bore/Gilmour Creek, Eyre Devel Rd.	6
Windorah Jundah Rd at Mayne River	7
Opalton, Qld	8
Lark Quarry T/O, Winton Jundah Rd	9
Bladensburg Nat Park--Logan Falls	10
Bladensburg Nat Park--Scrammys Waterhole	11
Thutira Pula Cultural Walk, Birdsville	12
Windorah Nature Trail, Cooper Creek end	13
Eyre Creek, Cuttaburra Crossing	14
Noccundra Waterhole	15
Big Red	16
Welford Nat Park--Welford Waterhole	17
Bedourie	18
Jundah	19
Dig Tree	20
Noonbah Station--Twin Dam	21
Birdsville Development Road	22
Thargomindah Bypass Road	23
Winton Jundah Rd, several stops	24
Stonehenge Rodeo Grounds	25
Warry Gate Road, Nockatunga	26
Welford Nat Park, Little Boomerang waterhole	27
Simpson Desert Nat Park	28
Diamantina Nat Park	29

Figure 1. Detailed map of Channel Country bioregion, showing localities mentioned in the text

The major towns in CHC are Birdsville, Bedourie, Windorah and Thargomindah, while the main access routes comprise the Diamantina, Eyre, Birdsville, Cooper and Bulloo Development Roads and the Silver City Highway. Protected Areas wholly or partly in the Bioregion include the Simpson Desert, Goneaway, Diamantina, Lochern, Welford and Bladensburg National Parks. Cravens Peak and Ethabuka Reserves are owned and managed by Bush Heritage Australia (BHA 2018). Mulligan River Nature Refuge has been recognised as a Nationally important wetland.

BirdLife Australia (2019) has identified eight Key Biodiversity Areas (KBAs) in this Bioregion: Simpson Desert, Diamantina Floodplain, Lake Yamma Yamma, Cooper Floodplain below Windorah, Diamantina N.P., Lakes Muncoonie/ Mumbleberry/ Torquinie, Lake Machattie and Bulloo Floodplain.

Ley et al. (2011) documented and mapped the distribution of birds in Diamantina NP, based on 15 surveys from 1994 to 2009. Of the 180 species they recorded in the park, 11 are classified as threatened under the Qld NCA Act 1992 or by Garnett & Crowley (2000).

BirdLife Australia (2015) produced a major review of birds in the arid lands of Australia looking at trends between 1999 and 2013. This considered six different ecological categories of birds, i.e. aerial insectivores, carnivores, common species, ground nesters, hollow nesters and those associated with woodland/shrublands. All but two groups showed a strong downward trend and some had very large variations in populations. This was especially recognised for the species prone to irruptions such as the Rufous Songlark, Budgerigar and Brown Quail.

Notable bird records in 2017

The following account summarises observations of birds of some significance. The CHC was hotter and drier in 2017 than average. All of the Local Government Areas were declared as drought stricken (QG 2019) because of the severe effects of the climate on the pastoral industry, the major industry in the region. There was some minor flooding in January only, despite the impact of Cyclone Debbie in the east during March-April (BoM 2018).

Plumed Whistling-Duck. A flock of 80 observed in November.

Black Swan. At Lake Koolovoo 50 observed in June, when usually two or three only are expected.

Freckled Duck. Nine birds observed at Diamantina NP in September.

Maned Duck. A 100 observed at a lagoon W of Windorah in November when generally 12 or fewer expected.

Australasian Shoveler. Three observed at the Birdsville wetland in April.

Hoary-headed Grebe. At Birdsville, 64 seen in April when generally only observed in small numbers.

Australian White Ibis. Unusual observation of 16 at Koolivoo Waterhole in April.

Royal Spoonbill. A large aggregation of 85 birds observed at Koolivoo Waterhole in April.

Yellow-billed Spoonbill. Unusually high number of 28 observed at Diamantina NP in July.

Nankeen Night Heron. Thirty birds observed at Noccundra in January.

Eastern Cattle Egret. Over 50 birds observed at ponds on north side of Bedourie in April.

Whistling Kite. Numerous records from Koolivoo Waterhole with a maximum of 20 in April.

Black-tailed Nativehen. At a wetland W of Windorah, 150 counted in November.

Brolga. Sixteen observed at Diamantina NP camp area in July.

Red-necked Avocet. At ponds on the north side of Bedourie, 43 counted in April.

Inland Dotterel. Along road north of Diamantina NP, 15 counted in July.

Red-capped Plover. One observed at Cuttaburra Crossing on Eyre Development Road in June.

Black-fronted Dotterel. Twelve observed at Diamantina NP in July.

Sharp-tailed Sandpiper. Thirty observed at a wetland E of Birdsville in November.

Red-necked Stint. Near-threatened. One observed at Diamantina NP in September.

Marsh Sandpiper. One observed at Diamantina NP in September.

Australian Pratincole. At Papaputcheri Waterhole in Diamantina NP, 13 in September.

Silver Gull. One hundred observed at Koolivoo Waterhole in June.

Gull-billed Tern. At a wetland on the E of Birdsville, 22 counted in November.

Caspian Tern. At Koolivoo Waterhole, 124 counted in April.

Whiskered Tern. Fifty observed at a wetland E of Birdsville in November.

Common Bronzewing. Twelve observed at Bladensberg NP in June, when generally fewer than six.

Flock Bronzewing. Five counts of flocks exceeding 1,000 birds, with a maximum of 8,000 near Lake Machattie in June.

Crested Pigeon. Two counts of 50 birds in May and June when usually 20–40.

Spinifex Pigeon. Over 100 observed near Winton in July when usually fewer than 50.

Barking Owl. One observed at Welford NP in May.

Spotted Nightjar. Ten counted at Lark Quarry in April, when usually three or fewer.

Pacific Swift. Two counts of c. 800 birds near Windorah in November, as well as smaller groups in region.

Red-tailed Black Cockatoo). A flock of over 50 at Diamantina NP in September, when usually only three to six.

Major Mitchell's Cockatoo. Ten observed near Noccundra in June.

Sulphur-crested Cockatoo. A flock of 20 in Diamantina NP in September.

Red-rumped Parrot. Forty observed at Nappa Merrie where generally fewer than ten birds.

Eastern Bluebonnet. Total of 18 observed at Birdsville in June, when typically only two to four birds.

Bourke's Parrot. Twenty observed on Noccundra-Warry Gate Road in September, when one to four birds more usual.

Budgerigar. An estimate of 1,500 at Diamantina NP in September, where generally in small flocks up to 40.

Brown Treecreeper. At Windorah, 14 counted in May, whereas one to four typical.

Splendid Fairywren. In April one observed at Bedourie, which is to W of the species' usual range.

White-winged Fairywren. Fifteen observed at Bedourie in July where usually three to seven recorded.

Rufous-crowned Emu-wren. Ten at Lark Quarry CP in April and July whereas six or fewer typical.

Grey Grasswren. Two observations of up to four birds at Bulloo Downs.

Eyrean Grasswren. Several records around Birdsville, including 5–6 birds at Big Red Sand Dune in June.

Black Honeyeater. Four observed near Lark Quarry in August, and also a record S of Winton on 7 September.

Pied Honeyeater. Three observed at flowering bloodwood near Lark Quarry in August.

Striped Honeyeater. Two observed at Windorah in September.

Little Friarbird. Records from Noccundra in June and Stonehenge in August.

Gibberbird. Recorded along Birdsville Development Road in June and September, as well as in Diamantina NP in April and September.

Crimson Chat. Commonly observed with up to 120 along Diamantina River, mainly from April to September.

Orange Chat. Commonly observed through CHC from April to November with up to 60 at Koolivoo Waterhole.

Yellow Chat. Multiple records between Birdsville and Bedourie in June.

Grey-headed Honeyeater. Most records N of Lark Quarry from April to Septemberbut also a few records from Diamantina NP in April, and near Stonehenge in August.

Red-browed Pardalote. Observations scattered over CHC mainly from June to September.

Striated Pardalote. Recorded near Windorah in June and September.

Weebill. Recorded from Bladensburg NP south to Windorah in May and June.

Redthroat. Single record near Lark Quarry in August, and another at Diamantina NP in April.

Chestnut-rumped Thornbill. Scattered records throughout eastern parts of CHC from April to September.

Southern Whiteface. Two records near NSW border in January and September.

Grey-crowned Babbler. A few records from N of Lark Quarry south to Windorah in June, August, and September.

Hall's Babbler Most records from the Lark Quarry area, but one record of eight birds at Windorah.

Chestnut-crowned Babbler. Three records to S and W of Noccundra in June and September.

Chirruping Wedgebill. Multiple records from Noccundra and to south in May and June.

Cinnamon Quail-thrush. Recorded from Birdsville to Bedourie in June, August, and November.

Chestnut-breasted Quail-thrush. Records from Bladensburg NP and Diamantina NP from April through June and also in September.

White-breasted Woodswallow. Flocks of up to ten throughout region, but no records from May to August.

Masked Woodswallow. Large flocks of up to 150 in September, and smaller flocks observed throughout CHC at other times.

White-browed Woodswallow. Flocks up to 200 in eastern parts of region from May to September.

Black-faced Woodswallow. A large flock of 150–200 birds, mixed with White-browed Woodswallows, SW of Opalton in June; smaller groups throughout CHC.

Grey Butcherbird. Recorded most frequently in the eastern half of the region.

White-bellied Cuckooshrike. One or two observed in Diamantina NP in April.

Varied Sittella. Small flocks observed at Bladensberg NP in May, and Lark Quarry in July.

Crested Bellbird. Regularly observed in eastern half of region from April to September.

Grey Fantail. Scattered records throughout CHC, most frequent in September.

Torresian Crow. Most records from north-eastern part of region during June.

Little Crow. Recorded throughout region in flocks of up to 50 during May through September.

Horsfield's Bushlark. Multiple records from Diamantina NP, mainly during April and September, and one record at Cuttaburra Crossing in June.

Welcome Swallow. Most records from western half of CHC, from May to August.

Australian Reed Warbler. Multiple records from around Birdsville in July and September, and ten birds at Thargomindah in September.

Little Grassbird. Multiple scattered records throughout CHC from January to September.

Brown Songlark. Most records from Diamantina NP but also observed in the S and W of CHC, particularly during January, September, and November.

Common Starling. A few records from Windorah during September and November.

House Sparrow. Small to large flocks resident in most towns in the region.

Painted Finch. Up to 30 counted in Diamantina NP in September.

Plum-headed Finch. A small flock observed at Bedourie ponds on 26 April.

Australian Pipit. A few observed W of Thargomindah in January.

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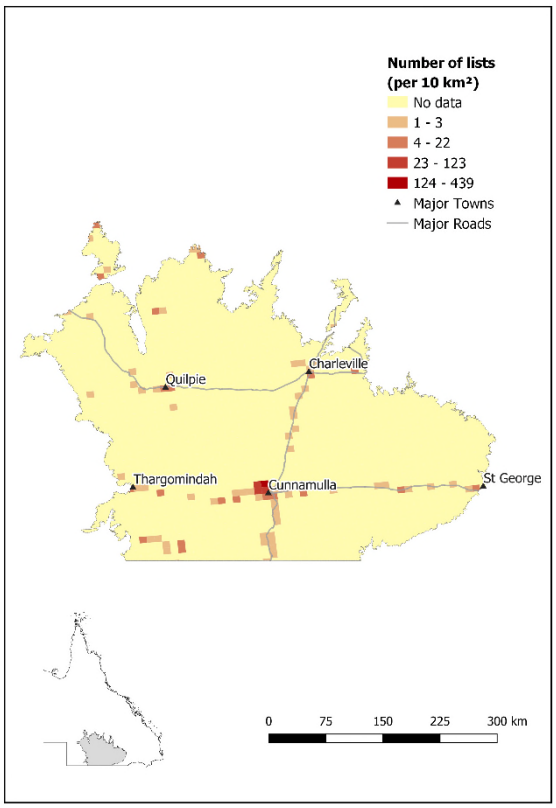
12. Mulga Lands

By David Niland



Map of Mulga Country Bioregion, showing eBird survey effort

Major-Mitchells Cockatoo (Paul Turner)

Geography

The Mulga Lands (MUL) constitute the fifth largest bioregion in the state, covering 12.6% (186,000 km^2) of Queensland, and extends south into adjacent New South Wales. The dominant topography is flat to undulating plains and low ranges, and the soils are generally infertile sandy earths. Mulga is the main vegetation community in shrubland and woodland, while Poplar Box is dominant in the tall woodlands of the wetter eastern half (Sattler & Williams 1999). The climate is semi-arid, with mean annual rainfall varying from 300 to 450mm across the bioregion, and high variability of rain events. Mean temperatures ranges are 8°– 22°C in winter, and 18°– 32°C in summer (BoM 2018).

The major towns in in MUL are St George, Cunnamulla, Thargomindah, Charleville and Quilpie. Major drainage catchments comprise the Bulloo, Paroo, Warrego and Balonne Rivers, the last forming the eastern boundary of the Bioregion. The main access routes through the area are the Balonne Highway from St George to Cunnamulla, continuing west as the Bulloo Development Road to Thargomindah. Radiating from Charleville are the Mitchell Highway running south through Cunnamulla to the border and the Diamantina Development Road running west through Quilpie.

Areas providing some degree of environmental protection include Currawinya, Hell Hole Gorge, Lake Bindegolly, Mariala, Thrushton National Parks and parts of Welford, Idalia, Culgoa Floodplain and Tregole National Parks. Bowra Sanctuary, just NW of Cunnamulla, is owned and actively managed by Australian Wildlife Conservancy (AWC 2019), while Birds Queensland is responsible for maintaining a roster of voluntary caretakers, as well as bird monitoring activities. Volunteers from Birds Queensland

conduct daily monitoring of the diversity and relative abundance of birds at Bowra Sanctuary through the nightly "Bird Call", during which the greatest number of birds seen by any observer(s) at one time is recorded. This simple measure of abundance has been recorded almost every month since 2010.

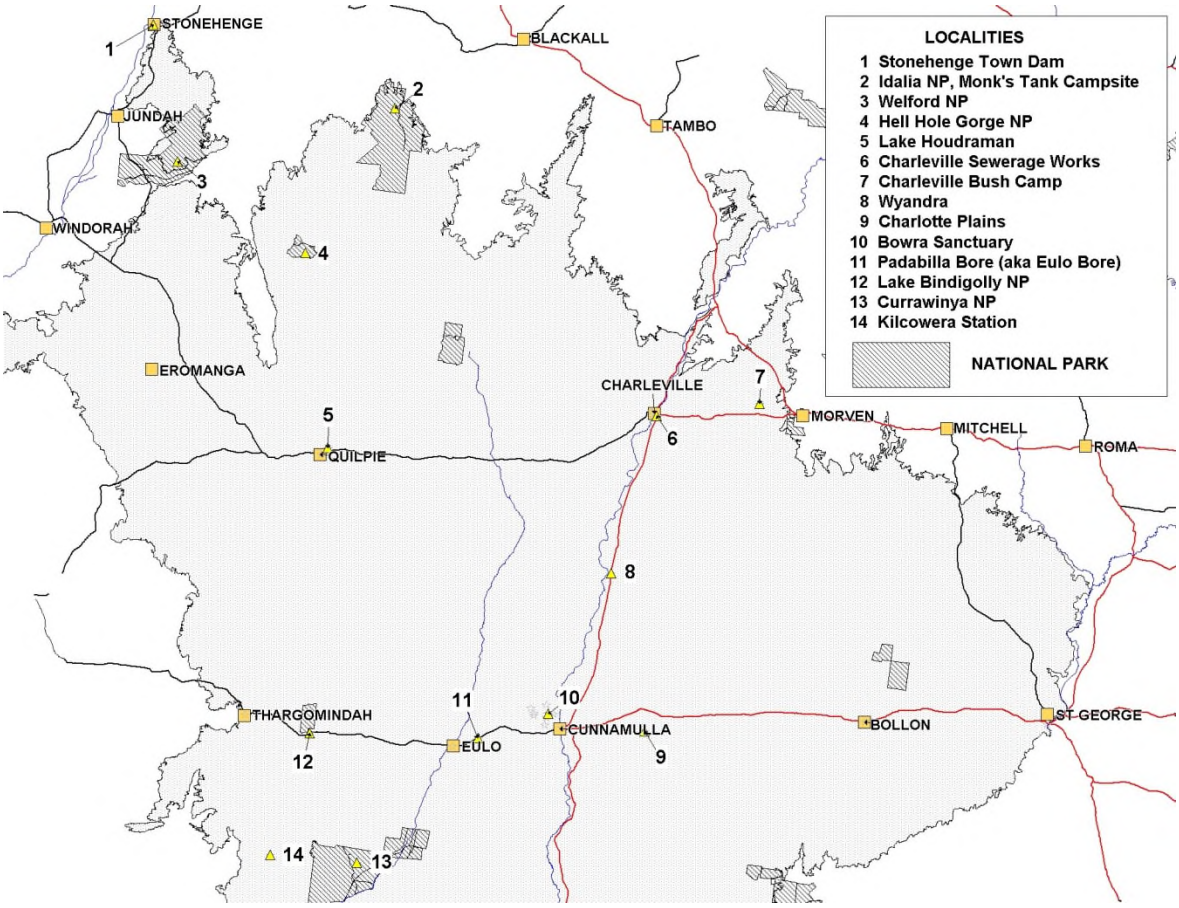


Figure 1. Detailed map of Mulga Lands bioregion, showing localities mentioned in the text

Birds in 2017

Bird survey effort is relatively low during summer, owing to the extreme heat experienced by observers during that period. Almost 94% of eBird records were collected from April to September. The locations of 31 eBird survey sites are shown in Fig. 1. While temperatures during 2017 were close to average, rainfall was generally lower than average (BoM 2018). Rainfall varied between 150mm and 300mm, increasing from west to east. All Local Government Areas were declared as drought-stricken throughout the year (QG 2019). There was very little flow in the rivers, and ephemeral wetlands such as Lake Bindigolly were dry throughout the year. Total 2017 rainfall at Bowra was 200mm, a mere 40% of the total for the previous year. The only significant falls (> 20mm) were in January, October and December (BoM 2018).

The total number of species recorded at Bowra Sanctuary during the year was 181, the lowest total for the last seven years, despite involving the greatest sample size (353 days). There were drastic reductions in granivores (finches and quail) and piscivores (cormorants, Darter and Pelican). Bird banding has also been conducted over a week during the Easter period each year since 2013 (see report herein). In 2017 the bird banding group captured and banded 1,129 birds, while another 113 birds were recaptures from previous years. Three species of honeyeaters accounted for 41% of the total catch. A total of 109 species was recorded during the week, very similar to previous years, but there was a a significant reduction in some species, due in part, to the lack of surface water.

Significant and interesting observations are detailed below.

Emu. Plentiful across the region, most frequently from May through September.

Plumed Whistling-Duck. Groups of six to 15 observed from December to April.

Black Swan. Most records of single birds from March to August.

Freckled Duck. One or two recorded at Cunnamulla and Charleville STW in April and June.

Pink-eared Duck. Regularly observed throughout the year and across region with a maximum count of over 1,000 at the Charleville STW in April.

Maned Duck. Observed throughout the year and across the region with counts of 30 to 70 common near urban areas.

Australasian Shoveler.One or two at several sites between April and September.

Grey Teal. Small groups throughout the year and across the region, with large count of 500–700 at Charleville STW in April.

Chestnut Teal. Small groups of four and nine at Cunnamulla STW in August and September.

Hardhead. Regular records of small numbers, but a peak of 50 observed at Charleville STW in April.

Blue-billed Duck. Near-threatened. One recorded at Charleville STW in April.

Brown Quail. Only two records, both in September.

Australasian Grebe. An unusually high count of 30 at Charleville STW in April.

Hoary-headed Grebe. Regular records of small numbers, but a peak of 25 at Charleville STW in April.

Great Crested Grebe. Eight observed at Quilpie STW in September.

Glossy Ibis. Forty observed at Eulo Wetlands in January.

Nankeen Night Heron. No records from July through December.

White-necked Heron. No records from November or December.

Great Egret. Records of single birds between January and September across bioregion.

Intermediate Egret. Usually singletons, but up to 15 at Bowra Sanctuary in March and May.

White-faced Heron. No records from November or December.

Australian Pelican. An unusually high count of 90 at Bowra Sanctuary in August.

Little Black Cormorant. A flock of 50 observed at Welford NP in August.

Great Cormorant. Small numbers recorded between March and September across region.

Black Kite. Large numbers between Cunnamulla and Burke, NSW, in August.

White-bellied Sea Eagle. Two observations of this sparse resident include one at Currawinya NP and one at Cunnamulla.

Australian Crake. Single birds recorded across region, mostly from April to September.

Spotless Crake. A single bird at Charleville STW in April and September.

Australasian Swamphen. Resident mainly observed at STWs from April through September.

Black-tailed Nativehen. Flock counts of 30–40 at Bowra Sanctuary and Quilpie, mostly from April through September.

Eurasian Coot. Up to 100 counted at Charleville STW in April.

Brolga. Resident with over 100 regularly counted on a paddock on Humeburn Rd outside Cunnamulla from May through June.

Bush Stone-curlew. A single bird at Bowra Sanctuary camping ground from August through September of this sparse resident species.

Red-necked Avocet. A flock of 28 at Kilcowera Station in August.

Banded Lapwing. Recorded from January through August at Bowra Sanctuary, with a maximum count of 16 in February.

Red-kneed Dotterel. Flocks of up to 15 at the Bowra Sanctuary in February and March.

Inland Dotterel. One observation of five birds at Bowra Sanctuary in March.

Red-capped Plover. One or two birds at Bowra Sanctuary between March and August, and eight at Currawinya NP in April.

Black-fronted Dotterel. Over 50 at Charlotte Plains Station in January.

Common Greenshank. Records across region in March, September, and October.

Australian Pratincole. Twelve recorded at Humeburn Rd turn-off in Cunnamulla during September.

Silver Gull. Scattered records from April to June.

Flock Bronzewing. A possible record five in Cunnamulla in April.

Crested Pigeon. Resident at Bowra Sanctuary, but flocks of up to 200 from April through July.

Spinifex Pigeon. Resident in parts of MUL; observed at Welford NP and Stonehenge.

Diamond Dove. Up to 50 observed at the Bowra Sanctuary, with peak numbers occurring in January and February.

Peaceful Dove. Up to thirty at Bowra Sanctuary, with peak numbers from June through September.

Bar-shouldered Dove. All records from May through October.

Horsfield's Bronze Cuckoo. Number of records at Bowra Sanctuary higher than in 2011-2016.

Black-eared Cuckoo. Number of records at Bowra Sanctuary higher than in 2011-2016.

Fan-tailed Cuckoo. A few observations from Bowra Sanctuary in June and July.

Spotted Nightjar. Most records from Bowra Sanctuary occurred in March and September.

Pacific Swift. Most records were of small groups, mainly in January, but one flock of 200 also recorded.

Oriental Dollarbird. One observed at Bowra Sanctuary in October.

Rainbow Bee-eater. Flocks of up to 50 in MUL, but no records from April through July.

Grey Falcon. Vulnerable. Single birds at Bowra Sanctuary from May through September.

Peregrine Falcon. Recorded at Bowra Sanctuary from May through June.

Cockatiel. Up to 400 at Bowra Sanctuary from January through March.

Red-tailed Black Cockatoo. One flock of 22 recorded at Welford NP in August.

Galah. Resident at Bowra Sanctuary, with large flocks of 200-600 from May through July.

Major Mitchell's Cockatoo. Resident at Bowra Sanctuary, with counts of 70-130 in August and September.

Eastern Bluebonnet. Flocks of up to 20 at Bowra Sanctuary during May through July.

Mulga Parrot. Flocks of up 20-40 at Bowra Sanctuary in June.

Pale-headed Rosella. A small population in Charleville appears to be resident.

Bourke's Parrot. Flocks of 30–40 of this resident species at Bowra Sanctuary during March through May.

Blue-winged Parrot. An occasional migrant to MUL, not recorded every year. One was captured at Bowra during bird banding week in April see report herein), and four were observed in September at Bowra Sanctuary.

Rainbow Lorikeet. A few observations of up to six birds in Charleville.

Budgerigar. Most records from January through March, and none after August.

Superb Fairywren. Western limits correspond to the eastern edge of MUL, resulting in a few records from St George and N of Augathella.

Black Honeyeater. Observations of up to six birds,mostly from June through October.

Pied Honeyeater. Three observed at Thargomindah in September.

Painted Honeyeater. Vulnerable. Observations of one to three at Bowra Sanctuary in September.

Black-chinned Honeyeater. Up to three birds recorded at Bowra Sanctuary and Thargomindah in August and September.

White-eared Honeyeater. Two recorded at Idalia NP in June.

Crimson Chat. Most records of only a few birds, but flocks of 40–50 at Bowra Sanctuary, mostly from May to August.

Orange Chat. Scattered observations throughout the year at Bowra Sanctuary with a maximum of ten birds in June and July.

White-fronted Chat. A rare species in MUL, but a single bird photographed at Bowra Sanctuary in June.

Yellow-faced Honeyeater. Uncommon in MUL, but records from Bowra Sanctuary in May and Eulo in July.

[**Noisy Miner**. Unconfirmed records from Bowra Sanctuary, Charleville, and Stonehenge between April and October. Photographic evidence is desired.]

White-fronted Honeyeater. Uncommon in MUL, but one or two birds at Bowra Sanctuary in February and June.

Grey-headed Honeyeater. Resident observed year-round at Bowra Sanctuary with up to six birds.

Red-browed Pardalote. Resident, but recorded more frequently from June through September.

Redthroat. Up to three birds at Bowra Sanctuary, Welford NP, and Hell Hole Gorge National Park between March and September.

Speckled Warbler. Three records, including one at Idalia NP in June–July.

Western Gerygone. Most records from Bowra Sanctuary with peaks in June–July, and September.

[**Buff-rumped Thornbill**. Most records from Bowra Sanctuary (145°35’E), with peak between April and September. These require confirmation as the accepted western limits in southwest Qld are around Dirranbandi (148°14’E; HANZAB), despite doubtful records at Yowah Opalfields (144°38’E; Sharrock 1982).]

[**Slaty-backed Thornbill**. Four records from across MUL from March to June require confirmation with detailed notes and preferably photos. Historical records in Queensland from 26 km W of Eromanga (143°16’E) in 1971 (Ford & Parker 1973), 30-40 km E of Adavale in 1983 (144°36’E; Stewart 1984); 70 km W of Windorah (143°19’E) in 1984 (Palliser 1985), and five birds 15 km E of Eulo (145°03’E) in 1991 (Inglis et al. 1992), all west of Bowra.]

Hall’s Babbler. This restricted-range species was recorded as far north as Stonehenge.

[**White-browed Babbler**. Four unconfirmed records from Bowra.]

Chestnut-crowned Babbler. Recorded as far north as Quilpie and Welford NP.

Chirruping Wedgebill. Recorded at Thargomindah and Lake Bindigolly NP.

Masked Woodswallow. Recorded throughout the year, but large flocks of over 100 at Bowra Sanctuary in late August and early September.

White-browed Woodswallow. Recorded throughout the year, but large flocks of over 100 at Bowra Sanctuary in late August and early September.

Black-faced Woodswallow. Recorded throughout the year, but largest flocks were recorded in August and September.

Dusky Woodswallow. Small numbers recorded from Cunnamulla to Thargomindah.

Little Woodswallow. Throughout MUL, with counts of up to 20 at Bowra Sanctuary.

Pied Currawong. A few records as far west as Bollon, Charleville and Idalia NP, though MUL is west of its normal range.

Ground Cuckooshrike. A few records from Bowra Sanctuary in August and September.

White-bellied Cuckooshrike. Most records from August, and a dark morph bird at Bowra Sanctuary.

White-winged Triller. Most records from August and September.

Varied Sittella. At Bowra, most birds appear to represent subspecies *chrysoptera*, though at least one bird similar to *pileata*.

Crested Bellbird. Regularly observed in eastern half of MUL, with most records from April to September.

Australian Golden Whistler. Rare MUL, but two records from Bowra Sanctuary, one in August and one in September.

Olive-backed Oriole. Most observations from May to August.

Grey Fantail. Clearly a visitor from late April until late September.

Leaden Flycatcher. Rare in MUL, but one recorded at Bowra Sanctuary in July.

Torresian Crow. Reported from St George, Charleville, Stonehenge and Bowra Sanctuary, but most records are unconfirmed and may refer to Australian Raven or Little Crow.

Little Crow. Small numbers recorded from Cunnamulla to Thargomindah.

Eastern Yellow Robin. Isolated records from Idalia NP and Hell Hole Gorge NP.

Australian Reed Warbler. Usually singletons but counts increased to eight during September.

Little Grassbird. A few records from Cunnamulla and Charleville STW.

Brown Songlark. Recorded at Bowra Sanctuary in January, June, and September.

Common Myna. Introduced. This invasive species appears to be slowly moving westward, with one observed at Charlotte Plains Station and four observed N of Angellala.

Common Starling. Introduced. Established populations of up to 30 at Cunnamulla and Quilpie.

House Sparrow. Feral. Observations of this resident recorded in most towns in the Mulga Lands region.

Plum-headed Finch. Scattered records between St George and Cunnamulla.

Zebra Finch. Virtually absent from Bowra Sanctuary presumably due to dry conditions and lack of grass seeds.

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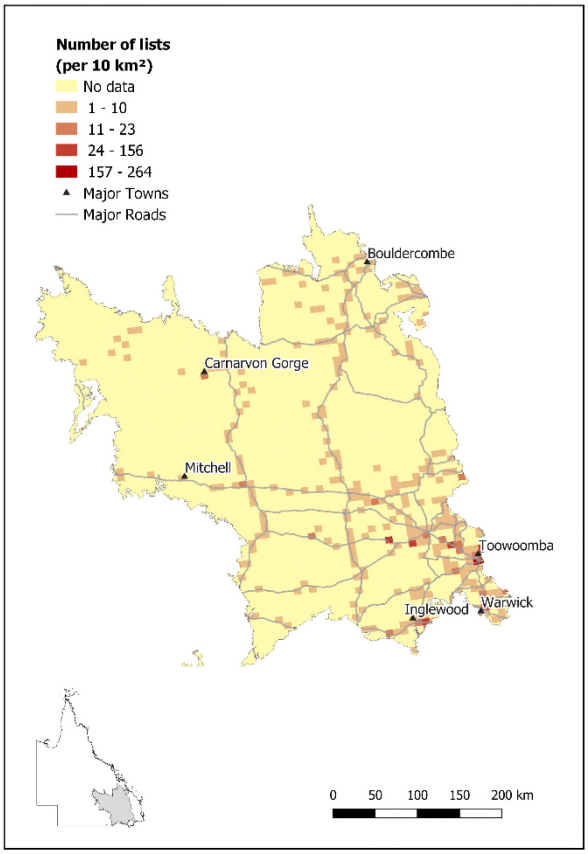
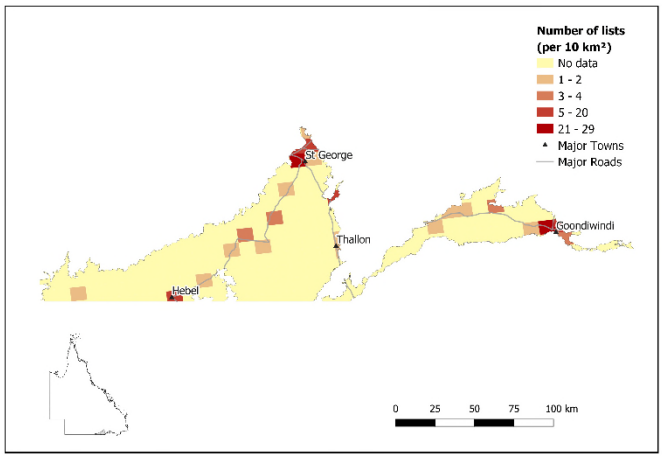
13. Brigalow Belt South, including Darling Riverine Plains

By Stacey McLean



Map of Brigalow Belt South bioregion, showing eBird survey effort

Wedge-tailed Eagle (Vince Bugeja)



Map of Darling Riverine bioregion, showing eBird survey effort

Geography

The Brigalow Belt South (BBS) bioregion covers 215,967 km^2, or 12.6% of the area of Queensland. It is one of the most biogeographically diverse Queensland bioregions, encompassing the elevated Carnarvon and Expedition Ranges sections of the Great Dividing Range, and the extensive riverine and

floodplain ecosystems of the Balonne-Condamine, Moonie and Border Rivers in the south (Low 2011). The BBS encompasses the northernmost parts of IBRA7 Darling River Plains bioregion, and spans three climatic zones – Subtropical, Grassland and Temperate (BoM 2019a). This biogeographic and climatic diversity is reflected in the BBS (and the BBN) bioregions supporting over 160 Regional Ecosystems (DES 2018a).

The main regional population centres are Toowoomba, Dalby and Roma. Transport corridors traversing the bioregion include the Leichhardt, Carnarvon, Warrego and Moonie Highways. The BBS bioregion supports several wetlands, waterbodies and floodplains that are especially important habitats for waterbird foraging and breeding. Important sites include the floodplain woodlands and swamps of the Monto area; Lakes Broadwater and Nugga Nugga; red gum and coolabah woodlands around Lake Murphy; and some artificial waterbodies, such as Coolmunda and Gordonbrook dams.

The major Protected Areas in BBS are Carnarvon and Expedition National Parks, encompassing over 3,000 km^2 and 1,000 km^2 respectively. Other important national parks and public forests include Culgoa Floodplain and Thrushton National Parks in the south, and Barakula State Forest in the east. Abutting Carnarvon National Park, Bush Heritage Australia's Carnarvon Station Reserve covers 59,000 ha, massively extending the protection of lower elevation ecosystems in this region (BHA 2018). The diversity of ecosystems is also represented in smaller scale private nature refuges – the Wildlife Land Fund Limited have a 30ha remnant of unusually varied Western Downs woodland under management near Dalby. (WLFL 2019)

The fertile cracking clay soils of BBS support extensive pastoralism for beef production, which has resulted in the clearing of over 90% of the native vegetation cover. In 2017-18, the reported state-wide woodland vegetation clearing rate was 392,000 ha per year. The highest clearing rate (204,000 ha per year) during this time occurred in the Brigalow Belt bioregions (DES 2018b). Many regional ecosystems in this bioregion are consequently threatened. These include Semi-evergreen vine thickets, Brigalow open forests, *Themeda* (Kangaroo Grass) and *Triodia* (spinifex) grassslands, Forest red gum woodlands, and Montane shrublands ((DES 2018a).

In 2017, temperature were above to well above average throughout and the rainfall varied from below average in the west to above average in the east. This was largely due to the effects of Tropical Cyclone Debbie which travelled down the eastern side as a rain depression in April (BoM 2019b). All local government areas encompassed by the BBS bioregion were Drought Declared (QG 2019) (full or partial) throughout 2017. Only the Central Highlands LGA was not drought declared.

Birds of the bioregion

The BBS bioregion supports several significant bird species as recognised in the *Back on Track* initiative (DES 2018a), and state and commonwealth legislation. Noteworthy observations of these and other species recorded in 2017 eBird data are provided below, but there were no records of the Australasian Bittern or Red Goshawk (Endangered), Plains-wanderer, Swift Parrot, Turquoise Parrot, Regent Honeyeater, Star Finch, Southern Black-throated Finch, Gouldian Finch , Black-breasted Buttonquail, Grey Falcon, Australian Masked Owl or Eastern Grass Owl (Vulnerable).

Birdlife Australia has identified one 'Key Biodiversity Area' (KBA) in the BBS bioregion – Palmgrove. This KBA recognises some 24,600 ha of land, centred on the Palmgrove National Park, as important habitat for the Black-breasted Button-quail. Since 2002, the Toowoomba Bird Observers has undertaken annual bird surveys of the Toowoomba region, extending west to Dalby, north to Goombungee; south to Pilton and Felton; and east into the Lockyer Valley.

The birds of Myall Park Botanic Gardens, 7 km north of Glenmorgan, and the surrounding Western Darling Downs region, are described in a lavishly illustrated spiral-bound book published by the Brigalow

Birds Educational Project. The book features 250 bird species and provides details of 13 local birding sites.

Notable bird records in 2017

The following list provided details of significant and interesting records in 2017. The majority of eBird surveys took place near major regional centres (e.g. Toowoomba), along major transport routes, and readily accessible Protected Areas, such as Carnarvon National Park.

Freckled Duck. Two records at Gordonbrook Dam in August.

Pink-eared Duck. Total of 55 records of mostly solitary birds, but seven at Keongs Lagoon at Oakey, 11 at Lake Broadwater Conservation Park outside Dalby, and 12 at Lake Coomunda near Inglewood.

Cotton Pygmy Goose. Seven records from Gordonbrook Dam in April and May.

Great Crested Grebe. Eleven observations of mostly one to three birds from Gordonbrook Dam and Lake Coolmunda, throughout the year.

Glossy Ibis. Thirteen birds were observed at Gordonbrook Dam during April and May.

Square-tailed Kite. Individual birds were recorded from Toowoomba in May and Lake Coolmunda in January.

Grey Goshawk. Individual birds were recorded in the eastern part of the bioregion including two at Highfields, Toowoomba, and Ambrose.

Pacific Golden Plover. Two observed at Lake Coolmunda in September.

Lesser Sand Plover. Endangered. No records of this species in the BBS bioregion in 2017.

Australian Painted-snipe. Vulnerable. One observed near Bringalily State Forest in February.

Sharp-tailed Sandpiper. Over 160 records at Gordonbrood Dam with the largest counts in March. Small numbers also recorded at Keongs Lagoon at Oakey.

Marsh Sandpiper. Total of 21 recorded at Keongs Lagoon at Oakey in January.

Squatter Pigeon (southern subspecies). Vulnerable. Very small numbers were recorded near Rockhampton at Bouldercombe and Gracemere, at Carnavon National Park, and near Inglewood at Bringalily State Forest.

Powerful Owl. Vulnerable. One record from Highfield Falls in June.

Barking Owl. One record from Carnarvon Gorge in November.

Australian Boobook. single birds recorded 21 times throughout the year at many locations including Toowoomba, Jondaryn, Millmerran, Carnarvon Gorge, and Cania George.

Tawny Frogmouth. single birds recorded 25 times at locations including Toowoomba, Highfields, Pittsworth, Jondaryn, and Monto.

Glossy Black Cockatoo. Observations of note include two at Ballara Park, two at Cow Pats Flats, and one at Gordonbrook Dam in May.

Brown Treecreeper. Between June and December, eight records of single birds, from several locations including Lake Broadwater, Canning Creek and Isla Gorge.

Painted Honeyeater. Vulnerable. Total of 29 records, the majority during the summer months and from locations in the Jondaryan-Oakey area of the eastern Darling Downs.

Black-chinned Honeyeater. Six recorded in the Salvator Rosa section of Carnarvon National Park in August.

Speckled Warbler. Throughout the year over 120 records of one or two birds from a wide area including Toowoomba and Highfields in the east, Tregole NP in the west, Wondul Range National Park in the south, and Coominglah in the north east.

Hooded Robin. Single birds recorded at Major Mitchell Spring in Carnarvon National Park, Millmerran State Forest, and Canning Creek.

Diamond Firetail. Total of 13 records from the Canning Creek area between June and August.

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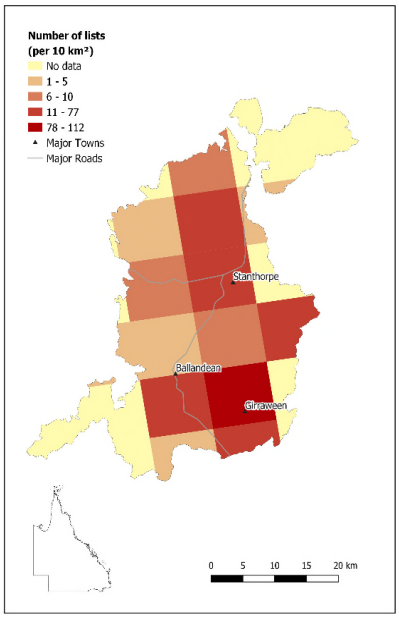
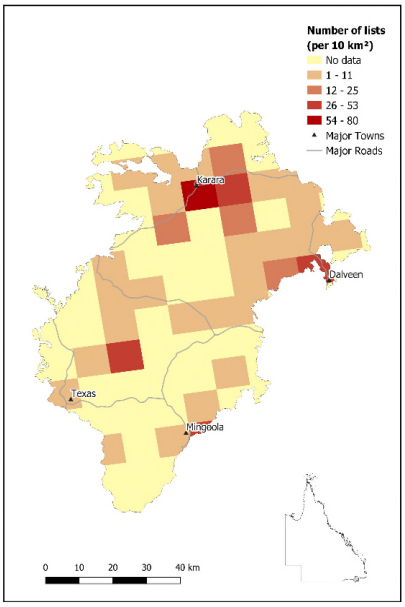
14. New England Tablelands, including Nandewar

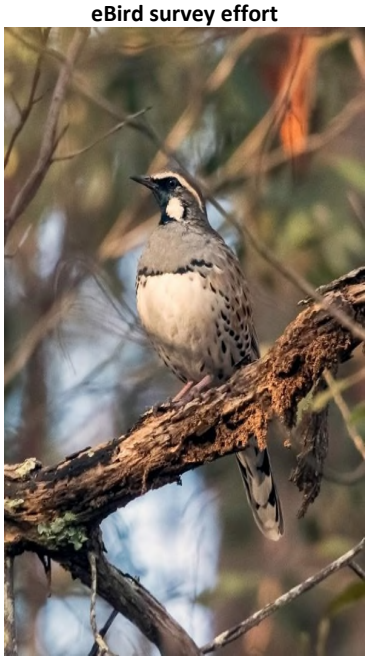
By David Niland & Paul Grimshaw



Map of New England Tablelands Bioregion, showing eBird survey effort



Map of Nandewar Bioregion, showing eBird survey effort



Spotted Quail-thrush (Graham Donaldson)

Grey-crowned Babbler (Vince Bugeja)

Geography

The New England Tablelands and Nandewar bioregions lie largely in north-eastern New South Wales, but small sections of each extend into southeast Queensland. The combined area of these two bioregions (NET) is 7,470 km^2, which accounts for merely 0.45% of the state, yet most of its ecosystems are unique within Queensland. As part of the Great Dividing Range, it is mainly elevated land, composed of a granite batholith with underlying sedimentary rocks which are exposed on the land sloping down to

the west. These geological landforms are known as the Granite Belt and Traprock Country regions, occupying roughly the eastern third and western two-thirds of NET, respectively.

The mean annual rainfall is 700– 770 mm, with most rain falling in from November to February. Average temperatures range from 1° to 16° in winter, and 14° to 27° in summer at Stanthorpe (BoM 2018).

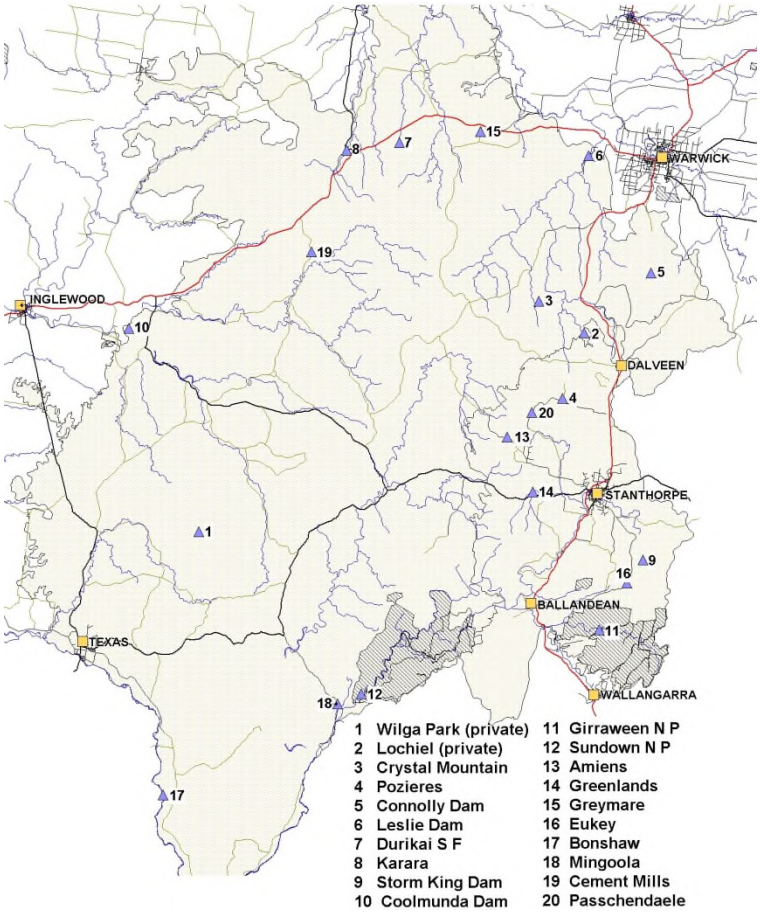


Figure 1. Map of New England and Nandewar bioregions combined, showing eBird survey localities

The major towns in these bioregions are Stanthorpe, Wallangarra and Texas, and the Traprock extends north to the village of Leyburn. Most of the region lies within the Southern Downs Local Government Area (LGA), and some western parts within the Goondiwindi LGA. The state boundary with New South Wales forms much of the eastern and southern boundaries of the bioregions. The Cunningham Highway crosses the northern section and the New England Highway runs down the eastern side, mainly through the Granite Belt. Major drainage catchments include a small part of the Condamine River and the headwaters of the Severn-Dumaresq River, which both drain to the west as part of the Darling River Basin (QG 2019).

Areas providing environmental protection comprise the Girraween and Sundown National Parks, as well as Horan's Gorge Environmental Park and Arcot, Broadwater, Durikai, Greenup, Gunyan, Leyburn, Passchendaele, Talgai and Texas State Forests. Artificial waterbodies include Storm King Dam in the east, and Glenlyon and Coolmunda Dams in the west, and to the north-east, the Leslie and Connolly Dams near Warwick. Most of the natural vegetation is grassy or shrubby woodland or open forest, with large granite outcrops and peaks in places (Sattler & Williams 1999).

Fruit and vegetable crops dominate the farmland west of Stanthorpe, but most of the remainder has sheep and cattle grazing. Many of the farms have small dams, but the amount of water they contain is variable. A series of ornamental ponds along Quart Pot Creek in Stanthorpe is attractive to many birds.

Birds of the bioregion

BirdLife Australia (2018) have identified the Traprock region as a Key Biodiversity Area, particularly for the Regent Honeyeater and Diamond Firetail. Since 2005 BirdLife Southern Queensland volunteers have been conducting seasonal surveys on farms at Braeside, Dalveen and Pozieres as part of their Adopt-a-farm project, and on properties north of Texas for the 20 Million Trees project (BirdLife Australia 2019). In 2017 Birds Queensland volunteers commenced a series of regular route surveys around the south-western end of Sundown National Park to map birds in the different ecosystems.

Notable bird records in 2017

A total of 242 species were recorded for the year on eBird.The vast majority (80%) of eBird surveys were undertaken from April to September. Although rainfall was well above average in March and October, the remainder of the year was drier than average. There was very little flow in any of the rivers, yet neither bioregion was declared drought-stricken. Temperatures were close to the long-term averages, and there were no significant bushfires during the year.

Significant or interesting records are detailed below.

Emu. Multiple observations of up to four resident birds in western half of NET.

Black Swan. A flock of 100 at Coolmunda Dam in May.

Pink-eared Duck. A flock of 30 on a small dam at Pozieres in September.

Australasian Shoveler. Up to ten at Wallangarra in June, and Leslie Dam in September.

Grey Teal. A flock of 100 at Coolmunda Dam in May.

Chestnut Teal. Four birds at the Leslie Dam in September.

Blue-billed Duck. Near-threatened. Up to seven on small dams in orchard areas across NET.

Musk Duck. One on a small dam at Pozieres in September.

Stubble Quail. One at Leslie Dam in September.

Hoary-headed Grebe. A flock of 50 on a small dam at Pozieres in September.

Australian White Ibis. Common throughout NET. A flock of 40 at Stanthrope in June.

Glossy Ibis. Two observed at Coolmunda Dam in November.

Nankeen Night Heron. One at Sundown NP in December.

Intermediate Egret. Single birds at Leslie Dam in April, Coolmunda Dam in May, and Pozieres in September.

Little Egret. Many records of one or two birds on most dams from May through October.

Australian Pelican. A total of 40 at Coolmunda Dam in May.

Little Black Cormorant. A total of 500 at Coolmunda Dam in May.

Great Cormorant. Records of one or two throughout NET from July to December.

Eastern Osprey. Up to three at Leslie Dam in April and June.

Square-tailed Kite. One at Durikai State Forest in August and two at Eukey in September.

Pacific Baza. One at Storm King Dam in August, and another at Girraween NP in October.

Grey Goshawk. One at Sundown NP in January and another N of Dalveen in May.

Swamp Harrier. One at Bonshaw in May, and another at Sundown NP in August.

Spotted Harrier. One at Mingoola in May.

Black Kite. Up to three recorded from April through August.

Eurasian Coot. A flock of 200 at Coolmunda Dam in May and Leslie Dam in June.

Buff-banded Rail. One N of Dalveen in May and one at Storm King Dam in November.

Baillon's Crake. Two at a small dam at Pozieres in September.

Little Button-quail. Two near Wallangarra in March.

Red-kneed Dotterel. Three at Coolmunda Dam in May.

Silver Gull. Up to 30 at Coolmunda Dam in May.

Gull-billed Tern. Four at Coolmunda Dam in May.

Caspian Tern. A total of 14 at Coolmunda Dam in May.

Whiskered Tern. Ten at Coolmunda Dam in November.

Rock Dove. Introduced. Three at Leslie Dan in September.

Squatter Pigeon. Vulnerable southern subspecies) by Threatened Species Scientific Committee 2015). Multiple records of up to three birds at Durikai and Wilga Park from February to September.

Wonga Pigeon. Multiple records at Sundown NP and Girraween NP.

Pacific Koel. Single birds recorded throughout NET from November to March.

Channel-billed Cuckoo. Up to three birds throughout NET from October to January.

Horsfield's Bronze Cuckoo. Many records of single birds mainly in September.

Little Bronze Cuckoo. One at Girraween NP in September.

Australian Masked Owl. One at Karara in May.

Eastern Barn Owl. Two at Karara in May, and one at Lochiel in April.

Spotted Nightjar. One at Sundown NP in February.

White-throated Nightjar. Many records of one or two at Sundown NP in January and February, and in Durikai SF in September.

White-throated Needletail. A flock of 30 at Durikai SF in January.

Oriental Dollarbird. Last departure recorded on 12 April and first return on 26 September.

Rainbow Bee-eater. Last departure on 15 April, and first return on 23 August.

Forest Kingfisher. One at Durikai in February, and two near Wallangarra in September.

Black Falcon. One near Wallangarra in March.

Cockatiel. A flock of 100 N of Texas in April.

Red-tailed Black Cockatoo. Seven near Wallangarra in April.

Glossy Black Cockatoo. Observed at Crystal Mountain in September.

Yellow-tailed Black Cockatoo. Groups of up to six observed often, with a maximum count of 45 at Stanthorpe in June.

Little Corella. A flock of 350 near Coolmunda Dam in May.

Eastern Bluebonnet. Four observed near Coolmunda in January.

Eastern Rosella. A hybrid Eastern Rosella x Crimson Rosella near Wallangarra in August, one or two Eastern Rosella x Pale-headed Rosella at and near Sundown NP.

Australian Ringneck. Two observed at Wilga Park in April.

Swift Parrot. Critically Endangered. Flocks of up 15 at Durikai in August and September.

Turquoise Parrot. Up to ten birds commonly observed in NET, but a high count of 18 near Wallangarra in September. Poison Pimelea berries were a favorite food when available.

Musk Lorikeet. Often seen in NET, with a high count of 70 near Dalveen in May.

Budgerigar. Single birds near Karara in May.

Superb Lyrebird. Multiple records from around Girraween NP from March through September and in December.

Spotted Bowerbird. Multiple records of single birds at Sundown NP in August and Wilga Park in September.

Red-browed Treecreeper. Multiple records of up to three birds at Girraween NP in January, April through May, and September.

Brown Treecreeper. Records primarily in Traprock Country and extending to Wallangarra.

White-winged Fairywren. Two near Coolmunda Dam in December.

Black Honeyeater. One at Durikai State Forest in September.

New Holland Honeyeater. Recorded almost exclusively in Girraween NP.

Painted Honeyeater. Vulnerable. Two at Durikai State Forest in September.

Black-chinned Honeyeater. Multiple records of up to four birds at Durikai SF, primarily from April through September.

Little Wattlebird. Single birds in Wallangarra NP in June, and in Girraween NP in September.

Regent Honeyeater. Critically Endangered. One in April at Durikai SF, which is historically one of the most reliable locations in Queensland.

Yellow-faced Honeyeater. Up to 40 birds in in September at Durikai SF, where usually 1-10 in other months; also up to 50 in May at Goldfields Braeside, 30 km SE of Durikai SF, where only 1-2 in September.

Yellow-tufted Honeyeater. Recorded only at Girraween NP and Sundown NP in December.

Bell Miner. Single birds at Durikai SF in February and Sundown NP in December. Two in September at Girraween NP, where the ranger first recorded the species during the previous winter.

Yellow-throated Miner. Four near Coolmunda Dam in January, and three observed at Durikai SF in February.

Fuscous Honeyeater. Many records from the western edge of NET.

Lewin's Honeyeater. Two records only: in Girraween NP in March and September respectively.

Spotted Pardalote. Records peaked in May.

Chestnut-rumped Heathwren. Recorded between Wallangarra and Girraween NP only.

Speckled Warbler. Most records from Traprock Country and near Wallangarra.

Western Gerygone. Multiple records from Sundown NP and Durikai SF.

Southern Whiteface. Up to four birds recorded from Amiens W to Wilga Park.

White-browed Babbler. Recorded at Durikai State Forest, Sundown NP, and near Wallangarra.

Eastern Whipbird. One record from near Girraween NP in April.

Spotted Quail-thrush. Most records from Girraween NP, and one observation N of Greenlands.

White-breasted Woodswallow. Two at Wilga Park in April, and one near Wallangarra in September.

Masked Woodswallow. Most records from Durikai SF in August and September, but 100 also seen over Girraween NP in September.

White-browed Woodswallow. Up to 500 at Durikai SF in September.

Black-faced Woodswallow. Two W of Passchendaele in February, and three at Texas in October.

Little Woodswallow. A flock of seven at Sundown NP from March through December, and two t Durikai SF in December.

Ground Cuckooshrike. Ten observed at Sundown NP in March.

White-winged Triller. Of 35 records, none from February to July.

Little Shrikethrush. Multiple records from Girraween NP in September and October.

Australasian Figbird. Two records from Girraween NP in June and September, and one record from near Cement Mills in August only.

Spangled Drongo. Multiple records primarily from Sundown NP from January through April and in December.

Rufous Fantail. Most records around Girraween NP.

Apostlebird. Recorded from Traprock Country only.

Rose Robin. Records from Traprock Country from March through September.

Flame Robin. Near threatened. A single bird at Eukey in June.

Scarlet Robin. Small numbers recorded throughout NEN, primarily from March to September.

Horsfield's Bush Lark. Five near Coolmunda Dam in January, and two at Greymare in April.

White-backed Swallow. Two at Sundown NP in May.

Fairy Martin. Most records from W side of NET, from May to December.

Australian Reed Warbler. Up to six birds from May through December.

Little Grassbird. Two at Pozieres in September, and one at Wallangarra in both April and December.

Rufous Songlark. Of 39 records, none from November or December.

Golden-headed Cisticola. Recorded from Pozieres to Greymare from January through May, and September.

Common Blackbird. Introduced species. Recorded from around Stanthorpe and Ballandean in March, September, and December.

House Sparrow. Introduced. Recorded from Wallangarra and Stanthorpe.

Diamond Firetail. Generally 1-6 birds but counts of 14 at Glen Hills and 15 at Hickling Lane.

Plum-headed Finch. Flocks of up to 40 in W part of NET and Wallangarra.

Zebra Finch. Five near Coolmunda Dam in January, and three at Wilga Park in April.

European Goldfinch. Introduced. Three at Pozieres in September and November.

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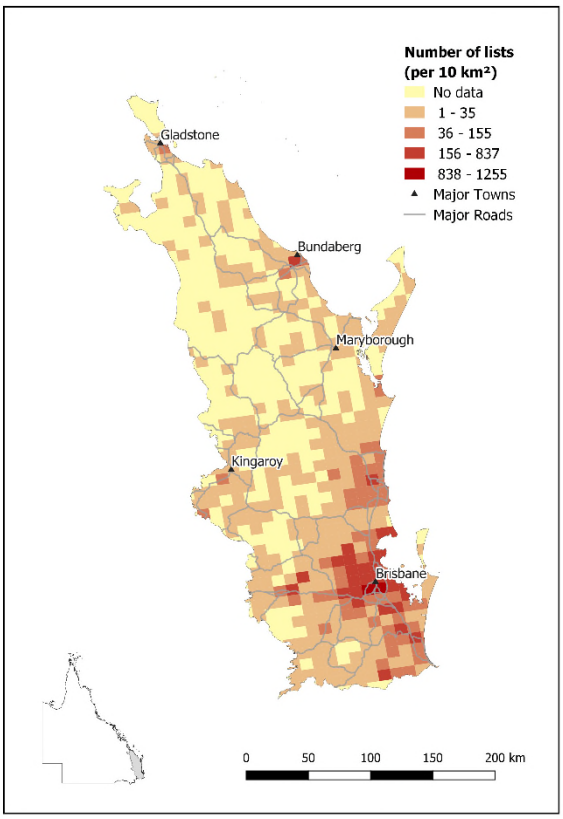
15. South East Queensland

By David Redhead



Map of South East Queensland Bioregion, showing eBird survey effort

Rufous Fantail (Graham Donaldson)

Geography

The Southeast Queensland (SEQ) bioregion covers some 62,484Km^2 or 3.6% of the state. The bioregion extends from Gladstone in the north, to the New South Wales border in the south, and in the west includes the city of Toowoomba, and towns of Warwick and Kingaroy. It shares its western and northern boundaries with the Brigalow Belt bioregions.

SEQ is topographically diverse. The McPherson Range forms part of its southern boundary, while the Great Dividing Range lies to the west. Mountain ranges bisect its centre from north to south (D'Aguillar, Conondale and Main Ranges) creating a distinct altitudinal gradient towards the coast, except along river valleys. Landforms also include several large sand islands, volcanic plugs (Glasshouse Mountains) and montane isolates (e.g. Bunya Mountains).

Together with the most northern parts of New South Wales, SEQ straddles the Macpherson-Macleay Overlap, an area where the distributions of many Torresian (Tropical) and Bassian (Temperate) species of plants and animals meet. These climatic, geological, and biological attributes make SEQ a major centre of biological diversity in Australia, especially for birds (QM 2007).

The importance of SEQ ecosystems to the persistence of Australia's native flora and fauna, including birds, is recognised nationally and internationally. These include the iconic Gondwana Rainforests and Fraser Island World Heritage Areas, North Stradbroke island, Moreton Bay and the Great Sandy Straight. Birdlife Australia (2019) has identified six Key Biodiversity Areas in this bioregion: Great

Sandy Straight, Cooloola & Fraser Coast, Conondale Range, Bunya Mountains & Yarraman, Moreton Bay & Pumicestone Passage, and Scenic Rim.

The mountains of Southeast Queensland are an important refuge for several ancient rainforest-dependant avian lineages, including lyrebirds *Menura* and scrub-birds *Atrichornis*. *Back on Track* documented several priority bird species for specific assessment, including the Rufous Scrub-bird, Eastern Bristlebird, and Black-breasted Button-quail.

The bioregion experiences a sub-tropical climate with warm to hot, humid summers and mild, dry winters, with typically c.75% of rain falling between October and April (BoM 2019a). Mean annual rainfall varies markedly from 650 (e.g. Kingaroy) to 1712mm (Nambour), while that of Eagle Farm-Brisbane is 1130mm. In 2017, Tropical Cyclone Debbie created a lot of flooding in early April, as well as keeping the rainfall close to average. Temperatures were well above average with the highest maximum on record for quite a few locations (BoM 2019b). The Gympie, Fraser Coast and Bundaberg Council areas were drought declared (QG 2019).

Notable bird records in 2017

A total of 390 bird species were recorded in SEQ during 2017, the largest number for any bioregion in the state. As with all other bioregions, bird survey effort shows a marked bias toward the major population centres - Greater Brisbane, Ipswich, and the Gold and Sunshine Coasts – and the well-known, readily accessible protected areas. The following annotated list provides details of records of 142 species that were reported less than 100 times during the year. Additional records of seabirds are provided in the Southport Seabird Report.

The tropical Low weather system resulting from cyclone Debbie passed South, parallel to the coast on 29-31 March, bringing reports of a Red-footed Booby at Shorncliffe on 30 March and 8 Roseate Terns at the Pine River on 31 March. There was an influx of Masked and White-browed Wood Swallows between 25 -30 September and Red-capped Robins between 2-10 September. The outstanding vagrant of the year was Stejneger's Petrel, seen during a Southport pelagic trip in November which was the second record for Queensland and the third for Australia.

Emu. One record only: a single bird at Inverlaw, SW of Kingaroy in June.

Radjah Shelduck. One at Anembo Lakes, Hervey Bay, in March and two at Agnes Waters in October.

Blue-billed Duck. Near-threatened. four records of single bird(s) at Daly's Lagoon near Ipswich from June to September; seven records of one to three birds at Lake Galletley, Gatton, between April and August; and ten records of up to six birds at Lake Clarendon, Lockyer Valley, between May and December.

Musk Duck. Single birds reported at seven locations across SEQ between April and December, including Dowse Lagoon, Sandgate, from July through December; two at Tandora, Maryborough, in April, and two at Lake Kurwongbah in July.

Stubble Quail. Six at Lake Samsonvale in September; single birds on Banool Road at Atkinson Dam in January, Haighslea–Amberly Road in August, Anstead Bushland Reserve in October, and Lake Clarendon in December.

King Quail. Of 96 records for SEQ, 75 from Lake Samsonvale area, with a maximum count of 11 in February. Other records include up to four at Oxley Creek Common in Brisbane, Finland Road on Sunshine Coast, Cooloola, The Dip at Armstrong Creek, Wivenhoe-Somerset Road, Boonah, Kedron Brook Reserve, and Sandy Camp Wetland at Wynnum.

Wilson's Storm Petrel. Regularly sighted during both Mooloolaba and Southport Pelagic trips from April through November, with a maximum of 60 in November on former, and on latter, 52 in April and 42 in November.

White-faced Storm Petrel. Two reported on Southport Pelagic in April.

Black-bellied Storm Petrel. Recorded during five Southport Pelagic trips between May and September, usually one or two birds, but 13 counted in May.

Northern Giant Petrel. One bird observed during two Southport Pelagic trips in June.

Cape Petrel. During Southport Pelagics, two recorded in June, and one in November.

Antarctic Prion. One reported on Southport Pelagic in June.

Grey-faced Petrel. Recorded on Southport Pelagic trips including one in February, two in March, and 34 in November.

Providence Petrel. Vulnerable. On Mooloolaba Pelagics 14 counted in July and 25 in August. Reported on 11 Southport Pelagic trips between April and November, with high counts of 103 in June and 94 in May.

Kermadec Petrel. Recorded during six Southport Pelagic trips between February and November, with maximum counts of 14 in November and seven in April. No records from June through August.

Mottled Petrel. Near threatened. One seen during Southport Pelagic in November.

White-necked Petrel. One seen during Southport Pelagic in February and April.

Black-winged Petrel. One seen during Southport Pelagic in December.

Gould's Petrel. Vulnerable. During Southport Pelagic trips, one seen in February and five in November.

Cook's Petrel. Vulnerable. One observed during Mooloolaba Pelagic in November.

Stejneger's Petrel. Vulnerable. One sighted during Southport Pelagic trip in November (see Page 141). This is the third record of this species in Australian waters and the second record for Queensland.

Tahiti Petrel. Near-threatened. Sighted during twelve Southport Pelagic trips and five Mooloolaba Pelagic trips. High counts of 50 off Mooloolaba in January, 30 off Southport in April, and 18 off both Mooloolaba and Southport in November.

Streaked Shearwater. Near-threatened. Eight in January and two in March during Mooloolaba Pelagic trips; two in February and one in March during Southport Pelagic trips.

Wedge-tailed Shearwater. Of 59 records, 12 from Southport Pelagic trips, with highest counts of 297 and 196 in April. None observed from May through August. Also recorded during five Mooloolaba Pelagic trips, with maximum counts of 250 in April and 100 in March and April. Maximum counts on Heron and Lady Elliot Island Islands were 300 in October, and twelve in February, respectively. The largest numbers counted from Point Lookout, North Stradbroke Island, were 80 in October and 200 in November.

Sooty Shearwater. Near-threatened. One reported off Gladstone in September.

Short-tailed Shearwater. Most records from October to December. High counts from Point Lookout on North Stradbroke Island were 400 in October, 1,800 in November and 2,765 in December. During Southport Pelagic trips, 440 in October and 255 in November, but no records from January through March or June through September. Also 200 counted from Noosa NP in November, and 200 during Mooloolaba Pelagic trip in November.

Flesh-footed Shearwater. Near-threatened. Two observed from Point Lookout on North Stradbroke Island in January. Four reports from Mooloolaba Pelagic trips, including five in January, 50 in March, one in August, and one in November. Eight reports from Southport Pelagic trips, with a maximum of 17 in April, but no observations from May through October.

Fluttering Shearwater. Four observed from Noosa NP in April and one from Point Lookout on North Stradbroke Island in June. Also up to three birds seen during three Southport Pelagic trips in February, June, and July respectively.

Hutton's Shearwater. Three sighted from Point Lookout on North Stradbroke Island in June. Recorded during four Mooloolaba Pelagic trips, with maximum count of 22 in August, and during nine Southport Pelagic trips from February through September, with maxima of ten in March and six in June.

Bulwer's Petrel. One observed during Southport Pelagic trip in December.

Hoary-headed Grebe. Records from 14 locations but none in January or February. Largest flocks include 90 at Lake Clarendon in September and 20 at Seven Mile Lagoon in Lockyer Valley in October.

White-tailed Tropicbird. One sighted during Mooloolaba Pelagic trip in January, and one on Southport Pelagic trip in November.

Black-backed Bittern. Single bird at Ewan Maddock Dam, W of Caloundra, in January; two records at Wallaroo Circuit, Northlakes, in May; four records from Parklands Wetland, Bli Bli, from February to November; and three records from Coolum Industrial Estate in February, July, and December. At Sandy Camp Wetlands, Wynnum, one was reported six times, and two were reported in November, but none were reported from April through October.

Black Bittern. Single birds reported 24 times at wetlands across SEQ, including Yandina Wetlands on Sunshine Coast, Toorbul, Buckley's Hole on Bribie Island, Tinchi Tamba Wetland Reserve at Pine River, Sandy Camp Wetlands in Wynnum, Fraser Island, Lake Doonella at Tewantin, and Gold Creek Reservoir and Fitzgibbon Bushland in Brisbane. Two were observed at Mookin-bah Reserve, Brisbane, in March and April, and another two at Tondoon Botanical Gardens, Gladstone, in February, March, and August.

Great Frigatebird. All records from Lady Elliot Island, with a maximum of 20 in February. None observed from April through August.

Lesser Frigatebird. Of 37 records, highest counts were 13 during Mooloolaba Pelagic trip in March, and 20 on Lady Elliot Island in February, where reported from February through December. Four reports of one during Southport Pelagic trips from February through April. Most other records of one or two birds in September and October.

Masked Booby. Records include six birds at sea 180 nautical miles ENE from Caloundra in September, one during Southport Pelagic trip in November, and one at Point Lookout, North Stradbroke Island, in December.

Red-footed Booby. One or two birds during Mooloolaba Pelagic trips in January and March, ten birds during Southport Pelagic trip in March, one bird from Shorncliffe Pier at Sandgate in March, and one bird 180 nautical miles ENE of Caloundra in September.

Brown Booby. Among 68 records, maximum counts were 12 at Lady Elliot Island in March, 46 off Burnett Heads in July, and ten at Heron Island in July. One also observed during a Southport Pelagic trip in November.

Little Eagle. A total of 48 records from May to August, almost all of single birds. Only three records N of Noosa.

Spotted Harrier. A total of 65 records, most during April and May, but 26 from September through November. Vast majority single birds, but two birds seen at Beerwah in May, Lake Clarendon in May and November, Bli Bli on the Sunshine Coast in June, and Pacific Paradise on the Sunshine Coast in November.

Australian Bustard. One at Dimond road E of Maryborough in January; two at Ban Ban Springs in February; one at Bonjour, SE of Gayndah in March; and one at Inverlaw, SW of Kingaroy, in June.

Australian Crake. Up to seven at Nathan Road Wetlands, Redcliffe, in September; one at Dohles Rocks Road, Pine River, in September; and one at Placid Hills, Gatton, in December.

Black-tailed Nativehen. Five observed at Moore Park Beach Wetlands near Bundaberg in October.

Brolga. Total of 57 records, mostly of one to three birds S of Hervey Bay.

Red-backed Buttonquail. Of 31 records throughout the year, 13 were from December and January. Twenty records from Lake Samsonvale area, where up to five birds in January. Other records from Corcorans Rd at Bryden, Wivenhoe-Somerset Rd, and Yandina on Sunshine Coast, in May; Ferny Grove, Brisbane, in November; and Hine Rd, Bryden, in December.,

Black-breasted Buttonquail. Near-threatened. Many records throughout the year at Noosa NP, where maximum count of four in September. Other records of note include one at Tarong-Yarraman Rd in January, six at Charlie Moreland Park at Conondale NP in February, three at Kholo Crossing at Ipswich in February, three at Stirling Crossing at Imbil in September, two at Googe State Forest in September, two reports of three at Pine Mountain in September and October, and two at Imbil State Forest in October.

Painted Buttonquail. A total of 49 records of up to three birds from 18 localities, mostly in Greater Brisbane and Ipswich areas, and from September through November.

Red-chested Buttonquail. Records from Lake Samsonvale and Lake Moogerah in January; Corcorans Rd, Bryden, in February; and Wilston, Brisbane, and Kobble Creek Rd, in December.

Sooty Oystercatcher. Records from coastal sites throughout the year, with a maximum count of 11 at Tannum Sands in December.

Banded Lapwing. A total of 34 records, mostly from January to September. Six observed on the Bundaberg-Gin Gin Road at Meadowvale in January. All other records from Banool Road at Seven Mile Lagoon, Lockyer Valley, where 25 observed in January.

Grey Plover. Of 46 records, 19 from December and January, and few from April through August. Maximum count of 133 at Boonooroo in January. At Caloundra, six in February and seven in October.

Double-banded Plover. Of 46 records, 26 in April and May, and none from November through February. First arrivals were eight birds at King Island on 12 March. Highest counts include 17 at Inskip point in April and 25 at King Island in April.

Greater Sand Plover. A total of 75 records of up to six birds, but none in June or July. Maximum counts of 47 at Boonooroo in January; 40 at Elliot Heads in March; 54 at Pelican Banks, Great Sandy Strait, in August; 50 at Wellington Point in December; and 200 at Point Vernon, Hervey Bay, in March.

Australian Painted-snipe. Endangered. Two at Lake Samsonvale in August; in October, up to three at Tea Tree Wetlands at , Gold Coast, and one at South Lake, Eagleby, Brisbane and up to three at Lake Clarendon in November; in November, up to three at Seven Mile Lagoon, Lockyer Valley and one at Noosa Recycling Centre.

Little Curlew. One at Lake Samsonvale in September and October, and another on Lady Elliot Island in December.

Ruff. One at Tinchi Tamba Reserve, Pine River, in February and March.

Broad-billed Sandpiper. Records include up to four birds at Port of Bundaburg from January through March, and one in December; up to six at Burnett Heads from January through March; and three or four at Thorneside, Morton Bay, in December.

Sanderling. Records include one at Noosa Estuary in May and October, one at Elliot Heads near Bundaberg in February and September, and three at Burnett Heads near Bundaberg in October.

Pectoral Sandpiper. Multiple observations of single birds at Dohles Rocks, Pine River, between January and March, Lake Clarendon, Lockyer Valley, between September and December, Kedron Brook Wetland between September and November, and Kianawah Road Wetlands, Hemmant, in November. In March a single bird at Atkinson Dam, Lockyer Valley, and at Lake Dyer, Laidley.

Asian Dowitcher. Near-threatened. Three records of one or two birds at Boonooroo in January and March, at Port of Brisbane in October and November, and on Pine River Estuary from January through March. One bird also recorded at Lytton Wader Roost in April.

Common Sandpiper. Of 49 records, majority were from Moreton Bay from January through February or September through October, with a maximum count of eight at Scarborough Boat Harbour in September.

Wandering Tattler. A total of 47 records from 16 locations, with a maximum count of six at Point Vernon at Hervey Bay in December. No records from May through July.

Wood Sandpiper. Records include: one at Nathan Road, Redcliffe, in January; one from Dowse Lagoon, Sandgate, from February to March; one from Tinchi Tamba Reserve, Pine River, in March; two from Sandy Camp Wetlands, Wynnum, in September; and one from Lake Clarendon, Lockyer Valley, in December.

Brown Noddy. High counts of 500 at Lady Elliot Island and 300 near Masthead Island, both in October. Up to 20 sighted from Point Lookout, North Stradbroke Island, from January to October, and one in Noosa Estuary in April. At sea, 40 on Mooloolaba Pelagic trip in January, and up to seven on eight Southport Pelagic trips from March through July.

Black Noddy. High counts include 2,500 on Heron Island in December, 1,500 at Lady Elliot Island in October, and 140 at Joseph Banks Conservation Park, Town of 1770, in March. Single birds seen on two Southport Pelagic trips (February and October), at Elliot Heads in March, and at Noosa Spit and Capricorn Cays NP in October.

White Tern. One on Mooloolaba Pelagic trip in March, and seven on Southport Pelagic trip in December.

Lesser Crested Tern. A total of 47 records, mostly of one or two birds. High counts include 31 at Heron Island in June and 36 at Seventy-Five Mile Beach, Fraser Island, in June.

Bridled Tern. Maximum counts of 200 at Lady Elliot Island in October, and 30 at Heron Island in December. Other records include one at Capricorn Cays NP in October, and two on Southport Pelagic trip in January.

Sooty Tern. Up to 30 seen during Mooloolaba Pelagic trips in January, August, and November, and up to three seen during three Southport Pelagic trips in March and November. On Lady Elliot Island, five in October and ten in December.

Roseate Tern. Multiple records from Lady Elliot Island, where 60 in December; also eight observed at Osprey House, Pine River, in March.

White-fronted Tern. Near-threatened. Four immature birds at Point Lookout, North Stradbroke Island, in June.

Black-naped Tern. Maximum counts of of 31 in June on Heron Island, and ten in December on Lady Elliot Island. Also a single bird at Capricorn Cays NP in October.

White-winged Tern. A total of 21 records, with peak counts in April including 115 at Maroochydore and 80 in Noosa Estuary. No reports in June through August.

Brown Skua. One observed during Mooloolaba Pelagic trip in July.

Pomarine Jaeger. Recorded during Mooloolaba Pelagic trips in January, March(26 birds), and November, and during ten Southport Pelagic trips, with a maximum count of six in March, and no records from May through October. Up to two observed from Point Lookout, North Stradbroke Island, in November and December.

Arctic Jaeger. Recorded during four Mooloolaba Pelagic trips in January, March and November, and during five Southport Pelagic trips, excluding May through September. Mostly one or two birds, but three in April and October.

Long-tailed Jaeger. Four observed during Southport Pelagic trip in November.

Brush Bronzewing. One on Fraser Island in June, and another at Teewah Creek on Cooloola Way in October.

Diamond Dove. One at Childers in July, and another at Moggill Wetlands in September.

Superb Fruit Dove. A total of 15 records, mostly of single birds in Greater Brisbane or Sunshine Coast areas. All but two records S of Noosa, and no records between mid- May and mid-November. Hervey Bay records in December include two at Gatakers Bay and four at Arkarra Lagoons. Four at Juffs Crossing, Dayboro, during February.

Torresian Imperial Pigeon. Two observed at Lake McDonald, Noosa, in December. Well south of normal range.

Oriental Cuckoo. Of 41 records, half in January and February, and none between mid-April and late November. All from Greater Brisbane area, except one at Mount Mellum on Sunshine Coast in February. Up to five birds in Anstead-Hawkesbury Road area of Brisbane in January and February, and up to three at Anstead in December.

Greater Sooty Owl. Of 51 records, 13 in January. Seven records from O'Reilly's at Lamington NP, seven at Bunya Mountains, and 22 at Mt Glorious. Also recorded at Conondale NP, Mary Cairncross Park, Bellthorpe NP, Mount Mee NP, and Cootharaba on the Sunshine Coast.

Australian Masked Owl. Of 20 records, seven from Mt Glorious area throughout the year. Single birds reported from: Gold Creek Road, Brookfield, in January; Kalpower State Forest in May; and and D'Aguilar NP in December; but up to three from Pullenvale from April through October.

Eastern Barn Owl. Nine records of single birds scattered through region S of Noosa throughout the year. Two at Lowe Road, Bollier, near Imbil in October.

Eastern Grass Owl. Of 17 records, nine from Kedron Brook Wetland; One or two birds at Finland Road, Sunshine Coast, in June and October, and at Lake Samsonvale in February and October. Single birds on Cooloola Way in July, and Yandina–Bli Bli Road in August.

Barking Owl. A total of 36 records from many localities including: Lake Cooribah, Noosa; Pinjarra Hills, Brisbane; Sheepstation Creek near Caboolture; Kenilworth-Brooloo Road and Brooloo near Imbil; O'Reillys in Lamington NP; Jindalee in Brisbane; Gladstone Golf Club, Reg Tanna Park in Gladstone, and Conondale NP.

Multiple records of one or two birds at Tondoon Botanic Gardens, Gladstone, from February through August, and one at Shuster Park, Gold Coast, from August through December.

Marbled Frogmouth. Of 52 records, 18 from D'Aguilar NP throughout the year. Other records from North Malaney, O'Reillys at Lamington NP, Mapleton NP, Mount Mee State Forest, and Bymien–Lake Poona track in Great Sandy NP. Six were observed at Tamborine NP in September.

White-throated Nightjar. Of 70 records, 13 in October and only three from April and June. Most records from southern parts of SEQ, and only four from N of Noosa.

Large-tailed Nightjar. Recorded from August through October with peak in September, when two birds at Yandina Creek Wetlands, one at Tannum Sands, three at Port Bundaberg, and two at Maroochy Wetland Sanctuary, where observed again in October. At Carlo Point, Rainbow Beach, one in August and two in October.

Australian Swiftlet. Sixty observed at Kingaroy in September.

Pacific Swift. A total of 22 records, all between September and May, and most in February. High counts included 22 at Coolum in February, 13 at Bundaberg Botanic Gardens in April, and 70 at Point Vernon, Hervey Bay, in December.

Blue-winged Kookaburra. The southern limits of this species' range occur in SEQ. Multiple records of one or two birds at Forest Hill, Lockyer Valley, from May through December. Also one or two birds at: Tondoon Botanic Gardens, Gladstone, in May; Canoe Point and the Esplanade, Tannum Sands, in August and September, respectively; West Gladstone in June; Agnes Waters in July; and Noosa NP in December.

Red-backed Kingfisher. Many observations of a single bird at Prior's Pocket, Moggill, in September and October.

Black Falcon. Of 49 records, ten in January, and the majority from Lockyer Valley. Only two records were N of Lake Wivenhoe. Highest count was five at Bremer Road, Rosewood, during September.

Red-tailed Black Cockatoo. A total of 64 records from scattered locations, but only two from Greater Brisbane region. Highest count was 58 at Helidon, Lockyer Valley, during May.

Glossy Black Cockatoo. A total of 58 records, of which only two S of Gympie. Highest count was 13 at Lamington NP in October.

Major Mitchell's Cockatoo. One at Pine Mountain Bush Reserve in September.

Red-winged Parrot. Of 68 records, 16 from Kingaroy area, where ten in May, and only two near the coast.

Red-rumped Parrot. A total of 48 records, mostly from Lockyer Valley, and no reports N of Proston, South Burnett. Highest count was twelve at Gatton campus of University of Queensland in July.

Eastern Rosella. A total of 36 records, mostly from Gold Coast and Hinterland, with a highest count of seven in Numinbah Valley in July. Only three records N of Brisbane, including two at Tinchi Tamba Wetlands in February, one at Caboolture Lakes in September, and two at Buderim in December.

Eastern Ground Parrot. Twelve observations of up to five birds in Cooloola area from February through December.

Musk Lorikeet. Eighteen records, half from Main Range NP and a maximum count of eight at Goomburra NP in August and November.

Rufous Scrubbird. Endangered. In Lamington NP, single birds in January, July, and November, but four birds counted in December.

Red-browed Treecreeper. A total of 47 records, of which 17 during October and November, and mostly from Mt Glorious, Lamington NP, and Main Range. No reports from N of Wivenhoe Lookout, D'Aguilar NP.

Brown Treecreeper. Of 27 records, 15 relate to a single bird at Lake Kurwongbah, Petrie, from April to mid-August.No records N of Hervey Bay.

Southern Emu-wren. Up to three birds observed at Cooloola NP in February, May, and October.

Painted Honeyeater. Vulnerable. A pair at Kianawah Road, Hemmant, in September.

Helmeted Friarbird. Three observed at Agnes Waters in October.

Black-chinned Honeyeater. A total of 33 records, 18 of which were in May and June. High counts of eight at Police Creek, Gladstone, in August, and Redbank Creek, Lockyer Valley, in May.

Brown-headed Honeyeater. Of 25 records, 17 were in May through July and 12 from a single location at Kingaroy between May and November with a count of 12 in June. Groups of up to nine observed at Redbank Creek, Lockyer Valley in May. No records N of Mundubberah in the South Burnett.

White-eared Honeyeater. One at Mary Cairncross Park in April, and one at Maroochy River Conservation Park in June.

Spiny-cheeked Honeyeater. Single birds at Mt Wooroolin, near Kingaroy, in March, and Bunyaville Forest Reserve, Brisbane, in August. One or two birds at Kingaroy during May and June, and at Boonah from May through October.

Red Wattlebird. Of 28 records, all but two from around Goomburra area of Main Range NP. Up to five birds recorded throughout the year.

Yellow-tufted Honeyeater. Of 38 records, half from June and July, with a maximum count of 20 at Wongi State Forest, W of Maryborough, in July.

White-plumed Honeyeater. Two reported from Sheep Station Creek, Upper Caboolture, during April.

Weebill. Of 63 records, 36 between March and June. Groups of eight observed at Mt Tamborine in April and Murphy's Creek in July.

Western Gerygone. An immature bird N of Wutul, near Toowoomba, in June.

Buff-rumped Thornbill. A total of 63 records, but few N of Samford. High counts include 14 at Mt Barney in March and 20 on Goldmine Road, Lockyer Valley, in August.

Spotted Quail-thrush. A total of 33 records at widely scattered locations, though no reports N of D'Aguilar NP.

Masked Woodswallow. A total of 38 records, 25 of which fell in late September, with many flock counts exceeding 50 birds, and an estimated maximum of 1,000 at the Spillway Common, Lake Wivenhoe.

White-browed Woodswallow. A total of 35 records, of which 24 fell in late September, mostly exceeding 20 birds, with a maximum count of 160 at Lake Samsonvale.

Black-faced Woodswallow. One at Kia Ora on the Gympie–Tin Can Bay Road in August.

Dusky Woodswallow. Of 61 records, 52 from May through August. High counts include 30 at Kin Kin in July, 50 at Benarkin State Forest, Blackbutt Range, in July, and 30 at Kobble Creek in August.

Ground Cuckooshrike. Of 24 records, 17 from around the Banool Road area, Lockyer Valley, where up to five birds. Highest count of eleven at Boyce's Road at Atkinson Dam in April.

Barred Cuckooshrike. Of 51 records, 19 in November, and none from late April through late October. Maximum counts of six birds at Kin Kin in March and Moogerah Peaks NP in April.

Crested Shrike-tit. A total of 96 records across SEQ with no reports north of Kin Kin,Gympie.

Olive Whistler. One record at Lamington NP in December.

Satin Flycatcher. Mostly single birds on northward passage at Kumbartcho Sanctuary, Moogerah Peaks NP and Opossum Creek, Ipswich, in March, and on southward passage at Moorhen Flats and Anstead Bushland Reserve, Brisbane, in October. At Fort Reserve, Oxley, in both March and December.

Shining Flycatcher. A total of 20 records of up to three birds, primarily at coastal locations between Bundaberg and the Tweed River on the Gold Coast.

Australian Raven. Ten records, of which four were from Bunya Mountains NP, and four from Main Range NP. Highest counts were of eight birds in May and four in November.

White-winged Chough. A total of 51 records, of which the closest to Brisbane was at Lockyer Waters, Lockyer Valley, in September. The largest count was 40 birds at Inverlaw, SW of Kingaroy in June.

Jacky Winter. Of 99 records, 61 from April through July, and a maximum count of ten birds at Redbank Creek, Lockyer Valley, in May.

Scarlet Robin. One female observed at Anstead, Brisbane, in May.

Red-capped Robin. Of 14 records, nine in early September, and primarily in SE part of region.

Horsfield's Bush Lark. A total of 21 records, of which eight from Corcorons Road, Bryden, including a count of 24 birds in February. No records from June through September.

Brown Songlark. Of 75 records, 48 from October through December, and over half from Lockyer Valley. A maximum count of six birds at Lake Clarendon in December, and many records of one or two birds from Priors Pocket, Moggill, from October through December.

Bassian Thrush. Of 70 records, 43 from Laminton NP. Multiple records from Main Range NP and Bunya Mountains, with a maximum count of 18 at Bunya Mountains in May.

Common Blackbird. Introduced species. Not yet common in Queensland, but single birds recorded at Bargara Lakes, Bundaberg, during October, at Beechmont during November, and at Mt Glorious during December.

Olive-backed Sunbird. SEQ marks the southern limits of range of this species. One at Tannum Sands in June and August, and four records of up to three birds at Seventeen Seventy, N of Agnes Waters, from June to December.

Diamond Firetail. One at the Atkinson Dam, Lockyer Valley, during April.

Plum-headed Finch. A total of 58 records, of which only four N of Gympie, and few between August and November. High counts included 86 at Barallon in August and 150 at Pechy's Lagoon, Lockyer Valley, during March.

Zebra Finch. A total of 20 records of which three were from Bundaberg region, the only records N of the Lockyer Valley.

Scaly-breasted Munia. Introduced. A total of 70 records, with a maximum count of 110 at Bundaberg Botanic Gardens in March.

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Appendix 1. Frequency of records of each bird species recorded in 2017 according to bioregion

This table lists all species recorded in eBird surveys in Queensland during 2017 and shows the reporting rate of each species in each of the 15 bioregions recognised in the foregoing report. Values represent the number of records of each species (row) in each bioregion (columns), divided by the total number of records for that bioregion, and multiplied by 1000. This permits a meaningful comparison across all bioregions, regardless of area and number of surveys. The coloured cells show the bioregion with the highest reporting rate for that species, indicating the region with the greatest chance of observing the species in Queensland.

The 15 bioregions are listed from left to right in the same order as in the Regional Accounts. Acronyms for bioregions are, in alphabetical order: BBN, Brigalow Belt North; BBS, Brigalow Belt South, including Darling Riverine Plains; CYP, Cape York; CQC, Central Queensland Coast; CHC, Channel Country, including Simpson Strezlecki Dunefields; DEU, Desert Uplands; EIU, Einasleigh Uplands; GUP, Gulf Plains; MIT, Mitchell Grass Downs; NWH, Northwest Highlands and Gulf Uplands; MUL, Mulga Lands; NEN, New England and Nandewar; SEQ, South East Queensland; TSI, Torres Strait Islands; WET, Wet Tropics.

Common Name	Scientific Name	CYP	TSI	WET	GUP	EIU	NWH	CQC	BBN	DEU	MGD	CHC	MUL	BBS	NEN	SEQ	No. BRs
Common Ostrich	*Struthio camelus*			0.02													1
Southern Cassowary	*Casuarius casuarius*			2.19													1
Emu	*Dromaius novaehollandiae*	0.18		0.04	0.80	2.51	1.91	0.91	0.29	5.16	8.52	5.97	17.07	1.96	0.59	0.00	14
Magpie Goose	*Anseranas semipalmata*	6.59		5.29	8.18	6.92		11.50	8.51					0.68		2.20	8
Spotted Whistling-Duck	*Dendrocygna guttata*	2.77		0.39													2
Plumed Whistling-Duck	*Dendrocygna eytoni*	0.74		1.99	4.65	2.33	0.52	12.81	4.38		0.71	2.49	0.23	1.72		1.70	12
Wandering Whistling-Duck	*Dendrocygna arcuata*	3.07		1.85	4.01	2.14	0.52	2.42	1.03		0.28	0.25	0.03	0.36		1.44	12
Black Swan	*Cygnus atratus*			0.12		4.96	0.17	1.71	1.90	0.65	2.27	1.74	1.10	4.96	0.81	3.88	12
Freckled Duck	*Stictonetta naevosa*			0.14	0.16	0.31	0.87		0.06		0.99	0.50	0.10	0.08		0.26	10
Radjah Shelduck	*Tadorna radjah*	3.57	0.01	2.55	4.33	0.18		6.35	0.33							0.00	8
Australian Shelduck	*Tadorna tadornoides*											0.75					1
Pink-eared Duck	*Malacorhynchus membranaceus*	0.31	0.00	1.23	6.73	1.35	3.81	0.10	0.42	5.81	10.22	8.22	2.30	2.56	0.66	0.98	15
Mandarin Duck	*Aix galericulata*															0.01	1

Common Name	Scientific Name	CYP	TSI	WET	GUP	EIU	NWH	CQC	BBN	DEU	MGD	CHC	MUL	BBS	NEN	SEQ	No. BRs
Maned Duck	*Chenonetta jubata*	0.02		0.61	1.60	3.06	1.56	2.82	1.85	5.16	2.13	4.23	5.66	10.83	8.89	9.39	14
Cotton Pygmy-Goose	*Nettapus coromandelianus*			0.43	0.16	1.65		1.92	1.65	0.65				0.52		0.41	8
Green Pygmy-Goose	*Nettapus pulchellus*	7.90	0.00	1.65	2.57	7.53	0.87	0.10	1.74								8
Mallard	*Anas platyrhynchos*			0.01				0.10					0.03	0.36			4
Pacific Black Duck	*Anas superciliosa*	3.76	0.01	8.04	9.78	8.70	5.72	14.93	8.05	4.52	15.62	11.20	8.42	14.27	6.98	14.84	15
Australian Shoveler	*Anas rhynchotis*								0.20		0.85	0.25	0.30	1.12	0.51	0.60	7
Grey Teal	*Anas gracilis*	2.70	0.00	1.71	11.86	4.53	5.89	3.73	3.59	9.68	14.05	9.71	9.12	8.56	2.13	5.60	15
Chestnut Teal	*Anas castanea*	0.05			0.32				0.26		0.28		0.07	0.52	0.07	2.54	8
Hardhead	*Aythya australis*	1.32	0.00	1.93	4.17	5.76	4.85	7.66	3.23	2.58	10.08	5.97	1.93	6.08	2.20	6.81	15
Blue-billed Duck	*Oxyura australis*										0.43		0.03		1.10	0.05	4
Musk Duck	*Biziura lobata*											0.50		0.16	0.07	0.17	4
Australian Brushturkey	*Alectura lathami*	12.04		10.67	0.16	2.94		8.27	3.58					0.40		7.07	8
Orange-footed Scrubfowl	*Megapodius reinwardt*	5.92		12.50		0.18		3.53	0.41								5
Helmeted Guineafowl	*Numida meleagris*			0.03		0.06											2
California Quail	*Callipepla californica*			0.01													1
Stubble Quail	*Coturnix pectoralis*			0.04	0.16	0.06	0.35		0.02			0.50		0.16	0.07	0.01	9
Brown Quail	*Coturnix ypsilophora*	0.09		0.42	1.28	1.04	1.21	1.01	0.88	0.65	1.28	0.25	0.07	0.76	1.40	2.92	14
King Quail	*Excalfactoria chinensis*	0.02						0.30								0.23	3
Red Junglefowl	*Gallus gallus*					0.06											1
Ring-necked Pheasant	*Phasianus colchicus*			0.01													1
Indian Peafowl	*Pavo cristatus*	0.07		0.28	0.48	0.06	1.73		0.02								6
Wilson's Storm-Petrel	*Oceanites oceanicus*	0.02		0.01												0.09	3
White-faced Storm-Petrel	*Pelagodroma marina*															0.00	1
Black-bellied Storm-Petrel	*Fregetta tropica*															0.03	1
Northern Giant-Petrel	*Macronectes halli*															0.01	1
Southern Giant-Petrel	*Macronectes giganteus*								0.02								1
Cape Petrel	*Daption capense*															0.01	1

Common Name	Scientific Name	CYP	TSI	WET	GUP	EIU	NWH	CQC	BBN	DEU	MGD	CHC	MUL	BBS	NEN	SEQ	No. BRs
Antarctic Prion	*Pachyptila desolata*															0.00	1
Grey-faced Petrel	*Procellaria gouldi*															0.01	1
Providence Petrel	*Pterodroma solandri*															0.08	1
Kermadec Petrel	*Pterodroma neglecta*	0.02														0.03	2
White-necked Petrel	*Pterodroma cervicalis*															0.01	1
Mottled Petrel	*Pterodroma inexpectata*															0.00	1
Black-winged Petrel	*Pterodroma nigripennis*															0.00	1
Gould's Petrel	*Pterodroma leucoptera*															0.01	1
Cook's Petrel	*Pterodroma cookii*															0.00	1
Stejneger's Petrel	*Pterodroma longirostris*															0.00	1
Tahiti Petrel	*Pseudobulweria rostrata*															0.09	1
Streaked Shearwater	*Calonectris leucomelas*															0.03	1
Wedge-tailed Shearwater	*Ardenna pacifica*	0.02	0.00	0.03				0.50								0.16	5
Sooty Shearwater	*Ardenna grisea*															0.01	1
Short-tailed Shearwater	*Ardenna tenuirostris*															0.07	1
Flesh-footed Shearwater	*Ardenna carneipes*															0.06	1
Fluttering Shearwater	*Puffinus gavia*															0.02	1
Hutton's Shearwater	*Puffinus huttoni*															0.07	1
Bulwer's Petrel	*Bulweria bulwerii*															0.01	1
Australasian Grebe	*Tachybaptus novaehollandiae*	0.88	0.01	3.01	5.45	7.41	6.24	6.35	4.26	3.87	12.21	5.48	3.83	7.24	5.66	7.25	15
Hoary-headed Grebe	*Poliocephalus poliocephalus*			0.03	0.32	0.24	1.56		0.02		8.09	2.99	1.40	0.48	1.10	0.18	11
Great Crested Grebe	*Podiceps cristatus*			1.36	0.48	0.67	2.08	0.50	0.42		0.43	0.25	0.03	2.08	1.10	1.31	12
Red-tailed Tropicbird	*Phaethon rubicauda*															0.03	1
White-tailed Tropicbird	*Phaethon lepturus*							0.10								0.01	2
Black-necked Stork	*Ephippiorhynchus asiaticus*	2.25	0.00	0.95	7.05	3.00	1.39	0.61	3.17					0.28		0.28	10
Australian Ibis	*Threskiornis moluccus*	2.82	0.02	8.13	10.10	6.25	2.25	14.52	23.60	1.29	2.70	0.50	0.67	7.56	0.88	14.51	15
Straw-necked Ibis	*Threskionis spinicollis*	3.55	0.00	5.37	11.06	14.15	3.29	7.87	11.46	3.23	2.27	1.00	0.93	9.11	4.11	5.66	15

Common Name	Scientific Name	CYP	TSI	WET	GUP	EIU	NWH	CQC	BBN	DEU	MGD	CHC	MUL	BBS	NEN	SEQ	No. BRs
Glossy Ibis	*Plegadis falcinellus*	2.01	0.00	0.53	5.45	1.35	4.51	2.32	1.26		1.28	1.24	1.10	2.16	0.07	1.35	14
Royal Spoonbill	*Platalea regia*	2.22	0.00	2.73	8.18	2.20	2.43	3.93	5.66	1.94	4.97	5.73	1.93	2.80	0.29	4.89	15
Yellow-billed Spoonbill	*Platalea flavipes*	0.05		0.31	2.24	0.18	1.04	0.20	1.03	5.16	3.69	9.21	9.95	3.28	0.59	0.47	14
Black-backed Bittern	*Ixobrychus dubius*			0.05					0.02							0.05	3
Black Bittern	*Dupetor flavicollis*	1.09		0.94	0.32	0.18		0.10	0.14							0.06	7
Nankeen Night-Heron	*Nycticorax caledonicus*	0.95	0.00	1.77	1.92	1.96	2.60	0.91	0.64	0.65	0.99	2.49	0.70	0.64	0.07	0.49	15
Striated Heron	*Butorides striata*	1.70	0.02	3.54	2.08	0.18		2.32	1.35							1.75	8
Eastern Cattle Egret	*Bubulcus coromandus*	1.75	0.00	5.95	2.41	4.47	2.08	8.07	5.91		0.14	0.25		3.04	0.37	6.17	13
White-necked Heron	*Ardea pacifica*	0.95		1.44	7.22	5.14	6.24	1.31	3.31	6.46	11.36	17.92	9.45	5.92	1.47	1.55	14
Great-billed Heron	*Ardea sumatrana*	0.07		0.68	0.32												3
Great Egret	*Ardea alba*	6.36	0.03	7.91	11.54	8.76	6.24	5.75	10.19	2.58	5.68	6.72	0.96	5.60	0.95	6.89	15
Intermediate Egret	*Egretta intermedia*	4.21	0.01	3.93	8.98	6.74	4.51	6.76	8.13	1.29	1.28	1.99	0.70	2.72	0.22	5.61	15
Pied Heron	*Egretta picata*	0.54	0.02	0.23	6.25	0.12	0.17		0.02								7
White-faced Heron	*Egretta novaehollandiae*	3.83	0.01	3.12	8.18	5.45	4.68	7.06	6.66	5.16	9.09	7.97	10.55	8.04	4.70	7.63	15
Little Egret	*Egretta garzetta*	3.00	0.01	3.50	9.14	1.65	2.77	7.36	5.72		0.28	0.25	0.03	1.56	0.44	4.22	14
Pacific Reef Heron	*Egretta sacra*	3.88	0.02	2.55	0.16			3.93	0.18							0.31	7
Australian Pelican	*Pelecanus conspicillatus*	0.47	0.01	5.14	7.38	3.86	5.72	4.84	4.85	2.58	3.12	11.95	2.26	5.84	0.81	7.61	15
Great Frigatebird	*Fregata minor*	0.52	0.00	0.44				0.20	0.05							0.03	6
Lesser Frigatebird	*Fregata ariel*	0.99	0.01	0.23					0.05							0.09	5
Australasian Gannet	*Morus serrator*								0.02							0.27	2
Masked Booby	*Sula dactylatra*	0.02		0.07				0.30								0.01	4
Red-footed Booby	*Sula sula*	0.02	0.00	0.13												0.03	4
Brown Booby	*Sula leucogaster*	0.69	0.00	0.83					0.15							0.19	5
Little Pied Cormorant	*Microcarbo melanoleucos*	1.09	0.01	4.68	7.05	9.37	5.37	6.76	6.98	0.65	1.85	2.99	1.16	7.80	6.10	9.97	15
Little Black Cormorant	*Phalacrocorax sulcirostris*	0.59	0.01	3.05	2.73	5.57	5.37	8.17	7.20	1.29	3.27	2.74	0.43	5.44	1.47	10.28	15
Pied Cormorant	*Phalacrocorax varius*	0.07	0.00	0.31	1.60	0.98	1.04	1.92	1.47	1.94	0.43	1.74	0.23	1.92	0.44	2.67	15
Great Cormorant	*Phalacrocorax carbo*			0.65		0.86	0.52	0.40	1.49	0.65	0.43	0.75	0.80	2.12	0.51	1.97	12

Common Name	Scientific Name	CYP	TSI	WET	GUP	EIU	NWH	CQC	BBN	DEU	MGD	CHC	MUL	BBS	NEN	SEQ	No. BRs
Australasian Darter	*Anhinga novaehollandiae*	3.15	0.01	4.22	6.73	10.53	6.24	7.56	8.64	1.94	3.12	6.47	1.80	7.24	0.95	7.56	15
Osprey	*Pandion cristatus*	1.80	0.02	3.23	0.64	1.29	0.17	3.33	3.82					0.04	0.15	1.87	11
Black-shouldered Kite	*Elanus axillaris*	0.09		1.55		0.80	0.52	0.30	0.96	0.65	0.14		0.07	1.84	0.59	0.84	12
Letter-winged Kite	*Elanus scriptus*						0.17					0.25					2
Square-tailed Kite	*Lophoictinia isura*	0.02		0.24	0.32	0.67		0.30	0.09	0.65	0.43		0.43	0.08	0.15	0.46	12
Black-breasted Buzzard	*Hamirostra melanosternon*	0.30		0.02	0.64	0.24	0.52		0.02	0.65	0.99	0.75	3.93				10
Pacific Baza	*Aviceda subcristata*	0.09		1.56		0.98		1.01	1.21					0.52	0.15	1.04	8
Little Eagle	*Hieraaetus morphnoides*	0.07		0.09	0.16	0.24	0.52	0.10	0.18	1.94	1.42	1.00	3.29	0.44	1.98	0.12	14
Wedge-tailed Eagle	*Aquila audax*	0.53		0.81	3.53	5.51	4.68	1.41	1.77	1.29	8.38	13.19	6.89	4.36	6.24	0.81	14
Red Goshawk	*Erythrotriorchis radiatus*	0.25															1
Grey Goshawk	*Accipiter novaehollandiae*	0.39		1.13		0.12		0.91	0.14					0.16	0.15	0.72	8
Brown Goshawk	*Accipiter fasciatus*	1.56	0.00	0.50	2.57	2.82	1.04	1.11	2.24	1.94	1.56	1.99	1.83	0.44	1.18	1.86	15
Collared Sparrowhawk	*Accipiter cirrocephalus*	0.18		0.23	0.96	1.04	2.43	0.81	0.35		1.42	2.24	1.26	0.12	0.95	0.37	13
Swamp Harrier	*Circus approximans*	0.14	0.00	0.53	0.96	1.04		0.71	1.40			0.75		0.24	0.15	0.36	11
Spotted Harrier	*Circus assimilis*	0.25		0.31	0.32	0.55	0.35		0.18	0.65	0.99	0.75		0.48	0.07	0.16	12
Black Kite	*Milvus migrans*	9.80		5.12	24.37	27.87	29.30	7.97	19.18	16.79	27.40	14.69	5.49	5.88	0.29	1.71	14
Whistling Kite	*Haliastur sphenurus*	7.49		4.17	21.32	15.68	15.60	5.75	12.62	15.49	21.44	25.39	14.74	9.51	2.57	5.49	14
Brahminy Kite	*Haliastur indus*	3.14		2.61	1.44	0.06	0.00	5.75	4.64					0.04		2.60	9
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	2.44	0.01	2.59	4.17	1.29	0.35	4.84	5.25	0.65	0.14		0.13	0.96	0.81	3.57	14
Australian Bustard	*Ardeotis australis*	0.79		0.14	5.93	8.27	1.73	0.91	2.52	2.58	5.39	3.49	1.26	1.24		0.01	13
Red-necked Crake	*Rallina tricolor*	0.32		0.93													2
Buff-banded Rail	*Gallirallus philippensis*	0.07	0.00	1.07		0.12		2.72	0.18		0.43	0.50		0.20	0.15	1.38	11
Lewin's Rail	*Lewinia pectoralis*															0.25	1
Pale-vented Bush-hen	*Amaurornis moluccana*	0.16		1.67		0.06		0.20	0.06							0.31	6
Baillon's Crake	*Porzana pusilla*			0.01		0.06	0.17	0.40			1.85	0.50	0.07	0.08	0.15	0.56	10
Australian Crake	*Porzana fluminea*						0.35				2.84	0.75	2.56			0.08	5
Spotless Crake	*Porzana tabuensis*			0.09					0.03		0.28	0.50	0.10			0.54	6

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White-browed Crake	*Porzana cinerea*	0.09		0.73		0.31		0.91	1.26								5
Australasian Swamphen	*Porphyrio melanotus*	0.05		3.01	1.92	1.41	1.39	11.09	1.40	0.65	4.26	2.49	0.50	2.40	2.20	8.29	14
Dusky Moorhen	*Gallinula tenebrosa*			1.41	1.12	1.90	1.21	11.70	2.74	0.65	5.68		0.23	5.88	3.45	10.26	12
Black-tailed Native-hen	*Tribonyx ventralis*				4.49	0.61	4.33	0.10	0.15	7.10	13.63	6.22	11.01	0.32		0.00	11
Eurasian Coot	*Fulica atra*	0.14	0.00	2.05	3.05	4.04	3.81	4.44	0.61		10.08	4.48	1.86	7.36	5.07	6.02	14
Sarus Crane	*Grus antigone*	0.09		0.89	7.54	0.31											4
Brolga	*Grus rubicunda*	1.34		0.74	14.59	2.82	1.21	2.02	5.87	3.87	10.36	6.97	3.03	1.04		0.15	13
Red-backed Buttonquail	*Turnix maculosus*	0.02		0.03				0.61	0.06					0.04		0.07	6
Black-breasted Buttonquail	*Turnix melanogaster*															0.07	1
Painted Buttonquail	*Turnix varius*	0.02		0.06				0.40						0.08	0.29	0.13	6
Red-chested Buttonquail	*Turnix pyrrhothorax*	0.05		0.02	0.16	0.24			0.06	0.65				0.04		0.02	8
Little Buttonquail	*Turnix velox*			0.01			2.60				0.43	1.49	0.07		0.07		6
Bush Stone-curlew	*Burhinus grallarius*	1.76		6.56	0.64	1.35	0.17	4.03	8.70				0.17			1.13	9
Beach Stone-curlew	*Esacus magnirostris*	0.64	0.00	0.96				1.61	0.49							0.27	6
Pied Oystercatcher	*Haematopus longirostris*	0.60		1.46	0.64			5.85	1.55							1.81	6
Sooty Oystercatcher	*Haematopus fuliginosus*			0.12				2.02	0.09							0.20	4
Pied Stilt	*Himantopus leucocephalus*	1.99		2.14	12.19	1.59	7.45	2.02	4.87	2.58	4.68	1.24	12.04	4.28	0.88	5.96	14
Red-necked Avocet	*Recurvirostra novaehollaniae*	0.02		0.03	0.64				0.24	0.65	0.14	5.23	0.33	0.40		0.56	10
Banded Lapwing	*Vanellus tricolor*					0.06		0.30	0.05		0.14		0.93	1.00		0.08	7
Masked Lapwing	*Vanellus miles*	13.13	0.04	16.19	9.78	13.35	7.45	18.05	22.28	9.04	6.81	2.49	12.11	9.87	6.46	15.30	15
Red-kneed Dotterel	*Erythrogonys cinctus*	0.28		0.18	2.41	0.43	1.04	0.20	0.09	3.23	1.70	1.24	4.76	0.52	0.15	1.24	14
Inland Dotterel	*Peltohyas australis*										0.14	4.23	0.03				3
Pacific Golden Plover	*Pluvialis fulva*	1.77	0.00	0.74	0.48	0.12		2.02	0.64					0.04		0.61	9
Grey Plover	*Pluvialis squatarola*	0.23		0.11				0.20	0.21							0.11	5
Red-capped Plover	*Charadrius ruficapillus*	1.32		2.08	1.92		0.17	4.74	2.05		0.28	0.50	0.23	0.04		1.12	11
Double-banded Plover	*Charadrius bicinctus*			0.28				0.40	0.05							0.11	4
Lesser Sand Plover	*Charadrius mongolus*	0.66	0.00	1.87	0.32			1.82	0.74							0.41	7

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Greater Sand Plover	*Charadrius leschenaultii*	1.61	0.01	1.92	0.32			1.41	0.76							0.18	7
Oriental Plover	*Charadrius veredus*	0.02						0.10	0.02								3
Black-fronted Dotterel	*Elseyornis melanops*	1.76		3.59	9.46	3.06	7.98	3.53	5.78	7.10	15.47	13.69	13.87	2.40	1.54	2.72	14
Australian Painted-Snipe	*Rostratula australis*													0.04		0.08	2
Comb-crested Jacana	*Irediparra gallinacea*	13.73		3.25	3.85	8.51	1.04	4.94	6.69					0.88		2.66	9
Latham's Snipe	*Gallinago hardwickii*	0.37		0.41	0.16	0.18		0.91	0.30		0.57	0.75		0.64		1.09	10
Swinhoe's Snipe	*Gallinago megala*			0.01													1
Asian Dowitcher	*Limnodromus semipalmatus*			0.02												0.04	2
Black-tailed Godwit	*Limosa limosa*	0.07		1.33	1.60	0.31		0.10	0.12							0.44	7
Bar-tailed Godwit	*Limosa lapponica*	1.04		4.13	0.48			2.82	1.08							1.84	6
Little Curlew	*Numenius minutus*	0.02		0.18	0.32	0.06										0.06	5
Whimbrel	*Numenius phaeopus*	3.53	0.02	4.35	1.44			6.56	1.83							2.16	7
Far Eastern Curlew	*Numenius madagascariensis*	2.37	0.00	3.21	2.41			5.95	1.61							1.86	7
Marsh Sandpiper	*Tringa stagnatilis*	0.14		0.28	2.89	0.12	0.35	0.20	0.20		0.14	0.25		0.24		0.48	11
Common Greenshank	*Tringa nebularia*	0.83		0.77	1.12		0.17	0.81	1.11				0.13			0.68	8
Wood Sandpiper	*Tringa glareola*	0.02		0.05	2.08		0.69									0.09	5
Grey-tailed Tattler	*Tringa brevipes*	1.37	0.00	2.86				4.13	1.02							0.75	6
Wandering Tattler	*Tringa incanus*			0.03					0.02							0.11	3
Terek Sandpiper	*Xenus cinereus*	0.12		1.59	0.64			1.11	0.21							0.24	6
Common Sandpiper	*Actitis hypoleucos*	1.94	0.01	0.88			0.17	0.30	0.17		0.14			0.04		0.12	9
Ruddy Turnstone	*Arenaria interpres*	0.05		0.86				1.92	0.29							0.31	5
Great Knot	*Calidris tenuirostris*	0.09		3.31	0.16			0.61	0.91							0.61	6
Red Knot	*Calidris canutus*			0.75				0.10	0.52							0.24	4
Sanderling	*Calidris alba*	0.05		0.09				0.40	0.03							0.01	5
Red-necked Stint	*Calidris ruficollis*	0.80	0.00	2.40	0.96			1.51	1.44		0.28	0.50				0.93	9
Pectoral Sandpiper	*Calidris melanotos*			0.01	0.16	0.12		0.10								0.07	5
Sharp-tailed Sandpiper	*Calidris acuminata*	0.76		1.39	1.44	0.31	0.87	0.40	1.09		1.42	1.49		0.24		1.24	11

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Curlew Sandpiper	*Calidris ferruginea*		0.00	1.81	0.80			0.50	0.11							0.65	6
Broad-billed Sandpiper	*Limicola falcinellus*	0.02		0.05												0.03	3
Ruff	*Philomachus pugnax*			0.01												0.01	2
Australian Pratincole	*Stiltia isabella*	0.43	0.01	0.22	4.17	0.18	0.17		0.14	0.65	1.56	3.24	0.10				11
Oriental Pratincole	*Glareola maldivarum*			0.13	0.16						0.14						3
Brown Noddy	*Anous stolidus*	0.24	0.00	0.78				0.10	0.02							0.12	6
Black Noddy	*Anous minutus*	0.12	0.00	0.16				0.40								0.13	5
White Tern	*Gygis alba*		0.00													0.01	2
Silver Gull	*Chroicocephalus novaehollandiae*	8.16	0.04	6.76	4.33		2.25	11.80	4.53		0.28	1.99	0.13	1.76	0.29	4.76	13
Gull-billed Tern	*Gelochelidon nilotica*	1.21	0.01	3.20	2.73	0.12		3.23	5.14		0.28	2.49	0.03	0.64	0.15	2.39	13
Caspian Tern	*Hydroprogne caspia*	0.33	0.00	1.83	2.08	0.67	2.25	2.72	3.56		0.57	4.48	0.03	1.32	0.15	2.26	14
Great Crested Tern	*Thalasseus bergii*	5.51	0.03	3.08	2.57			5.85	0.94							2.42	7
Lesser Crested Tern	*Thalasseus bengalensis*	0.60		0.84	0.32			0.61	0.45							0.11	6
Little Tern	*Sternula albifrons*	0.72		1.35	0.80	0.06		1.41	0.76		0.14					0.61	8
Australian Fairy Tern	*Sternula nerels*							0.10									1
Bridled Tern	*Onychoprion anaethetus*	0.42		0.38				0.10	0.02							0.11	5
Sooty Tern	*Onychoprion fuscata*	0.05	0.00	0.62				0.10								0.04	5
Roseate Tern	*Sterna dougallii*	0.09	0.00	0.17				0.50								0.03	5
White-fronted Tern	*Sterna striata*															0.00	1
Black-naped Tern	*Sterna sumatrana*	0.21	0.00	0.37	0.16			0.20	0.02							0.06	7
Common Tern	*Sterna hirundo*	0.09	0.00	0.19	0.32			0.20	0.12							0.25	7
Whiskered Tern	*Chlidonias hybrida*	0.09		0.19	2.89	0.86	1.04	0.81	2.09		1.56	2.74	0.07	1.64	0.15	1.45	13
White-winged Tern	*Chlidonias leucopterus*	0.07		0.05	0.32			0.10	0.18		0.14					0.05	7
Brown Skua	*Stercorarius antarcticus*															0.01	1
Pomarine Skua	*Stercorarius pomarinus*															0.07	1
Parasitic Jaeger	*Stercorarius parasiticus*															0.04	1
Long-tailed Jaeger	*Stercorarius longicaudus*															0.00	1

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Rock Dove	*Columba livia*	0.18		5.02	1.92	0.37	6.59		4.00		0.85		0.10	3.96	0.07	3.98	11
White-headed Pigeon	*Columba leucomela*	0.05		1.32		0.06		0.30								1.02	5
African Collared-Dove	*Streptopelia roseogrisea*										0.14						1
Spotted Dove	*Spilopelia chinensis*	1.06		6.03		0.18		5.55	6.69					4.88	0.59	8.00	8
Brown Cuckoo-Dove	*Macropygia phasianella*	0.95		6.69		0.55		6.66	0.06					0.68		3.87	7
Pacific Emerald Dove	*Chalcophaps longirostris*	2.89		5.38		0.12		2.22	0.12							0.80	6
Common Bronzewing	*Phaps chalcoptera*	0.09		0.05	1.12	1.65	5.37	0.30	0.08	3.87	3.41	3.24	10.55	1.72	4.77	1.17	14
Brush Bronzewing	*Phaps elegans*															0.01	1
Flock Bronzewing	*Phaps histrionica*				0.32						2.84	5.73	0.03				4
Crested Pigeon	*Ocyphaps lophotes*			0.67	10.10	10.29	18.20	7.26	6.20	14.85	30.95	25.89	17.83	22.15	9.11	11.15	13
Spinifex Pigeon	*Geophaps plumifera*				0.64		8.32				10.08	12.70	0.23				5
Squatter Pigeon	*Geophaps scripta*	0.07		0.28	3.21	9.98		0.20	0.71	4.52			0.03	0.48	0.66		10
Wonga Pigeon	*Leucosarcia melanoleuca*							0.30						0.20	1.32	2.31	4
Diamond Dove	*Geopelia cuneata*	0.39			10.90	2.20	5.20	0.10	0.03	3.87	5.96	8.71	5.16	0.28		0.00	12
Peaceful Dove	*Geopelia placida*	7.90	0.01	19.62	19.56	24.19	24.45	16.84	27.65	9.68	12.07	13.19	14.14	9.79	6.90	5.11	15
Bar-shouldered Dove	*Geopelia humeralis*	46.37	0.04	16.71	16.67	10.35	6.93	7.56	6.73	1.94			0.57	3.72	4.48	11.05	13
Wompoo Fruit Dove	*Ptilinopus magnificus*	5.92		7.62		0.12		3.73	0.02					0.04		0.95	7
Superb Fruit Dove	*Ptilinopus superbus*	1.32		3.51		0.12		1.31	0.23							0.04	6
Rose-crowned Fruit Dove	*Ptilinopus regina*	5.15		1.23				2.22	0.11					0.04		1.34	6
Torresian Imperial Pigeon	*Ducula bicolor*	12.70	0.02	10.48	0.32			7.87	4.64							0.00	7
Topknot Pigeon	*Lopholaimus antarcticus*	0.07		3.68				3.63	0.15							1.38	5
Pheasant Coucal	*Centropus phasianinus*	7.88	0.00	3.85	4.33	9.43	1.04	4.54	9.87	2.58	0.28			2.20	0.22	4.21	13
Pacific Koel	*Eudynamys orientalis*	1.27		1.59	0.96	4.23	0.87	4.84	8.61	1.29				2.24	0.73	4.00	11
Channel-billed Cuckoo	*Scythrops novaehollandiae*	1.73	0.00	1.41	2.41	3.74	2.25	4.64	3.44		0.14			1.20	0.44	3.84	12
Horsfield's Bronze-Cuckoo	*Chalcites basalis*	0.21		0.33	0.96	1.65	1.91	0.71	1.58	1.94	5.54	5.73	9.81	1.36	0.66	1.02	14
Black-eared Cuckoo	*Chalcites osculans*					0.06			0.02		0.43	0.50	5.89	0.56	0.29		7
Shining Bronze-Cuckoo	*Chalcites lucidus*	0.21		1.24	0.80	0.31	0.17	1.61	0.14		0.14		0.07	0.88	0.66	2.90	12

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Little Bronze-Cuckoo	*Chalcites minutillus*	6.75		5.67	4.49	1.84		1.82	1.88					0.20	0.07	0.48	9
Pallid Cuckoo	*Cacomantis pallidus*	0.12		0.14	0.16	0.55	0.52	0.10	0.71		0.14		1.96	2.04	1.76	0.44	12
Chestnut-breasted Cuckoo	*Cacomantis casteneiventris*	1.50		1.26													2
Fan-tailed Cuckoo	*Cacomantis flabelliformis*	0.02		0.68		0.31		1.11	0.17				0.27	1.72	6.17	4.71	9
Brush Cuckoo	*Cacomantis variolosus*	10.79	0.01	2.62	1.28	2.69	0.17	1.31	6.98		0.28			0.16	0.51	1.66	12
Oriental Cuckoo	*Cuculus optatus*	0.12	0.00	0.17					0.26							0.10	5
Sooty Owl	*Tyto tenebricosa*			0.73				0.10								0.12	3
Australian Masked Owl	*Tyto novaehollandiae*	0.02		0.02											0.07	0.05	4
Barn Owl	*Tyto javanica*	0.12		0.38		0.06	0.52		0.12	1.29	0.28	2.99	0.17	0.08	0.15	0.03	12
Eastern Grass Owl	*Tyto delicatula*			0.06					0.02							0.04	3
Rufous Owl	*Ninox rufa*	0.02		0.55		0.24			0.33								4
Powerful Owl	*Ninox strenua*													0.04		0.27	2
Barking Owl	*Ninox connivens*	0.19	0.01	0.23	0.48	0.06	0.87	0.40	1.71		0.14	0.50		0.04		0.08	12
Southern Boobook	*Ninox boobook*	0.28		0.23	1.76	0.55	0.52	0.61	0.23	1.94	0.43	1.00	0.17	0.88	0.81	0.69	14
Marbled Frogmouth	*Podargus ocellatus*	0.46														0.12	2
Papuan Frogmouth	*Podargus papuensis*	2.17		2.08													2
Tawny Frogmouth	*Podargus strigoides*	0.30		0.12	1.60	2.63	1.04	1.92	0.76	4.52		0.25	0.60	1.04	1.25	1.64	13
Spotted Nightjar	*Eurostopodus argus*	0.12			2.73	0.18	1.04		0.06	0.65	0.28	2.49	0.37	0.04	0.07		11
White-throated Nightjar	*Eurostopodus mystacalis*	0.02		0.03		0.06			0.02					0.04	0.37	0.17	7
Large-tailed Nightjar	*Caprimulgus macrurus*	0.97		0.32	0.16			0.10	0.15							0.02	6
Australian Owlet-nightjar	*Aegotheles cristatus*	0.12		0.05	2.24	0.55	2.43	0.20	0.09	3.87	1.99	3.24	2.73	0.28	0.73	0.41	14
Australian Swiftlet	*Aerodramus terraereginae*	0.72		11.98		0.98		0.30	0.53		0.14					0.00	7
White-throated Needletail	*Hirundapus caudacutus*	0.16		0.26		0.06		0.20	0.05				0.07	0.36	0.22	1.05	9
Pacific Swift	*Apus pacificus*	0.46		0.68	1.12	0.55		0.20	0.44	0.65	0.57	0.75	0.17	0.12		0.05	12
Oriental Dollarbird	*Eurystomus orientalis*	2.84	0.03	1.45	3.21	5.39	1.56	1.82	4.53	1.29	0.43		0.03	2.68	2.79	3.04	14
Buff-breasted Paradise Kingfisher	*Tanysiptera sylvia*	1.78		3.78		0.06		0.71	0.06								5

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Laughing Kookaburra	*Dacelo novaeguineae*	1.36		11.27	1.28	14.27		16.03	5.44	18.08	0.85		6.82	14.23	18.58	15.12	12
Blue-winged Kookaburra	*Dacelo leachii*	8.14	0.02	1.46	8.50	12.25	5.89	2.52	13.53	0.65	0.28			0.20		0.04	12
Forest Kingfisher	*Todiramphus macleayii*	7.50	0.00	9.37	4.17	9.06		3.43	8.81	1.29	0.14			0.68	0.15	1.82	12
Torresian Kingfisher	*Todiramphus sordidus*	0.24	0.00	1.71				0.30	0.03							1.27	6
Sacred Kingfisher	*Todiramphus sanctus*	6.01	0.01	4.86	3.37	2.63	6.24	7.66	4.73	1.29	2.27	1.24	3.19	5.24	3.01	6.87	15
Red-backed Kingfisher	*Todiramphus pyrrhopygius*	0.05		0.09	6.73	1.59	6.41		1.06	7.10	4.54	6.97	1.90			0.06	11
Yellow-billed Kingfisher	*Syma torotoro*	1.18															1
Azure Kingfisher	*Ceyx azurea*	1.96		2.22	0.16	0.86	0.69	2.02	0.32					0.60	1.32	1.01	10
Little Kingfisher	*Ceyx pusillus*	0.55		1.25				0.20	0.21								4
Rainbow Bee-eater	*Merops ornatus*	22.12	0.01	13.92	14.11	16.47	19.42	9.58	18.80	4.52	7.95	5.48	5.72	3.24	1.25	7.80	15
Nankeen Kestrel	*Falco cenchroides*	1.87	0.01	1.29	8.02	8.27	2.43	1.31	6.23	5.81	10.51	15.68	6.85	7.80	1.76	1.04	15
Australian Hobby	*Falco longipennis*	0.64	0.00	0.40	4.65	1.65	1.04	0.40	2.20	1.29	1.14	2.49	2.40	1.48	0.81	0.52	15
Brown Falcon	*Falco berigora*	0.88		0.46	11.86	4.84	2.25	1.41	3.58	3.87	7.52	10.95	7.12	2.16	1.32	0.62	14
Grey Falcon	*Falco hypoleucos*										0.57	7.22	0.30				3
Black Falcon	*Falco subniger*	0.07		0.01	0.32	0.24	0.17	0.10	0.09	0.65	1.85	2.74	0.27	0.28	0.07	0.12	14
Peregrine Falcon	*Falco peregrinus*	0.09	0.00	0.18	0.16	0.37	0.35	0.20	0.26	0.65	0.43	0.50	0.23	0.20	0.29	0.43	15
Cockatiel	*Nymphicus hollandicus*	0.02		0.02	5.77	1.71	2.25		0.53	14.85	13.77	5.48	5.76	9.39	0.37	0.48	13
Red-tailed Black Cockatoo	*Calyptorhynchus banksii*	0.86		1.78	6.57	10.47	2.95	4.74	11.45	15.49	1.56	3.73	0.27	0.36	0.07	0.15	14
Glossy Black Cockatoo	*Calyptorhynchus lathami*			0.01										0.20	0.07	0.15	4
Yellow-tailed Black Cockatoo	*Calyptorhynchus funereus*													0.60	2.57	1.93	3
Palm Cockatoo	*Probosciger aterrimus*	1.50															1
Galah	*Eolophus roseicapilla*	1.76		0.11	14.27	14.15	11.44	1.82	5.38	16.14	22.57	18.92	17.00	25.35	12.41	8.25	14
Major Mitchell's Cockatoo	*Lophochroa leadbeateri*										1.42	0.25	13.27	0.16		0.00	5
Long-billed Corella	*Cacatua tenuirostris*							0.10	0.09					0.12		0.61	4
Little Corella	*Cacatua sanguinea*	0.09		0.07	10.74	0.55	9.88	1.61	6.31	1.29	11.93	13.19	2.40	9.03	4.41	6.09	14
Sulphur-crested Cockatoo	*Cacatua galerita*	14.31	0.04	17.36	3.85	8.82	7.28	14.02	14.32	7.75	2.27	0.25	1.70	15.15	4.19	10.35	15
Australian King Parrot	*Alisterus scapularis*			2.01		0.12		1.41	0.02					2.04	4.19	4.33	7

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Red-winged Parrot	*Aprosmictus erythropterus*	12.57		0.45	8.18	13.11	15.26	0.20	3.53	17.43	12.63	3.98	13.47	8.84	4.55	0.16	14
Eclectus Parrot	*Eclectus roratus*	1.20		0.18												0.00	3
Red-cheeked Parrot	*Geoffroyus geoffroyi*	0.76															1
Alexandrine Parakeet	*Psittacula eupatria*															0.00	1
Rose-ringed Parakeet	*Psittacula krameri*			0.01												0.02	2
Red-rumped Parrot	*Psephotus haematonotus*											1.74	7.39	9.59	5.73	0.11	5
Eastern Bluebonnet	*Northiella haematogaster*											3.24	9.12	3.12	0.07		4
Mulga Parrot	*Psephotus varius*										0.43		10.85				2
Golden-shouldered Parrot	*Psephotus chrysopterygius*	0.60															1
Crimson Rosella	*Platycercus elegans*			0.69		0.12		1.71						0.04	10.94	1.36	6
Northern Rosella	*Platycercus venustus*						0.17										1
Pale-headed Rosella	*Platycercus adscitus*	1.46		0.33	2.08	15.49		2.92	4.50	26.47	0.99		0.30	14.19	2.35	7.53	12
Eastern Rosella	*Platycercus eximius*												0.03	1.40	12.34	0.08	4
Australian Ringneck	*Barnardius zonarius*				0.32		6.93			3.23	3.12	7.22	15.97	0.76	0.15		8
Swift Parrot	*Lathamus discolor*														0.44		1
Eastern Ground Parrot	*Pezoporus wallicus*															0.03	1
Bourke's Parrot	*Neopsephotus bourkii*										1.56	1.99	7.82				3
Blue-winged Parrot	*Neophema chrysostoma*												0.10				1
Turquoise Parrot	*Neophema pulchella*														4.63		1
Little Lorikeet	*Parvipsitta pusilla*			0.31		0.24		0.20	0.02					2.12	15.72	1.40	7
Varied Lorikeet	*Psitteuteles versicolor*				2.08	0.06	22.02				0.57						4
Rainbow Lorikeet	*Trichoglossus moluccanus*	41.59	0.02	22.49	3.69	20.39	3.29	21.38	24.98	9.04	2.56		0.17	17.71	7.93	24.13	14
Scaly-breasted Lorikeet	*Trichoglossus chlorolepidotus*	3.63		3.88		4.04	0.00	1.41	2.47					11.23	3.45	9.59	9
Musk Lorikeet	*Glossopsitta concinna*						0.00							2.20	1.84	0.04	4
Budgerigar	*Melopsittacus undulatus*			0.02	1.92	1.22	8.84		0.09	8.39	6.67	7.72	1.13	0.24	0.22		11
Double-eyed Fig Parrot	*Cyclopsitta diophthalma*	0.58		6.09		0.12											3
Papuan Pitta	*Erythropitta macklotii*	0.37															1

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Noisy Pitta	*Pitta versicolor*	3.93	0.01	2.40				2.72	0.02							0.64	6
Albert's Lyrebird	*Menura alberti*															0.36	1
Superb Lyrebird	*Menura novaehollandiae*														1.10		1
Rufous Scrub-bird	*Atrichornis rufescens*															0.01	1
Green Catbird	*Ailuroedus crassirostris*															1.74	1
Black-eared Catbird	*Ailuroedus melanotis*	0.16															1
Spotted Catbird	*Ailuroedus maculosis*			8.59		0.12											2
Tooth-billed Bowerbird	*Scenopoeetes dentirostris*			2.17													1
Golden Bowerbird	*Prionodura newtoniana*			0.93													1
Regent Bowerbird	*Prionodura chrysocephalus*							1.51						0.12		0.94	3
Satin Bowerbird	*Ptilonorhynchus violaceus*			0.68										1.24	4.33	1.61	4
Great Bowerbird	*Chlamydera nuchalis*	4.37		1.37	11.06	16.96	6.76	1.41	15.53	1.29							8
Spotted Bowerbird	*Chlamydera maculata*				0.48	0.06	10.58		0.23	7.75	10.93	12.20	15.37	1.88	0.15		10
Fawn-breasted Bowerbird	*Chlamydera cerviniventris*	0.42															1
White-throated Treecreeper	*Cormobates leucophaeus*			2.91		0.06		2.62	0.02					1.84	15.72	4.04	7
Red-browed Treecreeper	*Climacteris erythrops*													0.08	0.51	0.11	3
White-browed Treecreeper	*Climactris affinis*									1.94		0.50	4.96	0.08			4
Brown Treecreeper	*Climacteris picumnus*	0.05		0.13		2.51		0.20		9.68	0.57	3.98	16.40	0.68	8.81	0.06	11
Black-tailed Treecreeper	*Climacteris melanura*				0.32		6.93				0.14						3
Lovely Fairywren	*Malurus amabilis*	2.24		1.70													2
Variegated Fairywren	*Malurus lamberti*				5.61	0.24	7.98	0.10	0.09	5.81	8.38	12.45	7.98	3.60	3.45	5.37	12
Superb Fairywren	*Malurus cyaneus*								0.08				0.17	13.39	22.70	7.85	5
Splendid Fairywren	*Malurus splendens*										1.85	1.49	10.58	0.08			4
Purple-crowned Fairywren	*Malurus coronatus*				1.12		3.81										2
Red-backed Fairywren	*Malurus melanocephalus*	0.86		2.09	5.61	6.43	4.33	5.65	8.70	5.81	0.14			2.64	0.51	8.49	12
White-winged Fairywren	*Malurus leucopterus*				0.16		0.17			0.65	6.39	11.70	6.62	3.00	0.07		8
Southern Emu-wren	*Stipiturus malachurus*						0.00									0.01	2

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Rufous-crowned Emu-wren	*Stipiturus ruficeps*						0.17				0.43	5.73					3
Grey Grasswren	*Amytornis barbatus*						0.00					0.50					2
Carpentarian Grasswren	*Amytornis dorotheae*						2.60										1
Eyrean Grasswren	*Amytornis goyderi*											2.99					1
Dusky Grasswren	*Amytornis purnelli*										0.14	3.73					2
Kalkadoon Grasswren	*Amytornis ballarae*						3.47										1
Black Honeyeater	*Sugomel nigrum*				0.32		0.17			8.39	1.42	1.00	0.43	0.04	0.22		8
Dusky Myzomela	*Myzomela obscura*	17.77	0.01	10.83	0.16	1.53		11.40	1.20					0.08		0.55	9
Red-headed Myzomela	*Myzomela erythrocephala*	0.26	0.00		2.89												3
Scarlet Myzomela	*Myzomela sanguinolenta*	0.18		3.63		3.37		3.93	0.24					2.76	9.25	6.85	8
Green-backed Honeyeater	*Glycichaera fallax*	0.42															1
Eastern Spinebill	*Acanthorhynchus tenuirostris*			1.42		0.24		4.13	0.02					0.24	7.57	1.21	7
Pied Honeyeater	*Certhionyx variegatus*				0.80		0.35			0.65	0.57	0.25	0.07				6
Banded Honeyeater	*Cissomela pectoralis*	0.49		0.17		1.84	4.33		0.02								5
Brown Honeyeater	*Lichmera indistincta*	1.06	0.01	11.15	12.67	17.15	19.76	13.21	23.29	14.20	5.25	1.74	5.52	10.39	6.39	15.15	15
New Holland Honeyeater	*Phylidonyris novaehollaniae*														2.79	0.29	2
White-cheeked Honeyeater	*Phylidonyris niger*			1.87		0.24		0.61						0.16	0.81	0.84	6
White-streaked Honeyeater	*Trichodere cockerelli*	1.32		0.23													2
Painted Honeyeater	*Grantiella picta*				0.16		0.17		0.02		0.43		0.33	1.16	0.07	0.01	8
Striped Honeyeater	*Plectorhyncha lanceolata*					0.06			0.17	4.52	1.70	0.25	12.04	9.23	8.52	3.43	9
Macleay's Honeyeater	*Xanthotis macleayanus*	5.38		9.03		0.12											3
Tawny-breasted Honeyeater	*Xanthotis flaviventer*	2.13															1
Little Friarbird	*Philemon citreogularis*	2.10		0.49	9.30	11.64	7.45	6.96	8.01	12.27	2.13	0.50	6.65	6.28	3.45	4.47	14
Helmeted Friarbird	*Philemon buceroides*	39.32	0.03	13.26		1.84		10.89	7.63							0.00	7
Silver-crowned Friarbird	*Philemon argenticeps*	3.42		0.10		0.06	6.76	0.10									5
Noisy Friarbird	*Philemon corniculatus*	0.35		1.22	0.16	9.25		2.12	1.65	16.79	0.14	0.25	3.79	8.44	18.66	8.49	13
Blue-faced Honeyeater	*Entomyzon cyanotis*	6.89		2.24	8.34	24.31		13.82	14.38	20.01	2.98		5.99	9.19	4.48	10.11	12

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Black-chinned Honeyeater	*Melithreptus gularis*			0.04		0.61	7.45		0.86		0.14		0.17	0.12	2.50	0.08	9
Brown-headed Honeyeater	*Melithreptus brevirostris*												3.53	2.04	7.34	0.06	4
White-throated Honeyeater	*Melithreptus albogularis*	16.43		2.75	4.17	9.43	0.87	3.93	9.04	7.10				1.72	1.76	5.80	11
White-naped Honeyeater	*Melithreptus lunatus*			0.45		0.18		0.20	0.03					2.08	13.66	1.01	7
White-eared Honeyeater	*Nesoptilotis leucotis*									1.94			0.03	1.96	11.46	0.00	5
Gibberbird	*Ashbyia lovensis*										0.28	3.24					2
Crimson Chat	*Epthianura tricolor*				2.24		5.20			3.87	8.94	8.96	9.95	0.04			7
Orange Chat	*Epthianura aurifrons*				2.41		2.25				4.68	13.19	2.03				5
Yellow Chat	*Epthianura crocea*								0.11			2.49					2
White-fronted Chat	*Epthianura albifrons*												0.03				1
Rufous-banded Honeyeater	*Conopophila albogularis*	0.32			0.64												2
Rufous-throated Honeyeater	*Conopophila rufogularis*	0.12		0.32	10.74	2.82	9.19		2.02	0.65	5.25						8
Bar-breasted Honeyeater	*Ramsayornis fasciatus*	0.23		0.01	0.16			1.01	0.08					0.08			6
Brown-backed Honeyeater	*Ramsayornis modestus*	9.91		3.47		1.29			6.05								4
Spiny-cheeked Honeyeater	*Acanthagenys rufogularis*				1.12	0.18	4.68		0.15	14.20	15.76	12.45	16.40	7.76	4.48	0.02	11
Little Wattlebird	*Anthochaera chrysoptera*													0.12	0.15	2.72	3
Red Wattlebird	*Anthochaera carunculata*													1.20	10.43	0.07	3
Regent Honeyeater	*Anthochaera phrygia*														0.07		1
Bridled Honeyeater	*Bolemoreus frenatus*			3.28		0.43											2
Eungella Honeyeater	*Bolemoreus hindwoodi*							2.62									1
Yellow-faced Honeyeater	*Calegavis chrysops*	0.02		2.78		0.92			0.03				0.07	5.80	25.05	5.72	8
Yellow-tufted Honeyeater	*Lichenostomus melanops*													0.16	14.32	0.09	3
Bell Miner	*Manorina melanophrys*													0.20	0.29	2.22	3
Noisy Miner	*Manorina melanocephala*			0.43		3.37		0.71	1.61	10.33	0.14		0.57	27.30	17.33	21.84	10
Yellow-throated Miner	*Manorina flavigula*			0.05	4.65	1.71	22.02		1.77	9.68	21.15	19.17	17.03	5.32	0.22		11
White-fronted Honeyeater	*Purnella albifrons*				0.16								0.23				2
White-gaped Honeyeater	*Stomiopera unicolor*	0.09		0.57	3.21	0.55	6.59	0.50	7.90								7

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Yellow Honeyeater	*Stomiopera flava*	5.22		6.48	8.02	13.66		8.87	16.85								6
Varied Honeyeater	*Gavicalis versicolor*	0.71	0.00	3.72					0.32								4
Mangrove Honeyeater	*Gavicalis fasciogularis*							1.92	0.70							1.74	3
Singing Honeyeater	*Gavicalis virescens*				1.12	0.37	8.50		0.44	24.53	11.22	12.20	15.17	1.08			9
Yellow-tinted Honeyeater	*Ptilotula flavescens*	0.30		0.10	2.73	1.29	7.98										5
Fuscous Honeyeater	*Ptilotula fuscus*			0.39		0.24		0.10	0.08					0.56	10.06	0.38	7
Grey-headed Honeyeater	*Ptilotula keartlandi*				0.16		12.31			4.52	2.27	3.98	1.76	0.04			7
Grey-fronted Honeyeater	*Lichenostomus plumulus*				0.64	0.06	18.20			4.52							4
White-plumed Honeyeater	*Ptilotula penicillata*				1.12	0.12	17.51		0.02	18.08	29.67	28.63	19.89	6.00	15.57	0.00	11
Graceful Honeyeater	*Meliphaga gracilis*	3.41	0.00	9.44		0.43			0.02								5
Yellow-spotted Honeyeater	*Meliphaga notata*	42.04	0.01	13.35	2.73	0.49			0.79								6
Lewin's Honeyeater	*Meliphaga lewinii*			7.59		1.78		12.40	0.61					3.56	0.15	14.35	7
Spotted Pardalote	*Pardalotus punctatus*			0.17		0.43		0.40						2.60	16.97	2.58	6
Red-browed Pardalote	*Pardalotus rubricatus*	0.28		0.01	1.92	0.73	3.64		0.02		3.69	4.73	4.29	0.08			10
Striated Pardalote	*Pardalotus striatus*	1.32		1.03	8.82	14.51	11.27	2.42	2.94	30.34	1.99	0.75	4.03	11.11	15.50	11.72	14
Fernwren	*Oreoscopus gutturalis*			0.86													1
Chestnut-rumped Heathwren	*Hylacola pyrrhopygius*														1.18		1
Redthroat	*Pyrrholaemus brunneus*											0.25	0.57				2
Speckled Warbler	*Pyrrholaemus sagittatus*								0.02				0.10	3.36	9.62	0.33	5
Atherton Scrubwren	*Sericornis keri*			1.76													1
White-browed Scrubwren	*Sericornis frontalis*			0.31				4.44	0.03					2.20	6.54	6.77	6
Yellow-throated Scrubwren	*Sericornis citreogularis*			1.77										0.16		1.34	3
Large-billed Scrubwren	*Sericornis magnirostris*			4.97		0.12		2.72						0.12		2.38	5
Tropical Scrubwren	*Sericornis beccarii*	3.67		0.01													2
Weebill	*Smicrornis brevirostris*	0.16		0.05	7.86	6.37	22.19		0.26	16.14	2.70	0.75	4.49	6.92	8.37	0.15	13
Brown Gerygone	*Gerygone mouki*			4.23		0.12		3.43						0.12		1.61	5
Mangrove Gerygone	*Gerygone levigaster*			0.03	3.53			1.41	0.88							2.90	5

Common Name	Scientific Name	CYP	TSI	WET	GUP	EIU	NWH	CQC	BBN	DEU	MGD	CHC	MUL	BBS	NEN	SEQ	No. BRs
Western Gerygone	*Gerygone fusca*				0.16	0.12	0.17		0.02	1.94	0.71		1.63	1.24	0.37	0.00	10
Large-billed Gerygone	*Gerygone magnirostris*	8.20		6.06		0.55		0.71	0.18								5
White-throated Gerygone	*Gerygone albogularis*	0.62		0.22	8.02	5.45		0.61	0.38	5.81				4.24	6.32	4.16	10
Fairy Gerygone	*Gerygone palpebrosa*	11.35		4.05	0.16	1.78		1.41	0.32							0.29	7
Mountain Thornbill	*Acanthiza katherina*			1.68													1
Brown Thornbill	*Acanthiza pusilla*							4.74						1.68	6.68	4.12	4
Inland Thornbill	*Acanthiza apicalis*						0.17			1.29	2.56	4.73	6.72	2.48	2.42		7
Chestnut-rumped Thornbill	*Acanthiza uropygialis*									1.29	1.14	2.49	11.61	0.80			5
Buff-rumped Thornbill	*Acanthiza reguloides*			0.01		0.24		0.30	0.03	2.58	0.14		0.90	0.60	7.05	0.15	10
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*					0.06	1.73			3.87	1.42	0.25	7.92	7.88	9.47	0.60	9
Yellow Thornbill	*Acanthiza nana*			0.05		0.06		0.20	0.06	4.52	0.28		5.46	4.20	4.99	0.28	10
Striated Thornbill	*Acanthiza lineata*													0.28	4.55	0.39	3
Slaty-backed Thornbill	*Acanthiza robustirostris*										0.14		0.13				2
Southern Whiteface	*Aphelocephala leucopsis*											0.75	8.62	0.32	0.73		4
Banded Whiteface	*Aphelocephala nigricincta*											0.25					1
Grey-crowned Babbler	*Pomatostomus temporalis*	0.76		0.05	2.73	5.33	15.60		0.44	8.39	2.70	1.00	8.15	7.68	6.17	0.76	13
Hall's Babbler	*Pomatostomus halli*										1.56	4.73	6.79				3
White-browed Babbler	*Pomatostomus supercilliosus*											0.25	0.13	0.24	2.72		4
Chestnut-crowned Babbler	*Pomatostomus ruficeps*											1.49	10.88				2
Australian Logrunner	*Orthonyx temminckii*															1.04	1
Chowchilla	*Orthonyx spaldingii*			2.06													1
Eastern Whipbird	*Psophodes olivaceus*			5.62				5.14						2.00	0.07	10.80	5
Chirruping Wedgebill	*Psophodes cristatus*											1.49	0.27				2
Spotted Quail-thrush	*Cinclosoma punctatum*														0.66	0.08	2
Cinnamon Quail-thrush	*Cinclosoma cinamomeum*											2.74					1
Chestnut-breasted Quail-thrush	*Cinclosoma castaneothorax*										0.99	1.00	2.26				3
Yellow-breasted Boatbill	*Machaerirhynchus flaviventer*	1.46		3.34		0.18											3

Common Name	Scientific Name	CYP	TSI	WET	GUP	EIU	NWH	CQC	BBN	DEU	MGD	CHC	MUL	BBS	NEN	SEQ	No. BRs
White-breasted Woodswallow	*Artamus leucorynchus*	4.99	0.02	12.67	4.81	3.74	6.07	7.97	16.04	1.94	9.23	4.98	6.85	3.60	0.22	3.58	15
Masked Woodswallow	*Artamus personatus*	0.02		0.05	1.44	0.49	5.37	0.10	0.09	2.58	7.10	5.48	4.46	0.60	1.69	0.09	14
White-browed Woodswallow	*Artamus superciliosus*	0.07		0.17	2.41	0.43	7.63		0.14	5.81	7.81	3.73	5.59	1.08	2.72	0.08	13
Black-faced Woodswallow	*Artamus cinereus*	0.14		0.44	11.86	3.31	9.71	0.10	2.11	9.04	20.30	25.39	15.34	0.64	0.22	0.00	14
Dusky Woodswallow	*Artamus cyanopterus*			0.23		0.12	0.17		0.03	0.65	0.43		0.47	0.80	10.94	0.14	10
Little Woodswallow	*Artamus minor*	0.28		0.01	0.32	0.31	4.33		0.02	1.94	1.56	1.74	3.36	0.08	0.44		12
Black Butcherbird	*Cracticus quoyi*	12.99		12.01		0.24		0.81	0.32								5
Grey Butcherbird	*Cracticus torquatus*	0.12		0.15	1.28	3.86	0.17	0.40	0.74	21.30	2.98	4.48	11.71	10.27	11.09	12.56	14
Black-backed Butcherbird	*Cracticus mentalis*	1.48															1
Pied Butcherbird	*Cracticus nigrogularis*	0.76		0.35	11.22	19.72	10.58	13.51	7.40	21.95	10.08	2.99	12.97	16.15	13.00	14.68	14
Australian Magpie	*Cracticus tibicen*	0.65		0.86	9.78	22.42	6.59	16.64	18.49	25.82	17.60	11.70	16.43	29.06	24.16	22.73	14
Pied Currawong	*Strepera graculina*	0.49		2.07	0.64	5.94	0.17	7.46	1.11	7.75	0.85	0.25	0.53	16.15	21.15	12.49	14
Ground Cuckooshrike	*Coracina maxima*				0.96	0.24	0.35			1.29	0.28		0.47	0.32	0.59	0.06	9
Black-faced Cuckooshrike	*Coricina novaehollandiae*	1.44	0.00	1.71	12.99	14.02	14.74	9.58	11.13	7.75	4.26	3.73	5.89	13.15	9.84	12.38	15
Barred Cuckooshrike	*Coracina lineata*	0.02		2.72	0.00			0.10	0.02					0.04		0.12	7
White-bellied Cuckooshrike	*Coracina papuensis*	17.70	0.00	6.70	9.30	14.09	3.47	0.20	9.63	3.87	0.71	0.50	0.33	1.36	3.45	0.91	15
Common Cicadabird	*Coracina tenuirostris*	5.22		3.21	0.00	1.35		2.12	0.18					1.08	1.25	2.64	9
White-winged Triller	*Lalage tricolor*	0.67		0.39	5.13	3.86	4.33	0.30	3.44	1.29	3.55	3.24	4.36	2.12	2.57	0.84	14
Varied Triller	*Lalage leucomela*	27.89	0.01	9.26	1.12	1.41		7.77	5.81					0.28		2.83	9
Varied Sittella	*Daphoenositta chrysoptera*	0.16		0.21	0.32	0.80	0.69	0.10	0.05	1.94	0.99	1.00	3.79	1.48	2.64	1.08	14
Crested Bellbird	*Oreoica gutturalis*				0.16		3.99			3.23	3.12	5.23	12.28	0.04			7
Crested Shrike-tit	*Falcunculus frontatus*			0.18										0.16	3.45	0.23	4
Olive Whistler	*Pachycephala olivacea*															0.00	1
Grey Whistler	*Pachycephala simplex*	2.08	0.00	4.52		0.24											4
Australian Golden Whistler	*Pachycephala pectoralis*			3.77		0.31		3.23	0.03				0.07	3.08	8.74	7.16	8
Black-tailed Whistler	*Pachycephala melanura*		0.01		1.12												2
Rufous Whistler	*Pachycephala rufiventris*	1.04		3.47	12.35	9.55	12.14	3.23	2.97	19.37	7.24	7.97	11.01	9.95	10.94	9.24	14

Common Name	Scientific Name	CYP	TSI	WET	GUP	EIU	NWH	CQC	BBN	DEU	MGD	CHC	MUL	BBS	NEN	SEQ	No. BRs
White-breasted Whistler	*Pachycephala lanioides*				2.57												1
Bower's Shrikethrush	*Colluricincla boweri*			2.48		0.06		0.20									3
Little Shrikethrush	*Colluricincla megarhyncha*	13.93	0.00	11.66	0.32	1.22	0.17	7.36	2.34					0.20	0.22	3.35	11
Grey Shrikethrush	*Colluricincla harmonica*	3.10		0.89	0.80	1.84	12.48	4.24	0.35	7.10	9.09	15.43	11.91	5.32	15.86	9.92	14
Sandstone Shrikethrush	*Colluricincla woodwardi*				0.16		1.73										2
Australasian Figbird	*Sphecotheres vieilloti*	33.86	0.02	20.32	2.08	7.66		17.45	13.31	0.65				4.36	0.22	14.10	11
Olive-backed Oriole	*Oriolus sagittatus*	2.06		3.03	2.24	6.25	3.12	2.62	3.14	0.65	0.43		1.43	4.80	3.82	8.24	13
Green Oriole	*Oriolus flavocinctus*	49.00		8.55		0.12			0.02								4
Spangled Drongo	*Dicrurus bracteatus*	26.40	0.01	14.85	0.64	7.66		13.21	13.28					1.24	0.73	7.43	10
Willie Wagtail	*Rhipidura leucophrys*	1.11	0.00	17.68	20.68	19.29	23.06	14.12	12.81	29.05	33.79	33.36	21.13	22.91	24.02	17.59	15
Northern Fantail	*Rhipidura rufiventris*	7.23		1.69	3.21	0.49	0.87		0.20								6
Grey Fantail	*Rhipidura albiscapa*	2.84		6.09	4.97	7.17	1.56	8.77	5.08	5.81	3.27	1.99	4.72	9.47	13.59	11.56	14
Mangrove Fantail	*Rhipidura phasiana*				1.60												1
Rufous Fantail	*Rhipidura rufifrons*	2.84		3.33		0.67		3.33	0.21					1.04	0.51	3.79	8
Arafura Fantail	*Rhipidura dryas*				0.80		1.04										2
Spectacled Monarch	*Symposiachrus trivirgatus*	3.97	0.00	9.61		0.31		5.75	0.50					0.12		1.58	8
Black-faced Monarch	*Monarcha melanopsis*	0.81		4.37		0.12		2.42	0.17					0.32		1.45	7
Black-winged Monarch	*Monarcha frater*	1.36															1
White-eared Monarch	*Carterornis leucotis*	0.30		0.56				1.41	0.03							0.73	5
Frill-necked Monarch	*Arses lorealis*	1.39															1
Pied Monarch	*Arses kaupi*			2.61													1
Magpie-lark	*Grallina cyanoleuca*	12.37	0.00	17.25	21.97	26.76	26.53	18.46	29.07	21.30	30.38	25.64	18.46	29.98	13.59	17.18	15
Leaden Flycatcher	*Myiagra rubecula*	7.48	0.00	5.23	1.44	5.39	0.17	8.47	6.61	2.58			0.03	3.00	2.72	4.15	13
Broad-billed Flycatcher	*Myiagra ruficollis*	0.02		0.03	0.64												3
Satin Flycatcher	*Myiagra cyanoleuca*	0.09		0.09				0.50						0.04		0.04	5
Shining Flycatcher	*Myiagra alecto*	8.85		1.95	0.32			0.10	0.20							0.05	6
Paperbark Flycatcher	*Myiagra nana*	0.12			10.42	1.53	9.36				0.28						5

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Restless Flycatcher	*Myiagra inquieta*			0.09		2.20		0.61	0.45	6.46	6.96	6.47	12.61	3.68	10.06	1.16	11
Torresian Crow	*Corvus orru*	4.59	0.01	1.37	11.86	17.76	6.41	23.09	15.07	24.53	7.67	2.99	0.93	28.98	17.70	27.23	15
Little Crow	*Corvus bennetti*				0.48		0.52		0.06	1.29	2.56	4.48	1.33	0.20			8
Australian Raven	*Corvus coronoides*			0.06	8.34	3.55	15.60	1.71	4.44	13.56	18.17	27.63	17.17	5.20	10.14	0.02	13
White-winged Chough	*Corcorax melanorhamphos*					0.12			0.15	0.65	0.14		6.25	3.48	8.01	0.12	8
Apostlebird	*Struthidea cinerea*			0.01	13.47	13.72	3.29	0.10	1.73	16.14	14.91	4.48	11.94	11.23	5.73	0.37	13
Trumpet Manucode	*Phonygammus keraudrenii*	1.09															1
Paradise Riflebird	*Ptiloris paradiseus*															0.71	1
Victoria's Riflebird	*Ptiloris victoriae*			5.72													1
Magnificent Riflebird	*Ptiloris magnificus*	2.22															1
Grey-headed Robin	*Heteromyias cinereifrons*			5.03													1
White-browed Robin	*Poecilodryas superciliosa*	0.90		0.84		0.37		1.01	0.96								5
Buff-sided Robin	*Poecilodryas cerviniventris*				0.80		4.85										2
Mangrove Robin	*Peneonanthe pulverulenta*	0.12	0.01	1.02	3.69				0.03								5
White-faced Robin	*Tregellasia leucops*	0.90															1
Pale-yellow Robin	*Tregellasia capito*			7.54		0.12			0.02							0.57	4
Eastern Yellow Robin	*Eopsaltria australis*			1.36		0.98		8.47					0.13	4.04	16.38	9.17	7
Hooded Robin	*Melanodryas cucullata*						2.43			2.58	2.27	5.97	10.31	0.16	3.01		7
Yellow-legged Flycatcher	*Microeca griseoceps*	0.35															1
Lemon-bellied Flycatcher	*Microeca flavigaster*	1.99		0.88		2.14		0.10	0.70								5
Jacky-winter	*Microeca fascinans*	0.07		0.06	1.12	0.55	8.15		0.11	13.56	9.09	5.23	14.44	4.88	11.24	0.23	13
Rose Robin	*Petroica rosea*													0.64	2.42	1.78	3
Flame Robin	*Petroica phoenicea*														0.07		1
Scarlet Robin	*Petroica boodang*														1.91	0.00	2
Red-capped Robin	*Petroica goodenovii*				0.32	0.86	1.39		0.02	7.10	8.66	11.70	13.57	2.48	1.76	0.04	11
Northern Scrub-Robin	*Drymodes superciliaris*	0.42															1
Horsfield's Bush Lark	*Mirafra javanica*	0.09		0.58	2.08	0.92		0.10	1.12	0.65	2.70	3.49		1.04	0.15	0.05	12

Common Name	Scientific Name	CYP	TSI	WET	GUP	EIU	NWH	CQC	BBN	DEU	MGD	CHC	MUL	BBS	NEN	SEQ	No. BRs
Red-whiskered Bulbul	*Pycnonotus jocosus*							1.41									1
White-backed Swallow	*Cheramoeca leucosterna*						0.17	0.10			0.71	7.97	1.13	0.04	0.15		7
Barn Swallow	*Hirundo rustica*			0.05													1
Welcome Swallow	*Hirundo neoxena*	8.35	0.01	14.73	0.32	4.47	0.52	16.34	13.74		5.96	3.24	11.71	12.03	15.50	19.67	14
Fairy Martin	*Petrochelidon ariel*	0.05		2.13	1.44	2.94	4.33	3.63	7.48	2.58	8.38	8.46	5.76	2.08	1.69	3.19	14
Tree Martin	*Petrochelidon nigricans*	0.67		1.61	4.49	2.08	2.08	1.31	2.24	4.52	4.26	3.98	3.79	3.16	3.82	2.57	14
Australian Reed Warbler	*Acrocephalus australis*			0.63	1.28	0.55	3.12	0.91	1.76		7.81	2.24	0.63	3.04	1.32	2.17	12
Rufous Songlark	*Cincloramphus mathewsi*	0.05		0.06	0.96	1.53	3.64		0.88	3.87	2.70	0.50	1.26	1.84	2.86	0.49	13
Brown Songlark	*Cincloramphus cruralis*			0.05	0.16		0.35		0.79	0.65	1.70	1.99	0.50	0.80		0.20	10
Little Grassbird	*Poodytes gramineus*			0.08	2.24		0.52	1.11	0.15		6.25	3.24	0.40	0.16	0.29	0.24	11
Spinifexbird	*Poodytes carteri*						4.33				0.28	1.24					3
Tawny Grassbird	*Cincloramphus timoriensis*	0.07		0.83	0.48	0.55		0.91	3.41		0.14			0.40		5.74	9
Zitting Cisticola	*Cisticola juncidis*	0.12		0.17	1.92			0.10	0.15								5
Golden-headed Cisticola	*Cisticola exilis*	1.46		3.73	4.65	5.39	0.17	5.45	7.72		0.28			3.20	0.95	4.59	11
Ashy-bellied White-eye	*Zosterops citrinella*		0.01														1
Canary White-eye	*Zosterops luteus*	0.02	0.01		7.05				0.05								4
Silvereye	*Zosterops lateralis*	3.47		8.28		0.67		9.28	0.09					4.40	6.90	9.14	8
Metallic Starling	*Aplonis metallica*	3.79		10.82		0.37		0.40	0.02								5
Common Myna	*Acridotheres tristis*			13.99		3.06		0.10	8.16				0.10	12.91	2.86	6.58	8
European Starling	*Sturnus vulgaris*			0.01	0.16	0.06			0.05		0.14	0.75	0.27	4.44	1.54	0.62	10
Russet-tailed Thrush	*Zoothera heinei*			0.03				0.50								0.45	3
Bassian Thrush	*Zoothera lunulata*			0.31												0.17	2
Eurasian Blackbird	*Turdus merula*													0.12	0.29	0.01	3
Mistletoebird	*Dicaeum hirundinaceum*	14.62	0.02	8.04	3.69	3.98	9.88	5.75	6.52	7.10	6.25	10.21	8.95	7.12	9.77	5.41	15
Olive-backed Sunbird	*Cynnyris jugularis*	18.67	0.05	15.59		2.69		13.11	15.29							0.01	7
House Sparrow	*Passer domesticus*	0.66	0.03	4.68	2.57	1.41	5.72	6.76	9.78		9.09	6.22	0.67	4.44	0.73	0.51	14
Eurasian Tree Sparrow	*Passer montanus*		0.01														1

Common Name	Scientific Name	CYP	TSI	WET	GUP	EIU	NWH	CQC	BBN	DEU	MGD	CHC	MUL	BBS	NEN	SEQ	No. BRs
Painted Firetail	*Emblema pictum*						5.72					1.24					2
Diamond Firetail	*Stagonopleura guttata*													0.12	6.68	0.00	3
Red-browed Firetail	*Neochima temporalis*	2.32	0.00	8.19		1.29		3.93	0.14					1.92	6.61	6.30	9
Crimson Finch	*Neochmia phaeton*	0.05		2.20	0.80		5.37		4.94								5
Star Finch	*Neochmia ruficauda*	0.16			0.16	0.06											3
Plum-headed Finch	*Neochmia modesta*				0.16	0.86		0.10	0.83		2.13		0.20	3.68	2.06	0.14	9
Masked Finch	*Peophila personata*	0.28			0.64	0.49	0.17										4
Long-tailed Finch	*Poephila acuticauda*				0.48		6.93										2
Black-throated Finch	*Poephila cincta*	0.44				3.49			0.35								3
Zebra Finch	*Taeniopygia guttata*			0.07	15.07	3.06	21.50		3.47	14.20	23.57	30.37	3.09	2.92	0.22	0.05	12
Double-barred Finch	*Taeniopygia bichenovii*	0.60		0.29	10.58	15.37	7.63	1.82	7.89	9.04	1.14		9.91	8.68	6.83	4.96	13
Blue-faced Parrotfinch	*Erythrura trichroa*			0.73													1
Gouldian Finch	*Erythrura gouldiae*					0.06											1
Scaly-breasted Munia	*Lonchura punctulata*	0.05		3.78		0.37		0.20	6.81							0.17	6
Chestnut-breasted Mannikin	*Lonchura castaneothorax*	0.35	0.03	5.76	0.32	3.55	0.35	2.72	4.84		1.14			0.96		2.87	11
Pictorella Mannikin	*Heteromunia pectoralis*			0.01	0.64	0.06	0.87										4
Eastern Yellow Wagtail	*Motacilla tshutschensis*	0.02					0.00										2
Australian Pipit	*Anthus australis*	0.79		2.50	4.65	2.20	0.69	4.44	4.40	2.58	8.38	9.96	9.08	2.60	3.45	2.33	14
European Goldfinch	*Carduelis carduelis*														0.15		1
Total Species for Bioregion		318	111	372	264	286	216	288	326	161	220	192	217	286	242	390	**571**

SPECIALIST GROUP UPDATES

Birds of Prey – the Status of Queensland's Raptors

By Stacey McLean

Spotted Harrier (Graeme Donaldson)

Square-tailed Kite (Micha Jackson)

Introduction

In this review I provide a brief overview of the status of Australian raptors in Queensland, documenting current state of knowledge, known and emerging threats, conservation management issues, and response actions. For the purposes of this review, 'raptors' refers to diurnal birds of prey that occur on mainland Queensland and near-to-shore islands. Species inhabiting remote islands, vagrants and nocturnal birds of prey are not addressed.

Globally, raptors and other birds of prey are recognised as playing an important ecological role in the environment. As top order predators, changes in their abundance and distribution can indicate significant changes in the natural environment. As such, raptors act as 'sentinel' environmental indicators (Olsen, 1995; Derlink *et al*. 2018), as well as 'umbrella' species for regions or ecosystems of biological significance (Sergio *et al*. 2006, Buechley *et al*. 2019). With low reproductive rates, raptors are particularly vulnerable to a range of direct and indirect threats, including changes to prey distribution and abundance, foraging and breeding habitat loss and degradation, bioaccumulation of poisons, persecution, nest site disturbance, and nest predation.

Distribution and Abundance

All 24 Australian raptor species occur in Queensland, including Australia's 11 endemic species (Debus 2012, 2017). Raptors occupy a wide range of habitats, across all Queensland bioregions. Some species such as the Letter-winged Kite are largely restricted to particular ecosystems (e.g. Channel Country), whilst others such as the Brown Falcon and Black Kite are widespread. Currently only two raptor species

– the Red Goshawk and Grey Falcon - are recognised as threatened in Queensland state legislation (DES 2019). In addition, Garnett *et al.* (2011) categorises the Letter-winged Kite as 'Near Threatened' nationally.

The distribution and abundance of many raptors is dynamic. Climatic events (e.g. inland flooding) can produce an abundance of prey over large areas, triggering dramatic, temporary increases in, and movement of, raptor populations, including those geographically restricted (Garnett *et al.* 2011; Schoenjahn 2013). Raptor numbers also change seasonally, with significant movements occurring along the eastern seaboard, and between the Great Dividing Range and coast (Barrett *et al.* 2003; Marchant & Higgins 1993; Olsen 1995).

The lack of any state-wide or regional raptor survey and reporting programs greatly hampers analyses of Queensland raptor population trends. Information is predominately anecdotal, qualitative, geographically restricted, or associated with species-specific studies (Schoenjahn 2013; Debus & Searle 2014; Seaton 2014). However, eBird data provide some insight into the regional status of Queensland raptors in 2017 (Appendix 1). Many species remain widespread, with 18 (75%) occurring in ten or more bioregions, including Black Kite, Wedge-tailed Eagle, Brown Goshawk, Nankeen Kestrel, Whistling Kite and Brown Falcon. The most 'raptor-rich' bioregions were CYP, WET, BBN, BBS and SEQ, each having records for 20 or more raptor species. Only seven raptor species were recorded for the TSI bioregion, consistent with the small size of these islands compared with the mainland.

Peregrine Falcon (Jon Norling)

The Black Falcon and Peregrine Falcon, whilst occurring in almost all bioregions, were recorded relatively infrequently. For the Black Falcon in particular, the relatively low number of records is consistent with published accounts of its scarcity (Debus 2019). Few observations were recorded for the Grey Goshawk, despite it being considered common in its documented range. The species' cryptic behaviour and accessibility of its preferred habitats for regular birding may be significant factors driving this lack of data. The Brahminy Kite, Eastern Osprey and White-bellied Sea-eagle were observed relatively frequently along the coast, and inland where suitable open water and riverine habitat is available. The Swamp Harrier and Spotted Harrier were widespread but recorded relatively infrequently, most likely reflecting seasonal winter movements and responses to rainfall of these species.

The small number of Grey Falcon records align with our current understanding of this threatened species. Most records were restricted to the MGD and BBN bioregions. Although there were 29 records from the CHC bioregion, most appear to be multiple observations of a small number of individual birds in specific known locations (e.g. Diamantina NP). The few recorded observations of Red Goshawk were restricted to the CYP bioregion, consistent with the documented northward range contraction of this species (Seaton 2014; Czechura *et al*. 2011). Records of Letter-winged Kite were limited to single individuals in the NWH and CHC bioregions respectively.

As expected, the data reveal an important spatial bias that confounds a better understanding of population status. The bioregion reports in this volume highlight this situation - survey effort is

predominantly occurring near major regional centres, along major transport routes, and relatively accessible (at least seasonally) or well-known Protected Areas. However, such biases can be accounted for in statistical modelling of survey data. The recently developed 'Australian Bird Index' uses such data to detect national population trends. In the Arid Zone, for example, terrestrial carnivores are declining in general, and only one of the raptor species investigated, the Whistling Kite, increased in reporting rates (BirdLife Australia 2015).

Threats

Raptors are subject to many ongoing threats in Queensland. The extent and degree of these are influenced significantly by species ecology and life history, locality; and historical and prevailing environmental conditions. As with threats to other native wildlife, these occur concurrently, creating cumulative or compounding impacts which may affect breeding, roosting and foraging habitat availability and quality, individual bird physiological fitness, and seasonal movement (that is, 'in transit' habitat). Some threats remain little recognised and require closer investigation (Olsen 1995; Debus 2012).

The primary threat to the persistence of raptors and other native wildlife is ongoing native vegetation loss and fragmentation (Neldner *et al.* 2017; Reside *et al.* 2017; DEE 2016). In 2017-18, the state-wide clearing rate of woody vegetation was 392,000 ha per year, a 10% increase from 2016-17. The highest clearing rates during this time occurred in the Brigalow Belt (BBN and BBS) and Mulga Lands bioregions (MUL)109, at 204,000 ha per year and 106,000 ha per year, respectively. Coastal and sub-coastal Queensland landscapes are also experiencing ongoing habitat loss and fragmentation, the key drivers being growth and intensification of residential, commercial and industrial activities, and associated infrastructure. South East Queensland (SEQ) is experiencing the majority of this growth. In 2017-18, the vegetation loss rate for the SEQ Bioregion was 20,799 ha per year (QDES 2018).

Compounding vegetation loss and fragmentation is the subsequent degradation of remaining habitat. Changes in fire regimes, local hydrology, and establishment of invasive plants (e.g. non-native grasses), lead to substantial changes in habitat structure and composition. Over time, these may result in sustained reduction or local extirpation of prey populations, and loss of optimal roosting, nesting and refuge trees due to severe weather events or drought conditions. Reduction and degradation of remaining habitatalso intensifies inter- and intra-specific competition, leading to displacement of breeding birds (Debus 2012; 2017; Debus *et al.* 2017; QDEHP 2018a).

The proximity of development and associated human activity often results in more frequent disturbance of birds (especially during nest building and egg incubation), leading to reduced breeding success or, again, abandonment of apparently suitable habitat (Olsen & Trost 2017). Proximity to buildings and other infrastructure also often results in incremental loss of habitat trees through management of real or perceived risks to people and property (Riddell 2017b). Direct predation pressure can also be an important threat. For the Grey Falcon and Letter-winged Kite, nest predation by feral cats *Felix catus* may be significant (Garnett *et al.* 2011).

The mobility and carnivorous scavenging diet of some Australian raptors expose them to secondary poisoning across large parts of Australia through bioaccumulation of pesticides and rodenticides (Debus 2012; Lohr & Davis 2018). Raptor consumption of baits used for Feral Pig *Sus scrofa* and Red Fox *Vulpes vulpes* control which contain sodium fluoroacetate (1080), presents the greatest known risk. In a study undertaken in Culgoa National Park in southwestern Queensland, raptor species recorded as approaching or consuming feral pig baits were Brown Falcon and Whistling Kite. Black Kites and Wedge-tailed Eagle are also at some risk due to their scavenging habits (Gentle *et al*. 2014). A study in Tasmania assessing the risk of fox baits to non-target native wildlife identified 11 scavenging raptor species, including those identified above, as likely to potentially consume baits in Red Fox habitat in Tasmania (Mallick *et al*. 2016).

Secondary poisoning through exposure to Anticoagulant Rodenticides (AR) may represent a potentially significant risk to Australian raptors. ARs are widely used globally to control or manage introduced rodents and secondary poisoning of non-target wildlife is a known threat where it occurs. However, the risk to Australian raptors and other wildlife is not well recognised or studied (Lohr & Davis 2018). A recent review of AR use in Australia identified several accounts of raptor secondary poisoning. Species involved included Wedge-tailed Eagle, Little Eagle, Whistling Kite and Brown Falcon. Fundamental knowledge gaps in Australia requiring redress include patterns of AR application and prevalence, and species exposure and sensitivity (Lohr & Davis 2018).

Lead poisoning through the ingestion of animal carcasses containing bullet fragments may also represent a risk to raptors. A recent Australian review has identified several species at risk, including the Wedge-tailed Eagle (including the Tasmanian sub-species), Black Kite and Whistling Kite (Hampton *et al.* 2018). Research is required to assess their degree of exposure to, and the effects of, lead poisoning.

Deliberate poisoning and other forms of persecution present an ongoing danger to raptors (Debus 2017). During 2017 and 2018, over 400 Wedge-tailed Eagles were killed by injecting a poison into dead lamb carcases at Tabbutt in Victoria's East Gippsland region. The carcases were left out to attract carrion-eating raptors to scavenge. The extent of the impact on Wedge-tailed Eagles populations in East Gippsland is not known but is expected to be significant (BirdLife Australia 2018a).

Collision with wind turbines and powerlines causing death or injury is a known threat to many bird species globally (Loss & Marra 2014; Watson *et al*. 2018), as well as in Australia (Debus 2012). In 2014, an independent report for the Macarthur Windfarm operator AGL found that approximately one third of all birds killed at its 140-turbine operation in Victoria were raptors, including the Brown Falcon, Black Falcon, Wedge-tailed Eagle, and Nankeen Kestrel (Lloyd 2014). Collisions also present a significant ongoing threat to the Tasmanian subspecies of the Wedge-tailed Eagle (Shannon 2016; TSS 2006). Future development of wind farms in the northwest of South Australia is identified as a potentially new risk to raptors in that state (Falkenberg 2016). In Queensland, the significance of these risks is largely unknown.

Collision with vehicles may be a particularly important threat to some raptor populations in coastal areas experiencing urban growth. Further investigation of data sources such as raptor admissions to wildlife hospitals and carers will likely provide important insights into the nature and extent of this threat.

Anthropogenic climate change is expected to place many Australian bird species under additional stress, increasing the risk of population declines and bioregional or continental extinctions. Predicted changes to climatic regimes include increased temperatures; heatwaves; longer, more frequent droughts; increasing severity of cyclones; rising sea levels and associated storm tide inundation; and increased fire risk (Low 2011; Garnett *et al*. 2014; Reside *et al*. 2016).

The first ever continent-scale assessment of Australian bird vulnerability identified species across a wide range of habitats likely be highly vulnerable. These included small-island species, and some marine and shorebird species. Some species largely restricted to Cape York Peninsula were identified as having the greatest overall vulnerability, being considered sensitive due to small distributions, changes in fire frequency, and lower capacity for dispersal (Garnett *et al*. 2014).

For raptors, expected changes in climate will likely lead to longer term reductions in prey availability, contributing to reduced individual raptor fitness and breeding success. Expected changes will also lead to the progressive loss of roosting and breeding trees, further impacting breeding opportunities and success. Competition with other species for reduced quality breeding and roosting resources may also intensify.

Pacific Baza (Jon Norling)

State of knowledge

Historically, there have been significant gaps in our collective knowledge of Australia's raptors, hindering efforts to understand their ecological requirements and life history (even for some common species), evaluate or anticipate threats, or develop effective conservation responses. Such knowledge gaps persist for several raptor species in Queensland, including the Peregrine Falcon, Australian Hobby, Pacific Baza, Black-breasted Buzzard, Red Goshawk and Black Falcon (Debus 2011; 2012; Debus *et al.* 2017; Briggs 2018). Contributing factors include the extent of study undertaken or driven by government agencies, delayed or infrequent formal publication of studies, the relatively small pool of scientists and naturalists with the knowledge and experience to undertake or guide research, and the inherent logistical and resource barriers to studying species that are widespread, cryptic, and occurring in low densities (Debus 1998).

Nevertheless, recent scientific studies have advanced our understanding of the ecology and life history of the Grey Falcon, Little Eagle, Brown Goshawk, Collared Sparrowhawk, Pacific Baza and Brahminy Kite (Schoenjahn 2013; Olsen & Trost 2017a; 2017b; Riddell 2017a; Olsen *et al*. 2018; Briggs 2018; Debus *et al.* 2017; Aumann *et al.* 2016). Recent research on coastal raptors in Southeast Queensland has provided insights into the impact of urbanisation on their foraging behaviour and food availability (Thomson *et al.* 2016), and diet composition near airports (Leach *et al*. 2015). Since 2015 the Red Goshawk has been the subject of a collaborative research programme, involving the Queensland Government and Rio Tinto, which is investigating its ecology and life history. Collaborative investigations are also underway with the Australian Wildlife Conservancy (AWC), involving the AWC Piccaninny Plains Wildlife Sanctuary which supports critical habitat for the Red Goshawk (Rio Tinto 2018).

Community or citizen-led surveys make invaluable, on-going contributions to our scientific knowledge and understanding of birds (Callaghan *at al.* 2018; Hughes 1984; 1988). These activities are diverse: regular birding group outings, regional and continental 'twitch-a-thons', 'bio-blitz' events, and species-specific counts (Noske 2015; BLSQ 2018a; QWSG 2018). A recent review of citizen science activity in Queensland revealed nearly 20% of project types related to bird study (OQCS 2018). Some of these initiatives enable surveys to occur in areas not normally accessible and helping to address the observed geographical biases in survey efforts. As part of Birdlife Southern Queensland's 'Adopt-a-Farm' project, bird surveys are undertaken for private landowners in the Granite Belt. This initiative encompasses a diversity of habitats at altitudes of 800-900m (BLSQ 2018b).

Regular, repeated surveys undertaken over time, are essential to better understanding the ecology, life history and status of raptor populations. Such 'longitudinal' studies are rare for Australian raptors. Two continental surveys undertaken by Birdlife Australia (then Birds Australia) in 1986 to 1990, and again in 1996 to 2000, represent the largest raptor surveys in Australia to date.

The first of these - 'Bird of Prey Watch' (BoPWatch) - involved some 271 volunteer observers, conducting over 25,000 roadside surveys of diurnal raptors throughout Australia. Through this survey, the Mitchell Grass Downs and the northwest coast of the Top End were identified as important regions in terms of relative abundance of raptors. The data also revealed summer declines in relative abundances in northeast Queensland and the northern Wet-Dry Tropics, and a corresponding increase

in numbers in the Riverina and Nullabour regions, suggesting strong seasonal movements (Baker-Gabb & Steele 1999).

Few ongoing raptor surveys are occurring in Queensland, and these are predominantly community-led. Since 2002, the Toowoomba Bird Observers has undertaken an annual 'Raptor Census' of the Toowoomba region. The census is a vehicle-based survey, following particular routes each year, surveying a large geographic area around Toowoomba - extending west to Dalby, north to Goombungee; south to Pilton and Felton; and east into the Lockyer Valley (McConnell 2016).

Nature conservation planning and management

In 2018, a Queensland Audit Office (QAO) review identified several issues preventing the effective identification, protection and conservation of threatened species, all of which apply to Queensland raptors. These included the absence of a contemporary Queensland biodiversity conservation strategy (or framework), no active state-wide prioritisation process for guiding conservation management, threatened species recovery or species surveys, and an inadequate system for identification and assessment of species for listing as threatened (QAO 2018).

In 2010, the Queensland Government published a series of *Action for Biodiversity* reports for each of 14 Natural Resource Management (NRM) regions, identifying priority native flora and fauna species, major threats to these species, and prioritised response actions. Three raptor species were recognised as requiring further research or conservation action – Red Goshawk, Letter-winged Kite and Grey Falcon (QDEHP 2018a). The Queensland Government *Back on Track* species prioritisation initiative that underpinned these reports is not being maintained and its products are out of date (QAO 2018).

Nothwithstanding the above issues, raptor conservation (as with most other wildlife) in Queensland continues to be reliant on the indirect or surrogacy value of landscape-scale nature conservation decision-making processes. Through identification and recognition of threatened regional ecosystems, significant wildlife habitats, ecological corridors and other natural assets in statutory plans and processes, important conservation benefits for raptors can be achieved. Key instruments in this regard include state government legislation, local government land management strategies, local laws, public and private land acquisition, and land stewardship assistance programs.

The roles of governments

Vegetation clearing in Queensland is fundamentally regulated through the *Vegetation Management Act* 1999, *Nature Conservation Act* 1992, and associated regulations. With respect to land use change, it is the *Planning Act* 2016. Queensland's legislative framework includes Environmental Offsets, enacted through the *Environmental Offsets Act* 2014. Some vegetation clearing is regulated through the Australian Government's *Environment Protection and Biodiversity Conservation Act* 1999. Local governments play an important role in nature conservation through instruments such as planning schemes (town plans), vegetation management local laws, land acquisition programs, and landholder assistance programs. Some planning schemes include lists of specific wildlife species. Brisbane City Council recognises eight raptor species as 'significant', including the Square-tailed Kite, Brown Goshawk and Swamp Harrier (BCC 2018). The Gold Coast City Council identifies the Square-tailed Kite as significant (GCCC 2018).

Queensland's Protected Area Estate (e.g. National Parks, Conservation Parks, Nature Refuges) plays a fundamental role in conserving biodiversity. Excluding lands managed for forestry, the estate includes over 14 million ha of terrestrial reserves, covering approximately 8% of Queensland's land area (DES 2018a). The Nature Refuges Program is the Queensland Government's primary voluntary stewardship program for privately-owned lands. Attributes that may make a private property suitable, include: providing habitat for threatened species; supporting threatened regional ecosystems; or providing for wildlife movement. The Queensland Government currently has over 500 Nature Refuge agreements in place covering over 4 million ha (DES 2018b).

The protection and management of land for nature conservation purposes by non-government enterprises plays an increasingly important role in the conservation of Queensland's raptors and other native wildlife. Over 1.5 million ha of important natural habitats across Queensland bioregions is currently managed in this way. Reserves in the Mulga Lands and Einasleigh Uplands bioregions protect known breeding habitat for the Grey Falcon and Red goshawk respectively.

Specific species action planning

The **Red Goshawk** is threatened throughout its range, being listed as Critically Endangered in New South Wales, and Vulnerable in Victoria, Western Australia and the Northern Territory. The species is listed as Endangered in Queensland. Garnett *et al.* (2011) recognised the Red Goshawk as nationally Near Threatened, with a population estimated at the time of c.1,400 adult individuals across two subpopulations, and possibly declining. A national recovery plan is currently in place for the species, with the key desired outcomes of maintaining populations across its range, implementing measures to promote its recovery, appropriately managing important habitat, identifying its breeding requirements, and increasing community awareness and engagement (DERM 2012). Significant survey effort has occurred in the last 10 years to document the distribution and abundance of the Red Goshawk in Queensland (Seaton 2014; Czechura *et al*. 2011; Debus & Searle 2014).

The **Grey Falcon** is also threatened across its range, being recognised as Endangered in New South Wales, Vulnerable in the Northern Territory, Victoria and Western Australiaand Rare in South Australia. It is listed as Vulnerable in Queensland, and Data Deficient according to the Queensland Government *Back on Track* prioritisation exercise. Habitat degradation due to overgrazing and vegetation clearing across its range, and loss of suitable nesting trees are known threats (QDEHP 2018a). Garnett *et al*. (2011) identified the Grey Falcon as 'Vulnerable', having at that time a population estimated at fewer than 1,000 individuals. The key recommended conservation objective was to have stable populations persisting in identified refugia. Gathering data on populations fluctuations, and the extent of threats, such as cat and fox predation were priority action. There are currently no Queensland Government recovery or research programs in place for the Grey Falcon.

The **Letter-winged Kite** is threatened in parts of its range, being recognised as Rare in South Australia, a Priority Fauna species in Western Australia, and a Possibly Threatened fauna species in Victoria. It is not listed in Queensland as threatened. Garnett *et al*. (2011) identified the species as nationally Near Threatened with a population that fluctuates and may drop to fewer than 1,000 individuals. The key recommended conservation objective and actions are the same as those for the Grey Falcon. It is a species that requires further study in Queensland. There are currently no Queensland Government conservation or research programs in place for the Letter-winged Kite.

Nature conservation actions

Some important actions are outlined below that are necessary to advance our knowledge and understanding of raptors ecology and life history and enable more effective conservation and management outcomes. Undertaking a contemporary population status review for all raptor species to inform (and prioritise) listing evaluation, research priorities, and conservation planning and management interventions is essential. Complementary to this are targeted studies of the breeding biology and ecology of Grey Falcon, Letter-winged Kite, Square-tailed Kite, Black Falcon, Black-breasted Buzzard, and Peregrine Falcon. Investigations are also required into the value of vehicle-strike raptor injury data, and poison bioaccumulation risks faced by Queensland raptors.

Population status reviews need to inform contemporary species conservation or recovery plans for appropriate species. Objectives and action planning should be at the resolution of bioregions or NRM regions to facilitate adoption and application. Fit-for-purpose decision-support tools to enable this activation include need to encompass environmental impact assessment standards, on-ground works and management procedures and protocols, nest tree monitoring, and nest site disturbance mitigation.

On-going community participation in monitoring Queensland raptors is fundamental to addressing known knowledge gaps. Sustaining existing community initiatives and building broader community capacity to be involved are priority objectives.

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Seabirds in Queensland

By Paul Walbridge

Wilson's Storm-petrel (Paul Walbridge)

Kermadec Petrel (Paul Walbridge)

History

Pelagic trips were first conducted in the region in the late 1970s, mainly out of Brisbane. Initial trips were conducted by a number of people, notably Tony Palliser, David Stewart, Tom Tarrant and Chris Corben. Around 1990, Chris Corben handed the reins over to the author, and I continue to organise these trips to this day, albeit on a more organized and regular basis. From before 1990 until April 1995 the trips operated out of Manly Boat Harbour in Brisbane using the wooden hulled *Murphy Star*. This resulted in a long trip, usually under cover of darkness across Moreton Bay before we got out into open ocean. Moreover, the trips were at best sporadic, with fewer than four trips per year.

Early in 1995, the late Tony Ashby (a founding member of Southern Oceans Seabird Study Association), not long from Sydney and newly arrived on the Gold Coast, negotiated with *Sea World* to trial their Research & Rescue Vessel. The trial was successful and from April 1995 until late 2000 we enjoyed a fruitful relationship with Sea World and trips became as a rule, monthly when weather permitted. The trips were now operating out of Southport and via the Southport Seaway we were entering open ocean almost immediately! This partnership ended towards the end of 2000 and I took a year's break from organising pelagic trips.

Early in January 2002, Steve McCourt, who had worked with us when he was a *Sea World* employee, contacted me. He had recently acquired a boat and was keen to trial it for ongoing pelagic and fishing charters. We trialled the vessel which was fast but was powered by a two large outboard motors, and the eventual charter cost proved to be too high, especially when compared with that offered by Sea World, whose trips had been somewhat subsidised.

Occasionally, when the Sea World vessel was unavailable, we used one of the local *Wahoo Charters* vessels based at Mariner's Cove. I approached the owner of this fleet of four charter boats and negotiated a deal which enabled us to use one of the vessels, once a month at a reasonable cost per head. With four boats ranging from 42-65 feet, one vessel was always available. Due to unforeseen circumstances however, by 2005 the operation was becoming less viable and we needed to find yet another operator and vessel.

Finding an operator and vessel prepared to take a group of birders out to sea further than they would normally go, and for considerably less money than their usual commercial rates, is extremely difficult, even in a highly competitive arena like the Gold Coast. One other option remained open. During our tenure with both *Sea World* and *Wahoo* we had been supplied (with written permission from DPI) with free shark liver for berley, by the local beach protection contractor for the Gold Coast beaches, Mr Craig Newton. Craig was keen to initiate a different kind of charter, and he and various crew over time have become enthusiastic supporters of pelagic trips.

Since 1995, weather permitting, we have conducted a minimum of one trip per month, and except for January these trips are conducted on the third Saturday of each calendar month. If a trip is overbooked, or when weather forecasts predict apparently ideal conditions, an additional trip might be announced at short notice. Following the signing of a boat building contract in late 2016, work started on a new 46' Bass Strait cray boat-inspired vessel for the Southport Pelagics. Apart from being designed to aid in his continuing work as beach protection officer for Gold Coast waters, skipper Craig intended the *Grinner II*, in consultation with our group, to be a purpose built state of the art pelagic vessel. Building started in Smithton, Tasmania, but was completed on the Gold Coast. Grinner II was launched in early July 2019, and its first pelagic was conducted on 20 July 2019.

Sea surface temperatures were monitored from the seaway to the drift point in the East Australian current. Generally the minimum reading is close to shore and the maximum reading is at the widest point. This can vary according to the time of year and sometimes wind conditions. Temperatures were measured using the vessels on-board sensor, calibrated with the readings on the local wave rider buoys, and compared with online projections.

The region

The area around Southport is situated in the south Coral Sea, with the warm, north-south moving East Australian Current being the major influential feature. The main offshore underwater structures in this region are a series of seamounts or guyots, and it is around these structures that upwellings are most likely to occur. From north to south, they are Fraser Sea mount, Recorder Seamount (Guyot), Moreton Seamount, Brisbane Seamount, Queensland Seamount (Guyot), Britannia Seamount (Guyot) and Stradbroke Seamount (Fig. 1). Distances from the shore range from the widest, being 138 nautical miles (M) to Fraser Seamount, to the closest at 91 M to Queensland Guyot. The highest are Fraser Seamount and Queensland Guyot, which rise to within 359 m and 306 m of the sea surface, respectively. The largest is Britannia Guyot which adjoins the southern edge of the Queensland Guyot. The sea mounts in the south Coral Sea are the northern most cluster of a long chain of sea mounts running down the east coast of Australia to the south of Tasmania, known as the Tasmantid Seamounts and possibly the only ones lying within the Australian Exclusive Economic Zone.

Closer to shore and in the vicinity of Southport, the main offshore structures range from Mick's Mountain, ENE of Southport, moving south through Jim's Mountain, the Riviera Grounds and the Tweed Canyons south of the Qld/NSW border adjacent to Fingal Head or just to the south. These rises are roughly 30 nautical miles offshore except for the Tweed Canyons which are considerably closer to the coast. However all of these sea floor rises and canyons lie just off the Continental Shelf.

The Australian Continental Shelf ends at the 100 fathom mark (c.200 m), referred to as the Shelf-break. The distance of the Shelf-break from the shore varies greatly around the Australian coastline but off the Gold Coast it is c. 23 nautical miles offshore at 153°51.50'E.

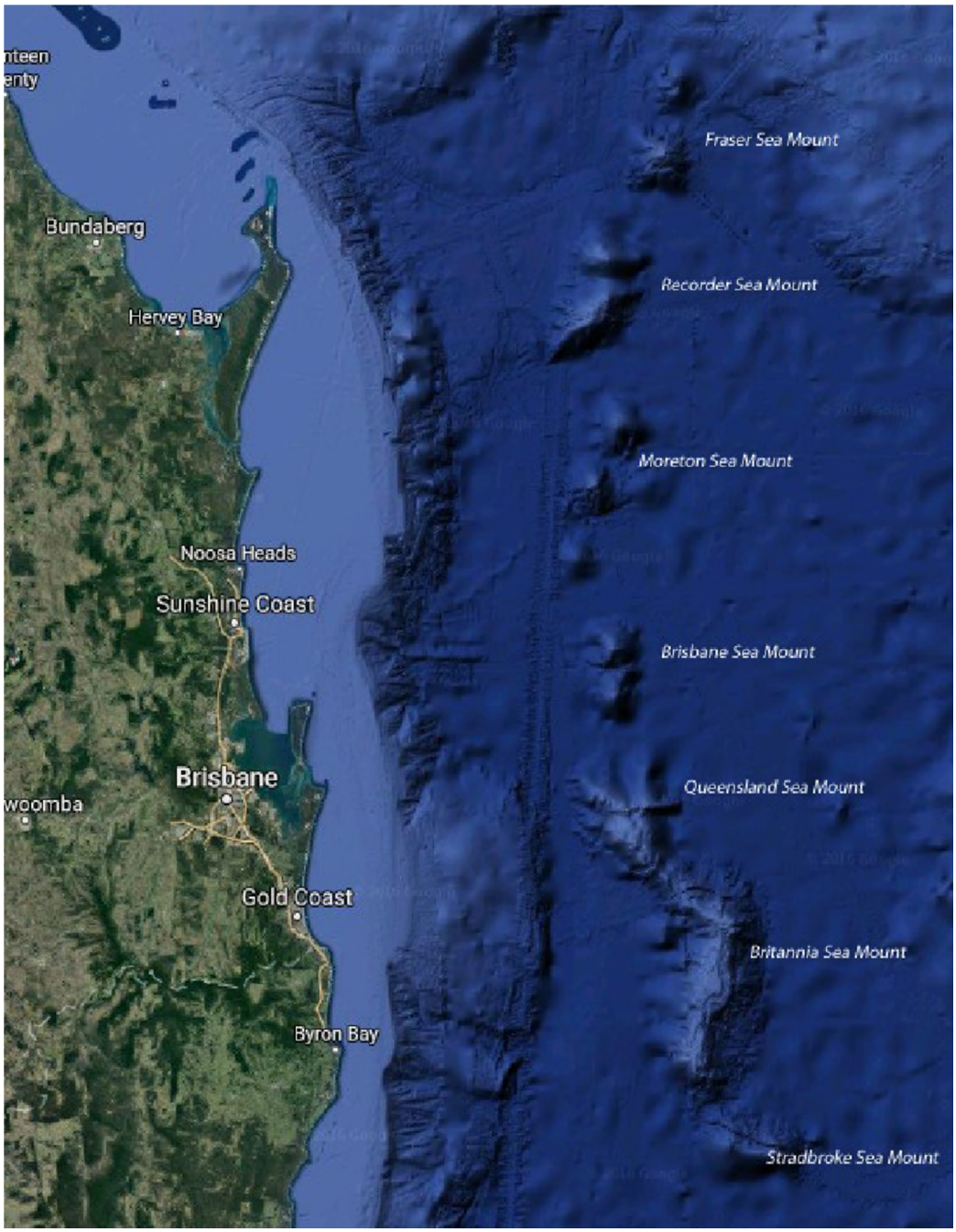


Figure 1. Google Earth image showing Sea Mounts off southeast Queensland and northeast New South Wales

Given that the region lies in the southern Coral Sea, close to the southern edge of the Great Barrier Reef, the water temperatures are relatively warm in winter. During winter, colder water currents from the south move northwards, forcing the weakening warm current further out. Another phenomenon that can occur is the Eckman Effect, where persistent northerly winds force the warm surface water further out to sea, causing colder water to rise to the surface, forming a kind of upwelling.

In January 2017 there was a differential spike in temperatures (Fig. 2), mainly due to the arrival of cooler fresh water from coastal rivers resulting from heavy rain inland, and the same to a lesser extent in April due to Cyclone Debbie, when off shore waters had started to cool. The winter months produced the usual large temperature differences, but unusually, the largest differential spike of the year occurred in November, prior to the arrival of a blanket of warm water from the EAC from close inshore to out wide in December.

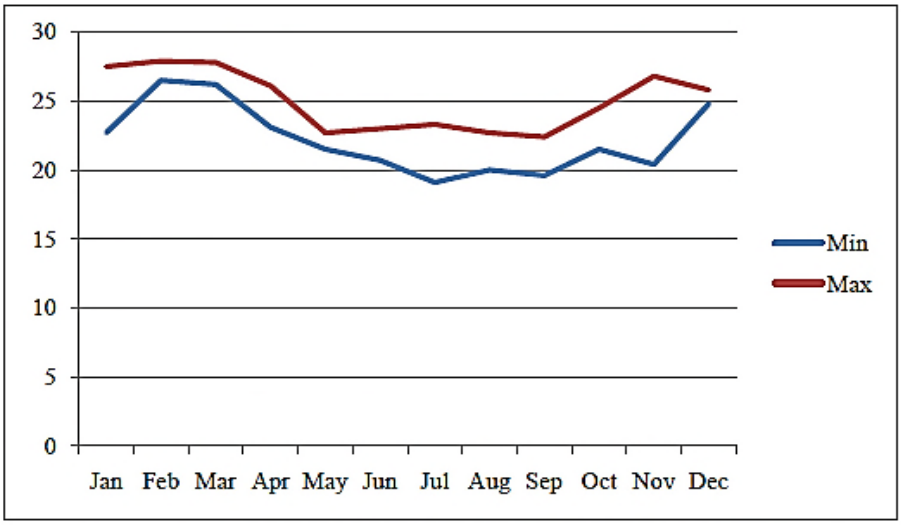


Figure 2. Monthly minimum and maximum sea surface temperatures recorded on pelagic excursions from inshore waters out to the Continental Slope waters as measured by vessel's onboard sensor

Seabird seasonality trends

In most years, March– April and October–November constitute the main autumn and spring seabird migration periods, respectively, when species richness rises. During the summer months from December to February, the numbers of local resident species and summer breeding visitors, such as the Wedge-tailed Shearwater, are bolstered by wintering visitors from the northern hemisphere, such as Common Tern and Streaked Shearwater, plus the three Jaeger species. The months of May and September are transition months, usually showing lower diversity. Summer visitors and most of the transient species have gone by winter (June to August), when winter breeders, such as Providence Petrels from Lord Howe, appear.

However, in the main, winter sightings rely heavily on both northward baitfish migration and adverse weather conditions, with strong southerly winds, in the southern part of the continent. Another contributing factor, albeit an artificial one, is the reliance on the local trawling fleet of some species, such as Gull-billed and Caspian Terns, species not generally sighted on pelagic trips, as well as the cormorants. Periods of bad weather can prevent the fleet from setting sail and there is a closed season of several weeks toward the end of the year.

Monthly highlights of 2017

A total of 17 trips were conducted from Southport in 2017. During over 155 survey hours, a total of 43 species were sighted, lower than the previous year and probably partly due to the very warm winter conditions and the lack of visiting Southern Ocean birds. Moreover our scheduled annual sea mount trip was cancelled, due at first to mechanical problems with the vessel, then the appearance of Cyclone Debbie. The last two months of the year produced two new species for Southport pelagics.

January produced two Bridled Terns and surprisingly, a pale-phase Wedge-tailed Shearwater, which is very rare on the east coast. There were two trips in February. The first (11 February) produced both Fluttering and Hutton's Shearwaters and three species of Pterodromas (Kermadec, Grey-faced and Gould's Petrels). The second (18 February) saw two Streaked Shearwaters, plus Kermadec and White-necked Petrels, and the first Lesser Frigatebird for some time. March saw the first returning Wilson's Storm-Petrel for the year, with a Streaked Shearwater, Kermadec and Grey-faced Petrels, unprecedented numbers of Red-footed Booby (up to ten) and an extraordinary count of seven White Terns.

Two trips in April proved a fruitful start to autumn surveys, that of 9 April delivering 21 species (Fig. 2), including 27 Wilson's Storm-Petrels, the first White-faced Storm-Petrel and second White-necked Petrel of the year, large numbers of Tahiti Petrels, seven Kermadec Petrels and 34 Providence Petrels, the first

for the year, as well as a second Lesser Frigatebird and the first returning Australasian Gannet. Highlights of the 15 April trip were 17 Flesh-footed Shearwater, the largest count for some time, seven Tahiti Petrels and yet another Lesser-Frigatebird. On 20 May, we counted 13 Black-bellied Storm-Petrels the first for the year, as well as large numbers of Wilson's Storm-Petrels. Six Common Noddies were counted, and the numbers of Providence Petrel had risen to 94. We were surprised by a late-arriving Short-tailed Shearwater coming aboard the boat, but also by three Tahiti Petrels when sea surface temperatures were still as high as 23° C.

The two June trips were disappointing with much lower than normal seabird diversity, probably mainly due to prevailing northerly winds bringing warm temperatures through much of winter. Just ten species were sighted on 10 June, with a lone Black-bellied Storm-Petrel, a juvenile Northern Giant Petrel and surprisingly, a lone Antarctic Prion, the only prion of the winter. Similarly 24 June produced just 11 species, including two Black-bellied Storm-Petrels, another juvenile Northern Giant Petrel, a nominate Cape Petrel and a large count of 103 Providence Petrels. To maximise the winter counts, an extra trip was scheduled for July but to no avail as both trips experienced rather warm conditions, reflected in the occurrence of a Tahiti Petrel on 15 July. August trips were cancelled due to extremely adverse weather conditions.

Mid-September saw nine south-bound Wilson's Storm-Petrels, four Black-bellied Storm-Petrels, two Kermadec Petrels and the first returning Wedge-tailed Shearwater, which is concerning given that large numbers normally appear in early August. The only record of note for 22 October was 440 south-bound Short-tailed Shearwaters. The first of two trips in November produced a White-tailed Tropicbird, the first returning Tahiti Petrels, a few residual Providence Petrels, and a Brown Booby on 4 November. The second, on 18 November, hit the jackpot with six species of Pterodroma, including a Stejneger's Petrel, constituting the third record for Australia (see regional reports), a Mottled Petrel, five Gould's Petrels, eight Providence Petrels, 14 Kermadec Petrels and 34 Grey-faced Petrels, as well as a very late Cape Petrel and 18 Tahiti Petrels. In addition we were joined by four Long-tailed Jaegers, two of which stayed around the boat for some time. Of two trips on consecutive days in December (16-17th), the first produced a Black-winged Petrel and a White Tern, while the second yielded the second new Southport species for the year in the shape of a Bulwer's Petrel. Monthly maximum counts for each species are shown in Table 1.

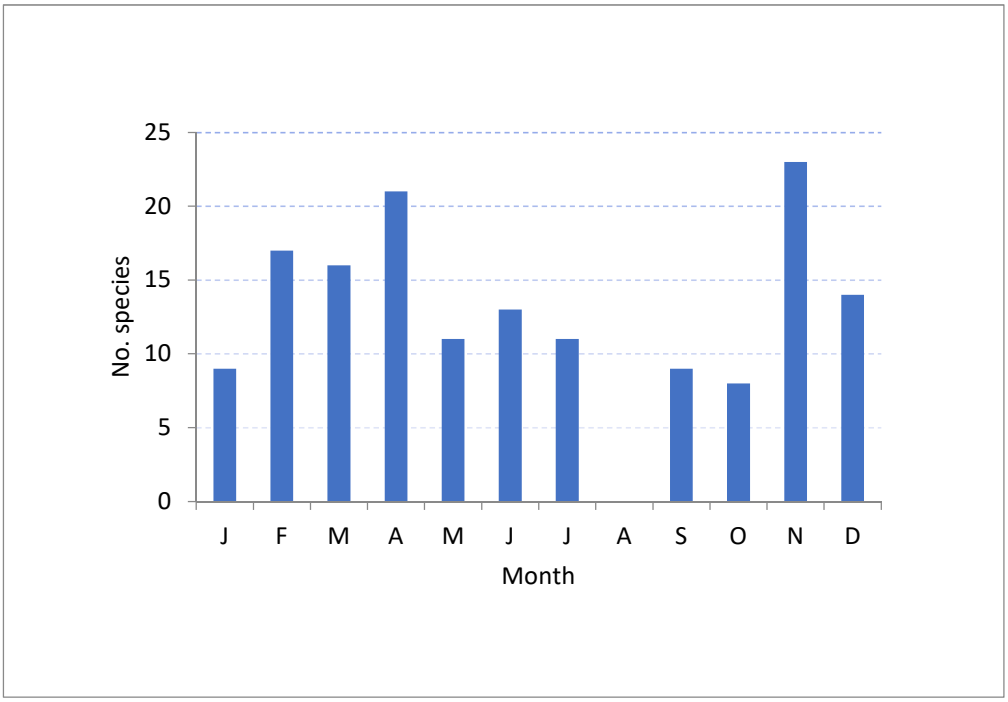


Figure 3. Monthly species totals for seabirds observed off Southport in 2017. There was no trip in August.

Table 1. **Maximum monthly counts of seabirds off Southport, in order of decreasing maximum abundance. There was no trip in August.**

Month	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	No. months
No. trips	1	2	1	2	1	2	2	0	1	1	2	2	
Wedge-tailed Shearwater	56	245	182	**493**					1	21	149	76	8
Short-tailed Shearwater				5	1					**440**	258	6	5
Crested Tern	111	176	42	**243**	77	125	65		58	9	209	196	11
Providence Petrel				48	94	**140**	63		11	30	8		7
Silver Gull	29	**100**	22	90	11	59	61		8		42	86	10
Wilson's Storm-petrel			1	**84**	38	12	10		9	19	63	4	9
Tahiti Petrel	6	28	1	**44**	3		1				35	24	8
Grey-faced Petrel		1	2								**34**		3
Flesh-footed Shearwater		8	3	**32**							3	1	5
Australasian Gannet				7		**32**	22		4				4
Common Tern	1	**22**		9						15			4
Kermadec Petrel		6	3	7	2				2		**17**		6
Pied Cormorant	1	4		10	1	3	**15**				3	12	8
Black-bellied Storm-petrel					**13**	3	1		4				4
Hutton's Shearwater		3	**10**	1	1	8	2		5				7
Red-footed Booby			10										1
Pomarine Jaeger	1	3	6	1						1	2	**9**	7
Common Noddy			2	2	6	**7**	**7**						5
White Tern			6									1	2
Gould's Petrel		1									5		2
Little Tern				2							5		2
Sooty Tern			1								4		2
Long-tailed Jaeger											4		1
Parasitic (Arctic) Jaeger	1	1								3	1		4
Fluttering Shearwater		1				3	1						3
Lesser Frigatebird		1	1	2									3
Streaked Shearwater		2	1										2
Little Black Cormorant				1								2	2
White-faced Storm-Petrel				2									1
Northern Giant Petrel						2							1
Great Cormorant				2									1
Bridled Tern	2												1
Cape Petrel						1					1		2
White-necked Petrel		1		1									2
Antarctic Prion						1							1
Mottled Petrel											1		1
Black-winged Petrel												1	1
Stejneger's Petrel											1		1
Bulwer's Petrel												1	1
White-tailed Tropicbird											1		1
Masked Booby											1		1
Brown Booby											1		1
Caspian tern												1	1

Acknowledgements

A grand total of 90 people participated in 17 regular Southport pelagics during 2017, an increase of ten from 2016, and averaging 14 participants per trip, also slightly higher than previous years. Not surprisingly, more than half of the participants (54) were from Queensland, only four from New South Wales, ten from Victoria and two from Tasmania. Thankfully news of the trips is spreading abroad and international participation was higher than in previous years, with four from Spain, three from the United Kingdom, one from New Zealand, and no fewer than eleven from the USA.

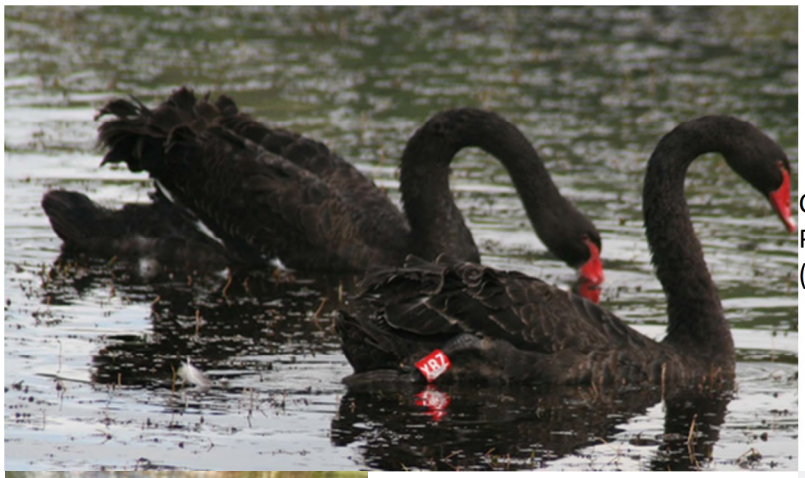
A total of 63 (70%) were single day trippers, while nine (10%) had returned for their second trip. However, those returning for a third or more trips rose to 18 (20%), consistent with the previous year. Only 11 patrons (12%) travelled out for half or more trips which disappointingly was 4% lower than the number for last year, despite overall participation being slightly higher.

Bird banding in Queensland in 2017

By Jon Coleman

Since 2006 three bird banding projects have been conducted in Queensland by the author and a team of voluntary assistants. These projects are supported by Birds Queensland who provide insurance cover for activities and the Queensland Wader Study Group who fund shorebird banding activities. The projects concern (1) the breeding biology of Black Swans, (2) the movements, and fidelity and of shorebird populations utilising Moreton Bay, and (3) the establishment of survival and productivity rates of a wide range of other bird species across many habitats throughout Queensland and Northern New south Wales. A brief summary of each project and its progress in 2017 is given below.

1. Black Swan breeding biology



Colour-marked Black Swans, Pacific Pines, Gold Coast (Jon Coleman)

Colour-banded adult female nesting, Pacific Pines, Gold Coast

Project aims

The study aims to establish mortality rates, dispersal patterns, Lifetime Reproductive Success, productivity and recruitment in Black Swans. In addition, the population in a defined study area will be monitored over a long period of time to establish population indices for breeding and non-breeding contingents of the population and establish long term trends in the black swan population.

Methods

The project involves a combination of capturing and banding with field survey work. Known breeding sites within the study area are visited each year to establish the presence of territorial pairs and

record if they breed and how many cygnets they hatch and rear. Attempts are made to catch and band all paired birds and where possible cygnets are also banded after being caught by hand.

Sites identified as non-breeding flock sites are visited each month, when numbers of birds and band numbers are recorded, and un-banded birds, where possible caught and banded. Where flocks of moulting birds are identified, attempts may be made to catch whole flocks when the birds are flightless to take the full range of biometric measures, band new birds and assess body condition during moult and hence moult site quality.

Every captured bird receives two bands, a standard ABBBS metal band on one leg, and an individually engraved colour band on the other leg. The combinations used can easily be read in the field by researchers or members of the public, without the need to recapture the bird. For each captured bird, measurements are made of tarsus length, radius bone length, total head length, bill length, bill width, and body weight, which is used to create a body condition index.

By repeating this field work consistently over a period of years, long-term population trends in the study area are being established. Data on survival, productivity and recruitment are being collated to determine Lifetime Reproductive Success, and used to understand the cause of individual variation in these factors, the cause of that variation and its impact on overall population demography. Continual monitoring, in the manner described above, with reports of colour sightings from the public, is generating comprehensive data on local movements, moult, migration (enabling the catchment areas of those sites to be established), dispersal of juveniles from the natal site and breeding site fidelity. Potentially irruptive behaviour can also be monitored and documented.

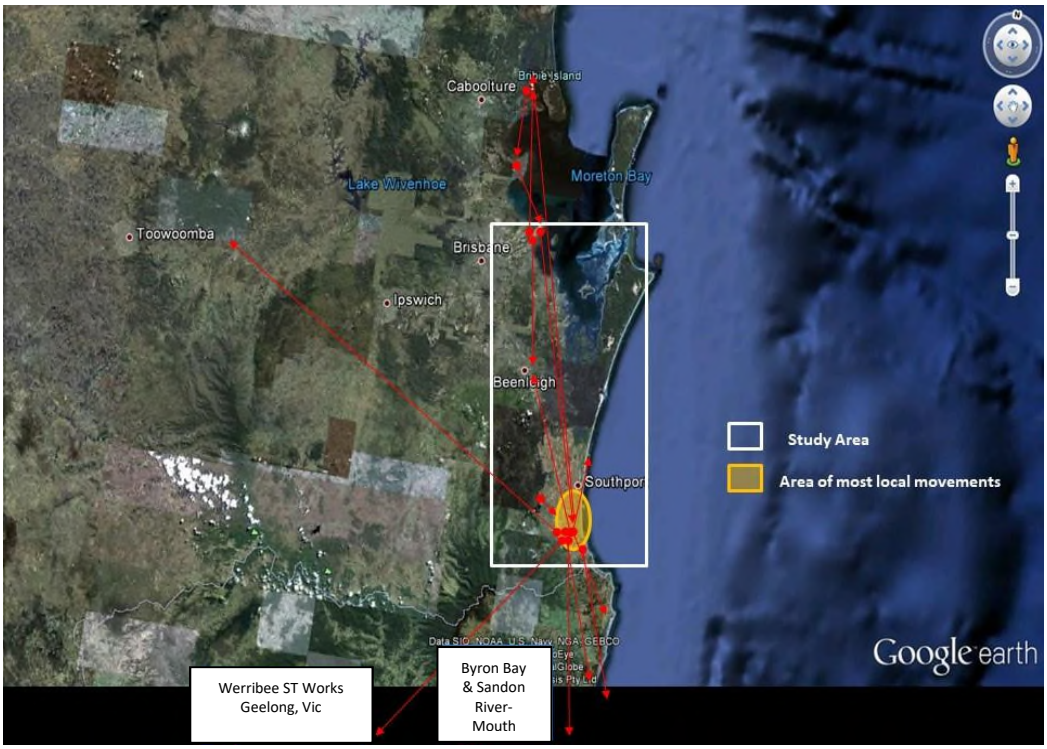


Figure 1. Recorded movements of Black Swans banded during this study

Results

From 2006 to 2017, 520 swans were banded, to which 55 were added in 2017 with 2,907 resightings recorded to date. The majority of recorded movements have occurred within Moreton Bay, but some birds have also been sighted in the Northern Rivers area of New South Wales and one bird was sighted in Werribee, Victoria. In 2017, 40 separate pairs were identified, compared to 44 in 2016 and only 27 in 2015. Of the 40 pairs, 22 were found breeding, and 29 breeding attempts were recorded. Figure 2 shows that 2013 was by far the poorest year recorded so far in terms of number of breeding

pairs with the following two years showing a gradual improvement, and 2016 showing a return to pre-2012 numbers. The reasons for the poor breeding season in 2013 are unclear.

Six pairs bred more than once in the calendar year. Five pairs nested twice, three of them successfully producing cygnets in both attempts. One pair nested three times, producing cygnets only in their final attempt. Of the 29 breeding attempts, six (19%) failed to produce cygnets, compared to 10(32%) in 2016, 5(28%) in 2015 and 7(39%) in 2014, indicating that 2017 was one of the most successful years for reproduction (Fig. 3).

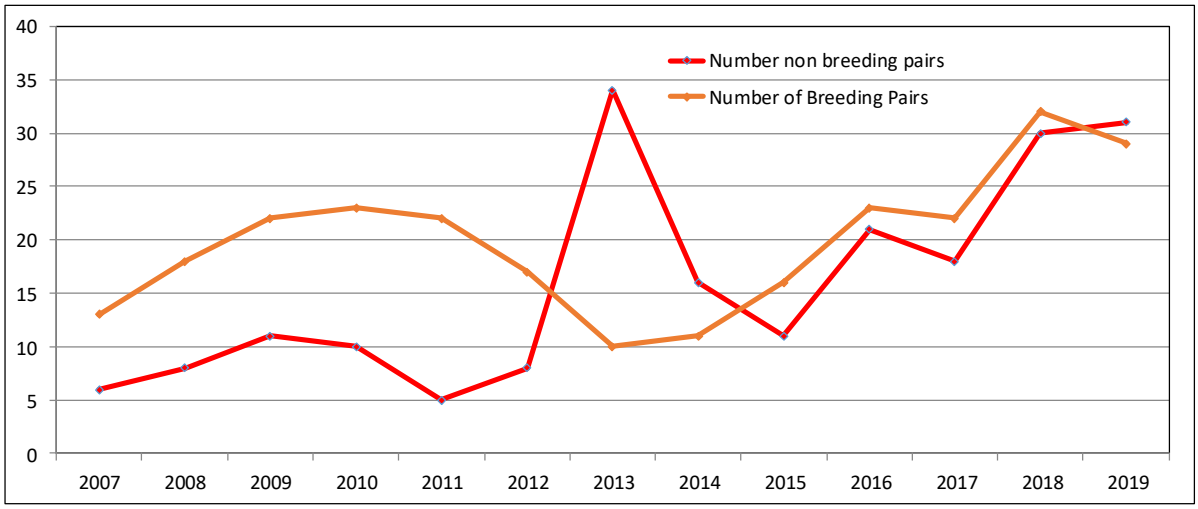


Figure 2. Number of breeding and non-breeding pairs recorded in each year of the study (2007-2017)

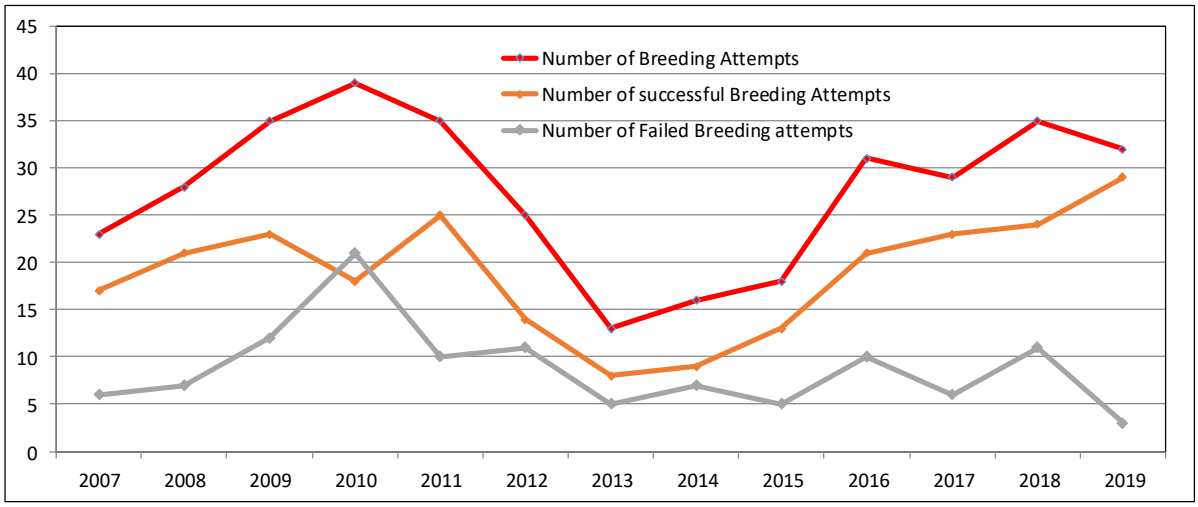


Figure 3. Number of breeding attempts recorded in each year of the study (2007-2017)

Hatching success for those breeding in 2016 was 2.88 (n=29, SE=0.4) per breeding attempt (compared to 2.54 and 2.04 in 2016 and 2015 respectively), which was the highest number of cygnets hatched per breeding attempt recorded in this study. Rearing success in 2017 was 2.19 cygnets per breeding attempt (n=29, SE=0.4), considerably better than that of 0.61 cygnets in 2014, and the third highest number of cygnets reared per breeding attempt recorded in the study.

Publications arising from this study

Coleman, J.T. 2010. Observations on breeding in the Black Swan *Cygnus atratus* in south-eastern Queensland. *Corella* 34: 103-106.

Coleman, J.T. 2014. Breeding biology of the Black Swan *Cygnus atratus* in south-east Queensland, Australia. *Wildfowl* 64: 217-230.

2. Body condition, survival rates and movements in shorebirds

This work forms one of the core research pillars of the Queensland Wader Study Group, a specialist interest group of Birds Queensland, and they provide funding to cover all equipment used in this work.

Pacific Golden Plover being fitted with a PTT, Manly Marina (Jon Coleman)

Far Eastern Curlew being fitted with a PTT, Toorbul (Jon Coleman)

Project aims

This project aims to regularly catch and band with individually engraved leg flags a wide range of migratory and non-migratory shorebirds every year. This will ensure that enough individually identifiable birds exist to allow migratory and local movement patterns to be monitored and survival rates estimated and monitored over time. Catching birds will also allow shorebird weights to be monitored and juvenile proportions for a range of species to be established each year and trends identified. This study also uses satellite and GPS technologies to understand the relationship between roosting, feeding sites and survival in Morton bay and the broader Flyway and establish common routes, critical areas for conservation on stopover and changing patterns of migration timing related to changes in climatic conditions.

Methods

Mist-nets are set to intercept waders flying into known roost sites in the Moreton Bay area at night. Cannon nets are also used during the day to catch birds on their roost sites. Every bird caught is banded with a metal band on the left tarsus and a green engraved leg flag on the right tibia, allowing it to be identified in the field by observers. Banding is conducted monthly at a range of sites to minimise disturbance of any one site mainly during the summer months, and to allow an analysis of spatial movements of birds in the bay. In addition low tide mist netting of birds in feeding areas has also been attempted with mixed success to date.

Each bird caught is aged, sexed if possible, and a series of biometric measures recorded. These are maximum wing chord length, tarsus length, total head length, bill length and weight. Weight will be regressed against a composite size measure to provide an indicative body index for every bird caught. A database of sighting records around the Moreton Bay area is being built up allowing patterns of habitat utilisation to be built up and changes monitored over time. This data is being collected through adhoc sightings of colour flags and from data collected by QWSG observers during the course of planned surveys.

In addition to leg flags Platform Terminal Transmitters (PTTs) were fitted to Pacific Golden Plovers, Far-eastern Curlews and Whimbrels in 2017 to track their movements using satellites. The use of Platform Terminal Transmitter techniques do not rely on observer effort and therefore provide unbiased data, including data from remote locations such as the breeding grounds. Geolocators only

provide data on long distance movements whereas PTT's provide much more accurate data allowing both long distance and local movements to be determined.

Weight and morphometric data are used to show trends in body condition index for species which can be used as an indicator of health, providing additional granularity to the data collected in survey work that may help to explain any observed changes. Age data is used to calculate proportions of juveniles to adults as comparative estimates of productivity of the various species caught between years. The locations in which shorebirds are being caught as part of this project are shown in figure 3. with some banding conducted at other sites in Queensland as required for specific projects.

Figure 3. Shorebird banding locations in the Moreton Bay area

Results

Since 2006, 3,988 shorebirds have been banded in Moreton Bay of which 3,770 have been fitted with individually identifiable leg flags (Table 1). These flagged birds have been re-sighted many times, allowing us to recognise movement patterns. During 2017, 76 foreign re-sightings were made, of which 36 involved Bar-tailed godwits at Aphae Island in South Korea, demonstrating the importance of this site. Bar-tailed Godwit records were also received from staging areas in South Korea with records of several Queensland Bar-tailed godwits returning to New Zealand following previous seasons in that country. In Japan, foreign Grey-tailed Tattler records were provided from staging areas, while two Bar-tailed Godwits were on their northward migration.

Great Knot were recorded in Taiwan, China and South Korea on migration. Also, of note was a Whimbrel, banded at Toorbul and seen on the Pribilof Islands, Alaska, USA. One Ruddy Turnstone was reported from China on northward migration. All re-sightings of green flagged shorebirds recorded overseas in 2017 are shown in Fig. 4.

Table 1. The total number of shorebirds caught between 1 January 2006 and 31 December 2017

Species	Banded 2006-16	Banded 2017	Total banded	Total Retraps
Stone-curlew, Bush	134	3	137	14
Oystercatcher, Pied	78	2	80	13
Stilt, Pied	39	12	51	1
Avocet, Red-necked	1	0	1	0
Lapwing, Masked	16	3	19	0
Dotterel, Red-kneed	25	0	25	0
Golden-Plover, Pacific	59	12	71	4
Plover, Grey	6	0	6	0
Plover, Red-capped	22	1	23	2
Plover, Double-banded	6	1	7	0
Sandplover, Lesser	141	93	234	18
Sandplover, Greater	22	9	31	1
Dotterel, Black-fronted	12	6	18	0
Godwit, Black-tailed	3	0	3	0
Godwit, Bar-tailed	807	112	919	34
Whimbrel	111	29	140	1
Curlew, Eastern	27	4	31	1
Greenshank, Common	0	1	1	0
Tattler, Grey-tailed	584	9	593	49
Tattler, Wandering	1	0	1	0
Sandpiper, Terek	49	0	49	3
Turnstone, Ruddy	66	26	92	9
Knot, Great	311	3	314	37
Knot, Red	9	0	9	1
Stint, Red-necked	582	164	746	48
Sandpiper, Sharp-tailed	158	16	174	4
Sandpiper, Curlew	191	10	201	15
Sandpiper, Broad-billed	3	0	3	0
Tern, Gull-billed	1	1	2	0
Tern, Crested	1	0	1	0
Tern, Little	2	0	2	1
Tern, Sooty	4	0	4	0
Totals	**3471**	**517**	**3988**	**256**

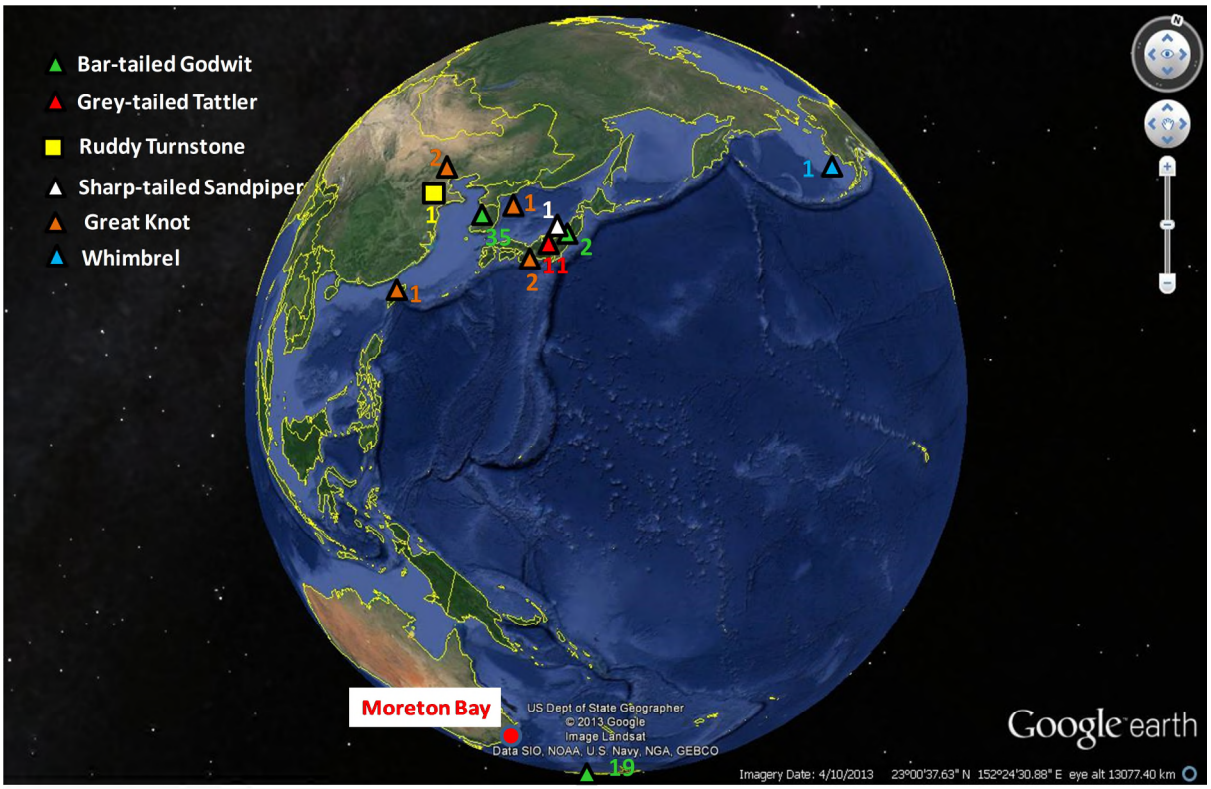


Figure 4. Overseas Resightings of leg flagged shorebirds in 2017

In 2017 there were 4,739 re-sightings of individually identifiable birds and to date leg flags have generated a total of 22,557 individual re-sightings, many birds with engraved leg flags reported multiple times. While a number of these re-sightings have been abroad (Fig. 4) and interstate, the majority involve repeated re-sightings of individuals within Moreton Bay. These data allow the calculation of preliminary estimates of survival rates for annual cohort groups of Grey-tailed Tattler and Bar-tailed Godwit. Further work is required to refine the models but initial analyses show the potential of such work.

Large numbers of birds banded in previous years have been re-sighted in Moreton Bay, indicating a high degree of site faithfulness. The data also show that most species are extremely faithful to their roosting and feeding locations both within and between seasons. As sample sizes increase and more roost sites are sampled more comprehensive fidelity data can be presented for more species using Moreton Bay. Building patterns of how birds remain in the same areas utilising a network of closely linked roosting and feeding areas, has implications in assessing and managing disturbance of shorebirds by humans and dogs.

Satellite tracking of four Pacific Golden Plover was conducted in 2017. All four birds provided a large amount of data on how the birds utilised Moreton Bay for roosting and foraging, including nocturnal feeding locations that were very different to daytime foraging locations (Fig. 5). Three of the four birds provided migration data, though only one arrived in Alaska before the device stopped transmitting. Of the other three, one was predated prior to migration and two devices failed during migration providing only partial data on the migration of those individuals. The one bird that migrated to Alaska flew north to Guam, where it staged for 8 days before moving to Japan where it staged at three different locations over 14 days. The bird then flew direct to Gareloi Island in Alaska where it was resident until the PTT stopped functioning (Fig. 6).

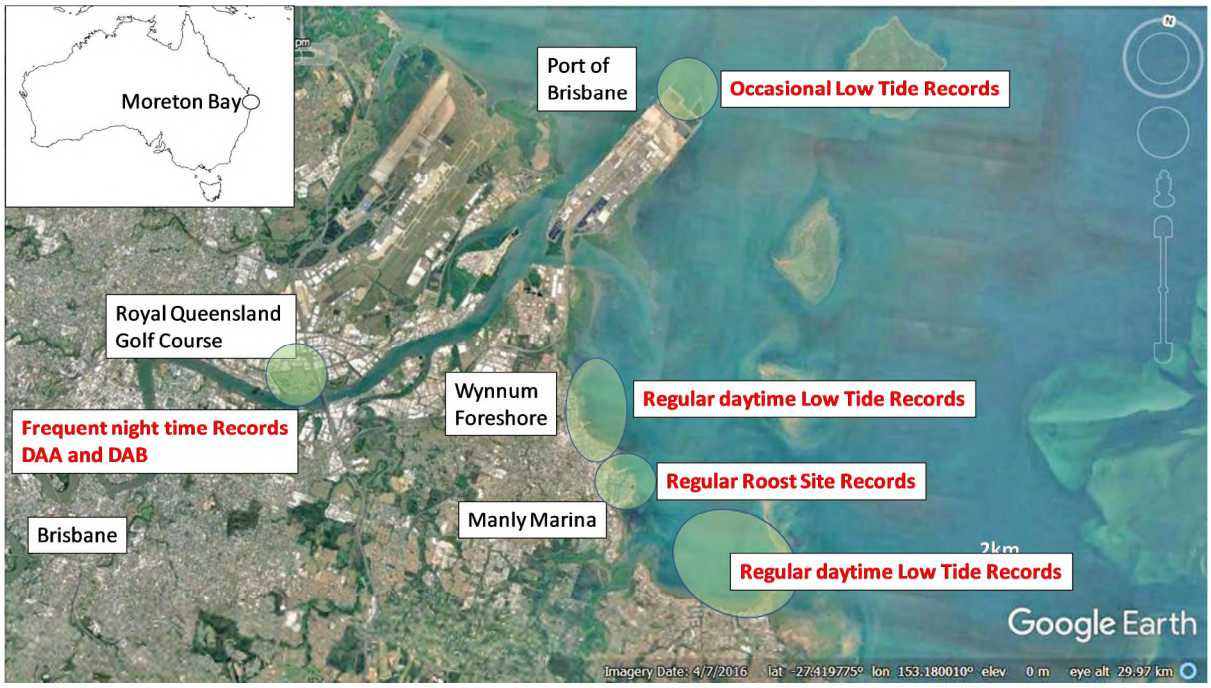


Figure 5. Local movements of satellite tracked Pacific Golden-plover caught at Manly Marina

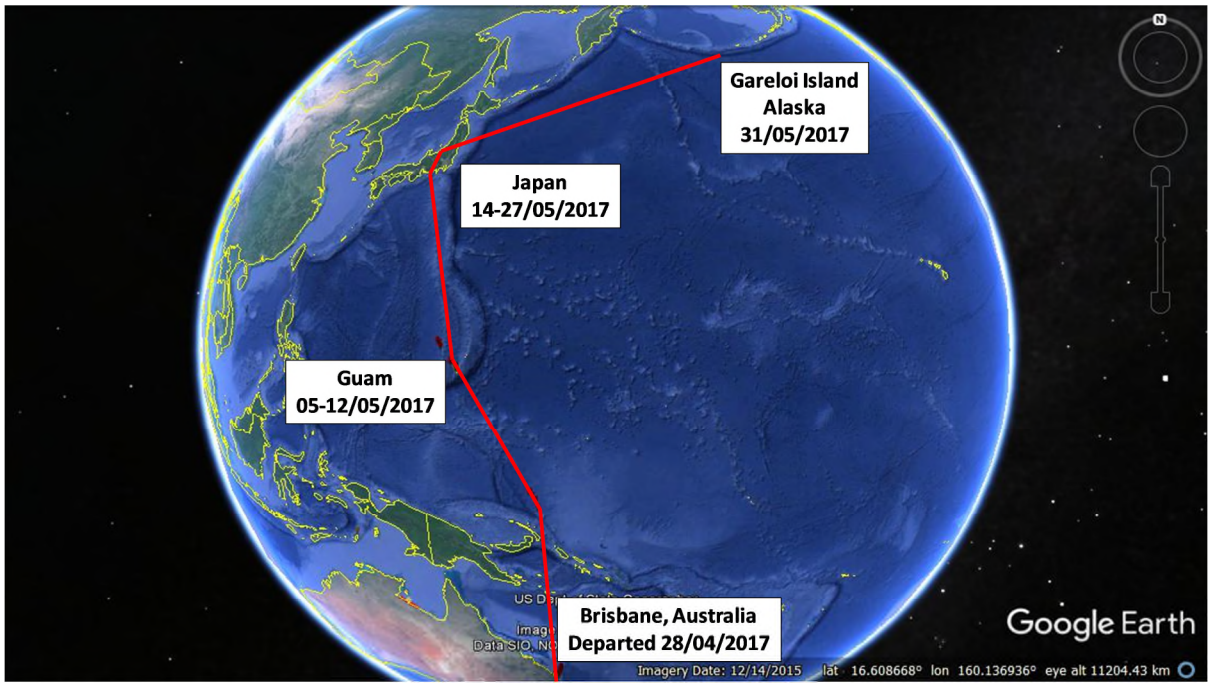


Figure 6. Northward migratory movements of Pacific Golden-plover

During 2017 five PTTs were attached to Whimbrels, one at Wellington Point and four at Toorbul, and two on Far-eastern Curlews, one at Toorbul and one at King Street, Thornlands. All devices provided large amounts of data on foraging and roosting behaviour prior to migration.

Publications arising from this project and use of QWSG banding data

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N., Gilg, O., Vincze, Johnson, O.W., Smith, P.A., Woodard, P.F., Tomkovich, P.S., Battley, P.F., Bentzen, R., Lanctot, R.B., Porter, R., Saalfeld, S.T., Freeman, S., Brown, S.C., Yezerinac, S., Székely, T., Montalvo, T., Piersma, T., Loverti, V., Pakanen, V.M., Wim Tijsen W. & Kempenaers, B. 2016. Unexpected diversity in socially synchronized rhythms of shorebirds. *Nature* 540: 109–113. *DOI, 10.1038/nature2056316*

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Weiser, E.L., Lanctot, R.B., Brown, S. C., Alves, J.A., Battley, P.F, Bentzen, R., Bêty, J., Bishop, M.A. Boldenow, M., Bollache, L., Casler, B., Christie,M., Coleman, J.T., Conklin, J.R., English, W.B., Gates, H.R, Gilg, O., Giroux, M.A., Gosbell, K., Hassell, C., Helmericks, J., Johnson, A., Katrínardóttir, B., Koivula, K., Kwon, E., Lamarre, J.F., Lang, J., Lank, D.B., Lecomte, N., Liebezeit, J., Loverti, V., McKinnon, L., Minton, C., Mizrahi, D., Nol, E., Pakanen, V.M., Perz, J., Porter, R., Rausch, J., Reneerkens, J., Rönkä, N., Saalfeld, S., Senner, N., Sittler, B., Smith, P.A., Sowl, K., Taylor, A., Ward, D.H., Yezerinac, S. & Sandercock B.K. 2016. Effects of geolocators on hatching success, return rates, breeding movements, and change in body mass in 16 species of arctic-breeding shorebirds. *Movement Ecology* 4: 12. *DOI 10.1186/s40462-016-0077-6.*

Zhao, M., Christie, M., Coleman, J.T., Hassell, C., Gosbell, K., Lisovski, S., Minton, C. & Klaassen, M. 2017. Time versus energy minimization migration strategy varies with body size and season in long-distance migratory shorebirds. *Movement Ecology* 5: 23. *DOI, 10.1186/s40462-017-0114-0*

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3. Monitoring long term trends in common Australian birds across a range of habitats in Queensland

Collared Kingfisher, Nudgee Beach (Jon Coleman)

Zebra Finch, Bowra (Jon Coleman)

Project aims

This project will establish and maintain a representative banded population sample of common indicator species across a range of key habitat types across Queensland. This is to allow the estimation of survival rates, based on MARK capture/recapture sampling and productivity rates based on juvenile/adult ratios. The long term nature of the project also allows comparison of those baseline rates over time and monitoring of trends as indicators of change. It will also allow determination of the timing of moult and breeding, as well as establishing methods to accurately age and sex species.

Methods

A series of habitat types have been targeted for the study and suitable sites have been identified and permission obtained. These sites are shown in Figure 9. A series of mist-net rides have been determined for each site and birds are caught, banded, measured and released from each location, each month. Each month exactly the same mist-net rides are used over a standard period of time between Dawn and Midday (0600-1200), mirroring the protocols for Constant Effort Site monitoring programmes used by a number of banding schemes in Europe. Where weather permits the aim is to make one visit to each habitat type, at least once every two months to ensure data is collected routinely throughout the year.

Every bird caught is banded, aged and sexed if possible and a series of biometric measurements are taken for further analysis. These are Flattened wing chord length (mm), Tail length (mm) Tarsus length (mm), Total head length (mm) Total head width (mm), Bill length to feather (mm), Bill length to skull (mm) and Weight to the nearest 0.1g. Body condition for birds will be calculated by regressing weight against the composite size measurements.

During banding periods environmental factors that may affect capture rates, such as weather conditions, actual start and finish times, variation in nets used and the presence of any flowering or fruiting plants are noted, and in addition to banding a list of all the species present at the site is collected.

Over time, the data collected on new birds and the recapture data will be used to determine survival rates in the target species along with productivity rates, abundance indices and body condition indices. The consistent nature of the data collection allows long term trends in the above parameters to be monitored and reported on for these specific sites when compared to the baseline data collected in the initial years.

In addition to collection of long-term trend data for a range of species in the communities targeted the methodology highlighted also enables the detailed examination of plumage characters, biometric variation and moult strategies in known age birds of a range of common species. This has been used to determine accurate ageing and sexing criteria for some species in which data is lacking or can be used to compare with data from other sub-specific population studies elsewhere in Australia. This work is ongoing and the same philosophy can be applied to the collection of moult data which may be lacking for some species but will also provide opportunity for examining sub-specific or geographical variation in others for species studied in more detail, elsewhere in Australia.

Finally, biometric variation has been described in many bird species and in larger species has been used to try and explain differences in lifetime reproductive success, recruitment to the breeding population and survival. The data collected will provide an opportunity to look at size variation within species captured both within and between sexes and may be a criterion that can be introduced, along with body condition index as a variable in the proposed MARK capture/Recapture survival analysis methods.

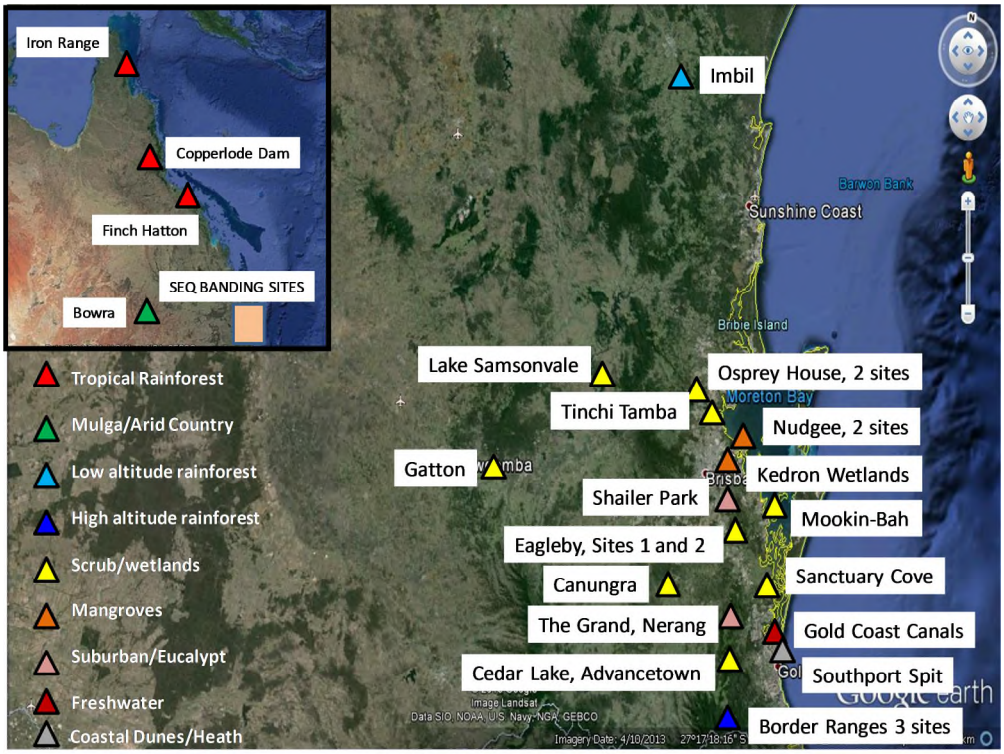

Figure 9. Banding locations used in this project

Table 1. The number of birds banded and retrapped in 2017, compared with totals for 10 years from 2006 to 2016

Species	Banded 2006 - 2016	Banded 2017	Total Banded	Total Retraps
Duck, Plumed-whistling	1	0	**1**	0
Duck, Pink-eared	1	0	**1**	0
Duck, Maned	64	3	**67**	63
Duck, Pacific-black	50	2	**52**	28
Teal, Chestnut	9	3	**12**	0
Hardhead	2	0	**2**	0
Brush-turkey, Australasian	10	4	**14**	52
Scrubfowl, Orange-footed	2	0	**2**	0

Species	Banded 2006 - 2016	Banded 2017	Total Banded	Total Retraps
Quail, Brown	29	7	**36**	1
Quail, King	0	1	**1**	0
Ibis, Australian-white	2	0	**2**	1
Ibis, Straw-necked	6	0	**6**	0
Heron, Striated	3	0	**3**	0
Egret, Cattle	1	0	**1**	0
Heron, White-faced	1	0	**1**	0
Egret, Little	1	0	**1**	0
Goshawk, Brown	4	1	**5**	0
Rail, Buff-banded	4	1	**5**	0
Swamphen, Purple	14	7	**21**	8
Moorhen, Dusky	9	3	**12**	0
Native-hen, Black-tailed	0	9	**9**	0
Button-quail, Painted	4	0	**4**	0
Gull, Silver	44	6	**50**	0
Dove, Spotted	180	10	**190**	37
Cuckoo-dove, Brown	9	4	**13**	0
Dove, Emerald	49	24	**73**	54
Bronzewing, Common	7	4	**11**	1
Pigeon, Crested	65	12	**77**	27
Pigeon, Wonga	2	0	**2**	1
Dove, Diamond	57	4	**61**	0
Dove, Peaceful	194	84	**278**	69
Dove, Bar-shouldered	107	11	**118**	68
Fruit-dove, Wompoo	0	1	**1**	0
Fruit-dove, Superb	1	1	**2**	0
Fruit-dove, Rose-crowned	3	0	**3**	0
Bronze-cuckoo, Horsefield's	6	3	**9**	0
Bronze-cuckoo, Shining	35	11	**46**	3
Bronze-cuckoo, Gould's	4	0	**4**	0
Bronze-cuckoo, Little	4	0	**4**	0
Cuckoo, Pallid	1	0	**1**	0
Cuckoo, Chestnut-breasted	3	0	**3**	0
Cuckoo, Fan-tailed	42	13	**55**	7
Cuckoo, Brush	11	1	**12**	1
Frogmouth, Tawny	2	0	**2**	0
Nightjar, Spotted	1	0	**1**	0
Nightjar, White-throated	1	0	**1**	0
Nightjar, Large-tailed	1	0	**1**	0
Owlet-nightjar, Australian	2	1	**3**	0
Dollarbird	0	1	**1**	0
Paradise-kingfisher, Buff-breasted	51	0	**51**	6
Kookaburra, Laughing	66	14	**80**	30

Species	Banded 2006 - 2016	Banded 2017	Total Banded	Total Retraps
Kookaburra, Blue-winged	1	0	**1**	0
Kingfisher, Forest	12	5	**17**	3
Kingfisher, Collared	39	1	**40**	7
Kingfisher, Sacred	120	15	**135**	24
Kingfisher, Red-backed	1	0	**1**	0
Kingfisher, Azure	59	10	**69**	30
Kingfisher, Little	7	1	**8**	1
Bee-eater, Rainbow	4	0	**4**	0
Falcon, Brown	0	1	**1**	0
Cockatoo, Yellow-tailed Black	0	1	**1**	0
Galah	26	6	**32**	8
Corella, Long-billed	11	0	**11**	0
Corella, Little	21	48	**69**	0
Cockatoo, Sulphur-crested	46	19	**65**	4
King-parrot, Australian	28	0	**28**	2
Parrot, Red-winged	5	2	**7**	0
Bonnet, Blue	0	1	**1**	0
Parrot, Mulga	3	7	**10**	0
Rosella, Crimson	0	1	**1**	0
Rosella, Pale-headed	55	4	**59**	24
Ringneck, Australian	19	26	**45**	1
Parrot, Bourke's	12	12	**24**	1
Parrot, Blue-winged	0	1	**1**	0
Lorikeet, Rainbow	814	82	**896**	72
Lorikeet, Scaly-breasted	42	11	**53**	0
Budgerigar	2	0	**2**	0
Pitta, Noisy	49	5	**54**	4
Catbird, Green	26	6	**32**	1
Catbird, Spotted	4	0	**4**	0
Bowerbird, Regent	16	1	**17**	0
Bowerbird, Satin	12	9	**21**	8
Bowerbird, Spotted	20	46	**66**	0
Treecreeper, White-throated	24	7	**31**	11
Treecreeper, White-browed	10	4	**14**	1
Treecreeper, Brown	62	38	**100**	16
Fairy-wren, Lovely	11	0	**11**	1
Fairy-wren, Variegated	176	36	**212**	209
Fairy-wren, Superb	148	27	**175**	100
Fairy-wren, Splendid	93	40	**133**	6
Fairy-wren, Red-backed	183	26	**209**	117
Fairy-wren, White-winged	25	0	**25**	1
Honeyeater, Dusky	164	28	**192**	35
Honeyeater, Scarlet	314	25	**339**	2

Species	Banded 2006 - 2016	Banded 2017	Total Banded	Total Retraps
Honeyeater, Green-backed	7	0	**7**	0
Spinebill, Eastern	85	21	**106**	12
Honeyeater, Pied	3	0	**3**	0
Honeyeater, Brown	995	136	**1131**	256
Honeyeater, New-Holland	25	28	**53**	7
Honeyeater, White-cheeked	2	0	**2**	0
Honeyeater, Striped	17	13	**30**	1
Honeyeater, Tawny-breasted	26	0	**26**	3
Friarbird, Little	22	2	**24**	0
Friarbird, Noisy	30	8	**38**	0
Honeyeater, Blue-faced	65	6	**71**	98
Honeyeater, Brown-headed	25	1	**26**	0
Honeyeater, White-throated	120	8	**128**	46
Honeyeater, White-naped	30	3	**33**	4
Chat, Crimson	0	5	**5**	0
Honeyeater, Spiny-cheeked	191	136	**327**	5
Honeyeater, Yellow-faced	398	54	**452**	113
Miner, Bell	0	6	**6**	0
Miner, Noisy	509	18	**527**	316
Miner, Yellow-throated	32	32	**64**	0
Honeyeater, White-fronted	2	0	**2**	0
Honeyeater, Mangrove	156	4	**160**	59
Honeyeater, Singing	140	101	**241**	9
Honeyeater, Grey-headed	11	11	**22**	0
Honeyeater, White-plumed	927	223	**1150**	195
Honeyeater, Graceful	56	0	**56**	0
Honeyeater, Yellow-spotted	128	0	**128**	18
Honeyeater, Lewin’s	605	135	**740**	453
Pardalote, Spotted	30	14	**44**	1
Pardalote, Striated	37	19	**56**	11
Redthroat	1	0	**1**	0
Warbler, Speckled	6	4	**10**	3
Scrub-wren, White-browed	427	76	**503**	656
Scrub-wren, Yellow-throated	236	53	**289**	176
Scrub-wren, Large-billed	304	56	**360**	251
Scrub-wren, Tropical	96	0	**96**	9
Weebill	18	1	**19**	0
Gerygone, Brown	43	10	**53**	5
Gerygone, Mangrove	491	14	**505**	146
Gerygone, White-throated	12	1	**13**	3
Gerygone, Fairy	44	7	**51**	8
Thornbill, Brown	111	33	**144**	46
Thornbill, Inland	43	15	**58**	8

Species	Banded 2006 - 2016	Banded 2017	Total Banded	Total Retraps
Thornbill, Chestnut-rumped	70	39	**109**	4
Thornbill, Yellow-rumped	9	13	**22**	2
Thornbill, Yellow	7	3	**10**	1
Whiteface, Southern	3	8	**11**	2
Babbler, Grey-crowned	4	3	**7**	0
Babbler, Hall's	21	13	**34**	3
Babbler, Chestnut-crowned	20	35	**55**	4
Logrunner	23	7	**30**	6
Whipbird, Eastern	102	11	**113**	66
Quail-thrush, Chestnut-breasted	1	2	**3**	0
Boatbill, Yellow-breasted	12	0	**12**	0
Woodswallow, White-breasted	13	0	**13**	0
Woodswallow, White-browed	3	0	**3**	0
Woodswallow, Black-faced	4	0	**4**	0
Woodswallow, Little	1	0	**1**	0
Butcherbird, Black	7	0	**7**	2
Butcherbird, Grey	51	12	**63**	24
Butcherbird, Pied	32	23	**55**	7
Magpie, Australian	61	4	**65**	101
Currawong, Pied	18	6	**24**	5
Cuckoo-shrike, Black-faced	9	0	**9**	0
Cuckoo-shrike, Barred	4	0	**4**	1
Cicadabird	3	2	**5**	0
Triller, White-winged	8	0	**8**	1
Triller, Varied	42	6	**48**	12
Sittella, Varied	9	9	**18**	0
Bellbird, Crested	4	3	**7**	0
Whistler, Grey	13	0	**13**	0
Whistler, Golden	383	89	**472**	238
Whistler, Rufous	258	53	**311**	97
Shrike-thrush, Little	460	24	**484**	311
Shrike-thrush, Grey	167	11	**178**	56
Figbird, Australasian	140	20	**160**	3
Oriole, Olive-backed	35	11	**46**	1
Oriole, Green	7	0	**7**	0
Drongo, Spangled	34	6	**40**	2
Wagtail, Willie	112	29	**141**	15
Fantail, Grey	386	73	**459**	66
Fantail, Rufous	383	62	**445**	95
Monarch, Spectacled	212	28	**240**	149
Monarch, Black-faced	19	2	**21**	1
Monarch, Black-winged	4	0	**4**	1
Monarch, White-eared	19	2	**21**	6

Species	Banded 2006 - 2016	Banded 2017	Total Banded	Total Retraps
Monarch, Frill-necked	15	0	**15**	2
Lark, Magpie	34	2	**36**	24
Flycatcher, Leaden	31	6	**37**	1
Flycatcher, Shining	19	0	**19**	5
Flycatcher, Restless	4	0	**4**	0
Crow, Torresian	15	0	**15**	0
Crow, Little	0	1	**1**	0
Chough, White-winged	1	0	**1**	0
Apostlebird	4	1	**5**	0
Manucode, Trumpet	1	0	**1**	0
Riflebird, Paradise	4	0	**4**	0
Riflebird, Magnificent	22	0	**22**	4
Robin, White-browed	3	0	**3**	0
Robin, White-faced	231	0	**231**	49
Robin, Pale-yellow	24	6	**30**	9
Robin, Eastern-yellow	658	124	**782**	791
Robin, Hooded	11	11	**22**	1
Winter, Jacky	8	13	**21**	0
Robin, Rose	31	8	**39**	5
Robin, Red-capped	70	33	**103**	3
Scrub-robin, Northern	6	0	**6**	0
Swallow, Welcome	24	4	**28**	0
Martin, Tree	6	0	**6**	0
Reed-warbler, Australian	54	31	**85**	16
Songlark, Rufous	9	0	**9**	1
Grassbird, Little	0	1	**1**	0
Grassbird, Tawny	257	34	**291**	124
Cisticola, Golden-headed	58	11	**69**	14
Silvereye	2985	474	**3459**	860
Starling, Metallic	3	0	**3**	0
Myna, Common	5	0	**5**	0
Thrush, Russet-tailed	42	14	**56**	16
Thrush, Bassian	30	7	**37**	5
Mistletoebird	86	19	**105**	6
Sunbird, Olive-backed	2	0	**2**	1
Sparrow, House	0	15	**15**	0
Finch, Red-browed	1479	355	**1834**	649
Finch, Plum-headed	52	24	**76**	1
Finch, Zebra	454	1	**455**	21
Finch, Double-barred	580	105	**685**	59
Mannikin, Chestnut-breasted	164	18	**182**	3
Pipit, Australian	3	0	**3**	1
TOTALS	**20993**	**3979**	**24972**	**8017**

Ageing and/or sexing criteria have now been established for 199 species (an additional 5 species added in 2017) which will help in identifying juvenile numbers caught in future years. This information is available as an updated pdf file covering all the analysed species should any other researchers require this information. These species accounts also record timing of breeding, as evidenced by the presence of brood patches and cloacal protuberances in birds as well as the presence of freshly fledged juvenile birds. Moult records and timing are also included providing a snapshot of the annual cycle of each species, where enough data has been collected.

In 2017, 3,979 new bird encounters were made as part of this project, with 1,519 recaptures of previously banded birds. There have now been 32,909 new birds banded since 2006 and 8,047 recaptures (24.5% recapture rate overall) of already banded individuals (Table 1). Habitats regularly surveyed now include open eucalypt forest, tropical rainforest, sub-tropical rainforest, temperate rainforest, mangrove and freshwater wetland. Three new sites were added in 2017, an Open Forest and reedbed site at Mookin-Bah Reserve, Manly and two sites near Gatton, one open forest site near the Toowoomba ranges and one on agricultural land on Lockyer Creek.

The many recaptures from a range of species mean that future survival analysis for many commonly caught species will be possible once several years of data have been collected. To date baseline survival analysis data has been published for the White-faced Robin and Mangrove Gerygone with preliminary analysis of data for the Cape York subspecies of Little Shrike Thrush underway.

Publications arising from this study

Coleman, J.T., Macdonald, S.H. & Smith, H.J. 2009. Analysis of biometric variation in the Brown Honeyeater *Lichmera indistincta* in South East Queensland. *Sunbird* 39: 39-48.

Coleman J.T., Van Gessel, F.W. & Clayton, M. 2012. Longevity and movements in the White-faced Robin (Tregellasia leucops albigularis) in Iron Range National Park, Cape York . *Sunbird* 42: 11-23.

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ARTICLES

A partially leucistic Australian Pipit *Anthus australis* in Brisbane

Louis Backstrom

25 Eddowes St, Kedron, QLD 4031; louis.backstrom@gmail.com

Plumage variations in wild birds are not uncommon and can result in a wide variety of novel phenotypes that may be either hereditary or non-hereditary. Leucism is a moderately common type of plumage aberration which results in the loss of melanin from part or all of the plumage, manifesting as pale to white areas of feather; soft parts may also be affected (Guay *et al.* 2012). The following report describes the observation of an Australian Pipit *Anthus australis* that displayed partial leucism in northeast Brisbane in August 2018.

At approximately 08:45 hrs on 31 August 2018, while birding Kedron Brook Wetlands Reserve in Brisbane (27.401°S, 153.083°E), I encountered an adult Australian Pipit which appeared to have partial leucism (Figs. 1,2). The bird was alone, although other pipits were seen at the site, also individually (Backstrom 2018). Its behaviour appeared normal, running between clumps of grass erratically and bobbing its tail, as is typical of this species (Higgins *et al.* 2006). It allowed approach within 10 m, but no closer before running away again, and was hesitant to fly. The whole encounter lasted *c.* 5 minutes.

The feathers around the eye, cheek and chin were very pale, with some pure white, but the rest of the plumage appeared to be unaffected and similar to that of non-aberrant birds (Fig. 3). The non-leucistic portions of the plumage indicated the individual was an adult bird, although ageing pipits with certainty can be difficult in the field (Higgins *et al.* 2006). The same bird had been seen the previous day (G. Daly pers. comm., 31 August 2018), but no other reports have been found by the author either prior to or since the latter date. Australian Pipits are common year-round at Kedron Brook Wetlands and are thought to be sedentary across their native range (Higgins *et al.* 2006), so it is possible that the bird had been present at the site for some time before these observations. There is a large amount of suitable habitat for this species in the vicinity of the wetlands and as such it is not surprising that the bird has evaded observation since the time of my sighting.

Leucism in pipits is poorly documented, especially in peer-reviewed scientific literature, but reports of partially or fully albino or leucistic birds exist across many species (e.g. Craig 2015; Valentini 2014; Tyler & Bonin 2019). The majority of these are opportunistic observations and are not fully documented, providing limited scope for detailed analyses of the incidence of leucism and other plumage aberrations within the Motacillidae and more specifically within *Anthus*. Furthermore, Higgins *et al.* (2006) mention only one record of a leucistic or albino Australian Pipit, which pertains to a wholly white specimen held in the H.L. White Collection housed in the Museum of Victoria, Melbourne. As such, this new record represents the first known record of leucism in *A. australis*, although it is unclear how common an occurrence such aberrations are, as often aberrant birds go unreported.

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Figure 1. The leucistic pipit showing pale patch around the eye and head. Note that in this image the breast is overexposed. (Louis Backstrom).

Figure 2. The leucistic pipit showing the pale patch around the head.(Louis Backstrom)

Figure 3. A non-aberrant individual Australian Pipit from same site as leucistic bird, 25 April 2018. (Louis Backstrom).

Parrot predation by Carpet Pythons

Andrew Ley[1]*, Beth Ley[1], Shirley Cook[2], Rae Clark[3] and Maggie Overend[4]

[1]19 Lynches Road, Armidale, NSW 2350
[2]4 Virginia Close, Armidale, NSW 2350
[3]2/42 Caroline Street, Annerley, Qld 4103
[4]29 Connors Close, Buderim, Qld 4556
*Corresponding author *andrewley15@gmail.com*

Abstract

Four observations of predation of birds by Carpet Pythons *Morelia spilota* are described, the prey being two Red-winged Parrots *Aprosmictus erythropterus*, a Rainbow Lorikeet *Trichoglossus moluccanus* and a Striated Pardalote *Pardalotus striatus.*

Carpet Pythons *Morelia spilota* commonly prey on birds of a wide range of sizes, and including various parrot species (Noske & Robson 2018). Here we describe three instances of Carpet Pythons taking parrots and one of a Carpet Python taking a Striated Pardalote *Pardalotus striatus*.

During the late afternoon of 30 April 2012 at Trafalgar Waterhole in Welford National Park, Queensland (park headquarters at 25°10'S, 143°20'E) AL, BL and SC observed a Carpet Python *Morelia spilota* killing and swallowing a Red-winged Parrot *Aprosmictus erythropterus*. Upon arrival at the waterhole we saw what looked like an untidy bundle near the centre of the top of a tree, probably a River Red Gum *Eucalyptus camaldulensis*. The tree was recently dead, still twiggy but without leaves, so our view was uninterrupted and what had attracted our attention proved to be a Carpet Python which had a Red-winged Parrot in its many coils and was commencing to swallow it. Moving about nearby was a second Red-winged Parrot which was making what sounded like distressed calls. Over perhaps 10 min the python continued to ingest the Parrot which was still kicking its legs as it disappeared; the snake then descended the near vertical branches and trunk of the tree with great ease and disappeared. We estimated the python as being in the order of 1m long and we later identified it as the Longreach subspecies *M. s. metcalfei* on the basis of illustrations in Emmott and Wilson (2009, pp. 37 and 55). How the python captured the Parrot in the expansive and leafless crown of a large tree is not known although it could be that because the tree was leafless it may have been an attractive and regularly used perching place for passing birds.

In December 2018 while caretaking on behalf of Birds Queensland at Australian Wildlife Conservancy's Bowra Sanctuary, Queensland (homestead at 27°59'S, 145°36'E), MO also observed predation of a Red-winged Parrot by a Carpet Python. The capture was at a tap which presumably was a water source for the Parrot. The python was at the tap every morning for five days and adopted various positions — at the top of the post, half way up the post, and either side of the water dish — before capturing the Parrot (Figure 1).

At 0650 h on the morning of 11 December 2017 in the Brisbane suburb of Fairfield (27°30'S, 153°1'E) RC observed a Carpet Python hanging over the guttering of a house and in the process of swallowing a Rainbow Lorikeet *Trichoglossus moluccanus*; only the lower body, tail and feet of the bird were still protruding from the snake's mouth. By 0655 h there were only a few tail feathers hanging out of the side of the python's mouth and within another minute these had disappeared. The ingested bird caused the neck of the python to bulge over 10-20 cm below its head. This event occurred at a place regularly visited by Lorikeets, probably attracted by water pooling in the gutter.

In addition to our observations concerning parrots, AL observed a Carpet Python preying on a Striated Pardalote in Currawinya National Park, Queensland. The incident occurred under the roof of an information shelter where there were numerous nests built by Fairy Martins *Petrochelidon ariel*

in which the Pardalote was presumably nesting. While it is possible that the snake had taken the Pardalote from a nest, it is also the case that the vicinity of a nesting colony could be an ideal location for the operations of an ambush predator like the Carpet Python (Slip & Shine 1988).

These observations add to previously published examples of predation of birds, including parrots, by Carpet Pythons. In an incident in Western Australia with similarities to our observation of a Red-winged Parrot being taken at the top of a leafless tree, Fulton (2006) observed a Carpet Python snatching an Australian Ringneck *Barnardius zonarius* that came within reach in the canopy of a Wandoo *Eucalyptus wandoo* tree; the bird was killed by constriction but was dropped after being partly swallowed, perhaps because it was too large for the python to swallow completely.

We thank Shane and Mary Hume for their hospitality at Welford, and Richard Noske for helpful comments.

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Figure 1. Predation of a Red-winged Parrot by a Carpet Python at Bowra Sanctuary (Maggie Overend)

New Zealand Shining Bronze-Cuckoos *Chalcites lucidus lucidus* are regular visitors to Southeast Queensland

Richard Noske

Centre for Biodiversity and Conservation Science, University of Queensland, St Lucia, Qld, 4072.
Email rnoske@tpg.com.au

Abstract

Formerly considered a rare migrant to Australia, the New Zealand-breeding Shining Bronze-Cuckoo *Chalcites l. lucidus* is shown to be a regular visitor to Southeast Queensland, mainly during March-April and September-October, coinciding with its presumed passage migration to and from known wintering grounds in northern Melanesia. Several records in June and July suggest that some birds may over-winter in Australia. Almost all records pertain to males, as all but the most recent of field guides fail to mention the marked sexual dimorphism of this subspecies, in which females resemble Australian-breeding *plagosus*. For this reason, and the likelihood that it rarely vocalises in Australia, *lucidus* may be much commoner than indicated by records to date. Birders are urged to carefully scrutinise, and if possible, photograph Shining Bronze-Cuckoos, to gain a better understanding of the status of this bird, which may well be "split" in the future.

Introduction

The Shining Bronze-Cuckoo *Chalcites lucidus* is currently treated as consisting of four subspecies, two of which (*layardi* and *harterti*) are restricted to certain islands of Melanesia, while the other two (*plagosus* and nominate *lucidus*) are at least partially migratory (Payne 2019; IOC 2019). Both of the latter subspecies occur in Australia, *plagosus* (formerly known as the Golden Bronze-Cuckoo), as both a resident and a migrant to New Guinea and the Lesser Sundas, and *lucidus* as a passage migrant from its breeding grounds in New Zealand to its wintering grounds in the southwest Pacific, from New Britain to New Caledonia (Gill 1983b; Higgins 1999; Pain *et al.* 2019). Although *plagosus* occurs year-round in eastern Australia north of around Canberra (c.35°N), it is not known if local populations are resident or are replaced by migratory populations breeding further south (Higgins 1999). This is further complicated by the passage of *lucidus* migrating to and from New Zealand.

In New South Wales, reporting rates of the species are relatively low and stable between January and July, but increase dramatically from August to October, and decrease in December (Cooper *et al.* 2016). In contrast, reporting rates in Brisbane are elevated throughout autumn and winter, and relatively low from November to February (eBird 2019). In Queensland, Storr (1984) considered New Zealand-breeding *lucidus* to be rare passage migrants off the east coast, accepting only one record from North West Island, Capricorn Group, in October, as authentic. Similarly, Roberts (1979) regarded *lucidus* to be a vagrant, with very few records from southeast Queensland. Blakers *et al.* (1984) maintained that only "a few" New Zealand birds visited eastern Queensland and the South-East Region, mostly during their autumn passage, and only occasionally in spring. Consistent with this generalisation, an alleged New Zealand bird was reported from Burpengary, Moreton Bay region, on 6 April 1985 (Niland 1986), although no description was provided.

Studies of museum specimens, however, challenged the widely-held assumption that *lucidus* was rare in Australia. After examining 200 museum specimens of the species, Gill (1983b) discovered that New Zealand-breeding *lucidus* had a significantly wider bill than Australian-breeding *plagosus*, and that an unexpectedly large number of wide-billed cuckoos had been collected in New South Wales and Queensland during the months of migration, viz. February-March and September-November. He concluded that these two eastern Australian states were important for *lucidus* on both their north and south migration. In support of his conclusion, Danny Rogers (in Higgins 1999) found that 16 (40%) of Queensland specimens of the species (n=40) that he examined were *lucidus*. The higher-

than-expected proportion of *lucidus* may be partly due to the greater likelihood of migrating birds colliding with windows or automobiles, the source of many museum specimens (D.I. Rogers in litt.).

In spite of Gill's deduction, the widespread belief that *lucidus* is rare in Australia has persisted. I believe this partly reflects its current taxonomic status as a subspecies, since the vast majority of birders are mainly interested in full species and are less inclined to attempt to identify subspecies, despite many recently recognised species ("splits") being resurrected subspecies. For the same reason, very few birders in Southeast Queensland distinguish between the local winter-breeding, resident "Black-headed Pardalote" *Pardalotus striatus melanocephalus* and migratory subspecies of Striated Pardalote (*P. s. striatus* and *P. s. ornatus*) from southern states, including Tasmania, despite differences in calls, plumage, and breeding season (Noske 2014).

Nevertheless, subspecific identification of Shining Bronze-Cuckoos in the field is not without its pitfalls. As noted by Higgins (1999), until recently Australian bird field guides consistently failed to mention the marked sexual dimorphism of *lucidus*, illustrating only the adult male. Although males of *lucidus* are fairly easily identified by the crown and mantle being an iridescent green, females resemble *plagosus* in having this area maroon-brown. Moreover, while most male *lucidus* have much white on the face, as well as white speckling on the forehead, features that are rare in either sex of *plagosus,* many female *lucidus* have little white on the face and only slight speckling on the forehead (Higgins 1999: Table 3). While many female *lucidus* are separable from *plagosus* by the chin being plain white instead of having dark bars or mottling, there is nevertheless much potential for female *lucidus* to be mistaken for *plagosus* unless they are carefully scrutinised.

While subspecific identification of adult Shining Bronze-Cuckoos on plumage characteristics is not always possible, the colour of the base of the lower mandible is diagnostic. In *lucidus* this area is blue-grey, both while in New Zealand and while migrating through Australia. In contrast the bill is wholly black or with a minute pale area on the lower mandible in Australian *plagosus* (Higgins 1999). This feature is illustrated in the *Australian Bird Guide* (Menkhorst *et al.* 2017), though unfortunately, during layout of this book, the illustrations of adult male *plagosus* and adult female *lucidus* were transposed. This mistake has been corrected in the revised edition released this year (Menkhorst *et al*. 2019). In some field settings, usually when viewing the bird from directly below, it may be possible to see the broader bill of *lucidus*. However, while the difference between the broadest-billed *lucidus* and narrowest-billed *plagosus* is quite obvious, the bill widths of the narrowest-billed *lucidus* and broadest-billed *plagosus* barely differ.

This report collates recent authenticated records of *lucidus* in Southeast Queensland from three main sources: eBird, Facebook (Jeff Davies, in litt.) and banding (Jon Coleman, in litt.). Although some records have undoubtedly been missed, I believe there are sufficient to assess the frequency and seasonality of this subspecies in the region.

Recent observations

Table 1 shows 38 records of *lucidus* since 2008 that were substantiated by descriptions or photographs, such as those in Plates 1–8. A further 22 records for "Shining Bronze-Cuckoo (Shining)" were listed in eBird, mostly from 2019, but are omitted from Table 1 as they contained no supporting evidence (descriptions or useful photographs). Not unexpectedly, the geographical locations of records were mostly in the Brisbane (47.4%) and Moreton Bay (23.7%) regions. The furthest inland records were from Bunya Mountains (c.150 km from the coast), Toowoomba (c.120 km west) and Cunningham's Gap (c.100 km), while the northernmost record was from Bundaberg. Of 78 Shining Bronze-Cuckoos banded at eleven sites in Southeast Queensland by Jon Coleman and his team since 2007, six birds (7.7%) from four sites were identified as *lucidus*.

I first became aware of *lucidus* in Southeast Queensland on 12 September 2015, when I observed and photographed an adult male during my routine survey of eucalypt forest in the northern

foothills of Mount Coot-tha, Brisbane. On 20 September, I saw a male and female, and on 29 September, succeeded in photographing the female. I did not record *lucidus* in 2016, which is also the year with the fewest records of the subspecies since 2014 (Table 1). Including records up to 7 August 2019, there is a clear bimodal pattern of occurrence, with most records in March-April and September-October (Fig. 1). However, assuming that the number of reports of *lucidus* for the remainder of 2019 will resemble that of the previous two years, it is likely that September and October will emerge as the peak months of occurrence. Most surprising were the winter sightings in June and July, though there are none for August as yet.

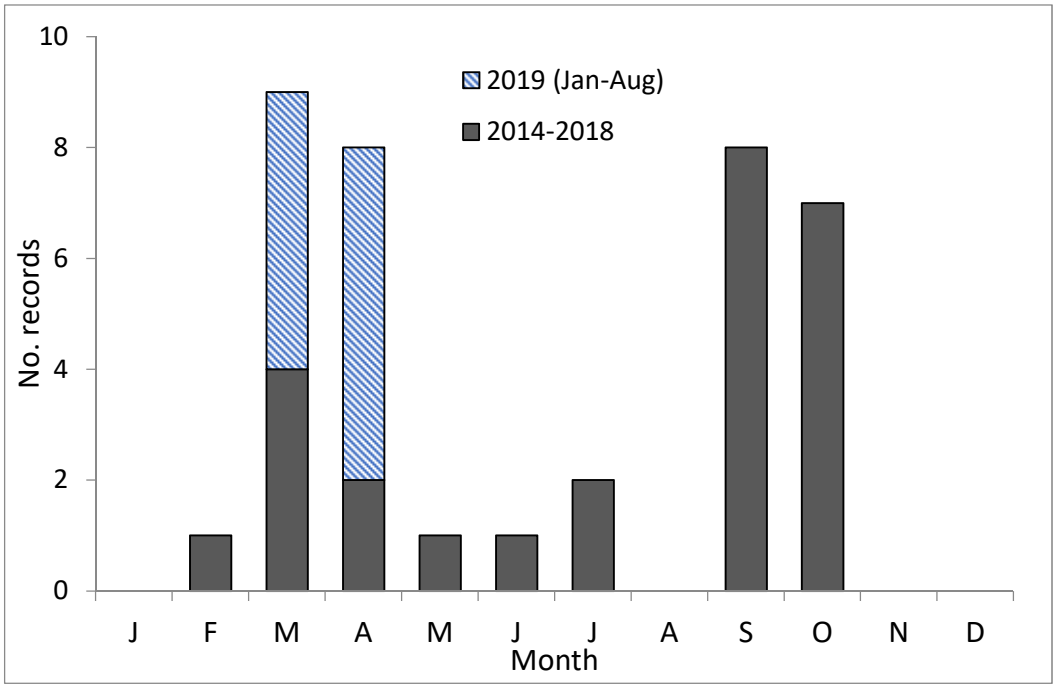

Figure 1. Monthly frequency of authenticated records of Shining Bronze-Cuckoos of New Zealand-breeding subspecies *lucidus* in Southeast Queensland since 2014 (n=37). For details see Table 1.

Discussion

In New Zealand, Shining Bronze-Cuckoos breed from mid-October to early January (Gill 1982, 1983a), and usually depart on migration from January to April (Higgins 1999). They are known to "winter" in northern Melanesia, with records from the Admiralty Islands through the Bismarck Archipelago, including New Britain, to Solomon Islands (Higgins 1999; Dutson 2011), where they have been recorded from mid-March to late September (Mayr 1940; Hadden 2004). Most birds return to, or are first heard, on both North and South Islands, New Zealand, from mid-September to mid-October (see Higgins 1999). The subspecies also breeds on Norfolk Island and Chatham Islands (Higgins 1999), c.745 km to the northwest and 650 km to the southeast of North Island, respectively.

The migration route of *lucidus* is uncertain. Based on the absence or rarity of *lucidus* from New Caledonia and New Hebrides (Vanuatu), where the subspecies *layardi* is resident, Mayr (1932) believed that New Zealand birds first migrate to eastern Australia, move north along the coast, and then fly via the Louisiade Archipelago to the Solomons and Bismarck Archipelago, a journey of some 5,000-6,000 km. Hindwood (1940), however, felt that such a route seemed "very circuitous and improbable", and suggested a direct transoceanic passage from New Zealand to the Solomons via Norfolk Island and Lord Howe Islands instead, despite records indicating that the species was a straggler to the latter island. Fell (1947) also favoured a direct transoceanic migration route for *lucidus*, noting that this proposed route, and the parallel one of *plagosus* in Australia (see Fell: Fig. 7), corresponded roughly with the direction of the Southeast Trade Winds. As Gill (1983) argued, however, while the indirect route via Australia is almost twice as long as the direct transoceanic

route of c.3,000 km to the Solomons, it involves shorter transoceanic distances of just over 2,000 km between New Zealand and Australia, and just under 2,000 km between Australia and the Solomons. The latter route also allowed the cuckoos to rest and feed during migration which they could not do on the direct route, except on Norfolk and Lord Howe islands. A third alternative is that both routes are used, but by different populations or age-groups.

Records since 2014 (Table 1) suggest that New Zealand *lucidus* is more common in Southeast Queensland than previously thought, and contrary to the conclusion of Blakers *et al.* (1984), they visit just as much during their southbound (spring) passage, i.e. en route to New Zealand, as during their northbound (autumn) passage. Moreover, several records in June and July suggest that some birds over-winter in Queensland. In New South Wales, *lucidus* has been reported in small numbers between 17 September and 17 November, and between 16 February and 17 April, with only two records outside these months, both in June (Cooper *et al.* 2016). In Southeast Queensland, the earliest record during the autumn passage was 17 February, and the latest during spring passage was 26 October (Table 1). While the former date corresponds well with the earliest calendar date in New South Wales, the latter date may suggest that birds linger longer in New South Wales than Queensland on their return trip to New Zealand.

However it seems likely that *lucidus* is even more common than recent records suggest, for two principal reasons. Firstly, the vast majority of records pertain to males, as females are much more difficult to distinguish from *plagosus* (see above). Assuming the sex ratio is even, and that both sexes use the same migration route, many female *lucidus* are being missed. Secondly, like most migratory landbirds that do not breed in Australia, *lucidus* probably vocalises much less commonly than *plagosus*. In the North Solomons, *lucidus* is normally silent, but may call occasionally just prior to their departure for New Zealand (Hadden 2004). During monthly 20-min surveys of many sites in D'Aguilar National Park, Brisbane, between 2012 and 2017, I recorded the species 180 times, 138 (87%) of which involved hearing calls while the remainder constituted sight-only records (Noske, unpubl. data). The frequency of call records was similar in each month of the year.

Although there has been no phylogenetic study of the two subspecies to date, it seems likely that they will be treated as distinct species in the future because of their non-overlapping breeding ranges, resulting in reproductive isolation from one another. Other characters that appear to argue in favour of "splitting" these two taxa are differences in plumage and mensural characters of adults (see above), morphology of nestlings, and selection of brood hosts (Brooker & Brooker 1989). Australian *plagosus* is a brood parasite of a large number of domed (or enclosed) nest-building species, such as thornbills and fairy-wrens, whereas New Zealand *lucidus* is a host-specialist parasitising the Grey Warbler only (Gill 1983a; Brooker & Brooker 1989).

Given our incomplete understanding of the occurrence of New Zealand birds in Queensland, I urge birders to check the identity of all Shining Bronze-Cuckoos they encounter, and if possible secure photographs, especially of their bills.

Acknowledgements

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Figure 1. *C. l. lucidus*, probable female, Lockyer Valley, 7 September 2008 (B. Jolly)

Table 1. Records of New Zealand Shining Bronze-Cuckoos (*C. l. lucidus*) from Southeast Queensland, authenticated by photographs, in chronological order. Additional date records for the same month and site are shown in brackets. Calendar years separated by horizontal lines.

Date	Location	Region	Observers	Source
7-Sep-08	Abberton, Lockyer Valley	Lockyer Valley	BJ	D
24-May-14	Ninderry	Sunshine Coast	GR	D
30-Jul-14	Ewan Maddock Dam, Lansborough	Sunshine Coast	VB, JW	D
27-Sep-14	Stable Swamp Creek, Sunnybank	Brisbane	LF	D
4-Oct-14	Eagleby Wetlands	Brisbane	JC	B
19-Oct-14	Kedron Wetlands	Brisbane	JC	B
8-Apr-15	Eaton's Hill	Moreton Bay	VB, JW	D
12-Sep-15	Boulder Trail, Mt Coot-tha Forest (3)	Brisbane	RN	A
24-Oct-15	Anstead Bushland Reserve	Brisbane	TN	E
29-Sep-16	Golds Scrub Lane, Lake Samsonvale (2)	Moreton Bay	JK	E
23-Feb-17	Colven Creek Gully, Canungra	Scenic Rim	JC	B
4-Mar-17	Boulder Trail, Mt Coot-tha Forest	Brisbane	RN	A
19-Mar-17	White Rock Conservation Park	Ipswich	EL, NH	E
10-Sep-17	Hillview Reserve near Dayboro	Moreton Bay	TT	E
6-Oct-17	Bundaberg	Bundaberg	CB	D
26-Oct-17	Smalls Road, Highvale	Moreton Bay	JK	E
26-Mar-18	Bunya Mountains National Park	Western Downs	CP	E
26-Mar-18	JC Slaughter Falls, Mt Coot-tha	Brisbane	SM	E
2-Apr-18	Lake Manchester	Brisbane	EL, GD	E
30-Jun-18	Kedron Wetlands	Brisbane	JC	B
17-Jul-18	Anstead Bushland Reserve	Brisbane	MGI	E
9-Sep-18	Whites Hill Reserve	Brisbane	EL, GD	E
11-Sep-18	Sandy Camp Wetlands	Brisbane	AN	E
19-Sep-18	Boulder Trail, Mt Coot-tha Forest (2)	Brisbane	RN, BC	A
27-Sep-18	Fig Tree Pocket	Brisbane	SA	D
7-Oct-18	Dayboro	Moreton Bay	RN, BC, TT	A
9-Oct-18	Golds Scrub Lane, Lake Samsonvale (2)	Moreton Bay	JC, LR	B,E
23-Mar-19	Highfields Falls, Toowoomba		TB	E
23-Mar-19	Tinchi Tamba Wetlands Reserve (2)	Brisbane	GT, AM	E
29-Mar-19	Eagleby Wetlands	Logan	AN	E
31-Mar-19	Nathan Road Wetlands Reserve	Moreton Bay	GT	E
31-Mar-19	Redwood Park, Redwood	Toowoomba	TB	E
5-Apr-19	Gold Coast	Gold Coast	JF	D
6-Apr-19	Old Creamtruck Rd, Dayboro	Moreton Bay	TT	E
6-Apr-19	Eagleby Wetlands	Brisbane	JC	B
7-Apr-19	Dohles Rocks Road, Griffin	Moreton Bay	AJ	E
9-Apr-19	Banks St Reserve (3)	Brisbane	MGR	E
10-Apr-19	Cunninghams Gap	Southern Downs	PK	D

Source: A, author; B, bird-banding (J. Coleman in litt.); F, Facebook/ blogs (J.N. Davies, in litt.); E, eBird lists.

Observers:

AJ	Andy Jensen
AN	Andrew Naumann
BC	Brian Coates
BJ	Bill Jolly
CP	Carla Perkins
CB	Chris Barnes
EL	Elliot Leach
GD	Gus Daly
GT	Ged Tranter
JC	Jon Coleman
JF	Jodie Forrester-Shaw
JK	James Kennerley
JW	Jack Whiting
GR	Greg Roberts
LF	Linda Fearn
LR	Lexie Roberts
MGI	Mat Gilfedder
MGR	Matteo Grilli
MG	Mat Gilfedder
NH	Nikolas Haass
PK	Pieter King
RN	Richard Noske
SA	Sylvia Alexander
SM	Stephen Murray
TB	Tyde Bands
TN	Tim Norris
TT	Tom Tarrant
VB	Vince Bugeja

Figure 2. *C. l. lucidus*, male, Sunnybank, 27 September 2014 (L. Fearn)

Figure 3. *C. l. lucidus*, male, Eatons Hill, 8 April 2015 (V. Bugeja)

Figure 4. (a) Left, female *C. l. lucidus*, Mt Coot-tha Forest, 29 September 2015 (R. Noske); (b) right, window-killed specimen of female *C. lucidus* found in Bundaberg, 6 October 2017 (C. Barnes)

Figure 5. *C. l. plagosus*, Mt Coot-tha Forest, 19 September 2018 (B. Coates)

Figure 6. *Left: C. l. plagosus*, 19 September 2018 (B. Coates); right, *C. l. lucidus*, showing bill width and colour, 7 October 2018 (B. Coates)

Figure 7. *C. l. lucidus* male, Dayboro, 7 October 2018 (T. Tarrant)

Figure 8. *C.l. lucidus* male, Dayboro, 7 October 2018 (B. Coates)

First record of intraspecific adoption by a female Superb Fairy-wren *Malurus cyaneus*

Nicole M. Richardson[1*], James A. Kennerley[1,2*], William E. Feeney[1]

[1] *Environmental Futures Research Institute, Griffith University, Nathan 4111, Australia*
[2] *Department of Zoology, University of Cambridge, Cambridge CB2 3EJ, United Kingdom*
**Corresponding authors. Email: npinicola@gmail.com and jak73@cam.ac.uk*

Background

At our study site on the western shores of Lake Samsonvale (27°16'S, 152°51'E), Queensland, we have been monitoring productivity and survival of a population of Superb Fairy-wrens *Malurus cyaneus* since 2015. Through the capture and banding of individuals, each Superb Fairy-wren bears a unique combination of three plastic colour bands along with an aluminium band issued by the Australian Bird and Bat Banding Scheme (ABBBS). With a unique identifier that is visible in the field, we are able to follow individual Superb Fairy-wrens and monitor and study their behaviours under natural settings.

Observations

On 24 August 2017, JAK found a Superb Fairy-wren nest during its construction (Nest A). The nest was attended by a pair of adult fairy-wrens, male-IBBS and female-ILIS. At seven days old, each of the chicks received a unique combination of colour bands in addition to an ABBBS band. On 25 September, the day before the chicks fledged, both male-IBBS and female-ILIS were observed attending the nest with food on this day. This was the last time female-ILIS was observed. The following day, all three chicks fledged and were being provisioned solely by male-IBBS.

On 3 September, another Superb Fairy-wren nest (Nest B), containing three incubated eggs, was located c. 450 m south of Nest A. Nest B was attended by adult male-IONS and adult female-CINS. As with the chicks in Nest A, the chicks of Nest B received bands at seven days old. On 25 September, the expected date of fledging, Nest B was found to be empty. We searched for the fledglings for 90 min, but were unable to locate them. Concurrently, in the territory surrounding Nest B (Territory B) we watched male-IONS and female-CINS foraging and giving alarm calls but neither were observed collecting food. Our conclusion was that the nest had been depredated during the preceding 24 hours. This was also the last time we observed male-IONS.

On 5 October, NMR again visited Territory B but failed to locate male-IONS or female-CINS. Later the same day NMR visited the territory where Nest A was located (Territory A) and found male-IBBS feeding the fledglings of Nest A and, to our surprise, in the company of female-CINS. This was the first sighting of female-CINS since 25 September and the first time she was seen outside Territory B. We later observed two fledglings, both identified as fledging from Nest A, begging at female-CINS whilst perched together on a twig. Female-CINS was then observed attending the fledglings, including feeding one individual four times. Meanwhile, male-IBBS foraged close by and, on multiple occasions, paused to give quiet bursts of song. At no point did we observe male-IBBS interact aggressively with female-CINS. The apparent family group of female-CINS, male-IBBS and the fledglings of Nest A remained together until the end of October 2017, with both adults continuing to feed the fledglings until they were able to forage independently. On 31 October, female-CINS returned to Territory B and paired with a new male, male-NOIS; the two remained here at least until the end of 2017.

Discussion

Cooperative breeding, in which a non-breeding helper, most often a male, assists with the rearing of young, is common in the Superb Fairy-wren (Rowley 1957, 1964; Mulder 1995). On the other hand, intraspecific adoption of fledglings has hitherto never been observed in this species, yet our observations clearly show that female-CINS from Territory B took over the parental role from female-ILIS for the dependent chicks that fledged from Nest A. Furthermore, although frequent in wildfowl (Eadie *et al.* 1988), to our knowledge, our observation makes the Superb Fairy-wren one of only three species of passerine in which intraspecific adoption has been recorded, the others being the North Island Robin *Petroica longipes* (Berggren 2006) and Eastern Bluebird *Sialia sialis* (Plissner & Gowaty 1988; Meek & Robertson 1991, Wetzel & Chandler 2008). Although not intraspecific adoption, one case of interspecific adoption by a female Superb Fairy-wren, observed by S. C. Tidemann, closely mirrors the events we have documented, and is detailed in Higgins *et al.*(2001):

> "At Booligal, on death of [the] resident female, a new female moved in to assist [the] male in feeding a nestling Horsfield's Bronze Cuckoo *Chrysococcyx basalis*, and continued to feed it after it fledged."

It is possible that in this case of adoption, supernormal stimuli by the nestling cuckoo triggered feeding by the new female Superb Fairy-wren. This has been proposed as an explanation for feeding of nestling and fledgling cuckoos by individuals other than the foster parents (Sealy & Lorenzana 1997; Feeney & Riehl 2019).

In our case of adoption, supernormal stimuli were unlikely to have been involved due to the absence of cuckoo chicks so we propose three hypotheses for intraspecific adoption behaviour. It is possible that female-CINS is a daughter of female-ILIS and male-IBBS, and adoption was an effort to maximise inclusive fitness. However, studies have shown that helper fairy-wrens are often unrelated to the young they help to rear (Dunn *et al.* 1995). Alternatively, adoption could have been an effort to enhance the future probability of breeding by pairing with an unpaired male. This would be concordant with findings in instances of adoption by male and female Eastern Bluebirds (Meek & Robertson 1992; Wetzel & Chandler 2008). Third, the recent loss of female-CINS's own brood triggered feeding of an apparently unrelated brood of conspecifics. Although the mechanism for adoption under these circumstances is not understood, it would be consistent with observations made in cases of interspecific brood parasitism (Shy 1982; Shaw *et al.* 2014). We suggest that the third hypothesis may be the most plausible explanation as female-CINS did not remain paired and did not attempt to breed with male-IBBS. However, further studies are needed to identify whether overlap in the breeding cycle and/or the disappearance of the resident female are necessary for intraspecific adoption to occur, and whether chick-parent signalling and stimuli could trigger the adoption of an apparently unrelated brood.

Due to the difficulties associated with identifying individual birds of the same species that are not uniquely marked, it is possible that intraspecific adoption is under-recorded in Superb Fairy-wrens as well as other passerine species. Thus, this study highlights the importance of monitoring colour-banded populations of common species as a tool to further our understanding of bird behaviour and our knowledge of species' life histories.

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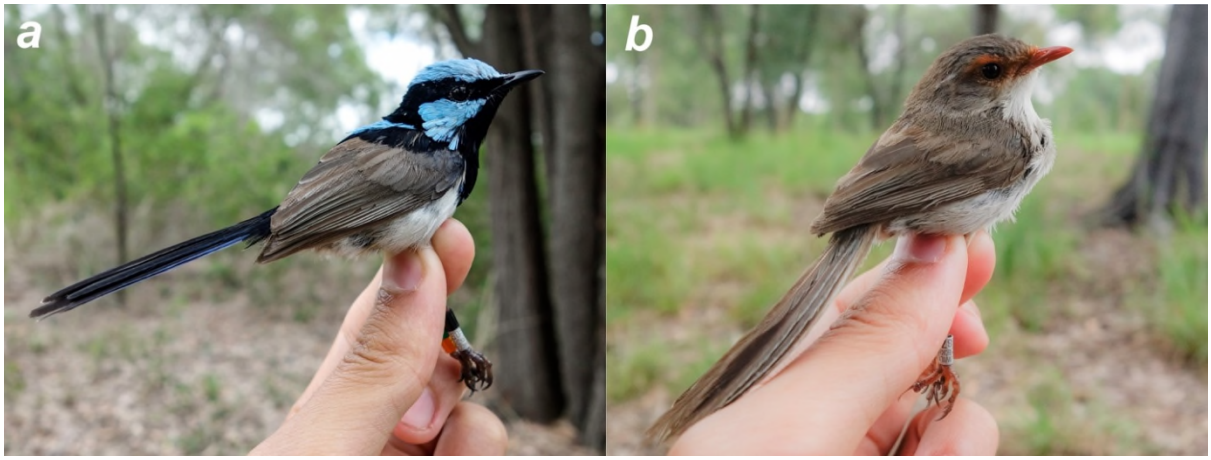

Figure 1. Superb Fairywrens *Malurus cyaneus*: (a) male-IONS, the mate of female-CINS whilst attending Nest B and (b) female-CINS, the individual observed to adopt fledglings of Nest A. Photos: James A. Kennerley.

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Notes on the parasitic ecology of newly-fledged Fan-tailed Cuckoos *Cacomantis flabelliformis* and their White-browed Scrubwren *Sericornis frontalis* hosts in south-east Queensland

Colleen Poje[1*], James A. Kennerley[1,2*], Nicole M. Richardson[1], Zara-Louise Cowan[1], Maggie R. Grundler[1,3,4], Matthew Marsh[1], William E. Feeney[1*]

[1] *Environmental Futures Research Institute, Griffith University, Nathan 4111, Australia*
[2] *Department of Zoology, University of Cambridge, Cambridge CB2 3EJ, United Kingdom*
[3] *Department of Environmental Science, Policy, and Management, University of California Berkeley, Berkeley, California 94720, USA*
[4] *Museum of Vertebrate Zoology, University of California, Berkeley, Berkeley, California, 94720, USA*
*Correspond with: pojecol23@gmail.com , jak73@cam.ac.uk , william.e.feeney@gmail.com

Abstract

Despite brood parasitic cuckoos being the subject of much scientific attention, in large part due to the study of the adaptation-counter adaptation evolutionary "arms-races" that they have with their hosts, there is surprisingly little literature on the natural habits of newly-fledged cuckoos. Generally, it is believed that after depositing their egg in their host's nest, adult cuckoos provide no parental care and care is only provided by the foster parents. However, intriguing records of adult cuckoos feeding newly-fledged cuckoos and provisioning by adult birds other than the cuckoo's host parents exist. Fledged-but-dependent Fan-tailed Cuckoos *Cacomantis flabelliformis* have been recorded to be fed by both adult conspecifics and a variety of non-foster parent adult birds, making it an interesting species to begin investigating why these phenomena exist. Here, we followed seven fledged but dependent Fan-tailed Cuckoos over the course of three months (August – October 2017) at Lake Samsonvale in south-east Queensland, Australia, to investigate their feeding ecology and record interactions between them and other species. Female White-browed Scrubwren *Sericornis frontalis* hosts provisioned fledged cuckoos at a significantly higher rate than males, and while newly-fledged cuckoos directed begging at individuals from species other than their foster parents (including one butterfly), we did not record any evidence of provisioning by non-hosts (i.e. auxiliary feeds, Sealy & Lorenzana 1997), in our 1207 provisioning observations. Our observations provide new insights into the ecology of newly-fledged Fan-tailed Cuckoos, including interactions with their foster parents and other species.

Introduction

The Fan-tailed Cuckoo *Cacomantis flabelliformis* is a species of Old World brood-parasitic cuckoo (Tribe: Cuculini) that is found throughout the south-west Pacific region. It is an obligate brood parasite, laying its eggs in the nests of other (host) species (Feeney *et al.* 2014). Seventeen species have been identified as biological hosts, the most commonly parasitised species being the White-browed Scrubwren *Sericornis frontalis*, Brown Thornbill *Acanthiza pusilla* and Inland Thornbill *A. apicalis (*Brooker & Brooker 1989; Guppy *et al.* 2017; Feeney *et al.* 2018). Raising a cuckoo represents a substantial cost to the host since post-fledging care of juvenile Fan-tailed Cuckoos is reported to last three to four weeks (Higgins 1999).

Fledgling Fan-tailed Cuckoos have been reported to be fed by adult Fan-tailed Cuckoos and species other than their hosts (Brooker & Brooker 1989; Sealy & Lorenzana 1997; Lorenzana & Sealy 1998; Higgins 1999). These behaviours may be a result of adult cuckoos providing more parental care than traditionally assumed or fledgling cuckoos having evolved behaviours or traits that take advantage of the sensory predispositions of parental behaviours e.g. supernormal signalling; Holen *et al.* 2001. Either way, these reports highlight that the natural habits of brood parasites, such as cuckoos, are sorely understudied

(reviewed by Feeney & Riehl 2019). In this study, we followed seven fledgling Fan-tailed Cuckoos to investigate interactions between them and other species in order to gain new insights into the fledgling ecology of this species, as well as why other species contribute to provisioning them.

Methods

Study Site

The study was conducted in an area west of Lake Samsonvale (27°16'S, 152°51'E) in south-east Queensland. The site contains a mix of vegetation with remnant rainforest and dry sclerophyll forest interspersed between grassland with planted *Eucalyptus* spp. The dominant habitat at the site is grassland where *Eucalyptus* spp have been planted. The dominant plant species of the understory is the invasive *Lantana camara.* Areas of remnant rainforest are found in a few gullies at the site.

Behavioural Observations

We observed seven fledged-but-dependent Fan-tailed Cuckoos for almost 80 h (4721 min) between August and October 2017. Each fledgling was watched for a single period each day (mean observation duration, 53.64 +/- 2.10 [SE] min; median, 59 min), with 91% of observations (n=88) starting between 10:00 and 12:30 hrs. Unfortunately, these birds had fledged prior to our field season starting so all observations were conducted on fledged cuckoos of unknown age. Our previous research (Feeney *et al.* 2018) showed that nestling Fan-tailed Cuckoos stay in White-browed Scrubwren nests for approximately 17 days after hatching so all cuckoos observed in this study were at least 17 days old.

During each observation period, each observer recorded the number of feeds and the species, sex and colour bands, if applicable, of the provisioning bird. Observers also recorded any interactions between the fledgling cuckoo and other species, as well as general feeding behaviours. Individual cuckoos were identified by association with the host parents' colour bands and home range. The sex of each White-browed Scrubwren host was determined through a combination of colour-band combinations and plumage characters (Magrath *et al.* 2000; Higgins & Peter 2002). All White-browed Scrubwrens observed in this study bred in pairs, rather than groups.

Figure 1. A fledged Fan-tailed Cuckoo being fed by an adult female White-browed Scrubwren (colour combination: BLYS) at the Samsonvale study site, Queensland, Australia. (Cameryn Brock).

Statistics

Statistical analyses were conducted in R (R Core Team 2015) and Generalised Linear Mixed Models (GLMMs) were conducted using the lme4 package (Bates & Maechler 2009). We used a GLMM to investigate whether males and females differed in their provisioning rates of the fledged Cuckoos. The full and final model had 'host parent sex' as a fixed effect, and 'observation event' and 'cuckoo ID' as random effects.

Results

Overall 1207 provisioning events were observed. Of these, the female fed the cuckoo on 358 occasions, the male on 226 occasions. The observers were unable to confidently identify the provisioner's sex on 584 occasions, so these data were excluded from statistical analysis. Our analysis suggests that female scrubwrens provisioned cuckoo fledglings at a significantly higher rate than male scrubwrens (χ_4^2 = 30.09, P < 0.001, Fig. 2).

Six of the observed fledglings displayed aggressive begging behaviour, following their hosts through vegetation while making begging calls. Three of the fledglings were observed pecking and nipping at their host parents' backs and tails. All fledglings displaying this behaviour were capable of foraging - one fledgling captured 23 insects during an observation period but received only 14 food items from the hosts. Five of the seven cuckoo fledglings received more feedings from their female host parent than from their male host parent (Fig.2).

Fledged-but-dependent cuckoos interacted with a variety of other species (Table 1). Most non-host species showed no interest in the fledglings, with only a brief examination before moving on. On four occasions the fledglings were chased by a non-host adult, after actively begging from it, namely a Rufous Whistler *Pachycephala rufiventris*, Willie Wagtail *Rhipidura leucophrys*, and two unidentified honeyeaters.

Adult Fan-tailed Cuckoos were observed at the study site throughout the duration of this study and showed interest in the fledged cuckoos on two occasions. During both interactions, the adult cuckoo approached and watched the fledgling within 7 m, but no contact was made.

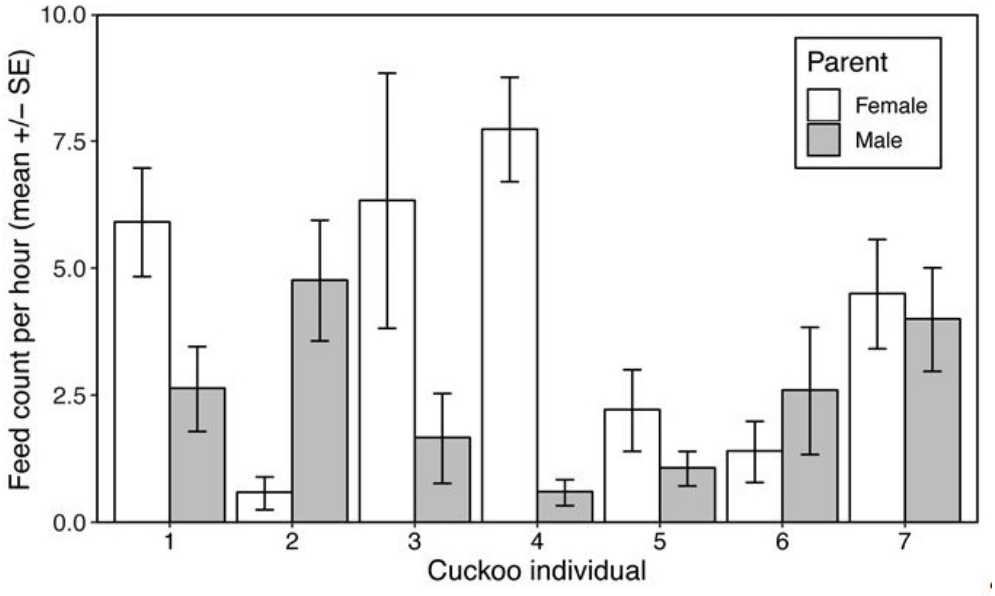

Figure 2. Mean provisioning rate of female and male White-browed Scrubwren *Sericornis frontalis* hosts to each of the fledged-but-dependent Fan-tailed Cuckoos *Cacomantis flabelliformis* observed in this study. Error bars denote standard error (SE).

Discussion

During the three months of observations we observed 1207 feeding events for seven Fan-tailed Cuckoo fledglings and saw no incidence of auxiliary feedings. We expected that male White-browed Scrubwrens would provide more feedings to the cuckoo fledglings than the females, as Magrath & Yezerinac (1997) found this to be the case when Scrubwrens in Canberra provisioned their own nestlings. While our study was conducted on fledgling, rather than nest-bound offspring, we found that the female provided significantly more feedings to the fledgling cuckoo. We do not know why this difference exists between the two studies, although one possibility is that provisioning rates change post-fledging. We suggest future work should consider feeding rates of cuckoos and biological offspring by scrubwren hosts from nestlings to independence post-fledging to fully understand these trends.

While we did not observe auxiliary feedings during our observations of Fan-tailed Cuckoo fledglings, we saw fledglings beg at a number of species other than their host parents, including one butterfly. In Sealy & Lorezana's (1997) review, all observed auxiliary feedings of fledgling brood parasites "were stimulated by vocalizing young". During our observations, all attempts by fledgling cuckoos to solicit food from non-hosts failed, the fledglings being chased off their perch in three cases (Table 1). In one case, a fledgling begged from an unidentified honeyeater and was chased twice during a single observation period. While this may seem like a poor strategy, fledgling Pallid Cuckoos *Heteroscenes pallidus* have been reported successfully soliciting food from attackers (Sharland 1929; Kikkawa & Dwyer 1962). Thus, our observations support the idea that incessant begging vocalizations by fledgling Fan-tailed Cuckoos may represent a supernormal stimulus (Holen *et al.* 2001) that can play on the sensory predispositions of parental birds to secure provisioning. The relentless begging by fledged cuckoos was such that it continued in the face of bird predators including a Lace Monitor *Varanus varius* and Carpet Python *Morelia spilota* (Table 1). We agree with Sealy & Lorenzana (1997) that a study of vocalizations and vocal mimicry during the fledgling stage of development would be beneficial to further understanding of cuckoo behaviour.

There is a general lack of information on the ecology and behaviour of brood parasites. A push in recent years to understand Australian cuckoos has resulted in several studies which broaden our knowledge of non-European cuckoos, such as the Pallid Cuckoo (Kennerley *et al.* 2019) and the Pacific Koel (Abernathy & Langmore 2016). This push, however, is focused mostly on the ecology and evolution of adult cuckoos and not fledglings, which remain largely understudied. A broader study of all cuckoo fledglings from time of fledging to when they reach independence is needed to fully understand the significance of this period in their development.

Acknowledgements

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Table 1. Summary of interactions between fledgling Fan-tailed Cuckoos and non-host individuals observed during this study.

Species	Interaction					Description
	Alarm Vocalization	*Chased*	*Ignored*	*Inspected*	*Scolding Vocalization*	
Brown Honeyeater *Lichmera indistincta*				X		Brown Honeyeater investigated a fledgling
Eastern Yellow Robin *Eopsaltria australis*		X				Robin chased a fledgling from its perch
Fan-tailed Cuckoo *Cacomantis flabelliformis*				X		Fan-tailed adult flew up to and then watched a fledgling
				X		Fan-tailed adult approached and then sat near-by and observed a begging fledgling
Grey Fantail *Rhipidura fuliginosa*			X			Fantail ignored a begging fledgling
			X			Fantail ignored a begging fledgling
Honeyeater spp. *Meliphagidae sp*		X				Honeyeater chased a begging fledgling from branch
		X				Honeyeater chased a begging fledgling from branch
Mistletoebird *Dicaeum hirundinaceum*				X		Female Mistletoebird flew up to and inspected a fledgling
Red-backed Fairywren *Malurus melanocephalus*					X	A fledgling was scolded by a group of Red-backed Fairywrens when it landed near them

	Alarm Vocalization	*Chased*	*Ignored*	*Inspected*	*Scolding Vocalization*	
Rufous Fantail *Rhipidura rufifrons*				X		Rufous fantail inspected a begging fledgling
Rufous Whistler *Pachycephala rufiventris*		X				Whistler chased a fledgling from its perch
			X			Rufous whistler ignored a begging fledgling
Superb Fairywren *Malurus cyaneus*			X			A singing Superb Fairywren ignored a begging fledgling
	X					Superb Fairywrens alarm called when a fledgling landed near them
Yellow-faced Honeyeater *Caligavis chrysops*		X				Yellow-faced Honeyeater chased a begging fledgling off a branch
				X		Yellow-faced Honeyeater investigated a fledgling but flew away after the fledgling lunged at the honeyeater
White-browed Scrubwren *Sericornis frontalis*	X					Scrubwrens alarm called when a fledgling landed near them
			X			A foraging scrubwren ignored a begging fledgling
Willie Wagtail *Rhipidura leucophrys*		X				A fledgling was chased by Willie Wagtail after the fledgling vocalized towards Willie Wagtail
			X			Willie Wagtail ignored a begging fledgling
			X			Willie Wagtail ignored a begging fledgling
Non-Avian Species						
Butterfly (unidentified)						A fledgling begged towards butterfly as the butterfly flew past
Carpet Python *Varanus varius*						A fledgling was begging loudly and pursuing its host parents through the undergrowth when they came across a carpet python. Host parents went quite but the cuckoo kept begging
Lace Monitor *Morelia spilota*						A Lace Monitor was moving through undergrowth towards the fledgling and host parents. Fledgling continued begging as other birds in the area alarm called at the monitor

ERRATUM – SUNBIRD V47(1) December 2017

Would members who received this issue of Sunbird please note the following Erratum.

Erratum for:

Bielewicz, F. & Bielewicz, J. 2017. A preliminary checklist of the birds of the Meandu Creek Dam in the South Burnett region of south-eastern Queensland. Sunbird 47: 10-22.

Page 16 of this article contains an error in the ratios given in the last sentence of the first paragraph:

The sentence “In simple terms, each site returned a 1.3 waterbird/terrestrial bird ratio [1.2.84 at Broadwater]." The ratios should be replaced should read "In simple terms, each site returned a 1.2 waterbird/terrestrial bird ratio [1.1.84 at Broadwater].

INSTRUCTIONS FOR AUTHORS

The Sunbird is the peer reviewed journal of Birds Queensland (Queensland Ornithological Society Incorporated) which publishes original papers about birds in Queensland and adjacent northern regions. From 2019, the journal will be published online but limited hard copies may be provided on demand.

Manuscripts are invited from non-members as well as members on all aspects of ornithology, e.g. life history, taxonomy, distribution, behaviour and ecology. Manuscripts may take the form of major articles on specific birds, birds in specific areas or habitats, short notes on birds, or the literature on birds, such as reviews of books or comments on published articles.

Submission of a paper for consideration implies that the authors' findings have not been published, nor are being considered for publication elsewhere. All submissions will undergo a formal refereeing process including peer review. As part of that process the editor reserves the right to submit records of rare birds to the Rarities Appraisal Committee of Birds Queensland.

Manuscripts should be submitted in Microsoft Word to the Sunbird Editor via email. Manuscripts should be received no later than 30 June in the year of proposed publication. Common and scientific names of birds should follow International Ornithological Congress (IOC) systematics and taxonomy. (http://www.birdsqueensland.org.au/bird_lists.php). Lists of birds should also follow the IOC sequence.

Intending authors should consult recent issues of *The Sunbird* to see acceptable forms of contributions. Once received, an appropriate referee will assess each submission. Recent issues of *The Sunbird* are available as full text in the Humanities & Social Sciences Collection of the Informit website (http://search.informit.com.au/search;res=IELHSS).

References should be listed in alphabetical order using the following format:

Fleay, D.H. 1973. Nesting habits of the brush turkey. *Emu* 36: 153-163.

Frith, H.J. (Ed.) 1976. Mallee fowl. In *Complete Book of Australian Birds,* pp. 136-137. Reader's Digest, Sydney.

Serventy, D., Serventy, V.N. & Warham, J. 1971. *The Handbook of Australian Sea-birds.* Reed, Sydney.

BoM. 2019. Queensland in 2017: The warmest year on record. Bureau of Meteorology. http://www.bom.gov.au/climate/current/annual/qld/archive/2017.summary.shtml#recordsTmaxA . Last accessed 15 September 2019.

Tables and figures should be numbered sequentially, in the order they are referenced in the text of the manuscript. Drawings and diagrams should be in electronic form, preferably as a .jpg file. Authors may also submit photographs with their manuscripts, with suitable captions and the name of the photographer. Requests for advice or help in preparing manuscripts can be made to the editor.

Manuscripts and other correspondence should be sent to:

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