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The South Australian Ornithological Association Inc. (Birds SA)

FOUNDED 1899

Birds SA is the trading name of The South Australian Ornithological Association Inc.

The principal aims of the Association are to promote the study and conservation of Australian birds, to disseminate the results of research into all aspects of bird life, and to encourage bird watching as a leisure activity.

The *South Australian Ornithologist* is supplied to all members and subscribers, and is usually published as two issues per year. In addition, a quarterly newsletter, *The Birder,* reports on the activities of the Association, announces its programs and includes items of general interest.

Meetings are held at 7.45 pm on the last Friday of each month (except December when there is no meeting) in the Charles Hawker Conference Centre, Waite Road, Urrbrae (near the Hartley Road roundabout). Meetings feature presentations on topics of ornithological interest. Visitors are welcome.

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Marchant, S. and Higgins, P. J. (eds). 1990. *Handbook of Australian, New Zealand and Antarctic Birds. Volume 1B, Australian Pelican to Ducks*. Oxford University Press, Melbourne.

SAOA. 1995. Bird Records. *South Australian Ornithological Association Newsletter* 155: 15.

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Revised February 2021

Birds of The Greater Reedbeds, Adelaide Plains

PENNY PATON

Abstract

The Greater Reedbeds to the west of Adelaide in 1836 supported a patchwork of wetlands, woodlands and sandhills, and the complexity of the vegetation was reflected in a rich avifauna. Of the 230 bird species recorded from the Greater Reedbeds since European settlement, most were recorded up to the 1930s and many bred in the area. With the growth of Adelaide and the development of the area for agriculture and later for residential and commercial purposes, most of the wetlands and native vegetation was destroyed or highly modified. The introduction of weeds and pest animals further decimated the native plants and animals of the Reedbeds. Many bird species became extinct, many others have become rare and a few have colonised the area. From the 1970s on changing attitudes to nature conservation led to more extensive plantings of native plants in parks and gardens and, in the early 2000s, concern over sustainable water use led to the development of Aquifer Storage and Recovery systems at golf courses. The wetlands associated with these systems and the more sympathetic treatment of the rivers and creeks in the area have benefitted some waterbird species. Despite declines in native bird abundance and richness, the Greater Reedbeds remains the richest area for birds in the inner metropolitan Adelaide area, due mainly to the open space of airport land, the golf courses, the River Torrens and Patawalonga Creek and their associated wetlands, and the West Beach Trust land. Management actions to further enhance terrestrial and wetland open space for birds are provided to guide land managers in their decision making. Regular bird surveys at Adelaide Airport, two golf courses and the lower reaches of the River Torrens conducted from 1988 to the present (to 2016 at the Airport) were the impetus for this paper and they demonstrate the importance of detailed and long-term data sets. They will provide a baseline to measure future changes to avifauna in the area, particularly as we experience a hotter and drier climate due to anthropogenic climate change.

INTRODUCTION

All but obliterated under an urban landscape was a natural paradise known as the Greater Reedbeds (*sensu* Kraehenbuehl 1996) – a substantial patchwork of woodland, sandhills, reedbeds dominated by rushes and reeds (after which the area was originally named) and other wetlands to the west of Adelaide that stretched from Glenelg in the south to Seaton and Grange in the north (Figure 1). The waters of the River Torrens and other streams entered the Greater Reedbeds on its eastern border, with the overflow draining to the sea via the Patawalonga Creek and through the Old Port Reach of the Port River (Holmes and Iversen 1976). While the River Torrens, enhanced by water from its five creeks, delivered the largest amount of water to the Reedbeds, three other streams in descending order of size, Sturt River, Brownhill Creek and Glen Osmond Creek, also flowed into these low-lying swamps (Holmes and Iversen 1976). Sand dunes along the coast confined the water until summer and autumn heat evaporated much of it (Holmes and Iversen 1976). Research by Kraehenbuehl (1996) determined that the waters of Brownhill Creek did not enter the Sturt River, but rather flooded out in a broken line onto the plains west of Plympton.

One of the best descriptions of the area comes from Samuel White whose father, John White, arrived in the fledgling colony of South Australia in 1836 and settled at Fulham, known at that time as the Reedbeds. Figure 2 shows the extent of John White's property superimposed on a more modern map. Samuel's son, (Captain)

S. A. White, recounted his father's memory of the original environment (White 1914):

> At that time much of the property was covered in a dense mass of reeds and flags, outside of which was a fringe of high dense rushes and luxuriant grasses. This, combined with belts along the river of fine timber, red gum (*Eucalyptus rostrata*) [now *E. camaldulensis*] and sandhills not far off, covered with pines and banksia, and out beyond that open plains and marsh land, made a rich and diversified collecting ground, which has today practically passed away owing to the advance of civilization.

Cecil Rix (1983) painted a picture of the view from his front veranda as a child growing up on

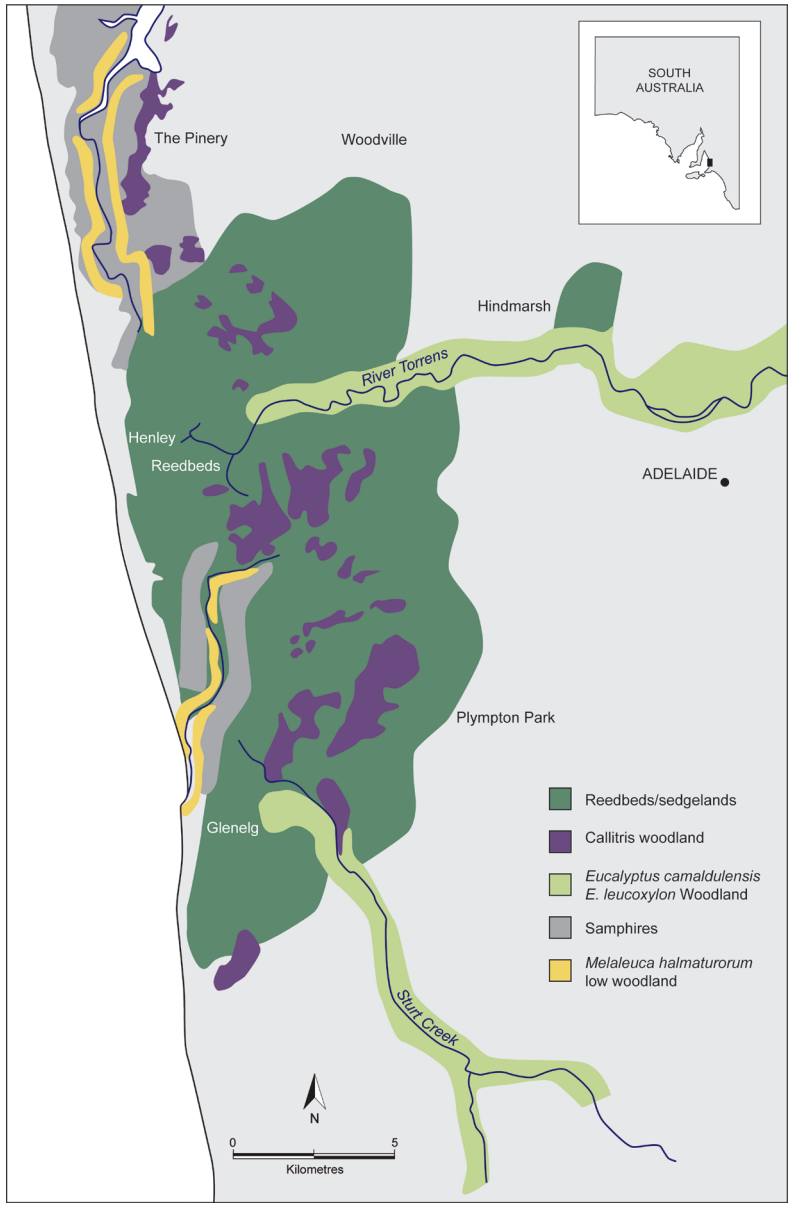

Figure 1. The extent of the Greater Reedbeds area and complementary terrestrial vegetation along watercourses and on red sandhills in 1836 (after Kraehenbuehl 1996).

Figure 2. Western portion of 1839 map of Adelaide, superimposed on a modern map. The area outlined in blue shows the extent of John White's 'Fulham Farm' property, and the yellow square in its NE corner marks the site of 'Weetunga', the home built by Samuel White in the late 1870s.

East Terrace at Henley Beach in the period after 1910:

> The view to the east was of vast expanses of grassy paddocks studded with River Red gums, a few Weeping Willows, various patches of reeds and rushes and some grazing cattle… They were old trees and certainly predated the proclamation of South Australia.

Neither S. A. White nor J. W. Mellor, ornithological cousins who lived all their lives in the Fulham and Lockleys area and wrote papers and notes on the birds they recorded and collected there, outlined the boundaries of what they called the Reedbeds. However, most of what we know of the birdlife of the Greater Reedbeds from the nineteenth century and the first thirty years of the twentieth century comes from the observations of these two men and from White's paper on his father and grandfather's recollections (White 1919a). We can assume that many of their records came from near their homes. Kraehenbuehl (1996) mapped the extent of the swampy country which he called the Reedbeds in his figure depicting the 1836 vegetation of the Adelaide Plains. This shows a roughly rectangular area from Somerton Park, Glenelg South and Glengowrie extending northwards along the coast to Grange, Seaton and Woodville South and with its easterly extent demarcated by the current suburbs of Plympton, Marleston, Cowandilla, Underdale and Beverley.

Known as Wittongga tarto (low swampy reed country), the northern part of the Reedbeds was an important area for the Kaurna people due to the rich resources of plant and animal life,

particularly during the summer (https://www.charlessturt.sa.gov.au/Witongga). The more southerly section around the Sturt River was called Warriparinga and the area was described thus by William Everard in the autumn of 1838 (Dolling 1981):

> a chain of freshwater lagoons overgrown with flags and bulrushes about eight feet high and abounding in wild ducks. It was a happy hunting ground where Aborigines trapped swans, pelicans, teal, bronze-winged pigeons, quail and parakeets, as well as numerous fish in and around the flooded gums, swampy areas and samphires.

Development of the Greater Reedbeds after European colonisation

The usefulness of this fertile and well-watered area was quickly recognised by the early European colonists who established farms and gardens, growing crops, vegetables, fruit and vines as well as using pastures for grazing domestic stock. By the 1840s there were a number of farms in the district, including the Grange of 400 acres, (https://data.environment.sa.gov.au/Content/heritage-surveys/3-Western-Adelaide-Region-Heritage-Survey.pdf) and John White's Fulham Farm of four sections (Linn 1989). Likewise in the southern part of the Greater Reedbeds, sections were acquired and farmed in the late 1830s and 1840s, including Dr Everard's two farms along what is now Anzac Highway in Plympton (Dolling 1981). By the 1870s Frogmore Farm covered 3000 acres of the Patawalonga Creek area, made possible by 15 miles (24 km) of drains (http://users.sa.chariot.net.au/~littoral/pat-ck/pb/pb3-2a.htm). In the 1870s, John Fox Mellor established a farm and substantial home, Holmfirth, on the north-western corner of Tapleys Hill and Henley Beach Roads and photos

Figure 3. Photo taken from a windmill on the River Torrens looking north-west over paddocks at the back of the Mellor home 'Holmfirth', Lockleys. The photo is undated but is likely to be from the late 1800s (From the collection of the State Library of South Australia, PRG 335/109/11).

in the Mellor collection in the State Library of South Australia demonstrate the agricultural nature of the area in the late 1880s (one such photo is shown in Figure 3).

In the southern part of the Greater Reedbeds, Glenelg was the earliest town established; Glenelg was an important port and from the 1840s became a seaside resort, with a daily passenger service to Adelaide by horse-drawn cart beginning in 1845 (https://data.environment.sa.gov.au/Content/heritage-surveys/2-Glenelg-Heritage-Survey-Stage-1-1983.pdf). However, in the early years flooding of the track between Glenelg and Adelaide was a constant problem when the Sturt River rose. The opening of the railway to Adelaide in 1873 assured the continued growth of Glenelg as a resort and a residential area (*ibid*.). Periodic flooding from the Sturt River was a continuing problem in the middle years of the nineteenth century, when the railway was swamped and roads became impassable. In 1879 construction was completed of a 3-mile (5 km) drain to take floodwaters of the Sturt north-west into the Patawalonga (Dolling 1981). Despite this, intermittent flooding continued and, after severe flooding in 1963, the river was concrete-lined, through the construction of the Sturt Drain between 1968 and 1972 (https://birdssa.asn.au/location/warriparinga-wetlands-sturt/).

Urban development in the low-lying swampy area of the northern Greater Reedbeds was curtailed until the first roads were constructed in the 1870s (http://henleyandgrangehistory.org.au/?page_id=10). From 1877 the townships of Henley and Grange sprang up but development was slow until public transport was secured in 1882, with a horse-drawn tram service operating between Adelaide and Henley, extended to Grange a few months later, and a narrow-gauge railway between Grange and Woodville. Over the next few years these small townships grew into popular seaside holiday spots. Their popularity increased with the extension of the train line to Henley in 1894 and the electrification of the tram in 1909 (*ibid*.). In the southern part of the Greater Reedbeds, townships like Glandore and Plympton Park were subdivided in the early 1880s but remained unoccupied and undeveloped for a number of years (Dolling 1981).

Despite the viaduct which carried the tramway across a flood-prone part of Henley, regular winter floods caused havoc with the tram and rail services. This was not rectified until 1937 when the River Torrens outlet via Breakout Creek was constructed. Rapid housing development followed after World War II, partly fuelled by the greater availability of motor transport. This saw Adelaide's population more than double in thirty years, from 382,000 in 1947 to 900,432 in 1976, and the urban footprint expand threefold in this same period (https://data.environment.sa.gov.au/Content/heritage-surveys/3-Western-Adelaide-Region-Heritage-Survey.pdf).

Most of the suburbs of the Greater Reedbeds were established prior to 1976, the exception being the last remnant of the Kidman property. For nearly a hundred years, until 1973, there was a horse stud on the northern side of the River Torrens. In 1868, William Blackler purchased the Fulham Park Estate, which at that time extended from south of Henley Beach Road to Grange Road (http://www.charlessturt.sa.gov.au/FulhamParkStud), and in 1874 created the Fulham Park Stud. In 1912 the estate was bought by Sir Sidney Kidman, who used the property for thoroughbred breeding. Part of the Fulham Park Stud south of the Torrens was acquired in 1935-36 by the Engineering and Water Supply Department for the construction of Breakout Creek and, in 1949, 50 acres in the north were sold to the Housing Trust, becoming the suburb of Kidman Park. Through the 1960s 70 acres were retained by the Kidman family but in 1973 all but three acres around the homestead were sold; the last three acres were subdivided in the late 1980s.

While most of the Greater Reedbeds area was subdivided for housing, commercial properties or light industry, a few areas were retained as open space. Construction of Adelaide Airport was completed in 1954 and the main runway was extended to the south-west in 1995-97. This included the rerouting of Tapleys Hill Road and a change to the area and configuration of the Patawalonga Creek and resulted in the Airport occupying 785 hectares. Over the past 20 years, open airport land to the south-west of Adelaide Airport and north of James Melrose Road has been leased for commercial and industrial purposes, leading to a diminution in the area of this habitat. This process of reclamation of airport land for such purposes is expected to continue.

West and south-west of Adelaide Airport is West Beach Parks, a 135-hectare site, comprising two golf courses, playing fields and holiday

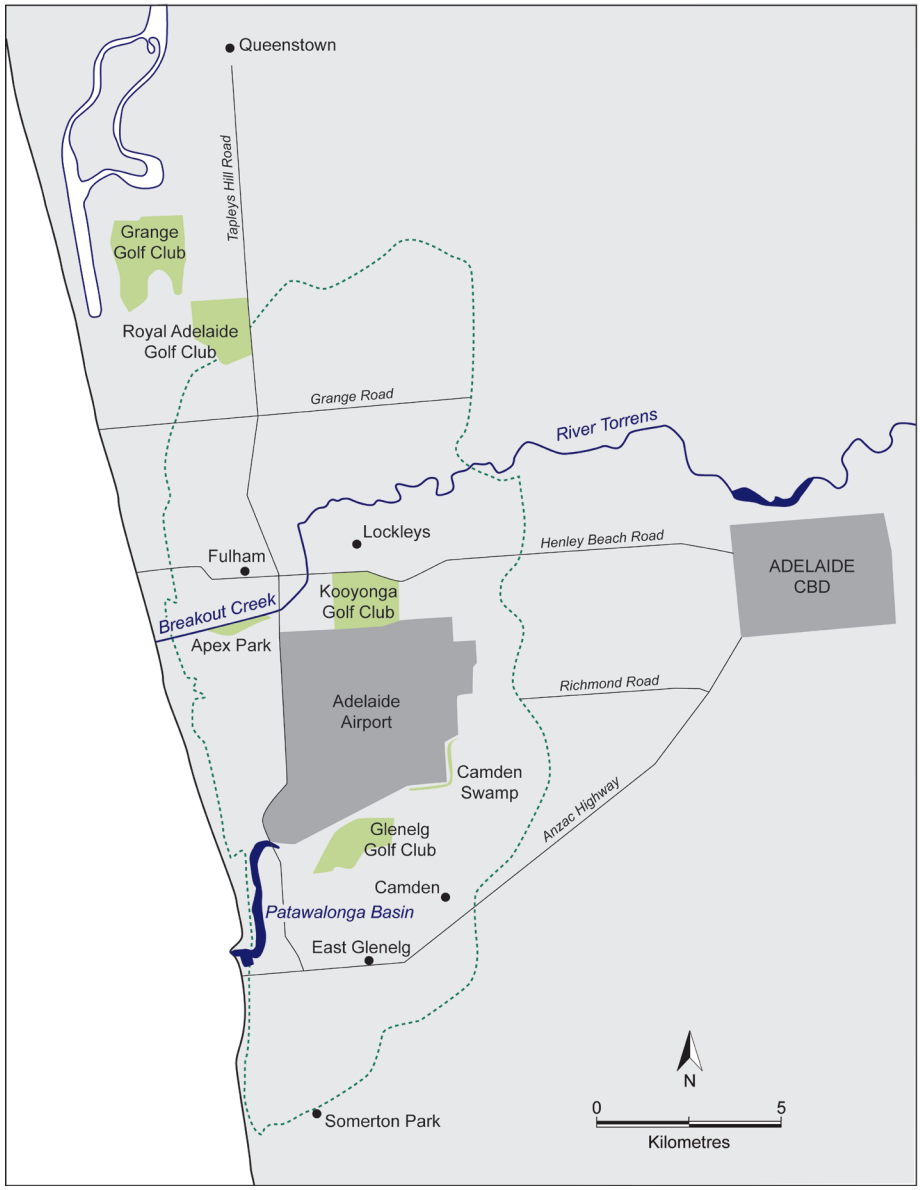

Figure 4. The Greater Reedbeds area in 2020, showing the watercourses, golf courses, Adelaide Airport, major roads and relevant suburbs. The Greater Reedbeds itself is delineated by the dotted line.

accommodation. This land is managed by the West Beach Trust, is bounded by West Beach, Military and Tapleys Hill Roads and to the south by the Patawalonga Creek, and includes a large detention basin north of Africaine Road and several smaller water bodies. On the corner of Tapleys Hill and West Beach Roads is a section of the Patawalonga Creek and environs on airport land that was restored and revegetated in the 1990s. Throughout the Greater Reedbeds are small and medium-sized ovals, public parks and gardens.

A number of golf courses dot the area, namely Glenelg, Kooyonga and Royal Adelaide (see Figure 4) and the two West Beach Parks courses, including the Patawalonga Course, at Westward Ho Golf Club. A Linear Park borders the River Torrens and in the lower reaches there have been two major redevelopments of the wetlands and river banks. In 1999 Breakout Creek Stage 1 was constructed, north of Henley Beach Road, and from 2009 to 2010 Stage 2 was implemented between Henley Beach and Tapleys Hill Roads. Horse grazing was thus restricted to the river banks between Tapleys Hill Road and the sea and the upstream areas were planted with local native plant species. Islands were created and reed and rush growth along the banks of the River Torrens has increased due to these changes.

In terms of wetlands, while most of the original Greater Reedbeds swamps have disappeared, there still exist the waters of the River Torrens, the Patawalonga Creek and a series of drains that surround and cut through the Adelaide Airport, including Brownhill Creek, which meets the Patawalonga on the southern edge of the Airport. New wetlands have recently been constructed at two golf courses as part of a region-wide Aquifer Storage and Recovery scheme. Built in 2009, the wetland at Royal Adelaide Golf Course has an area of about 1 ha and in 2010 the Glenelg Golf Club added 1.4 ha of wetlands and 50,000 plants to the course. The 7 ha Apex Park site at West Beach features a large wetland, constructed in 1993 to detain and improve stormwater before discharge to the River Torrens. This wetland was reconstructed between early 2018 and late 2019, reducing the extent of the wetland and associated reedbeds. This was part of Breakout Creek Stage 3 and included the relocation of horse yards adjacent to Lockleys Oval to the northern side of Apex Park. While Grange Golf Course is situated in an area known as The Pinery and is north of the Greater Reedbeds (Figures 1, 4), it is worth noting that this Golf Club constructed 3 ha of vegetated pools on its eastern boundary in 2009 and provides habitat for both terrestrial and wetland birds.

Vegetation of the Greater Reedbeds

Kraehenbuehl (1996) provided a summary of the plant associations and plant species of the Greater Reedbeds area noted by early botanists and collectors, including Ferdinand von Mueller and Ralph Tate in the nineteenth century and S. A. White and J. B. Cleland in the early twentieth century. Kraehenbuehl (1996) listed 129 plant taxa from the Reedbeds, but we can be sure that there were many more species. Of these 129 taxa, at least 73 (about 57%) are extinct and many more are rare due to the almost total draining and clearance of the area. A River Red Gum *Eucalyptus camaldulensis* open forest over Lignum *Muehlenbeckia florulenta* with a sedgeland of Common Reed *Phragmites australis* and Narrowleaf Bulrush *Typha domingensis* was widespread along the River Torrens and Sturt River and around the lagoons near the coast. This association probably merged into a *Juncus*/*Cyperus*/*Isolepis* (now *Ficinia*) sedgeland around the lagoons and may have included Swamp Wattle *Acacia provincialis*. Interspersed amongst the swampy sedgelands and reedbeds were patches of Southern Cypress Pine *Callitris gracilis* and Drooping Sheoak *Allocasuarina verticillata* woodland on red sandhills (Figure 1). A low open forest of Swamp Paperbark *Melaleuca halmaturorum* with samphire flats occurred in saline and semi-saline areas on the

periphery of the reedbeds, interspersed with grasslands of rushes, reeds and salt-tolerant grasses. In the permanent and temporary waters were an array of water-loving plants such as Water-ribbons *Triglochin procerum*, water milfoils *Myriophyllum* spp. and pondweeds *Potamogeton* spp. (Kraehenbuehl 1996).

Fenner and Cleland (1935) described the geology and botany of the Adelaide coast. This publication included Cleland's notes on the flora of an area stretching from Outer Harbor in the north to Sellicks Beach in the south. He described ten different vegetation types, including the Reedbeds and the consolidated sand dunes, and gave a complete plant list based on his collections. Cleland's definition of the Reedbeds covered the area from the Port River in the north to the Patawalonga Creek in the south and is thus fairly similar to the area described as the Greater Reedbeds by Kraehenbuehl (1996). Cleland also provided maps of the coast showing the different vegetation types. Information from both these sources is combined in this paper.

Cleland (in Fenner and Cleland 1935) described the area as he knew it in the 1920s and 1930s:

> The Reedbeds were formed by the waters of the Torrens, obstructed by the coastal sandhills, spreading out laterally over alluvial flats and junctioning by more definite channels with the Port River on the north and the Patawalonga on the south. Thirty or more years ago they were what their name implies, extensive swamps covered with water two to several feet deep… As a result of the destruction of the natural vegetation of our hills, the creeks flowing into the Torrens have been bringing down annually vast quantities of soil in their flood waters…. This silting combined with drainage channels has reclaimed nearly all the swamp and changed the whole face of the area.

By the 1930s little of the original swamp vegetation remained in the Reedbeds, despite some minor flooding of the flats near the River Torrens (Cleland, in Fenner and Cleland 1935). 'Jerusalem', an area that contained native vegetation, was probably the first artificial wetland on the Adelaide Plains. In 1893 William White, S. A. White's uncle, began constructing a wetland covering two hectares on property owned by his brother, Charles, in what is now Henley Beach South (Grainger 2016). A lake and planted native vegetation provided habitat for birds and other animals but, despite the area being designated a sanctuary, illegal hunting occurred and the area was poorly maintained in its latter years. By 1919 the area was not fulfilling William White's intentions and in the mid-1930s 'Jerusalem' was drained and severely damaged by the construction of the outlet of the River Torrens (Grainger 2016).

Sand dunes once extended from about Queenstown to the north of the Reedbeds, south to the Sturt River near Camden Park, with a disjunct minor group of dunes occurring further south between East Glenelg and Somerton (Kraehenbuehl 1996). They had fared better than the swamps when Cleland described them in the mid-1930s (Fenner and Cleland 1935). The creation of the five western suburbs golf links provided some protection for the vegetation of the sand dunes and at least prevented those areas from being subdivided for housing.

Aims of this paper

This paper presents a summary of bird species recorded from the Greater Reedbeds area since 1836, documents the species that have become extinct in the area, describes species that have apparently colonised or recolonised the area after a period of extinction, as well as presenting data from thirty years of observation of birds of the Adelaide Airport and its environs, spanning 1988 to 2020.

METHODS

For the purpose of this study the Greater

Reedbeds region is the area shown as being dominated by reedbeds by Kraehenbuehl (Figure 1) and delineated by a dotted line in Figure 4. The latter figure shows the current course of the River Torrens and localities discussed in the text.

Early records

We will only ever have an incomplete picture of the birdlife of the Reedbeds, due to the early clearance of vegetation and draining of the wetlands for agriculture and the dearth of any systematic bird surveys from the early days. However, a reasonably comprehensive list was collated from the following sources.

The ornithologists S. A. White and J. W. Mellor recorded their observations and made skin and egg collections in the Reedbeds area in the late nineteenth and early twentieth centuries. White (1919a) documented bird species recorded by himself, his father and grandfather and made notes on trends in abundance, including extinctions. Another, shorter paper documented the more unusual birds seen by White (1925) over the autumn and winter of 1924. White and Mellor also contributed observations on birds seen at the Reedbeds in the 'Bird Notes' section of the *South Australian Ornithologist*. In addition, White and Mellor contributed specimens and notes to G. M. Mathews for his *Birds of Australia* (1910-1927). While White and Mellor were very competent observers, we cannot interrogate their records and White was known to make errors of omission and commission. Therefore, we need to be cautious in interpreting their data and be aware of possible errors, like White's omission of Buff-banded Rail *Hypotaenidia philippensis* from his paper (White 1919a). Rix (1983) reported this species coming to his garden on a regular basis in the early 1900s and there are records from Fulham and Lockleys from 1917 onwards (e.g. Mellor 1917a, 1918; White 1919b).

Most of the early records fall in the period prior to the early 1930s before J. W. Mellor died in 1931 and after which S.A. White's interest in birds waned. However, there are incidental specimen and sight records in the period between 1932 and the more intensive modern recording period of 1988 to 2020. An arbitrary cut-off date of 1945 was chosen to divide the two periods, which corresponded to a large increase in the size of metropolitan Adelaide post-World War II and increased development in the study area, with the establishment of housing estates and, in 1954, the Adelaide Airport. Accordingly, the time periods considered will be 1836 to 1880 (at the end of which S. A. White and J. W. Mellor were old enough to collect specimens and document their sightings), 1880 to 1945, and 1946 to 2020. However, the results and discussion about bird distribution and abundance more closely reference the period 1988 to 2020 to align with the current author's and others' more in-depth observation period.

Specimen records from the study area (Figure 4) in the South Australian Museum, Adelaide (SAMA) were analysed and these include those collected by S. A. White and J. W. Mellor, and S. A. White's father, Samuel, and his uncle, William (Horton *et al.* 2018). Specimen records were divided into three periods: ≤1880 and pre- and post- 1945 to align with sight records.

Within the Reedbeds was an area known in the early 1900s as Camden Swamp. This series of swamps was visited by members of the South Australian Ornithological Association, and bird species seen there were noted in early volumes of the *South Australian Ornithologist*. J. Neil McGilp was one of the few early ornithologists to describe the exact location of Camden Swamp, on the data slip for a clutch of eggs of the Red-kneed Dotterel *Erythrogonys cinctus* (SAMA B14403) that he collected there. He placed it 'About one mile from Morphettville Racecourse in a northerly direction … adjoining sand hills, and immediately west of Bronzewing Poultry Farm' (P. Horton pers. comm.).

This location is near the current Mooringe Avenue in North Plympton and its approximate position shown in Figure 4. Camden Swamp was drained prior to September 1936 (Sutton 1936), but Sutton noted that there was still swampy ground along Richmond Road (about 1.5 km to the north) that provided habitat for waders. The earliest records of specimens in the SAMA from Camden Swamp were Dr A. M. Morgan's collection of egg clutches of Hoary-headed Grebe *Poliocephalus poliocephalus* and Red-kneed Dotterel on 2 October 1915.

Recent surveys

During the course of nearly thirty years' employment surveying and counting birds at Adelaide Airport, I surveyed birds at Glenelg Golf Course (GC), Kooyonga GC and along the River Torrens from just north of where it crosses under Henley Beach Road to the sea and including the Apex Park Wetland (Figure 4). The Airport was surveyed over five hours several times each month from 1988 to mid-2016, while the golf courses and River Torrens surveys occupied three to four hours in the early morning every three months, usually in February, May, August and November, from 1995 to 2020.

Bird records from two other golf courses in the area were included. Those from the Royal Adelaide GC (which straddles the boundary between the Greater Reedbeds and The Pinery) were retrieved from lists held by the administration at the Club and based largely on birds observed by golfers including my mother, Muriel Reid, a long-term club member. These lists are largely unannotated so it is impossible with most species to know how frequently or when they were observed. There is also less certainty about the accuracy of bird identification so records of rare species or those which were only recorded from the Royal Adelaide GC must be viewed with a degree of caution. While not included in the list of birds in Table 1 nor in the analysis of bird records from the Greater Reedbeds, reference is made where relevant to birds observed at Grange GC from 1993 till mid-2009 by Derek Carter and from 1965 to 1970 by T. J. Smith.

David Edey provided me with his extensive database of birds and breeding birds of the Greater Reedbeds area from 1995 to the present. These included birds recorded for the Birds Australia atlassing scheme from 1995 to 2003, the Birds SA atlassing scheme from January 2014 to January 2015, and opportunistic observations at Ayton Road, Fulham from 1995 to 2006 and at Malurus Avenue and Mellor Park, Lockleys from 2007 to the present. From 2019 onwards eBird surveys were made for Malurus Avenue and Mellor Park, the River Torrens and Breakout Creek, Apex Park Wetland, Burbridge Road at West Beach and the West Beach Trust land immediately west of the Airport, including the West Beach Stormwater Basin, the Patawalonga Creek, the playing fields and the edges of the Westward Ho Golf Courses. Other areas surveyed by David Edey were the Brownhill Creek wetlands and adjacent paddocks south of the Airport, the Patawalonga Lake, drains and wetlands north and west of the Airport, the Lockleys Oval and parts of Grange, including Sturt's cottage environs and Kirkcaldy Park.

Birds recorded from the Greater Reedbeds area were extracted from the Bird Reports of the SAOA published in the *South Australian Ornithologist* from 1963 onwards. Further observations were extracted from Volumes 1-6 (1972-2018) of *Bird Talk*, the journal of the Adelaide Ornithologists Club, including an article describing childhood memories of the birdlife of the Greater Reedbeds by Rix (1983). Records also came from the Breakout Creek part of the River Torrens and an adjacent swamp in Fulham for the period 1974-1977 (Whatmough 1978). A survey of the River Torrens based on three visits from October 1991 to April 1992 was analysed for records from the three sections of the river that are pertinent to this study (Paton and Pedler 1999).

Table 1. Bird species recorded from the Greater Reedbeds area from all time periods (see text for details of sources). Escapees, vagrant seabirds and coastal species are excluded. Where there is only one record for a time period, the date is given in the table. Taxonomy and nomenclature follow Horton *et al.* (2020).
Column 1: species recorded prior to about 1880 (White 1919a; Gould 1865; SAMA records).
Column 2: S. A. White's records (White 1919a, 1925), assessed by White (1919a) as: episodic – EP; autumn/winter visitors – AUT; occasional – OCC; introduced – I.
Column 3: sight records and SAMA records up to 1945.
Column 4: sight records and SAMA records post-1945. Bolded records are those of P. Paton.
Columns 5, 6 and 7: observations made by Whatmough (1978), Paton and Pedler (1999) and D. Edey (unpublished personal data 1995-2020), respectively.
P – present; B – breeding; D – declining; FO – flying over; R – rare; S – skin specimen; SK – skeleton specimen; E – egg clutch specimen; SP – spirit specimen; * – introduced.

		1	2	3	4	5	6	7
Common Name	**Scientific Name**	**≤1880**	**White**	**≤1945**	**≥1946**	**1978**	**1999**	**Edey**
Emu	*Dromaius novehollandiae*	P						
Stubble Quail	*Coturnix pectoralis*		B D	P B; S E	**P**			
Brown Quail	*Coturnix ypsilophora*			P B; S E	P			
Magpie Goose	*Anseranas semipalmata*	P		P R				
Chestnut Teal	*Anas castanea*		P	P	**P**	P	P	P
Grey Teal	*Anas gracilis*		P D	P; S	**P**	P	P	P
Mallard*	*Anas platyrhynchos*				**P B**	P	P B	P
Mallard/Pacific Black Duck	(hybrid)				**P B**		P B	B
Pacific Black Duck	*Anas superciliosa*		B D	P B; S E	**P**	P	P	B
Hardhead	*Aythya australis*		P D	P B; S	**P**	P		P
Musk Duck	*Biziura lobata*		P R	P	**P**	P		P
Muscovy Duck*	*Cairina moschata*				**P**			P
Cape Barren Goose	*Cereopsis novaehollandiae*			P B R; E	**P**			
Maned Duck	*Chenonetta jubata*		P R	P; S	**P B**; S	P		B
Black Swan	*Cygnus atratus*		P D	P; S	**P B**	P		P
Pink-eared Duck	*Malacorhynchus membranaceus*		P D	P; S	**P**			P
Blue-billed Duck	*Oxyura australis*	P			**P**			P
Australasian Shoveler	*Spatula rhynchotis*		B D	P B; S E	**P**	P		B
Freckled Duck	*Stictonetta naevosa*		P D	P	**P**			P
Australian Shelduck	*Tadorna tadornoides*		P D	P	**P**			
Tawny Frogmouth	*Podargus strigoides*		P D	P B	**P;** SK			
Spotted Nightjar	*Eurostopodus argus*		P R	P R				
Australian Owlet-nightjar	*Aegotheles cristatus*				P			
Pacific Swift	*Apus pacificus*		P	P R; S	P			
White-throated Needletail	*Hirundapus caudacutus*			P R	P			
Australian Bustard	*Ardeotis australis*		P D	P				
Fan-tailed Cuckoo	*Cacomantis flabelliformis*		P	P B R; S	P			

Common Name	Scientific Name	≤1880	White	≤1945	≥1946	1978	1999	Edey
Pallid Cuckoo	*Cacomantis pallidus*		P	P B; S E	**P**			P
Horsfield's Bronze Cuckoo	*Chalcites basalis*		P	P B; S E	**P**			?B
Shining Bronze Cuckoo	*Chalcites lucidus*		P D	P				
Black-eared Cuckoo	*Chalcites osculans*			P	P; SK			
Feral Pigeon*	*Columba livia*			P; S E	**P** B	P	P	P
Peaceful Dove	*Geopelia placida*			P B; S E				
Crested Pigeon	*Ocyphaps lophotes*			P B	**P B**; S SP	P	P B	P
Common Bronzewing	*Phaps chalcoptera*	P	P R	P R				
Brush Bronzewing	*Phaps elegans*				P			
Spotted Dove*	*Spilopelia chinensis*				**P**	P	P	B
Barbary Dove*	*Streptopelia risoria*				**P**			P
Eurasian Coot	*Fulica atra*		P D	P; S	**P B**; S	P B	P B	P
Dusky Moorhen	*Gallinula tenebrosa*		B D	P B; S	**P B**; S	P	P B	P
Buff-banded Rail	*Hypotaenidia philippensis*			P B; S E	**P**			P
Australasian Swamphen	*Porphyrio melanotus*			P B; S E	**P B**		P	P
Australian Crake	*Porzana fluminea*		B D	P B; S E	**P**; S; SK	P		P
Black-tailed Nativehen	*Tribonyx ventralis*		P D	P B; S SK	**P B**	P	P	P
Baillon's Crake	*Zapornia pusilla*	S	P R	P B; E	**P**			
Spotless Crake	*Zapornia tabuensis*		P		**P**			
Brolga	*Antigone rubicunda*	P						
Great Crested Grebe	*Podiceps cristatus*		P R	P	P		P	
Hoary-headed Grebe	*Poliocephalus poliocephalus*		P D	P B; S E	**P**	P	P	P
Australasian Grebe	*Tachybaptus novaehollandiae*		P R	P B	**P B;** E	P		P
Little Buttonquail	*Turnix velox*		B D	P B; S	P			
Bush Stonecurlew	*Burhinus grallarius*		P D	P B; S				
Banded Stilt	*Cladorhynchus leucocephalus*		P D	P				
Pied Stilt	*Himantopus leucocephalus*		B D	P B; S E	**P** B 1976	P B	P	P
Red-necked Avocet	*Recurvirostra novaehollandiae*		P R	P	**P**			P
Double-banded Plover	*Charadrius bicinctus*		P R	P	P			
Red-capped Plover	*Charadrius ruficapillus*		B	P B; S E	**P** B 1980			
Oriental Plover	*Charadrius veredus*				P			
Black-fronted Dotterel	*Elseyornis melanops*	E	B D	P B; E	**P B**	P	P	P
Red-kneed Dotterel	*Erythrogonys cinctus*		B D	P B; E	**P**; E	P B		P
Pacific Golden Plover	*Pluvialis fulva*				1967			
Hooded Plover	*Thinornis cucullatus*				P			
Masked Lapwing	*Vanellus miles*	E	B D	P B; S E	**P B**	P	P	
Banded Lapwing	*Vanellus tricolor*	E	B D	P B; E	**P** B; SK	P		
Australian Painted-snipe	*Rostratula australis*		P	P B; S E	**P**			
Plains-wanderer	*Pedionomus torquatus*			S 1902				

Common Name	Scientific Name	≤1880	White	≤1945	≥1946	1978	1999	Edey
Common Sandpiper	*Actitis hypoleucos*				**P**	P		P
Sharp-tailed Sandpiper	*Calidris acuminata*		P	P; S SK	P	P		
Curlew Sandpiper	*Calidris ferruginea*		P	P	1969			
Red-necked Stint	*Calidris ruficollis*		P D	P; S	P	P		
Latham's Snipe	*Gallinago hardwickii*			P; S	2012	P		P
Bar-tailed Godwit	*Limosa lapponica*		P	P				
Far Eastern Curlew	*Numenius madagascariensis*		P	P				
Wood Sandpiper	*Tringa glareola*			S	P; S	P		2000
Common Greenshank	*Tringa nebularia*				P	P	P	
Marsh Sandpiper	*Tringa stagnatilis*				1967			
Australian Pratincole	*Stiltia isabella*		P	P	1965			
Silver Gull	*Chroicocephalus novaehollandiae*		P	P; S	**P**; SK	P	P	
Kelp Gull	*Larus dominicanus*				1969			
Pacific Gull	*Larus pacificus*		P R	P				
Whiskered Tern	*Chlidonias hybrida*			P; S	**P**	P		P
Australian Tern	*Gelochelidon macrotarsa*		P D	P				
Caspian Tern	*Hydroprogne caspia*		P R	P	**P**	P	P	P
Fairy Tern	*Sternula nereis*					P		
Greater Crested Tern	*Thalasseus bergii*		P	P	**P**	P		
Australasian Darter	*Anhinga novaehollandiae*				**P**	P		P
Little Pied Cormorant	*Microcarbo melanoleucos*		P D	P; S	**P B**		P	B
Great Cormorant	*Phalacrocorax carbo*		P D	P	**P**	P		P
Little Black Cormorant	*Phalacrocorax sulcirostris*		P R	P; S	**P**	P	P	P
Pied Cormorant	*Phalacrocorax varius*		P D	P; S	**P**	P		P
Yellow-billed Spoonbill	*Platalea flavipes*		P R	P; S	**P;** S	P	P	P
Royal Spoonbill	*Platalea regia*		P D	P	**P**	P	P	P
Glossy Ibis	*Plegadis falcinellus*	P	P D	P	P	P		
Australian White Ibis	*Threskiornis molucca*		P D	P; S	**P**	P	P	P
Straw-necked Ibis	*Threskiornis spinicollis*		P	P; S	**P**	P		P
Great Egret	*Ardea alba*		P D	P; S	**P**	P	P	P
Intermediate Egret	*Ardea intermedia*				2004			
White-necked Heron	*Ardea pacifica*		P D	P B	P			
Australasian Bittern	*Botaurus poiciloptilus*		P R	P B; E				
Little Egret	*Egretta garzetta*				**P**			P
White-faced Heron	*Egretta novaehollandiae*	B	B D	P B; E	**P B**; S		P	B
Nankeen Night Heron	*Nycticorax caledonicus*	P	P	P; S	**P**; S			P
Australian Pelican	*Pelecanus conspicillatus*		P D	P	**P**	P	P	P
Collared Sparrowhawk	*Accipiter cirrocephalus*		P R	P	**P**; S			P
Brown Goshawk	*Accipiter fasciatus*		P D	P; S	**P**			P

Common Name	Scientific Name	≤1880	White	≤1945	≥1946	1978	1999	Edey
Grey Goshawk	*Accipiter novaehollandiae*	P			S 1949			
Wedge-tailed Eagle	*Aquila audax*		P D	P	**P**			
Swamp Harrier	*Circus approximans*		B R	P B; E	**P**			
Spotted Harrier	*Circus assimilis*				P			
Black-shouldered Kite	*Elanus axillaris*		B D	P B; S SK	**P**	P	P	P
White-bellied Sea Eagle	*Haliaeetus leucogaster*				**P**			P(FO)
Whistling Kite	*Haliastur sphenurus*	B	B D	P B; S	**P**			2020
Little Eagle	*Hieraaetus morphnoides*		P R		**P**			
Square-tailed Kite	*Lophoictinia isura*							2016
Black Kite	*Milvus migrans*							FO 2018
Eastern Barn Owl	*Tyto javanica*		P EP	P B; S E	**P**; S			
Australian Boobook	*Ninox boobook*		P D	P; S	**P**; S			B
Azure Kingfisher	*Ceyx azureus*		P D	P R B; S E				
Laughing Kookaburra	*Dacelo novaeguineae*	P	P I	P B; S E	**P**			?B
Red-backed Kingfisher	*Todiramphus pyrrhopygius*	P		P R				
Sacred Kingfisher	*Todiramphus sanctus*		P D	P B; S E	**P**			P
Rainbow Bee-eater	*Merops ornatus*		P D	P	P			
Brown Falcon	*Falco berigora*		B R	P B	**P**			
Nankeen Kestrel	*Falco cenchroides*		P	P B; S	**P B**; SK	P	P	P
Grey Falcon	*Falco hypoleucos*			P; S 1890				
Australian Hobby	*Falco longipennis*	S	P R	P; S	**P** B; S		P	P
Peregrine Falcon	*Falco peregrinus*		P R	P; S	**P**			P
Black Falcon	*Falco subniger*				**P**			P(FO)
Sulphur-crested Cockatoo	*Cacatua galerita*		P D	P	**P**			B
Little Corella	*Cacatua sanguinea*		P EP	P	**P**			?B
Long-billed Corella	*Cacatua tenuirostris*				**P**			?B
S-c Cockatoo/L-b Corella	(hybrid)							P
Galah	*Eolophus roseicapilla*		B EP	P B; S	**P**; S SK	P		B
Cockatiel	*Nymphicus hollandicus*		P D	P	1969			
Yellow-tailed Black Cockatoo	*Zanda funerea*	P			**P**			P
Australian Ringneck	*Barnadius zonarius*			P	**?****			?**
Musk Lorikeet	*Glossopsitta concinna*		P D	P B; S E	**P**	P	P	B
Swift Parrot	*Lathamus discolor*	P; S						
Budgerigar	*Melopsittacus undulatus*		B D	P B; S	P			
Orange-bellied Parrot	*Neophema chrysogaster*	1839						
Blue-winged Parrot	*Neophema chrysostoma*				1964			
Elegant Parrot	*Neophema elegans*	P		S	**?*****	P		
Rock Parrot	*Neophema petrophila*				P			
Purple-crowned Lorikeet	*Parvipsitta porphyrocephala*		P	P; S	**P**	P		P

Common Name	Scientific Name	≤1880	White	≤1945	≥1946	1978	1999	Edey
Little Lorikeet	*Parvipsitta pusilla*		P	P; S				
Eastern Ground Parrot	*Pezoporus wallicus*	B; S						
Adelaide (Crimson) Rosella	*Platycercus elegans* ssp.		P D	P; S	**P**			P
Eastern Rosella	*Platycercus eximius*		P	P; S	**P**			P
Crimson/Eastern Rosella	(hybrid)			P				P
Regent Parrot	*Polytelis anthopeplus*			P				
Red-rumped Parrot	*Psephotus haematanotus*		B D	P B	**P**			P1990s
Rainbow Lorikeet	*Trichoglossus moluccanus*		P D	P	**P**		P	B
Brown Treecreeper	*Climacteris picumnus*	P	P R	P B; E				
Superb Fairywren	*Malurus cyaneus*	S	P	P B; S	**P B**			?B
Spiny-cheeked Honeyeater	*Acanthagenys rufogularis*		P EP	P	1990			
Eastern Spinebill	*Acanthorhynchus tenuirostris*		P	P; S	**P**			P
Red Wattlebird	*Anthochaera carunculata*		P D	P; S	**P B**	P	P B	P
Little Wattlebird	*Anthochaera chrysoptera*		B	P B; S	**P B**	P	P B	P
Regent Honeyeater	*Anthochaera phrygia*			P R; S				
Yellow-faced Honeyeater	*Caligavis chrysops*			P R; S				
Blue-faced Honeyeater	*Entomyzon cyanotis*				2010			
White-fronted Chat	*Epthianura albifrons*		P	P B; S E	**P**			
Orange Chat	*Epthianura aurifrons*	S E	P R	P; S E				
Crimson Chat	*Epthianura tricolor*		P R	P				
Singing Honeyeater	*Gavicalis virescens*		P D	P; S	**P**	P	P	B
Noisy Miner	*Manorina melanocephala*		P	P B; S	**P B**	P	P B	P
Brown-headed Honeyeater	*Melithreptus brevirostris*			P				
Black-chinned Honeyeater	*Melithreptus gularis*		P D	P; S	**P**			B2006
White-naped Honeyeater	*Melithreptus lunatus*		P D	P; S	P			2020
New Holland Honeyeater	*Phylidonyris novaehollandiae*		B	P B; S	**P B**	P	P B	P
Striped Honeyeater	*Plectorhyncha lanceolata*		P R	P; S				
White-plumed Honeyeater	*Ptilotula penicillata*	E	P D	P B; S	**P B**	P	P B	P
White-fronted Honeyeater	*Purnella albifrons*				P			
Spotted Pardalote	*Pardalotus punctatus*	P	P D	P B; S	**P B**			
Striated Pardalote	*Pardalotus striatus*		P D	P B; S E	**P**			?B
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*		B D	P D B; S E	**P B**			B
Yellow Thornbill	*Acanthiza nana*				**P**			P
Southern Whiteface	*Aphelocephala leucopsis*		B D	P B				
White-throated Gerygone	*Gerygone olivacea*							1995
White-browed Scrubwren	*Sericornis frontalis*		B D	P B				
Weebill	*Smicrornis brevirostris*		P R	P	1997			
White-browed Babbler	*Pomatostomus superciliosus*	P	B D	P B	P			
Dusky Woodswallow	*Artamus cyanopterus*		P D	P B; S				

Common Name	Scientific Name	≤1880	White	≤1945	≥1946	1978	1999	Edey
Masked Woodswallow	*Artamus personatus*		B EP	P B; E				
White-browed Woodswallow	*Artamus superciliosus*		B EP	P B				
Grey Butcherbird	*Cracticus torquatus*		P R	P				
Australian Magpie	*Gymnorhina tibicen*		B	P B; S SK	**P B**; S SK	P	P	P
Black-faced Cuckooshrike	*Coracina novaehollandiae*		P	P; S	**P**	P	P	P
White-bellied Cuckooshrike	*Coracina papuensis*			P; S				
White-winged Triller	*Lalage tricolor*		B R	P B; E	**P**			P
Crested Shriketit	*Falcunculus frontatus*		B D	P B; S E				
Grey Shrikethrush	*Colluricincla harmonica*		B D	P B; S E	**P**			
Australian Golden Whistler	*Pachycephala pectoralis*		P AUT	P; S	**P**; SP			P
Rufous Whistler	*Pachycephala rufiventris*	S	P AUT	P; S	**P**			P1990s
Olive-backed Oriole	*Oriolus sagittatus*		P AUT	P; S				
Grey Fantail	*Rhipidura albiscapa*		B AUT	P B	**P**			P
Willie Wagtail	*Rhipidura leucophrys*		P D	P B; S E	**P B**	P	P B	P
Magpielark	*Grallina cyanoleuca*		B D	P B; S	**P B**; S	P	P B	P
Restless Flycatcher	*Myiagra inquieta*		P D AUT	P R; S				
Little Raven	*Corvus mellori*		P D	P B	**P B**; S	P	P	B
Apostlebird	*Struthidea cinerea*				P			
Hooded Robin	*Melanodryas cucullata*			P; E				
Jacky Winter	*Microeca fascinans*		P D	P B; E				
Scarlet Robin	*Petroica boodang*		P AUT	P R	P			
Red-capped Robin	*Petroica goodenovii*		P OCC	P	P			
Flame Robin	*Petroica phoenicea*	P	P AUT	P	**P**			
Rose Robin	*Petroica rosea*				P			
Eurasian Skylark*	*Alauda arvensis*			P	**P**	P		P
Horsfield's Busk Lark	*Mirafra javanica*		P D	P B; E				
White-backed Swallow	*Cheramoeca leucosterna*		B R	P B; S E				P2013
Welcome Swallow	*Hirundo neoxena*		P	P B; S	**P B**	P		P
Fairy Martin	*Petrochelidon ariel*		B R	P B; E	**P B**	P B	P	B
Tree Martin	*Petrochelidon nigricans*		P D	P B; S E	**P**	P	P	P
Australian Reed Warbler	*Acrocephalus australis*		B D	P B; S E	**P B**		P	P
Brown Songlark	*Cincloramphus cruralis*		B D	P B; E	**P**	P		P
Rufous Songlark	*Cincloramphus mathewsi*		B D	P B; E				
Little Grassbird	*Poodytes gramineus*		P R	P B; E	**P**	P	P	B
Golden-headed Cisticola	*Cisticola exilis*	E		P B; S	**P**	P		
Silvereye	*Zosterops lateralis*		P	P; S	**P**	P		B
Common Myna*	*Acridotheres tristis*				P			
Common Starling*	*Sturnus vulgaris*			P	**P**; SP	P	P B	B
Common Blackbird*	*Turdus merula*			P	**P**; S SP	P	P B	B

Common Name	Scientific Name	≤1880	White	≤1945	≥1946	1978	1999	Edey
Bassian Thrush	*Zoothera lunulata*			S 1945				
Mistletoebird	*Dicaeum hirundinaceum*		P D	P; S	**P**			P
House Sparrow*	*Passer domesticus*			P B; S	**P**	P	P B	B
Red-browed Finch	*Neochmia temporalis*		B D	P B; S	**P**			
Beautiful Firetail	*Stagonopleura bella*	P						
Diamond Firetail	*Stagonopleura guttata*		B D	P B; S				
Zebra Finch	*Taeniopygia guttata*	E	P	P B; S	P	P		
Australian Pipit	*Anthus australis*		B D	P B; S E	**P**	P		P
European Goldfinch*	*Carduelis carduelis*			P	**P**	P		P
European Greenfinch*	*Chloris chloris*			P	**P**; SK	P		P

?** possible escapee from captivity; ?*** unidentified *Neophema* sp., probably *N. elegans*

RESULTS

Table 1 shows the 230 bird species and three hybrids recorded from the Greater Reedbeds area from the sources listed above. The table excludes probable escapee birds, vagrant seabirds driven inland by rough weather and birds flying over unless they were using the airspace for feeding/foraging. I have also excluded coastal species that are generally found on beaches, as White, Mellor and the early ornithologists did not record these birds and they usually occur outside the study area.

Column 1 of Table 1 is bird species recorded by White (1919a) as being seen prior to 1880 in his father's and grandfather's time, one species recorded by Gould (1865) and specimens in the SAMA collected before 1880. Regrettably this list is incomplete as White did not give a full list of species seen by his father and grandfather. Several of these species were extinct by the time S. A. White began recording, but others were seen by him or J. W. Mellor in the late nineteenth and early twentieth centuries. Column 2 lists 155 species that White and his family had recorded in the Reedbeds area (White 1919a, 1925). About half of this number (80 species) was regarded as declining (marked with a 'D') by White (1919a) and some he regarded as extinct. These latter 30 species are marked as 'R' (rare) to indicate that S. A. White considered them to have been lost from the area, but there are later records for them, albeit some of these are vagrant records. Column 2 provides additional information based on White's papers indicating species that he regarded as episodic, occasional and autumn/winter visitors, as well as one native species that was thought to have been reintroduced. Column 3 lists bird species that S. A. White and J. W. Mellor and other observers published in the *South Australian Ornithologist* from 1914 to 1945, as well as Rix's observations for the period 1910-1930 (Rix 1983). Skin specimens and egg clutches in the SAMA collected from 1880 to 1945 are included in this column.

Column 4 combines my records from 1988 to 2020 (bolded) and published and unpublished records from the period 1946 to 2020. This includes records of birds from the Royal Adelaide GC and specimens in the SAMA collected after 1945.

Column 5 lists the species recorded from an intensive survey of the Breakout Creek section of the River Torrens and an adjacent swamp at Fulham during 1974-1977 (Whatmough 1978). There were species seen in these surveys that were not recorded by me or other observers in this time period. Column 6 records bird species

seen in three visits between October 1991 and February 1992 in the Breakout Creek section of the River Torrens (Paton and Pedler 1999). Columns 5 and 6 list birds that were present as well as those where breeding was confirmed. Column 7 lists the species seen by David Edey from 1995 to the present during his residence in Fulham and Lockleys and from searches over much of the Greater Reedbeds area accessible to the public.

Species compositions have changed significantly between time periods, with eight species becoming extinct by the 1880s, an additional 60 species later declining to extinction or extreme rarity and 16 species disappearing over many decades, only to be recorded in the past 30 years. Four bird species colonised the area during the early years of the twentieth century and five species of introduced birds and 27 native bird species were only recorded post-1945.

DISCUSSION

While most bird species can be grouped easily for discussion of their abundance and status, there are a few that cannot be slotted into the categories below. These include the Grey Falcon, which is represented only by a SAMA specimen collected in 1890 at Fulham, although a pair attempted to nest at Grange GC in October 1995 and a single bird was recorded there in February 2001 (D. Carter pers. comm.). The Grey Goshawk was recorded by Samuel White prior to 1880 (White 1919a) and there is a SAMA specimen from Fulham from 1949, but no other records. Both species can be regarded as vagrants.

Bird species that became extinct prior to 1945

Since European colonisation many bird species disappeared from the Greater Reedbeds area and, from White's (1919a) paper, eight of these were probably lost in the 1800s (Table 2). White (1919a) suggested that his father saw Magpie Geese but that he himself did not; however, Rix (1983) reported seeing four or five of this species in 1916 on what became Adelaide Airport land. There have been no further records of this species on the Adelaide Plains.

Table 2. Bird species only recorded in the Greater Reedbeds area prior to about 1900 (White 1919a; Mathews 1921-22; Gould 1865; SAMA records).
See text for further details of some species.

Emu
Brolga
Swift Parrot
Orange-bellied Parrot
Eastern Ground Parrot
Orange Chat
Crimson Chat
Beautiful Firetail

John Gould saw Orange-bellied Parrots in 1839 in the Reedbeds area: 'On visiting South Australia in winter, I there found it equally abundant on the flat, marshy grounds bordering the coast, especially between Port Adelaide and Holdfast Bay' (Gould 1865). Carpenter and Black (2015) confirm that Gould's sighting was in July of 1839 and was thus of birds wintering on the mainland. The species was not seen by S. A. White or John Mellor so was probably extinct or rare in the region by the 1890s and probably earlier as it was not recorded by White's ancestors either.

Of the Eastern Ground Parrot, White said in correspondence with Gregory Mathews (Mathews 1916-17):

> These rare birds were once very common on the Adelaide plains, and both my father and his brother have spoken of the numbers the black boys snared with horsehair snares and have also spoken of the many nests these boys would find in a day and the eggs devoured by them. The birds had become extinct as far as this locality is concerned before my days of observation began…

Of the Orange Chat, White said: 'I have seen it

as far south as the Reed beds, but only on rare occasions …' (Mathews 1921-22) and 'has not been seen for very many years' (White 1919a). While modern bird observers regard both Orange and Crimson Chats as mainly inhabitants of the arid and semi-arid parts of Australia, White's (1919a) paper asserted that both species were regular summer migrants to the samphire flats of the Reedbeds region. Observations of the Orange Chat in the Strathalbyn area from 1963 to 2007 indicated that the species was at least partially nomadic in this part of South Australia, which is about 50 km south-east of the Greater Reedbeds (Eckert 2014). The species was recorded there in 51% of these 45 years and first records for the year varied widely from late summer through to spring, with breeding occurring on several occasions in spring and late summer.

In addition to these species are two others that have disappeared but probably did not do so as early. White (1919a) noted that the Striped Honeyeater had been recorded, but did not say by whom or how often. Apart from two skins in the SAMA collected on 14 July 1912 at Wetunga (or Weetunga, the White family home built in the late 1870s), there are no other documented records for the Reedbeds, so the species can be considered extinct in the area. The Horsfield's Bush Lark was seen rarely by White (1919a) prior to 1919 and was not recorded after this by either White or Mellor, and there have been no records since that time.

A further two species are each represented only by a single SAMA specimen: a Plains-wanderer collected at Fulham in 1902 and a Bassian Thrush collected in 1945, also at Fulham. Neither species has been recorded since then and both were probably only ever occasional visitors to the Greater Reedbeds.

Bird species that disappeared prior to 1945 but have been recorded post-1980

Some bird species ceased to be recorded either before or during S. A. White's time as a dedicated ornithologist, up until about 1930, but have been recorded in recent times (Table 3). The development of constructed wetlands explains the reappearance of waterbirds, some of which are fairly common, like the Australasian Grebe, while others are rare or vagrant. For example, there are only two recent records of Musk Ducks: the species was reported at Adelaide Airport in 1996 and a female was at the mouth of Breakout Creek on 10 October 2014. While Australasian Shovelers are fairly rare in the Reedbeds, there is one breeding record of a pair with five ducklings on Brownhill Creek adjacent James Melrose Road on 22 October 2020.

Table 3. Bird species recorded in the early period in the Greater Reedbeds area, disappeared for a number of years and have been recorded in the modern period.

Musk Duck
Cape Barren Goose
Blue-billed Duck
Australasian Shoveler
Freckled Duck
Baillon's Crake
Spotless Crake
Great Crested Grebe
Australasian Grebe
Little Black Cormorant
Yellow-billed Spoonbill
Collared Sparrowhawk
Little Eagle
Yellow-tailed Black Cockatoo
White-backed Swallow
Golden-headed Cisticola

Two species, Blue-billed Duck and Great Crested Grebe, were recorded by Samuel White but not by S. A. White, but have been reported in the modern period. One Blue-billed Duck was seen on the Patawalonga Creek west of Tapleys Hill Road on 8 September 2009 by me, three were seen in a similar area on 6 June 2017 and one in the same place on 15 October 2017 (D. Edey

pers. comm.). One Great Crested Grebe was seen on the Patawalonga Creek in early March 1991 (Rix 1992) and one bird in breeding plumage was seen in the lower reaches of the River Torrens in October-November 1991 (Paton and Pedler 1999).

Wetland restoration may also explain the two recent records of Golden-headed Cisticola, of two birds on the banks of the Outlet Channel near the swamp at Fulham in August 1975 (Whatmough 1978) and a bird I recorded in the Apex Park constructed wetland in about 2000. White (1919a) reported that this species had disappeared, but had been once very common in the Reedbeds district. The cisticola is now regarded as vagrant. A different explanation may be required for the other terrestrial species. There is only one record in the modern period of the White-backed Swallow, a single bird flying over Fulham on 17 January 2013 (D. Edey pers. comm.), so this also is a vagrant rather than a species returning to the area.

Paton *et al.* (1994) documented an increase in distribution of the Collared Sparrowhawk from 1974-75 to 1984-85 in the Southern Mount Lofty Ranges and the Adelaide Plains. So its reappearance in the Reedbeds area may be part of a more general increase in range and abundance over the second half of the twentieth century.

The Yellow-tailed Black Cockatoo was not seen by S. A. White but was recorded by his father Samuel (White 1919a), who died in 1880, so we can assume that this species disappeared from the Reedbeds before 1880. S. A. White assigned its disappearance to the clearance of Silver Banksia *Banksia marginata*/*Callitris gracilis*/*Allocasuarina verticillata* woodlands that occupied the old red consolidated sand dunes that once stretched discontinuously from Queenstown to Camden Park and even further south to Somerton (Kraehenbuehl 1996). From information on plant species occurring in these woodlands, the plant most likely to have provided food for the Yellow-tailed Black Cockatoo is *Banksia marginata*. Other genera that the cockatoo feeds on include *Allocasuarina*, *Acacia* and *Hakea* (Higgins 1999); I cannot find any record from the sand dunes of any of the *Hakea* species that are an important food source for the cockatoos in the Mount Lofty Ranges (MLR), but *Allocasuarina verticillata* and several acacias occurred in this area and may have supplemented food from the banksias. Kraehenbuehl (1996) commented that Yellow-tailed Black Cockatoos 'once frequented the site of Kooyonga Golf Links' but does not give the source for his information.

Yellow-tailed Black Cockatoos returned to the Adelaide Plains, including the western suburbs, from the early 2000s. Singletons and small groups are now regularly sighted feeding in introduced pine trees from late October to February, with the largest total being about 50 birds at Kooyonga GC on 11 February 2017 (G. Carpenter pers. comm.). There are several alternative explanations for this changed behaviour. One is that there is an increase in numbers in the Adelaide/MLR region, thus forcing the birds to find new feeding grounds. This is unlikely as counts in 2011 and 2012 indicate a static population of about 2000 birds (Carpenter *et al.* n.d.). Another explanation is that the removal of pines in the MLR, to improve the quality of native vegetation, has reduced their food there, thus forcing them to find new areas of pines. Linked to this is the possibility that the Ash Wednesday fires in 1983 burnt substantial amounts of pine trees in the MLR that the birds were dependent on for food. Observers in the eastern foothills noted an increase in sightings of Yellow-tailed Black Cockatoos after 1983 (A. Black pers. comm.). A third explanation is that the Millenium Drought (2001-2009) severely depleted their food resources in the MLR, thus forcing them to search a wider area for food.

Linked to the two previous explanations is a fourth - that birds are coming to the plains during the breeding season as there is a dearth of food near their nesting trees in the hills

(Carpenter *et al.* n.d.). This explanation is supported by my observations at the golf courses over the past 15 years suggesting that most of the cockatoos are male birds. Presumably they are feeding on the plains and returning to the hills to feed the females when they are brooding eggs and, later the young birds, which are largely fed by male birds from about 10 days old (Higgins 1999). Another issue may be the explosion in the number of Little Corellas in the Adelaide region over the past 20 years. Large flocks of this species move across the region and can strip a pine tree of cones in about 30 minutes. They are aggressive birds and, as their flocks can number in the thousands, they may be competing with Yellow-tailed Black Cockatoos for food and for nesting hollows.

The occurrence of Yellow-tailed Black Cockatoos in areas previously unknown or after a gap of some years has occurred in other regions of Australia; for example in New South Wales, birds reappeared in the 1990s in the outer suburbs of Sydney, especially in pine plantations and golf courses (Higgins 1999).

While Cape Barren Geese occasionally occur at Adelaide Airport and on wetlands in the area, so cannot be classed as extinct, they are much less common than they were in the nineteenth century. There is a clutch of Cape Barren Goose eggs in the SAMA collected on 18 August 1903. At first these were considered likely to have come from Mellor's extensive aviaries, as there are few documented records of breeding of this species on the Australian mainland. However, notes with the clutch, which came to the Museum via the J. N. McGilp Collection, say

> Thinking that this clutch was produced by domesticated Cape Barren Geese I [McGilp] asked Mr Mellor if it was so. He informed me that at one time these geese were frequently to be seen at the Reedbeds and that they bred down on the swamps. This set was almost the last taken by him; since this date the geese have gradually cleared right away from the swamps.

Mellor's notes on the clutch state 'Nest on ground in clump of grass & reeds, composed of reed leaves, grass etc., & warmly lined with down from the bird's breast, making a complete covering for the eggs' (P. Horton pers. comm.). The only other substantiated record of breeding Cape Barren Geese on the SA mainland is from 1968 when a pair built a nest and laid eggs at Angle Swamp in the Gawler Ranges (Parker *et al*. 1985).

White (1919a) said of the Little Eagle that it was 'never plentiful' and 'never seen now', suggesting that by 1919 it was extinct in the region. Modern records come from the Adelaide Airport and all are from February to July and from the period 1990-2003, despite an observation period extending to 2016, suggesting that such incursions into the suburbs are decreasing. Apart from White's (1919a) observations, there are no reports of Little Eagles on the Adelaide Plains before the 1970s and all records since then are between summer and early winter, suggesting that this is a post-breeding dispersal of immature birds (G. Carpenter, pers. comm.).

While not strictly fitting the category of species absent between 1945 and 1980, the Rainbow Lorikeet followed a similar trend. Although noted as declining by White (1919a), it was recorded in the period up to 1945, but at some time after this it seems to have disappeared from the western suburbs of Adelaide and presumably from the Greater Reedbeds area. For example, in the intensive surveys of the River Torrens from 1974 to 1977 documented by Whatmough (1978), the species was not recorded from the Outlet Channel and was only recorded from the City of Adelaide and east thereof. From the 1970s onwards this species gradually spread to the west and increased hugely in abundance to the point in 2020 where it is one of the most common urban birds in

Table 4. Bird species that have declined in the Greater Reedbeds area, some to extinction or extreme rarity. Species in bold were recorded up to about 1945 but have not been recorded since.

Bird Species	Records from modern period
Tawny Frogmouth	1 at Kooyonga Golf Course 13/10/2014
Spotted Nightjar	
Australian Bustard	
Fan-tailed Cuckoo	1 along River Torrens 20/11/1991
Horsfield's Bronze Cuckoo	1 Apex Park 6/6/1995, 30/11/1999, 21/2/2011, 31/7/2011 & 21/7/2012; at Adelaide Airport, 2 on 9/7/2008 & 1 on 11/10/2015; at West Beach Stormwater Basin, 1 on 5/9/2000, 3 on 10/8/2017, 1 on 25/9/18; possible breeding August 2000, Fulham, and October 2017, West Beach Stormwater Basin (D. Edey pers. comm.)
Shining Bronze Cuckoo	
Peaceful Dove	
Common Bronzewing	
Bush Stonecurlew	
Banded Stilt	
Red-necked Avocet	1 on Patawalonga Creek 5/11/1992, 5/8/1993 & 23/12/1994; 2 on Patawalonga Creek 18/11/1993 & 20/9/1994; 2 on West Beach Stormwater Basin 21/6/2018 (D. Edey pers. comm.)
Red-kneed Dotterel	Fulham Swamp and Outlet Channel, 1974-77, breeding (Whatmough 1978); recorded on Patawalonga Creek regularly in early 1990s; last seen River Torrens, 18/2/2003
Australian Painted Snipe	1 in drain, Adelaide Airport, 29/8/1977; 1 on River Torrens on 18/2/2003
Sharp-tailed Sandpiper	recorded by Whatmough (1978)
Curlew Sandpiper	50+ on artificial lake at Glenelg on 22/10/1969
Red-necked Stint	recorded by Whatmough (1978)
Bar-tailed Godwit	
Far Eastern Curlew	
Australian Pratincole	1 on Patawalonga Golf Course on 10/7/1965
Pacific Gull	
Australian Tern	
Fairy Tern	recorded along the Outlet Channel or the River Torrens mouth in 1974 (Whatmough 1978)
Pied Cormorant	few records of single birds, 1974-77 (Whatmough 1978); 1 on River Torrens on 1/8/2006
White-necked Heron	1 on Glandore Oval, 3/12/2011
Australasian Bittern	1 in River Torrens outlet channel on 22/3/52 (Glover 1952)

Bird Species	Records from modern period
Azure Kingfisher	
Sacred Kingfisher	1 at Apex Park on 21/2/2011; 1 on Breakout Creek on 8/3/2014; 1 recorded at Royal Adelaide Golf Course
Rainbow Bee-eater	recorded at Royal Adelaide Golf Course in a list made in 2012
Cockatiel	5 at Glenelg on 25/10/1969
Little Lorikeet	
Red-rumped Parrot	2 at Collins Reserve, Fulham Gardens, 1990s (D. Edey pers. comm.); 1 flying over River Torrens (Breakout Creek) 25/8/2018
Brown Treecreeper	
Spiny-cheeked Honeyeater	recorded at Royal Adelaide Golf Course 1990
Regent Honeyeater	
Yellow-faced Honeyeater	
Brown-headed Honeyeater	
White-naped Honeyeater	1 at Breakout Creek on 3/3/2020 (D. Edey pers. comm.)
Southern Whiteface	
White-browed Scrubwren	
Weebill	recorded at Royal Adelaide Golf Course 1997
White-browed Babbler	present at Royal Adelaide Golf Course at least until 1972 (Glover 1973) and Grange Golf Course until 2002 (D. Carter pers. comm.)
Dusky Woodswallow	
Masked Woodswallow	
White-browed Woodswallow	
Grey Butcherbird	
White-bellied Cuckooshrike	
Crested Shriketit	
Grey Shrikethrush	1 at Kooyonga Golf Course on 18/8/1993
Olive-backed Oriole	
Restless Flycatcher	
Hooded Robin	
Jacky Winter	
Scarlet Robin	last seen at Royal Adelaide Golf Course in mid-1980s
Red-capped Robin	recorded at Royal Adelaide Golf Course in a list made in 2012
Flame Robin	1 at Adelaide Airport on 13/5/2006
Horsfield's Bush Lark	
Rufous Songlark	
Red-browed Finch	several birds at Glenelg Golf Course on 18/8/2015; 2 birds at Kooyonga Golf Course 2015 (M. Campbell pers. comm.)
Diamond Firetail	
Zebra Finch	downstream of Lockleys on 21/5/1977 (Whatmough 1978)

Adelaide and extremely common in the Greater Reedbeds area. This species breeds annually in hollows in River Red Gums and White Cedar *Melia* sp. at Mellor Park, Lockleys Oval and Malurus Avenue at Lockleys and at most times is the most abundant lorikeet in the district (D. Edey pers. comm.).

Bird species that have declined, some to extinction, since about 1945

In addition to the species discussed above as being extinct prior to 1945, 60 additional species are now either extinct or very rare in the Greater Reedbeds area (Table 4). For 32 of these there are no recent records, so they must be considered as extinct or at least functionally extinct; they are bolded in Table 4.

Some of these species were common in the 60 years following colonisation, like Brown Treecreeper, Southern Whiteface and Dusky Woodswallow. Many species were resident, or were regular visitors, and some bred in the area. For example White (1919a) says of the Masked and White-browed Woodswallows: 'Visits the district at long intervals, generally in numbers, and remains to nest'. White also documented the loss of the Spotted Nightjar from the Reedbeds area: 'This was a common bird at the Reedbeds not so many years ago, but they have now disappeared. The last one which came under my notice was in 1915. They sit upon the ground in the daytime and become easy prey to domestic cats' (Mathews 1918-19). Mellor, quoted in Mathews (1918-19), regarded the Spotted Nightjar as uncommon on the Adelaide Plains and noted that their favoured habitat was sandy country well-clothed with trees and bushes. Other species were less abundant or regular before 1945 and these include White-bellied Cuckooshrike, Hooded Robin and Grey Butcherbird.

In addition to the 32 species that are considered to be extinct, there are another 28 species for which there are very few records in the post-1945 period and/or numbers have declined sharply over the past ten to twenty years. These species, unbolded in Table 4, are now considered vagrant to the Reedbeds area and are shown with more recent records. As with the birds that are considered extinct, many of these species were common residents or commonly visited the area in the nineteenth and early twentieth centuries. For example, White (1919a) noted that the Australasian Bittern could be 'found in numbers, their deep, weird, booming sound could be heard so frequently echoing along the thick flag and reed swamps' but that by 1919 they had disappeared. The Weebill was described as 'once plentiful; not seen for many years' by White (1919a) and there is only one recent record from the Royal Adelaide GC from 1997.

White-browed Babblers were present on both Royal Adelaide GC and Grange GC in the second half of the twentieth century but there is no record of when they disappeared from the former, the last published record being of six to eight birds on 31 May 1972 (Glover 1973). The species was last seen at Grange GC in May 2002 and is not present now (D. Carter pers. comm.). Of the Rainbow Bee-eater, White commented: 'The Bee-eater was a spring and summer migrant to the Reedbeds in years gone by. Fifteen or twenty years ago there was never a summer passed without seeing many of the Bee-eaters, now I have heard them once only in the last ten years' (Mathews 1918-19).

Of the White-necked Heron, White said: 'It always nests on the Adelaide Plains during wet winters, but never in any numbers' (Mathews 1913-14). There are no corroborating egg clutches to verify this statement regarding breeding of this species in the Reedbeds and, as there are errors in some of White's observations to Mathews, this comment needs to be treated with caution. It may be that it refers to the more common White-faced Heron, which White (1919a) reported as breeding every year in the district. Mellor (1923) reported 36 White-necked Herons on swamps at Fulham in early October 1922, suggesting

that even in the 1920s this species visited the area in large numbers. Mellor did not mention breeding of this species in the Reedbeds in his correspondence with Mathews (Mathews 1913-14).

I recorded one Cockatiel at Breakout Creek on 28 May 2003 which I considered most likely to be an escapee, but the record of five birds at Glenelg in October 1969 (Glover 1972) was most likely to be of wild birds and coincided with an influx of this species into the south of the state. This situation contrasts with White's experience: 'This was once a numerous bird in the late summer on the Adelaide plains visiting us in great numbers, and I can remember an old bird catcher netting them in hundreds. They are seldom, if ever, seen here now' (Mathews 1916-17). Mellor reported that thousands of this species were caught annually by bird-trappers from flocks that came south after the breeding season and fed on the grassy flats behind the sand dunes along the Adelaide coastline (Mathews 1916-17). He intimated that most of the captured birds were destined for the European cage bird industry. While neither White nor Mellor suggested that the Cockatiel bred in the Greater Reedbeds, the species is a spring and summer migrant to the Strathalbyn area, where it breeds locally in most years (Eckert 2000). However there has been a decline in abundance over the 45 years from 1963 to 2007 in this area (Eckert 2014).

The Fairy Tern was recorded in the mid-1970s from the River Torrens Outlet Channel or River Torrens mouth (Whatmough 1978). This species has been included in Table 4 for completeness, although it is unclear from the paper whether the birds were on the beach or inland slightly. I have only recorded this species on the beach at the outlet and only up until the early 2000s. There are two more recent records from the River Torrens mouth: one bird on 24 September 2014 and eight birds on 26 September 2017, as well as records from West Beach north of the marina in December 2000 and September 2001 (D. Edey pers. comm.). This species has experienced a catastrophic decline in South Australia over the past twenty to thirty years (DENR 2012).

The long list of species that have disappeared or become very rare since 1945 in the Reedbeds is unsurprising due to the increased urbanisation of the Reedbeds and the greater Adelaide area from the 1930s, but more particularly post-1945. In addition, some of these species have declined in abundance and distribution more broadly in South Australia, mainly due to clearance and fragmentation of habitat.

Bird species showing declines over the 1988-2020 period

There are 17 bird species that have declined over the past 30 years of more intensive surveying of the area (Table 5). For some of these species, including the Red-rumped Parrot, White-fronted Chat, Australian Golden Whistler, Rufous Whistler, Grey Fantail and Mistletoebird, this decline may reflect a more pervasive decline across the MLR and/or Adelaide region. For others, like the Stubble Quail, Banded Lapwing and Brown Songlark, the decline may also be the result of the increasing size of the urban area of Adelaide and higher density development of the urban area. Stubble Quail were recorded only at Adelaide Airport and were last heard there in 2011.

For the Pacific Black Duck, the cause of the decline is hybridisation with Mallards. A survey of the distribution and abundance of Mallards, Pacific Black Ducks and their hybrids in South Australia in 1987 concluded that Mallards and hybrids had increased in the Adelaide region since the 1970s and that the concomitant decline in Pacific Black Duck numbers in urban Adelaide, along the River Torrens, was linked to this increase (Paton *et al.* 1992). The only recent record of Pacific Black Duck was of a pair with fledglings at Breakout Creek, Lockleys, during October and November 2014 (D. Edey pers. comm.).

For the Royal and Yellow-billed Spoonbills, Straw-necked Ibis, Spotted Pardalote, Singing Honeyeater and Yellow-rumped Thornbill, the reasons for the decline are less clear but may be due to the reasons cited above and, for the small bush birds, the impact of abundant Noisy Miners. The decline of populations and abundance of Yellow-rumped Thornbills mirrors a similar decline documented by Whatmough (1997) in the Adelaide Parklands. In the twenty-one years between 1974 and 1995, monthly surveys of the Adelaide and North Adelaide Parklands identified the demise of three out of five groups of Yellow-rumped Thornbills, leaving just two groups totalling five or six birds. The last Yellow-rumped Thornbills were recorded in the Parklands in November 1998 (R. Whatmough pers. comm.). Whatmough (1997) could not attribute this decline to habitat changes alone.

Similar declines occurred across the greater Adelaide Airport area between the late 1980s and 2000s (pers. obs.). At Kooyonga GC surveys documented up to 20 Yellow-rumped Thornbills in the early 1990s but by 2000 numbers had dropped to about five and the last birds were sighted there in 2005. At Glenelg GC more than 20 birds were recorded in the early 1990s and birds bred on the course through the 1990s and into the 2000s. There were still up to 15 birds recorded between 2001 and 2010 but numbers dropped after this and only one to three birds were seen from 2016 to the present and not on every survey. Habitat changes on the golf courses may have had some impact on this species, but counts at Kooyonga GC of Noisy Miners indicate that they have increased threefold in the thirty years from 1990 to 2020 and their aggressive behaviour may be partly responsible for the demise of the Yellow-rumped Thornbill. However, Noisy Miners mainly occur on the boundaries of Glenelg GC and thornbills have drastically declined there as well, although the process occurred ten years later. Numbers and frequency of recording of Yellow-rumped Thornbills also declined at Grange GC from about 2006 and its status there is uncertain, but likely to be vagrant (D. Carter pers. comm.).

A small group of up to seven Yellow-rumped Thornbills occupies the West Beach Trust land and breeding behaviour was observed there in the spring of 2019 (D. Edey pers. comm.). Another group occupies the Brownhill Creek wetland and the open land north of James Melrose Road (D. Edey pers. comm.) and is presumably the source of the few birds recorded at the adjacent Glenelg GC over the past few years. Despite the persistence of these two small groups, their long-term future is uncertain given the continuing commercial and industrial infill of Adelaide Airport land along James Melrose Road and the history of decline of other populations. The decline of the Yellow-rumped Thornbill may be the result of a complex mix of greater urban size, habitat change, interaction with other bird species and the species' ecology.

Table 5. Bird species that have declined between 1988 and 2020.

Stubble Quail
Pacific Black Duck
Red-capped Plover
Banded Lapwing
Yellow-billed Spoonbill
Royal Spoonbill
Straw-necked Ibis
Red-rumped Parrot
White-fronted Chat
Singing Honeyeater
Spotted Pardalote
Yellow-rumped Thornbill
Australian Golden Whistler
Rufous Whistler
Grey Fantail
Brown Songlark
Mistletoebird

The Singing Honeyeater showed a similar pattern to the Yellow-rumped Thornbill on the golf courses for which long-term data exist. At Kooyonga GC, where Noisy Miner numbers have

increased hugely since 1990, one to three and occasionally four Singing Honeyeaters were recorded in most censuses from the early 1990s to 2000, then numbers declined from 2001 to 2005, with the last bird recorded in March 2005. At Glenelg GC, one to a few were recorded in most censuses from 1990-1995, but the frequency of reporting dropped in the early 2000s and between 2002-2009 and 2015-2018, there were no records at all. Since 2018 one or two birds have been recorded in some censuses. Singing Honeyeaters are resident and bred in December 2001 on West Beach Trust land, which is their core area and links to the coastal dune system that they also occupy (D. Edey pers. comm.).

Australian Golden Whistlers were not recorded at Adelaide Airport, but did occur singly during autumn/winter at Kooyonga and Glenelg Golf Courses in the late 1990s and early 2000s, with the last sighting being at Kooyonga GC in May 2009. At nearby Grange GC, numbers and frequency of recording declined from 2006 (D. Carter pers. comm.). There was a record of an uncoloured bird along the River Torrens Linear Park near the sea on 24 May 2018. There are a few records of one or two birds from Apex Park, Ayton Avenue at Fulham and the West Beach Stormwater Basin from 1995 to 2020 (D. Edey pers. comm.). This species typically comes down to the Adelaide Plains from the MLR in small numbers during autumn and winter. Its local decline may be due to the higher density urban development occurring in the Reedbeds area and in many suburbs of Adelaide.

Like the preceding species, Rufous Whistlers were not recorded at Adelaide Airport, but there are two records of single birds from Glenelg GC in April 1997 and November 1999 and three from Kooyonga GC, of single birds in April 1993, May 1994 and May 1996. Rufous Whistlers were sporadic at Grange GC, with the last record of two birds being in 2005 (D. Carter pers. comm.). Solitary immature Rufous Whistlers were recorded twice in the 1990s from Ayton Avenue at Fulham (D. Edey pers. comm.). The paucity of records suggests that this species must now be regarded as a vagrant to the Reedbeds area.

According to White (1919a) and Rix (1983), the Grey Fantail was a common breeding resident until the early twentieth century and then became a rare autumn/winter migrant to the Reedbeds, as it is today. Small numbers of this species come down to the Adelaide Plains from the MLR in the autumn and winter of most years and this pattern is reflected in my records from the golf courses. At Kooyonga GC one or two birds were seen in May of nine years between 1994 and 2015 and in August of 2006, but there are no records from there since 2015. At Glenelg GC there are records spanning April to August of most years between 1991 and 2020, with up to three or four birds being recorded on some mornings. However, since 2015 there are only two records, in August 2017 and May 2020, suggesting a recent decline. Grey Fantails were recorded at Breakout Creek in 2001, at Apex Park in 2014 and 2016 and from the West Beach Stormwater Basin in 2018 and 2019 (D. Edey pers. comm.).

Mistletoebirds were not recorded at Adelaide Airport or Kooyonga GC but at Glenelg GC, where Harlequin Mistletoe *Lysiana exocarpi* was common in one section of the course, there were records of one or two birds in February-May 1995 and then in most years from 1998 to 2014. However, there have been no records since May 2014, despite regular visits. While there may have been a decline in Mistletoebirds in the area, it is also likely that the removal of some of the host trees of the mistletoe has contributed to their disappearance from the course. One or two birds were seen at Grange GC in April 1997 and April 2001, but the species was not recorded there over the next eight years (D. Carter pers. comm.). The species still visits the Greater Reedbeds area, with annual sightings from Lockleys of birds using mistletoe in an American Sweetgum *Liquidambar styraciflua* (D. Edey pers. comm.) and a record of two birds

from West Beach in June 2020 (D. Edey ebird.org).

Spotted Pardalotes were common in S. A. White's father's time but by implication less so by 1919 (White 1919a). I have only one record from Glenelg GC in November 2000 and a few records of one to two birds in May and November from Kooyonga GC between 1998 and 2015, with a breeding record from November 2000. Up to five birds were seen at Grange GC between 1996 and 2007 and they bred successfully there on several occasions, but the last record there was in April 2007 (D. Carter pers. comm.). The species is probably a vagrant to the area now.

White (1919a) indicated that Red-rumped Parrots, while once numerous and nesting in the Reedbeds, had disappeared. In fact there were a few records published by S. A. White and J. W. Mellor from Fulham and Lockleys in the early 1920s (White 1925; Mellor 1922). They were recorded twice at Grange GC in the 1960s but were not seen during a period of intensive recording from 1993 to 2009 (D. Carter pers. comm.), and are on the list of birds reported from the Royal Adelaide GC prior to 1987 but not on an updated list prepared in 2012. In over thirty years of recording birds at Adelaide Airport, at adjacent golf courses and along the Torrens River and Patawalonga Creek, I only have one record, of a single bird flying east across the River Torrens on 25 August 2018. In the absence of other records this species must be considered vagrant to the area now. It has experienced a steady decline in the parklands north and east of Adelaide and along the River Torrens near Gilberton, albeit in a slightly later period. Flocks of up to 15 birds were regularly recorded in Botanic Park from 1971 to 1974 (Paton 1976) and up to 20 were regularly recorded in open areas at Gilberton and North Adelaide through the 1980s and 1990s. Up to ten birds continued to be seen in the early 2000s with a peak of 18 at Gilberton in April 2003 and juvenile and immatures recorded in 2006, indicating breeding nearby. Numbers and recording frequency declined from 2007, until the last sighting of two pairs in North Adelaide on 13 May 2018 (pers. obs.).

While White (1919a) regarded the Red-capped Plover as common and breeding in the Reedbeds area in the early twentieth century, Whatmough (1978) only recorded a party of eight birds at the mouth of the River Torrens in the intensive survey of 1974-77. There are a few records from Adelaide Airport between 2000 and 2012, as well as records from the Patawalonga Creek between 1980 and 2012, including a breeding record in 1980. As there are no records since 2014, this species may be a vagrant to the Reedbeds area now.

Banded Lapwings were only recorded from Adelaide Airport, with small numbers present there in most months of the year from 1990 to 2000. One to two birds were seen sporadically in 2001, 2006 and 2009 and the species was last seen in February 2013.

Apart from records of resident birds in the samphire flats near the River Torrens Outlet Channel in 1952 (Glover 1952), White-fronted Chats were recorded mainly from Adelaide Airport. Small numbers occurred there from 1990 to 1997 and then they were intermittent until the last sighting of seven birds on 17 October 2014.

Yellow-billed Spoonbills were recorded occasionally at Adelaide Airport between 1991 and 1999 and there was an isolated record on 27 November 2007 of one bird. Along the River Torrens this species was observed on only two occasions, with single birds on 20 November 2007 and 17 November 2011. The Royal Spoonbill was recorded more frequently and in larger numbers, with records at Adelaide Airport between 1993 and 1998 and again between 2012 and 2016, although the latter were mainly of one or two birds and probably the same individuals for some records. Along the River Torrens there were up to 18 birds seen at one time from 1995 to 1999, while from 2000 to 2019 the maximum number seen was seven. Both spoonbill species

have declined in numbers and frequency of observation over the last 30 years.

Straw-necked Ibis were common, especially from December to June, at Adelaide Airport in the early 1990s with a flock of up to 20 birds regularly reported. From the mid-1990s until 2007, fewer birds were recorded and they were more evenly spread throughout the year. After a four-year gap, one or two birds were again recorded there intermittently between late winter and late summer from 2011 to 2016. The River Torrens surveys also recorded a decline in this species, with 26 birds in May 1991, 15 in March 1995, 4 in February 2003, 5 in February 2004 and the last record of one individual in February 2010.

White reported a decline in the abundance of the Brown Songlark, which was a spring visitor that stayed to breed in the Reedbeds area (White 1919a). My observations of Brown Songlark in the grasslands at Adelaide Airport show that it regularly visited from 1988 to 2016, with first arrival dates in June to October. In fact, songlarks were observed in every month of the year at the airport, but the majority of records fell in the July to November period. Only one or two birds were recorded at the Airport at one time and there was a slight decline in reporting frequency after 2011. There are records from the West Beach Stormwater Basin from September 2001 and September 2018 (D. Edey pers. comm.).

Bird species that were recorded first after 1945

Table 6 lists 27 native species and five exotic species that were not recorded by S. A. White and J. W. Mellor but were recorded by me or other recent observers. The exotic species have appeared either through deliberate or accidental introduction by humans and an exploration of the appearance of the native species is presented below.

Apart from the Long-billed Corella, these native species are not common or frequently recorded in the area and the recording of most may reflect the greater number of observers in recent times compared with a century before. This explanation may hold true for the Australasian Darter, Hooded Plover and Apostlebird.
The Darter is uncommon in the Adelaide region, where there are occasional records of, particularly, single birds. Four Hooded Plover were on the Patawalonga Creek in March 1991 (Rix 1992). A group of Apostlebirds was only recorded at Royal Adelaide GC during December 1968 and January 1969 (Collison 1972; Glover 1971). There was only one record for each of Intermediate Egret, Little Egret, Square-tailed Kite, Black Kite, Oriental Plover, Pacific Golden Plover, Marsh Sandpiper, Kelp Gull, Blue-winged Parrot, Blue-faced Honeyeater and White-throated Gerygone, suggesting that these species are very rare in or vagrant to the region.

However, Little Egrets have evidently increased their range throughout Australia since 1901 (Marchant and Higgins 1990) and were not recorded in South Australia until the early 1950s (Parker *et al.* 1979). The first documented breeding of Little Egrets in the Adelaide region was in November 1984, when at least six nests with chicks and fifteen adult birds were seen in or near mangroves on a small island north of Torrens Island (Vincent and Paton 1986).

Records of the Black Falcon on the Adelaide Plains may be the result of clearance of native vegetation over much of southern South Australia. Marchant and Higgins (1993) stated that 'Clearing and establishment of pasture and crops has increased feeding habitat [for Black Falcons] in better-watered parts of range'. However, a more recent assessment of this species concluded that it is declining in the Murray-Darling Basin and is already state-listed as vulnerable in New South Wales and Victoria (Lutter and Debus 2014).

Long-billed Corellas were once restricted to the South East of South Australia (e.g. Condon 1968), but from the 1980s sightings began to

occur from the southern Fleurieu Peninsula and the Adelaide region. The Bird Report for 1982-1999 (Carpenter *et al.* 2003) noted: 'An introduced population has established in the AP [Adelaide Plains] and MLR where it often associates with the Little Corella or Galah.' This tallies with an observation in the Bird Report for 1976, which indicated that about 30 Long-billed Corellas were accidentally released in about 1975 (Reid 1980). For the years from 1991-1992, when three Long-billed Corellas were observed at the upper River Torrens, to 1999, Paton and Pedler (1999) reported the establishment of a population numbering at least 100 birds in the south-eastern suburbs of Adelaide and small numbers from all parts of suburban Adelaide. Currently large flocks of up to several hundred birds occur in the Adelaide parklands (pers. obs.). Their expansion in the Greater Reedbeds area is discussed below in the section on birds that have increased in abundance between 1988 and 2020.

The Yellow Thornbill was not recorded by White (1919a) or other early observers, which is surprising given the abundance of *Callitris* pine habitat in the old red sand dunes adjacent the Reedbeds. It is a small, inconspicuous bird easily overlooked by inexperienced observers, but its call is loud and White and Mellor were extremely competent observers. I therefore conclude that the species was not resident in the Reedbeds area in their lifetimes, although it may have been present before the largescale destruction of native pine/banksia/casuarina woodlands. Its status in the area today is uncertain; I have recorded one or two birds irregularly at Glenelg GC in 2002, 2011, 2012 and 2017, and in February 2018 three birds were seen. The species is always in the same part of the course, which is secluded and planted with native shrubs and trees, including a few Southern Cypress Pine, and the birds are often in company with Silvereyes and/or Yellow-rumped Thornbills. There is also a record of two birds in Drooping Sheoak near the Patawalonga GC on 3 October 2020 (D. Edey pers. comm.).

Table 6. Bird species first recorded for the Greater Reedbeds area after 1945.
*** introduced species**

*Mallard
*Muscovy Duck
Australian Owlet-nightjar
Brush Bronzewing
*Spotted Dove
*Barbary Dove
Oriental Plover
Pacific Golden Plover
Hooded Plover
Common Sandpiper
Common Greenshank
Marsh Sandpiper
Kelp Gull
Fairy Tern
Australasian Darter
Intermediate Egret
Little Egret
Spotted Harrier
White-bellied Sea Eagle
Square-tailed Kite
Black Kite
Black Falcon
Long-billed Corella
Blue-winged Parrot
Rock Parrot
Blue-faced Honeyeater
White-fronted Honeyeater
Yellow Thornbill
White-throated Gerygone
Apostlebird
Rose Robin
*Common Myna

The only records of Common Greenshank came from the 1974-1977 period of regular surveys along the River Torrens and were of a few birds in the Outlet Channel and adjacent swamp, mostly from October to December (Whatmough 1978). The Wood Sandpiper showed a similar occurrence in that it was reported from the Outlet Channel and adjacent swamp in the mid-1970s, with a comment that numbers had decreased from a maximum of four birds in 1974-75 and 1975-76 to two in 1976-77 and none in 1977-78 up

to December (Whatmough 1978). There were also records of Wood Sandpiper from drains along Tapleys Hill Road in February 1952, in the River Torrens Outlet Channel during February-April 1952 (Glover 1952) and from the Patawalonga Creek drain north of West Beach Road, Henley Beach, in December 2000 (D. Edey pers. comm.), and a SAMA specimen collected at Lockleys in 1960. However, this species is not included in Table 6 as there is also a SAMA specimen collected at Glenelg GC in 1938, suggesting that it was an occasional visitor to the Greater Reedbeds long before 1945.

Bird species that established in the Reedbeds in the 1920s or earlier

There are several species that arrived in the Reedbeds area during S. A. White's adulthood. White (1919a) observed that Noisy Miners had only appeared in the last six or so years, which is consistent with suggestions that they were first seen at the Reedbeds in about 1914 (Anon 1917). Mellor reported Noisy Miners breeding in 1917 at Lockleys (Mellor 1917b), with observations of two fully fledged birds being fed by adults in March of that year. Anon (1917) suggested that this species was unknown in the Adelaide district until about 1895, at which time it began extending its range over the Adelaide Plains along the foothills from the Barossa Ranges. The species was by 1917 'fairly numerous at the Reedbeds' (Anon 1917).

The aggressive nature of Noisy Miners was evident only a few years after their appearance at the Reedbeds, with Mellor (1926) noting their attacks on Common Blackbirds and an Eastern Rosella. Noisy Miners are notorious now in many urban and woodland habitats for their abundance and aggression which enables them to exclude many smaller bird species from co-existence (Debus 2008). In the MLR they are still moving south down the Fleurieu Peninsula (pers. obs.).

Two other species that colonised the Adelaide area relatively recently were the Crested Pigeon (Black 2015) and Galah, with both species moving from more arid parts of South Australia into the more settled areas. In the early twentieth century Galahs first visited the Reedbeds in small numbers but did not stay long (White 1919a). They began nesting in the early 1920s and Mellor (1926) recorded 20 birds in August 1925, which was the largest flock he had seen to that date. The first record of Crested Pigeons from the Reedbeds was a pair seen by Mellor in his garden at Lockleys in November 1923 (Mellor 1924a). By their actions he presumed they were breeding in a nearby thicket and breeding was confirmed by the appearance of two young birds with their parents in January 1924 (Mellor 1924b).

White (1919a) recorded that Spiny-cheeked Honeyeaters visited the Reedbeds district in recent years, presumably the early twentieth century, but that they were unknown previously. In Mathews (1925-27), White said of this honeyeater, 'strange to say within the last few years it has come on to the Adelaide plains, and I have heard them calling in their wonderful way for months in the garden'. There are so few records of this species from the Reedbeds that it is likely their appearance for a few years was the result of dry conditions in their normal range and not a shift in their area of occupancy. There is only one record from the modern period, from the Royal Adelaide GC in 1990.

Bird species showing increases over the 1988-2020 period

There are a few species that have increased in abundance over the 1988-2020 period of intensive surveying by the author. These are Black Swan, Australian White Ibis, Eurasian Coot, Dusky Moorhen, Australasian Swamphen, Barbary Dove, Little Corella, Long-billed Corella and Noisy Miner. The Superb Fairywren was also more frequently recorded in the late 1990s and early 2000s and bred in the area, but then declined.

Whatmough (1978) regarded Black Swans as rare in the Outlet Channel of the River Torrens from the intensive survey of 1974-77, with only two records of a solitary bird there. Nor were they recorded in the 1991-92 survey for the River Torrens south of Henley Beach Road (Paton and Pedler 1999). For the past twenty years, a pair of swans has been regularly recorded in the Breakout Creek section of the River Torrens and/or on the Apex Park wetland. There are also breeding records for most of these twenty years in these locations, with up to five or six young produced in some years. This increase mirrors a similar increase in Black Swan numbers along the River Torrens in the city of Adelaide as well as upstream as far as Gilberton and St Peters, where a pair is frequently recorded and breeding has occurred (pers. obs.). The increase in the lower reaches of the Torrens River may reflect the improved habitat for this species due to wetland reconstruction and enhancement.

When regular surveys began at Adelaide Airport in 1988, Australian White Ibis were infrequently recorded and in low numbers. From about 1993 the frequency of recording increased and from 2005 increased again, until by 2012 the species was being seen in most censuses. The number of birds seen at one time was still small, with six or fewer being typical. Along the River Torrens small numbers of Australian White Ibis were seen infrequently in the 1990s and early 2000s, but by 2015 this species was recorded in most censuses. Numbers of birds were still small, with 16 birds being the maximum in February 2015, but typically six or fewer. This is despite the large increases in Australian White Ibis populations and the establishment of breeding colonies in the Adelaide area over the past fifteen years (Paton 2016).

Eurasian Coot, Dusky Moorhen and Australasian Swamphen were regarded by Whatmough (1978) as respectively occasional, rare and absent from the River Torrens Outlet Channel during the 1974-1977 survey, although there were breeding records of the coot and moorhen. Likewise, Paton and Pedler (1999) found the Australasian Swamphen and Dusky Moorhen to be absent, and the Eurasian Coot rare or absent, from the two lower sections of the River in 1991-92. However, the swamphen and moorhen were common closer to Henley Beach Road, with the latter species breeding. The coot was uncommon in this reach of the River. Since that time, numbers of all three species have increased to the point where they are common from at least above Henley Beach Road to the sea and all breed regularly in this area. All three species are also common on the constructed wetlands on the golf courses and all breed on the wetlands of the Glenelg GC. Eurasian Coot were episodic at Glenelg GC from the early 1990s through to the early 2000s but, after completion of the ASR scheme in 2010, they were more frequently recorded and have bred in most years. While moorhen and swamphen numbers are relatively constant, coot numbers oscillate, with counts of up to 90 birds not unusual, especially in the section of the River Torrens downstream of Tapleys Hill Road.

A local resident believes that Barbary Doves are increasing in the Greater Reedbeds area as well as Adelaide generally and has records from Kopurlo Road at Brooklyn Park in 2014, Glen Rowan Road at Woodville South from 2017 and the corner of Esk and Fife Streets in Woodville South from December 2018 to the present (D. Edey pers. comm.).

Whatmough (1978) reported that Little Corellas were occasional at the Outlet Channel between 1974 and 1977, with a small flock visiting the banks of the river in each summer. Paton and Pedler (1999) did not record Little Corella from the lower reaches of the River Torrens in 1991-92. Records from Adelaide Airport from 1988 to 2016 show that this species was first recorded in February 1994 and from 1999 frequency of recording increased markedly. Numbers fluctuated enormously with flocks

of up to 200 being recorded in February 2010 and March 2012 but, at other times, groups of up to 20 birds were more typical. This pattern was repeated along the River Torrens and in the large eucalypts near the Lockleys Oval, where small numbers of birds, particularly in summer, appeared in about 2008. Flocks of up to 200 birds were not unusual from 2010 onwards. Little Corellas have increased markedly in the Greater Adelaide area over this same time period and to the extent that they are a major pest for some local councils, due to the noise of large flocks and the damage they inflict on infrastructure including ovals and other grassy areas.

While not increasing in such numbers as the former species, Long-billed Corellas self-introduced to the Reedbeds area, as discussed above. The species was not recorded in the 1974-1977 survey of the River Torrens in suburban Adelaide (Whatmough 1978), nor in the 1991-92 survey of the Torrens, apart from three birds in the upper Torrens valley (Paton and Pedler 1999). At Adelaide Airport they were first reported in June and July 2002 and then not again until September 2007. After this they were more regularly recorded until the end of the survey period in mid-2016. Numbers fluctuated from just a few birds to a maximum of 85 birds in March 2015. Similarly, the species occurs along the River Torrens west of Henley Beach Road, often in mixed flocks with Little Corellas. The first record was of 14 birds in February 2011 but they could have been missed in previous years in the mixed flocks of corellas. Small numbers were observed in most years after this, often with Little Corellas and usually in summer. The largest recorded numbers were 40 birds in February 2014, 34 feeding on bulbs between Tapleys Hill Road and the sea in August 2015, and 100 in eucalypts near Lockleys Oval in February 2019 in company with 100 Little Corellas.

Noisy Miners have been discussed earlier, in reference to bird species that established in the Reedbeds area during the early twentieth century. Their numbers have increased over the last thirty years, as evidenced by the threefold increase in numbers at Kooyonga GC between 1990 and 2020. Moreover, at Grange GC there were very few Noisy Miners in 1993 when regular bird recording began but numbers have increased, possibly due to the clearance of Coastal Teatree *Leptospermum laevigatum* (D. Carter pers. comm.).

Superb Fairywrens were recorded at three golf courses between 1998 and 2005, but there was only one record at Kooyonga GC (one bird on 15 August 2002) and one bird at Grange GC (February to September 2000). The species was first recorded at Glenelg GC in May 1998 (a single bird), then a coloured male was seen twice in 1999 and once in 2000, followed by regular records of groups of birds from February 2002 till August 2005. The largest total seen on one day was 6 birds on 25 November 2002 and 19 November 2003. Evidence of breeding was found on two occasions: three juveniles accompanied a coloured male and two females on 25 November 2002 and a female was carrying nesting material on 20 September 2004. Birds were generally seen in a secluded and bushy part of the course although, after breeding in 2002, a separate group appeared to establish a couple of hundred metres away. The last record at Glenelg GC was in August 2005.

Since then, a single Superb Fairywren was at Adelaide Airport on 26 April 2016 and a few birds have been seen sporadically at Apex Park wetland since 2014. The maximum seen there was three birds (2 females and a male in eclipse plumage) on 28 February 2018. Three birds were seen there in November 2020, alleviating a concern that the major redevelopment of this site in 2018-19 may disrupt the fairywrens there. A male bird was reported on two occasions from West Beach during this time, once from Tapleys Hill Road on 3 September 2019 and once from West Beach Road on 16 September 2019 (SAOA 2020).

Escapee bird species

I have not included bird species in Table 1 that are most likely to be escapee cage birds. These are a Pale-headed Rosella *Platycercus adscitus* reported by Mellor in March 1922 (Mellor 1922) and a Major Mitchell's Cockatoo *Lophochroa leadbeateri*, also recorded by Mellor in September 1925 from Lockleys (Mellor 1926). Also excluded is an Eastern Bluebonnet *Northiella haematogaster* that was collected by S. A. White in April 1941 after his daughter Wanda saw it 'feeding on the grass seeds in the garden' (notes with the specimen, SAMA). The species had been kept in captivity for a long period and the specimen had an elongate upper mandible and long claws, making it most likely to be an aviary escapee (P. Horton, pers. comm.).

An Australian Ringneck that I observed at one of the golf courses was possibly an escapee but is included in Table 1 for reasons of completeness. Other escapee species from the area include Superb Parrot *Polytelis swainsonii* (1 in 2008 at Lockleys), Alexandrine Parakeet *Psittacula eupatria* (1 in 2019 at Lockleys), Rose-ringed Parakeet *Psittacula krameri* (single birds at Underdale, West Beach, Henley Beach South and Lockleys from 2015 to 2020) and Rosy-faced Lovebird *Agapornis roseicollis* (1 in 1994 at Fulham) (D. Edey pers. comm.).

Introduced bird species

White (1919a) did not include introduced birds in his paper nor did he explain why he omitted them, but Mellor did report six common exotic species for the early period, namely House Sparrow, Common Starling, European Goldfinch, European Greenfinch, Eurasian Skylark and Feral Pigeon (Mellor 1919, 1920, 1924b, 1925). In addition, in passing, White did record a Common Blackbird being pursued by two Australian Magpies in May 1920, thus confirming the blackbird's presence in the Greater Reedbeds (White 1920). Four additional introduced species occur regularly in the area now: Spotted Dove, Barbary Dove, Muscovy Duck and Mallard (which includes Khaki Campbell). Spotted Doves are abundant while the Barbary Dove was recorded by me only once, on 3 February 1999 in horse paddocks to the west of Adelaide Airport (but see other records above). Muscovy Ducks and Mallards have established wild populations on the River Torrens and on other wetlands in the district. One or two Common Mynas were recorded in the vicinity of the Adelaide Airport and Tapleys Hill Road in September and November 2011 and a single bird from Netley in December 2012 (Carpenter and Horton 2020). This introduced species is prohibited in South Australia but is occasionally reported in the Adelaide area, from deliberate introduction or accidentally through shipping or road transport.

Species richness and abundance and reasons for declines/increases

The reasons for the disappearance of so many bird species and, where the species still occur, their decline in abundance, are mainly due to wetland drainage, vegetation clearance and eventually urban infill over most of the Reedbeds in just over one hundred years. For a few individual species there were other contributing factors, for example the competitive exclusion by Noisy Miners of small bush birds but, in the long run, urbanisation may have led to the extinction or decline of those species regardless.

The numbers of species that have declined or increased do not tell the full story of the responses of avifauna to urbanisation. White and Mellor gave little indication of the numbers of individuals of each species in their bird notes and papers, but their few comments are illuminating. White (1925) described hearing the call of the Bush Stonecurlew in 1924 for the first time for a few years and noted that at one time there were up to 10 pairs nesting in one season and that the birds were plentiful. By 1924 they were no longer resident, a result that he put

down to 'population and the fox.' Likewise the Bustard, one of which appeared in June 1924, was 'often in numbers' in earlier times (White 1925). Also referring to 1924, White (1925) described the birds on his extensive swamps, listing twenty species, among them Sharp-tailed Stint [Sandpiper] 'in thousands', plentiful Australian Painted Snipe which would soon begin breeding, and Grey Teal in great numbers.

Rix (1983) painted a scene from his childhood from 1910 to 1918 of how numerous waterfowl were in the Greater Reedbeds during big flood events:

> Shooting was not prevalent but when someone did fire a shot or two the effect was amazing … I remember several occasions when this occurred and for a quarter of an hour or more, the whole of the sky over an area three to four miles long by about two miles wide, was literally filled with vast flocks of waterfowl circling, wheeling, swooping and climbing to the accompaniment of massed communication – calls blended with the sound of the rushing, whistling wings of several million birds.

Factors that White (1925, and in Mathews 1910-27) postulated had an effect on the survival of birds in the Reedbeds district were shooting, poisoning, bird catching for the aviculture trade, cats, foxes, vegetation clearance, particularly of the big timber that provided hollows, and competition for nesting hollows from the introduced Common Starling. Birds that were destroyed in large numbers included the Red Wattlebird and the Adelaide (Crimson) Rosella. White (in Mathews 1916-17) stated of the Adelaide Rosella:

> These lovely parrots were once exceedingly numerous in the Mount Lofty Ranges but their ranks have been much thinned by poison and the gun: this is due to the bird being very destructive in the orchards: they are still to be found in numbers in the ranges and many thousands are killed each year. …They were once regular visitors to the Adelaide plains in the autumn, but they are now seldom seen.

Adelaide Rosellas are currently a common bird in the MLR, so the destruction White described may not have had a long-term effect on their population, but his mention of them regularly visiting the plains in the autumn is interesting. This regular movement is highlighted by his description of Adelaide Rosellas coming down to the plains in the autumn of 1924 and having left the Reedbeds by 26 July (White 1925). Currently Adelaide Rosellas are a common resident of the Adelaide Plains and there is no obvious seasonality to their occurrence.

Of Red Wattlebirds, White (in Mathews 1925-27) stated:

> This is a widely distributed bird, but is becoming scarcer each year as they have been shot down in great numbers in the past owing to their being good eating and being troublesome at times in the orchards. From twenty to thirty years ago these birds appeared with us in the autumn on the Adelaide Plains in great numbers and their harsh note could be heard everywhere, but now an odd one or two puts in an appearance and that is all.

As with the preceding species, Red Wattlebirds have become a common resident species on the Adelaide Plains, although larger flocks move across the plains in the autumn (pers. obs.).

One species with an interesting history in the Reedbeds area is the Laughing Kookaburra. White (1919a) recorded that the species was 'numerous in the first place, then exterminated, later reintroduced; fair number about now.' He used the word 'exterminated' about this species and the Sacred Kingfisher but it is not clear whether he meant that they were persecuted or had just declined, but I suspect the latter

meaning. This is supported by a letter in the *Adelaide Observer* from 3 October 1896 in which the writer stated that kookaburras were plentiful near Adelaide fifty years prior and that their numbers had declined through the destruction of trees (https://trove.nla.gov.au/newspaper/article/162363357). Mellor reported the Laughing Kookaburra breeding at Lockleys in October 1917 (Mellor 1918). They are an uncommon bird in the area now, with one or two birds recorded at Kooyonga GC on a regular basis. Up to four birds (2 adults and 2 immatures bred locally) have been seen from Kooyonga GC north-east through Lockleys to the River Torrens from 2014 to the present (D. Edey pers. comm.).

Breeding species

A comparison between the two periods in terms of breeding birds is difficult to make due to incomplete records from both periods. Egg clutch data from SAMA records offer proof of breeding and White and Mellor documented breeding of some species from the earlier period, but lack of comments about breeding is not conclusive evidence for non-breeding. Likewise for the later period, breeding was noted in the course of bird surveys, but no systematic or rigorous attempts were made to document breeding.

Table 1 shows 87 breeding species in the pre-1945 period and 48 in the post-1945 period. The post-1945 list does not include a breeding record for some resident species, like Australian Pipit, suggesting that the number of breeding species is underestimated for this time period.

CONCLUSIONS

The drainage of wetlands and clearance of most of the native vegetation in the area formerly known as the Greater Reedbeds on the western Adelaide Plains has led to the extinction of many bird species and to the decline of many more. Positive influences are the creation of artificial wetlands in the Royal Adelaide and Glenelg Golf Courses, the redevelopment of the lower reaches of the River Torrens, the retention of open areas like Adelaide Airport, the interest in planting of parks and private gardens for wildlife, and more sympathetic attitudes to the natural world. While the golf courses are predominantly managed for golfers and their sport, these open areas are planted with a variety of native and non-native plants that benefit some bird species. These factors have favoured a range of native and introduced birds and led to their colonisation or recolonisation of the area.

Other factors have also contributed to changes in the avifauna of the area, including the increase in the size of the Adelaide urban area, changes to weather patterns in South Australia and beyond, due to human-induced climate change, and on-going native vegetation clearance in the wider region.

Notwithstanding the losses of habitat and bird species from the Greater Reedbeds, it remains the richest area for birds in the inner metropolitan Adelaide area, due mainly to the open space of Adelaide Airport, golf courses, the River Torrens and Patawalonga Creek and their associated wetlands, and the West Beach Trust land. Also important are the connections offered through the riverine systems that flow from the MLR to the coast.

The following management actions to enhance bird biodiversity are a combination of the thoughts of the author and David Edey. There is scope for attracting more bird species by the modification of existing wetlands to provide more variety of habitats, for example, gently sloping muddy and reedy banks, variations in salinity, and islands for breeding species. For some wetlands additional fringing vegetation below two metres would benefit crakes and rails and offer opportunities for breeding of terrestrial and wetland species. As it is not being used for water-based recreation, the Patawalonga Lake upstream of the boat harbour and downstream of the weir near Tapleys Hill Road is suitable for landscaping to enhance its appeal for birds.

Some low vegetation and muddy banks would complement the existing lawns and rocky banks, and shallow muddy areas in this saline environment would be attractive to some waders and terns.

The stark contrast in Noisy Miner numbers between Kooyonga and Glenelg Golf Courses is evidence of this species' attraction to park-like vegetation dominated by eucalypts. In many other ways the two courses are similar, but at Glenelg there are few eucalypt trees in the upper canopy, while at Kooyonga, eucalypts are the dominant tree. While there are other factors at play in the decline of smaller bush birds in the Greater Reedbeds over the past thirty years, the increase in Noisy Miners appears to be an important factor. Adding non-eucalyptus native trees to parks and gardens would lessen Noisy Miner dominance, as would the planting of dense low vegetation under existing trees, as this gives the smaller birds places to evade the miners. Regrettably the trend at both Kooyonga and Glenelg courses is to clear such dense low plantings in favour of links-style courses.

The area that supports the largest number and greatest richness of small bush birds is a narrow strip of habitat (50 m by 300 m) bordered by the two Westward Ho golf courses, the driving range, the Patawalonga stormwater basin and a section of the Patawalonga Creek. Found here are small resident populations of Singing Honeyeater and Yellow-rumped Thornbill and visiting Superb Fairywren, Yellow Thornbill, White-winged Triller, Grey Fantail, Golden Whistler and Horsfield's Bronze Cuckoo. With low numbers of Noisy Miners, this habitat is of low native species, including low mallee-type eucalypts and shrubs generally less than two metres tall and herbaceous plants below 30 cm in height. Such plantings in other open areas would be beneficial for a range of smaller terrestrial birds.

I hope this paper will provide a baseline so that further changes in avifauna can be measured and reported in the future. The results show the importance of systematic and long-term data sets.

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Records of the Night Parrot *Pezoporus occidentalis* in South Australia, including its 'rediscovery' in the North East in 1979 and a review of its habitat use

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Abstract

At a time when the Night Parrot, one of the world's rarest birds, is being studied within well documented populations on either side of the Australian continent, we review its historical occurrence in South Australia. It was in this State, then a British colony, that the first specimen was taken and preserved for science; and it was here for a period that almost all that the world knew of the Night Parrot came through the work of a collector F. W. Andrews and a museum curator F. G. Waterhouse. Then, in the period between 1912 and 1990 during which no specimen was taken to confirm its continuing existence, another curator, S. A. Parker, became the first professional ornithologist to seek the species and find it. We here itemise reports of the Night Parrot that have accumulated since the 1880s at intervals of a few years to a decade or more. While none can be confirmed in the absence of verifiable specimen material or photographs, we accept nine as valid records and more as plausible. Most recent records are from the far north and north-eastern parts of the State, with others in the Flinders Ranges, but only one possible report from the Gawler Ranges, where Andrews had most of his field experience. We have analysed evidence of the Cooper Creek habitat in which Parker's observation was made that complements other documented habitat data for the species. The occurrence of so few records over such a vast area remains to be explained and invites speculation.

INTRODUCTION

The Night Parrot *Pezoporus occidentalis* (Gould, 1861) has long been held to be one of the world's most enigmatic and elusive birds. The first specimen (Figure 1) was taken in South Australia (SA) in October 1845, to the east of Lake Toontoowaranie and south of Lake Lady Blanche (Reid 2000) in the Coongie Lakes region, by John McDouall Stuart on Sturt's 1844-1846 expedition into the interior of Australia but it was thought to be an [Eastern] Ground Parrot *Pezoporus wallicus* (Kerr, 1792) and not a new species (Sturt 1849 Vol. 2: 35). The error was repeated in the list of birds recorded during the expedition, that included the names of specimens collected, as identified by Gould; here it was described as having red above the bill (Sturt 1849 Vol. 2 Appendix: 41). Gould's apparent error is discussed in Appendix 1.

The next specimen to be collected, the holotype taken near Mount Farmer in Western Australia (WA) in September 1854 by Kenneth Brown, a young member of Robert Austin's survey party, was sent to Gould but remained unnamed for another seven years (Gould 1865; Wilson 1937). It too had been mistaken for the Ground Parrot (Forshaw *et al.* 1976; Gould 1861). A little later, in 1867 and 1873, two birds were taken alive to London, where, during their truncated lives, their nocturnal habits amazed the members of the Zoological Society (Murie 1868; Sclater 1873).

Most of the known specimens of the Night Parrot were collected in the 1870s and perhaps three were exhibited at international exhibitions, in Philadelphia in 1876 and possibly in Paris in 1878. Of the 25 documented 19th century specimens, 21 or 22 were collected by one person, Frederick William Andrews, probably

one only from Cooper Creek in SA in 1875 and the others in the Gawler Ranges, all, as far as is known, in the years 1870 to 1873 (Black 2012; Horton *et al.* 2018; South Australian Museum (SAMA) archival documents). The next three skin specimens collected were taken in September 1912 at Nichol Spring in the Pilbara, WA (M. A. Bourgoin in Wilson 1937) and in western Queensland in October 1990 (36 km north of Boulia) and September 2006 (Diamantina National Park) (Boles *et al.* 1994; Cupitt and Cupitt 2008; McDougall *et al.* 2009).

Between 1912 and 1990, when no Night Parrot specimen was collected, occasional and mostly chance observations continued to be claimed but, in the absence of substantive evidence, many were treated with scepticism (Storr 1960; Garnett

a)

b)

Figure 1. The first Night Parrot specimen collected, taken in the Coongie Lakes area, South Australia, October 1845, by John McDouall Stuart on the Charles Sturt expedition to Central Australia. World Museum, Liverpool D640c. a) ventral, b) dorsal. Images P. Horton

1993; Pyke and Ehrlich 2014), yet among them were undoubtedly a number of valid sightings. In particular, M. A. Bourgoin convincingly described several encounters in the Little Sandy Desert, WA, between 1920 and 1935 (Wilson 1937) and David Stewart (pers. comm. to AB 25 March 2018) flushed a Night Parrot in the Great Sandy Desert WA between wells 35 and 36 of the Canning Stock Route in April 1967 and saw it fly about 60-70 metres between spinifex [*Triodia*] clumps. He later found that many indigenous people knew Night Parrots from the western deserts, identifying the species from Cayley's *What Bird is That?* (Cayley 1966). Another encounter was the result of a targeted excursion to Cooper Creek in SA in 1979, on the initiative of the late Shane Parker, then Curator of Birds at SAMA. During this expedition Night Parrots were observed near an unnamed lake south of Cooroomunchena Waterhole and their report was widely celebrated as the rediscovery of a lost species.

Since May 2013, small populations of Night Parrots have been seen and photographed (Dooley 2013; Murphy 2013; Jones 2017) and have become subjects of intense field study in western Queensland (Murphy *et al.* 2015, 2017a, b, 2018) and inland central WA (Jackett *et al*. 2017; Hamilton *et al*. 2017). In publications of and publicity for these recent records and research, Parker's 'rediscovery' has received relatively little attention or has been overlooked entirely.

In North East SA a single feather of the species was reportedly found in the nest of a Zebra Finch *Taeniopygia guttata* on Kalamurina Wildlife Sanctuary in July 2017 (McCarthy 2017; Australian Wildlife Conservancy 2017; Appendix 1, record 44) and led to the claim, later retracted (Menkhorst *et al*. 2020), as the first record from northern SA since that of McDouall Stuart 170 years earlier. That was incorrect; Parker's record was less than 40 years earlier and his and Andrews's in 1875, when he took one or possibly more specimens, were all from Cooper Creek in the same drainage as Stuart's.

Some aspects of Parker's observations have been published (Parker 1980; Wilson 1980; Ellis 1982, 2014; Pyke and Ehrlich 2014; Horton *et al.* 2018; Olsen 2018). In the light of intense recent interest in the Night Parrot and its possible persistence across the Australian continent, we take the opportunity of placing Parker's record in that context, including unpublished habitat information of potential value in future field investigations. We also document information recorded by Parker, following his scrutiny of other likely records of the Night Parrot in SA, and we add further reports that have come to our attention.

METHODS

We reviewed recent literature concerning the Night Parrot. We examined documents relating to the Night Parrot held in SAMA, including Shane Parker's field notebook of May-June 1979 and the extensive files and correspondence that he accumulated before and after the discovery. We have contacted some of the members of the 1979 expedition for corroborative evidence.

We sought South Australian reports of Night Parrots incorporated in newspaper items and through colleagues, including reference to the extensive database of records compiled by IM, which incorporates Parker's files. We included all reports except those that lacked supporting evidence or appeared improbable from descriptions of the bird or its behaviour or locality. We accepted historical records if it was clear that the observer was familiar with the Night Parrot, and more recent reports if a description of the bird was persuasively of the species and usually accompanied by behavioural and habitat information. We judged reports that fell short of providing full diagnostic details as provisional, and any that might as likely represent misidentification as in doubt. Birth and death dates of early observers are from the Genealogy SA Database (Web1).

We have examined the habitat of the Cooroomunchena area in which Night Parrots were observed in 1979, as described by members of the expedition and later corroborated by vegetation mapping during 1991-92 of the Kanowana Lakes, Cooper Creek, region, in which Cooroomunchena is situated (Gillen and Drewien 1993). We provide more detailed descriptions of the habitats and vegetation from visits made by one of us (JR) in August 2015 and September 2020. In 2015 the percent cover of the dominant plant species was estimated at nine points around each of two automatic sound recorders placed near the presumptive locality of the 1979 Night Parrot observations. A complete list of vascular plants recorded in an area of approximately 40 km by 30 km centred on the observation locality (west to Lake Perigundi, south to Round Waterhole (WH), east to Lake Bulpanie and north to 5 km north of Cooroomunchena WH) was extracted from the Atlas of Living Australia (Web2) and compared with known and suspected dietary items of the Night Parrot (Murphy *et al.* 2017b).

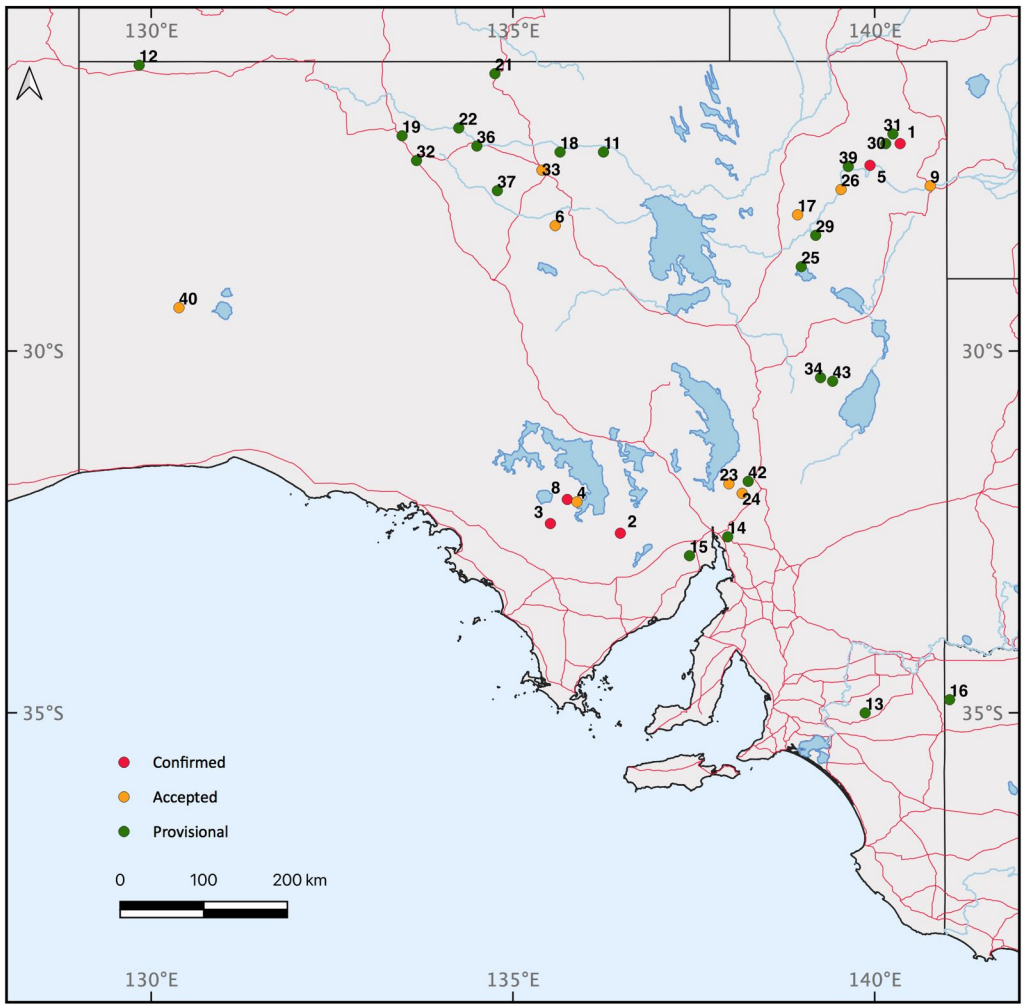

Figure 2. Map of South Australia showing Night Parrot records as listed in Table 1. Red dots are confirmed (specimen) records, orange dots are accepted records and green dots are provisional records. Doubtful records are not mapped.

RESULTS

Records of the Night Parrot accepted by Shane Parker, together with additional reports collated by the authors, are shown on the map (Figure 2) and chronologically in Table 1 (p. 94) and are annotated in Appendix 1. We compiled 44 records from SA and included one from western Victoria very close to the SA border, covering a period of 175 years. Of these we consider eight records as in doubt (not mapped in Figure 2) and 23 as provisional; we accept nine sight records and the remaining five are museum specimens and thereby confirmed.

The 1979 Cooper Creek observation

In May 1979 Parker arranged with outback safari operator Rex Ellis to take a team of observers by camel (Figure 3) across the channels and floodplains of Cooper Creek in north-eastern SA, from near Gidgealpa Homestead to the Birdsville Track, thus examining where he believed that F. W. Andrews may have secured one or more Night Parrots in 1875 (Ellis 1982; see Appendix 1). Parker reasoned that a string of camels might flush birds from their roosts, as cattle, sheep and horses have been shown to do (Whitlock 1924; Powell 1970; reports herein), and allow direct observation in daylight. He also knew that Andrews (1883) had found that Night Parrots occupied 'patches of shrubby samphire, on the salt flats bordering on the creeks [channels of Cooper Creek]' and that at least one nest had been found in 'a samphire bush' by John McDonald of Macumba Station, when on Cootanoorina Station south of Oodnadatta in the 1870s and 1880s (McGilp 1931). His attention was therefore directed to 'samphire-bassia' and not 'porcupine grass', in which Andrews had found Night Parrots in the Gawler Ranges (Ellis 1982).

Parker's notes of 1 June [1979] (SAMA file) read:

> Late afternoon, passing down into Bassia [= *Sclerolaena* sp.] flat on eastern side of Cooroomunchena Lake [at *ca* 27° 46′ S, 139° 31′ E, an unnamed lake immediately south of Cooroomunchena WH] - fat yellowish-green parrot rose from Bassia near thicket of lignum, about Neophema size but tail short & dark, wing ends dark, back same colour as the Bassia, flew 4-5 yds [= metres] then dropped back into bassia. (Spent two days in area searching, but not seen again). 3 others seen same spot by J. Mason within the hour.

In the margin is written 'probably Night Parrot'.

In contrast to Parker's ambiguous annotation, he gave no impression of being other than entirely convinced at the time, stating that he had 'just seen a Night Parrot' (Ellis 1982) and later telling a member of the party, Malcolm Wilson (1980), that it was 'one of the highlights of his ornithological career'. The other member of the party to see Night Parrots, John Mason, was in no doubt about his identification either (pers. comm. to AB 14 April 2014). Eastern Bluebonnets *Northiella haematogaster pallescens* and Red-rumped Parrots *Psephotus haematonotus caeruleus*, which are moderately common in the area, had been observed over previous days. At the time, the locality of the observation was usually reported as 'east of Lake Perigundi' in the popular press (e.g. Anon. 1979, Tilbrook 1979; also Parker 1980). Ellis (1982) noted that the first Night Parrot had been flushed from 'under the feet and feeding heads of the camels', the animals being partial to the succulent bassia.

The 'bassia' that Parker noted as a samphire-like plant, was dominant in the flat where Night Parrots were observed (Figure 4) and evidently of a sufficiently dense and intricate structure to provide protective refuge for the parrots. A specimen prepared by Brian Crisp, a member of the party, was identified by Michael Crisp at the Canberra Botanic Gardens Herbarium as *Sclerolaena divaricata.* It was among ten plants collected earlier, on 26 May at 27° 50′ S, 140° 08′ E [*ca* two km west of Gidgealpa WH], and was thought to represent the 'bassia' among which Night Parrots were seen. The latter, on the other

hand, was consistently named as another species Tangled Poverty Bush *Bassia* [or *Sclerolaena*] *intricata* (Parker 1980; Wilson 1980; Olsen 2018), almost certainly correctly (see below), but only two plant specimens were collected at the actual Night Parrot site and not the abundant and critically pertinent 'bassia'.

Vegetation and Habitats around Cooroomunchena

Descriptions of the vegetation at the locality, given at the time of or soon after the sightings of Night Parrots, are scant. Parker's brief habitat notes recorded above are matched by a published account of Wilson (1980: 7-8):

> … a bassia flat with odd clumps of lignum between a low sandridge on the eastern side and thick lignum on the western side extending along the lake side. The bassia which averaged one foot [= 0.3 m] high was *Bassia intricata*. Two sandridges back from the lake was a large isolated patch of spinifex on a sandridge; also in many places in this area it was noticed that something had been nipping off short pieces of bassia and leaving them lying around the plant.

Ellis (1982: 217-218) described the location similarly: between a dune to the east and 'a freshwater lake, brimming full and surrounded by the usual coolabahs, river coobas, and other growth', 'a narrow flat near the lake covered with bassia', 'about 200 metres wide by about 400 metres long'.

The general locality is shown on recent Landsat images of the north-eastern margins of 'Lake Cooroomunchena' (Figure 5) and a broader image of the Cooroomunchena area (Figure 6).

A vegetation survey of lakebeds and floodplains in the Kanowana Lakes region, based on objective analyses of vegetation data gathered at 168 sites, downstream from Lake Apanburra (Coongie Lakes district) to Round WH (Kanowana ruins, 13 km south-east of Cooroomunchena WH), identified five major vegetation types around 'Lake Cooroomunchena' (Figure 6; Gillen and Drewien 1993). One survey site KK2I was close to Parker's Night Parrot locality. The then dry lakebed of 'Lake Cooroomunchena' was mapped as Rat's-tail Couch *Sporobolus mitchellii* grassland (Gillen and Drewein 1993 Appendix F, fold-out 3), while the floodplain margins of the lakebed, including the Night Parrot locality, were mapped as Lignum *Duma florulenta* shrubland. Cooroomunchena and Round WHs, and other well-defined channels, were mapped as lined with Coolibah *Eucalyptus coolabah* woodland, and a sparse, less floristically diverse version of this marks the district's lake shores (e.g. Lakes Cooroomunchena and Bulpanie, the latter being 4 km east of Cooroomunchena WH). The westernmost part of the floodplain to the east of the fringing dune shown in Figure 5 (labelled 'C') was mapped as Nardoo *Marsilea drummondii* herbland, while floodplains east of there and south to Round WH were mapped as Lignum or Lignum-Nitre Goosefoot *Chenopodium nitrariaceum* shrublands. Common associates of Lignum in the two shrubland associations included the shrubby chenopods Old-man Saltbush *Atriplex nummularia*, Brown-head Samphire *Tecticornia indica* subsp. *leiostachya* and Tangled Poverty Bush, as well as several herbs and forbs indicated by Murphy *et al.* (2017b: Appendix S8) as potential food plants of the Night Parrot, e.g. *Portulaca oleracea, Trianthema triquetra, Alternanthera* sp. and *Frankenia* sp. All common associates of the Lignum and Lignum-Nitre Goosefoot shrubland associations identified by Gillen and Drewien (1993) are listed in Appendix 2 and, although not necessarily recorded around Cooroomunchena, the associations are widespread in the greater Kanowana Lakes region.

In recent years during and following the extensive Millenium Drought (2002-2009), no flats of dense Tangled Poverty Bush have been detected in the area described by the 1979 expeditioners.

Figure 3. The camel expedition leaving Lake Perigundi, Cooper Creek, 5 June 1979. Shane Parker, wearing his white pith helmet, is on the camel second from the right. Image M. Wilson

Figure 4. Floodplain on eastern shore of 'Lake Cooroomunchena', Cooper Creek, 1 June 1979. The Night Parrot seen by Shane Parker rose from this patch of samphire-like 'bassia' (*Sclerolaena intricata*). Image M. Wilson

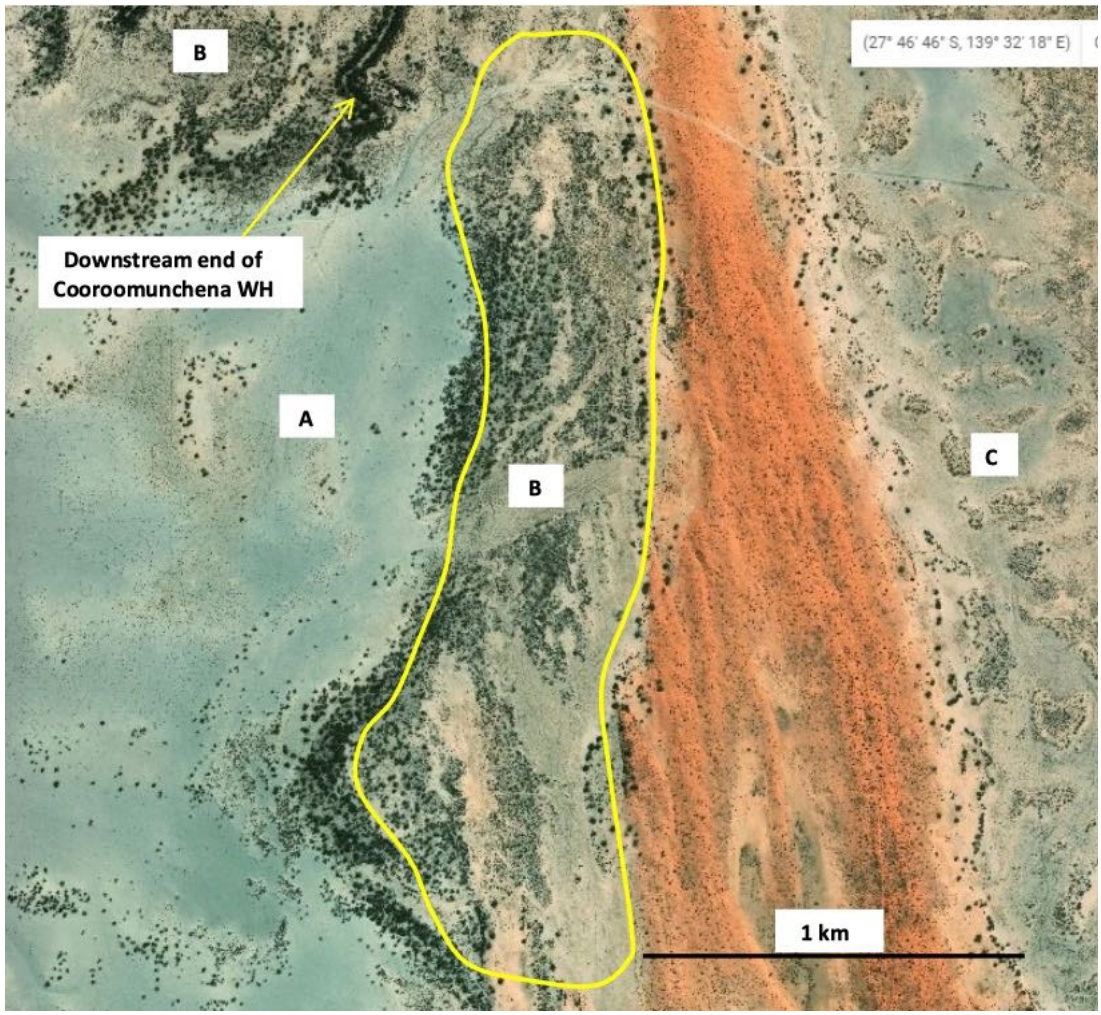

Figure 5. North-eastern section of 'Lake Cooroomunchena' (A) showing the floodplain (B) immediately east of the lake margin and west of adjacent dune, with the area outlined in yellow indicating where we think the Night Parrots were flushed by Shane Parker and party on 1 June 1979. C is the western edge of the floodplain east of the dune. Landsat 8 image, *ca* 2020 (Web8); scale approximate, North at top.

In August 2015 three species dominated the cover of 27 plants in the vicinity of the 1979 Night Parrot observation (Table 2), namely Lignum 5.3%, Elegant Wattle *Acacia victoriae* 3.7% and Coolibah 3.1%. The sound recorders were deliberately placed near the fringing dune, and *ca* 1-2 km south of the presumptive Night Parrot locality, due to the decision of the senior investigator Dr S. Murphy to locate them closer to an extensive patch of Lobed Spinifex *Triodia basedowii* in the adjacent dunes (Figure 6), potential roosting habitat for Night Parrots (Murphy *et al*. 2017a, b). Other prevalent species included Ruby Saltbush *Enchylaena tomentosa* 2.2%, generally growing under Coolibahs, and Sandhill Canegrass *Zygochloa paradoxa* 2.0%. The prevalence of the last species and Elegant Wattle indicate the ecotonal nature of the vegetation close to a sand dune. Another 28 herbaceous species were recorded in the vicinity of the sound recorders (Appendix 3). Several potential food plants of the Night Parrot indicated by Murphy *et*

al. (2017b) are included in these plant lists, as are most of the associates of Gillen and Drewien's (1993) Lignum shrubland association. Samphire and Tangled Poverty Bush, although present, were scarce (≤ 0.5% cover) at this location (Table 2) and were not prominent anywhere along the eastern margins of 'Lake Cooroomunchena' at that time (JR, personal observations). In September 2020, the general area between the fringing dune and north-eastern part of the dry lake had even less vegetation cover than in 2015 and appeared to have been heavily grazed and drought affected. A permanent stock-watering point had been installed in the north-western margin of 'Lake Cooroomunchena' some time before the August 2015 visit, when large numbers of cattle were present. There were smaller but still considerable numbers of cattle locally in 2020.

DISCUSSION

The 40 Night Parrot sight and auditory records presented in Table 1 and Appendix 1 collectively illustrate the difficulty of identifying this species in the field. Prior to the 1990 specimen find in western Queensland, few would have been considered likely and even now we have confidence in accepting only about a quarter. Assessing the validity of sight records is always imprecise and subjective (see Leseberg *et al.* 2020) and we acknowledge that many provisional (P) and some doubtful (D) records might be of Night Parrots, and that some accepted records (A) might not.

Leaving aside doubtful records, some tentative interpretations can be offered. Several records illustrate the apparent tendency of Night Parrots to remain hidden in vegetation until imperative for them to move, because of fire (Appendix 1, record 10), trampling large herbivores (6, 17, 23, 24, 26), prolonged harassment from a dog (33), or a rolling boulder (34). Once flushed, a common behaviour appears to be that the bird will fly a short distance at low level, then drop back down into vegetation or to the ground and run to cover (6, 17, 19, 23, 24, 26, 33, 34, 36, 40). Powell (1970) remarked 'This is by far the shyest bird I have ever seen and when hiding in suitable cover is almost impossible to find unless nearly trodden on.' and this observation is confirmed by behaviour observed at current sites in Queensland and Western Australia (N. Leseberg, pers. comm.).

Since the first SA Night Parrot record in 1845 there have been reports in every decade until the present, except for the 1850s, 1940s and 1950s, although Night Parrots were reported from these decades elsewhere in Australia

Figure 6. Google Earth image of 'Lake Cooroomunchena', *ca* 2016, showing the presumptive Night Parrot sighting locality (green thumbtack) and location of two automatic sound recorders (yellow thumbtack) where semi-quantitative vegetation data were gathered in 2015; scale approximate, North at top.

Table 1. Chronological list of reports of Night Parrot from South Australia. In the first column are the numbers shown on the map (Figure 2) and in Appendix 1. Latitudes and longitudes, particularly for older records, may be only a close approximation. The final column categorises records as confirmed (C) if specimen-based, accepted (A) if we find a sight record to be highly probable, provisional (P) if better substantiated than others, and in doubt (D) including reports in the public domain that lack corroboration and others for which evidence is inconclusive but which cannot be entirely dismissed. Further details of each record are given in Appendix 1. Geographical regions are: EP = north-eastern Eyre Peninsula, FR = Flinders Ranges, GR = Gawler Ranges, MM = Murray Mallee, NE = North East SA, NW = North West SA.

Map no.	Year	Locality	Region	Latitude & Longitude	Observer	
1	1845	East of Lake Toontoowaranie	NE	27° 08′ S, 140° 21′ E	John McDouall Stuart	C
2	1867	Nonning Station	GR	32° 31′ S, 136° 29′ E	donor: Charles Ryan	C
3	1872	Yardea Station	GR	32° 23′ S, 135° 31′ E	F. W. Andrews	C
4	early 1870s	Murnea Rockholes near Lake Gairdner	GR	32° 05′ S, 135° 53′ E	F. W. Andrews	A
5	1875	Cooper Creek (Munjoorooanie Waterhole)	NE	27° 26′ S, 139° 56′ E	F. W. Andrews	C
6	1870s-1880s	Cootanoorina Station	NW	28° 16′ S, 135° 35′ E	John McDonald	A
7	1880?	Coralbignie Station	GR	32° 37′ S, 136° 22′ E	F. W. Andrews	D
8	1880?	between Lakes Gairdner and Acraman	GR	32° 03′ S, 135° 45′ E	F. W. Andrews	C
9	early 1880s	Innamincka Station	NE	27° 43′ S, 140° 46′ E	Alfred Walker	A
10	*ca* 1881	Port Augusta region, perhaps Gawler Ranges	NW / EP	unknown	Norman Richardson	P
11	1899	Macumba Creek	NW	27° 15′ S, 136° 15′ E	Angus McKenzie	P
12	1902 / 1907	Tomkinson, Mann and Musgrave Ranges area	NW	26° 03′ S, 129° 50′ E (Mann Ranges)	Tommy Dodd	P
13	1910	Ned's Well	MM	35° 00′ S, 139° 52′ E	a camel driver	P
14	before 1911	between Port Augusta and Mount Brown	FR	32° 34′ S, 137° 58′ E	Thomas C. Ash	P
15	before 1912	Mount Whyalla	EP	32° 49′ S, 137° 26′ E	Norman Richardson?	P
16	1913	North of Bellbird Bore, near SA / Victoria border	MM	34° 49′ S, 141° 02′ E	J. J. Scarce	P
17	1922	between Mungeranie and Lake Appadare	NE	28° 07′ S, 138° 56′ E	Hurtle J. Lewis	A
18	1926	Macumba Station	NW	27° 15′ S, 135° 39′ E	a station hand	P

Map no.	Year	Locality	Region	Latitude & Longitude	Observer	
19	Late 1920s	Wantapella Swamp	NW	27° 01′ S, 133° 28′ E	Charlie O'Toole	P
20	1931	Mulka, N of Cooper Creek	NE	28° 22′ S, 138° 40′ E	George Aiston	D
21	1933	near NT border	NW	approx. 26° 10′ S, 134° 45′ E	two Aborigines	P
22	1934	100 miles NW of Oodnadatta	NW	26° 55′ S, 134° 15′ E	several bushmen	P
23	1963-70	Neuroodla	FR	31° 50′ S, 137° 59′ E	Brian Powell	A
24	1969	Partacoona	FR	31° 58′ S, 138° 10′ E	Brian Powell	A
25	1977	Lake Kopperekoppinna	NE	28° 50′ S, 138° 59′ E	Joan Osborne	P
26	1979	Unnamed lake S of Cooroomunchena Waterhole, Cooper Creek	NE	27° 46′ S, 139° 32′ E	Shane Parker, John Mason	A
27	early 1980s?	between Watson and Cook, and Ooldea and Fisher, Nullarbor Plain	NW	30° 30′ S, 131° 30' E (Watson)	Sid Dooling	D
28	1982	Dalhousie Springs	NE	26° 25′ S, 135° 19′ E	Dick Kimber	D
29	1986	Lake Walpayapeninna, Cooper Creek	NE	28° 24′ S, 139° 11′ E	Daryl Bell	P
30	1987	Lake Toontoowaranie, Coongie Lakes	NE	27° 08′ S, 140° 09′ E	Julian Reid	P
31	1987	Lake Marradibbadibba, Coongie Lakes	NE	27° 00′ S, 140° 15′ E	Julian Reid	P
32	1989	South of Marla	NW	27° 22′ S, 133° 40′ E	Bob Eveston, Dick Gloster	P
33	1989	Angle Pole Waterhole near Oodnadatta	NW	27° 30′ S, 135° 24′ E	Phil Gee	A
34	1990	SE of Arkaroola	FR	30° 22′ S, 139° 15′ E	Brett Schuppan	P
35	1992	Yardea Station	GR	32° 07′ S, 135° 51′ E	Allan Lees	D
36	1993	55 km E of Welbourn Hill	NW	27° 10′ S, 134° 30′ E	Bob Sim	P
37	1995	Arckaringa	NW	27° 47′ S, 134° 47′ E	Ralph Foster	P
38	2001	near Port Augusta	NW	32° 35′ S, 137° 50′ E	Maxine & Glyn Francis	D
39	2005	Deparanie Waterhole, Cooper Creek	NE	27° 27′ S, 139° 38′ E	Jake Gillen	P
40	2007	30 km west of Oak Valley, Great Victoria Desert	NW	29° 24′ S, 130° 23′ E	Bob Sim	A
41	2009	Kallakoopah Creek	NE	27° 23′ S, 138° 27′ E	Richard Green	D
42	2014	Hookina Creek	FR	31° 48′ S, 138° 15′ E	David Hunter	P
43	2015	Wooltana Station	FR	30° 25′ S, 139° 25′ E	Andy Bennett	P
44	2017	Kalamurina Sanctuary	NE	undisclosed	John Young	D
45	2019	Coongie Lakes	NE	undisclosed	(per R. Brandle)	P

(Leseberg *et al.* in review). Nevertheless, most were of apparently single birds and over the 175-year period the reporting rate is extremely low. F. W. Andrews obtained more than 20 specimens in the Gawler Ranges in the 1870s but noted that by 1883 on Moonaree Station 'the sheep now running loose over the large fenced-in paddocks' [as opposed to being shepherded in smaller numbers] had driven away 'all kinds of birds and animals' (Andrews 1885). This undoubtedly contributed to his apparent lack of success in finding Night Parrots in that year. Alfred Walker (record 9) saw Night Parrots at Innamincka Station in the 1880s but by 1885 they had disappeared. Hurtle Lewis (17) was familiar with Night Parrots in the 1890s but considered that they vanished from most parts after the Federation Drought, ending around 1902. John McDonald (6) reported that Night Parrots were 'fairly numerous' on Cootanoorina Station in the late 1870s to early 1880s. Norman Richardson (10) used to see them in the Port Augusta region in the early 1880s but in 1911 stated that he had not seen them 'for many years' (White 1912a). These scant records suggest that in SA the species declined severely from the mid-1870s to around the turn of the century; this is consistent with the findings of Leseberg *et al.* (in review).

The 1979 Cooper Creek sighting

Parker's observation was the first made by a professional ornithologist since Andrews a century earlier and he received both public and private messages of congratulation. Many such letters and copies of articles about the discovery are retained in 'Night Parrot' files in SAMA, along with letters from individuals whom he contacted over several years in order to document what he accepted as reliable published and unpublished records, for inclusion in a paper on Night Parrot occurrences Australia-wide. His companions on the camel trip waited in vain for that paper to appear and some outside that group began to question if the observation had been genuine. Julian Ford, for example, wrote to one experienced observer among the camel party, Malcolm Wilson of Dalby, Queensland, to express his doubt (M. Wilson pers. comm. to AB 14 April 2014). Enigmatically Parker himself had only written in his contemporaneous notes 'probably Night Parrot' but he gave no indication that he was in any doubt about his identification. He emphasised (pers. comm. to PH) that the parrot was a brighter green on the dorsum than was evident from faded museum skins, an observation amply confirmed by recent photographs of wild birds.

Malcolm Wilson corresponded with Parker over several years and asked him why he had not published formally. Parker had told him in several letters that he was preparing 'to write up the Night Parrot articles' and on 24 February 1982 wrote that he had 'all the basic references and was ready to go' (M. Wilson pers. comm. and copies of letters to AB). Parker is not known to have provided an answer to his fellows but told one reporter a decade after his sighting (Park 1989) that while 'personally happy that I've seen them, as a scientist, I find sight records unsatisfying.' As a professional ornithologist, he had come to accept that he could not publish the 1979 sighting without more concrete evidence. To him a sighting was only a probable record; a specimen of some kind was needed, or at the very least a photograph, before he could present his observation formally for the scrutiny of his peers. He might also have been embarrassed about his incomplete documentation of the habitat where his observations were made, as noted above. In addition, most records of other observers that he had accumulated were likewise unverifiable sightings which, if written up, would have made a lengthy paper fraught with doubt. By 1985 Parker began to relinquish his career as an ornithologist, working thereafter on marine invertebrates (Horton *et al.* 2018). In April 1987 he wrote and asked IM if he would take over the Night Parrot files and shortly afterwards forwarded his card index and some of his paperwork (*in litt.* to IM 'Easter Sunday' 1987).

In discussing the 'scientific record' of a rare bird

such as the Night Parrot, Leseberg *et al.* (2020) asked what standard of proof is required to consider a sight record confirmed? Leaving the question unanswered, they argued that any report of a 'confirmed' sight record should be treated as ambiguous and interpreted only after considering the evidence upon which it had been deemed confirmed and in the context of more substantive and objective evidence, gained primarily from reliably documented voucher specimens. Parker's record was accepted as a 'rediscovery' but was not claimed as the first 'confirmed' record since 1912. Yet, in review now and in the context of present broad acceptance of the bird's existence, it provides a valuable contribution to knowledge of the species. Likewise, it was only after Parker had seen a living Night Parrot and gained suitable evidentiary context, that he was prepared to gather other records and accept those he found reliable. We have listed well-substantiated cases as accepted by us but other cases lacking in critical details only as provisional. We have listed as confirmed only those supported by specimen evidence with corroborative documentation.

Night Parrot habitats

All published visual and auditory reports of Night Parrots over the last 10 years have come from *Triodia*-dominated environments (Murphy 2013; Hamilton *et al.* 2017; Jackett *et al.* 2017; Murphy *et al.* 2017 a, b), and Murphy *et al.* (2017a) and Jackett *et al.* (2017) have described the species nesting within *Triodia* clumps in south-western Queensland and the East Murchison, WA, respectively. Of the 25 SA records presented here (excluding doubtful) with adequate habitat notes, twelve (6, 10, 13, 15, 16, 17, 18, 19, 21, 25, 34 and 40) state that *Triodia* was present at or in the immediate vicinity of the observation sites, including two that described nesting within *Triodia* (6, 17).

Figure 2 shows that the SA records are not distributed across the entire state, there being none in the wetter, southern regions (South East, Adelaide-Mount Lofty Ranges, Yorke Peninsula, most of Eyre Peninsula). Nor are there records in the central region dominated by Mulga *Acacia aneura* woodlands, acacia or chenopod shrublands or stony plains, with little or no *Triodia*. Most records are clustered in the North East, northern central SA, Flinders Ranges and Gawler Ranges, with two in the Murray Mallee, in all of which *Triodia* is patchily or abundantly present (Nature Maps, Web3). The solitary records from the far North West (12) and Great Victoria Desert (40) and absence from the Yellabinna may reflect the relative inaccessibility (to human observers) of these regions, where *Triodia* is also abundant. Alternatively, we speculate that Night Parrots may be largely absent from the interior of vast spinifex deserts, such as parts of the Great Victoria Desert and Yellabinna, given that research at Pullen Pullen, western Queensland (Kearney *et al.* 2016; Murphy *et al.* 2017b; S. Murphy, pers. comms) suggests Night Parrots may need to drink regularly, perhaps daily under hot and dry conditions.

Despite this apparent association with *Triodia* in the broad landscape, thirteen observations were made in other habitats: samphire (1, 5), samphire and saltbush (29), Tangled Poverty Bush (26), Nitre Bush *Nitraria billardierei* (33), long grass (11), grass and forbs (37), saltbush (23, 43), Wards Weed *Carrichtera annua* (24, 42) and lignum (with or without other shrubs: 30, 39), although in several instances *Triodia* occurred within a few kilometres. Jackett *et al.* (2017) similarly noted the presence of adjacent samphire flats at three localities from where the species has been recorded this century in WA, and cited earlier documentation of Night Parrots using samphire habitats (Andrews 1883; McGilp 1931; Forshaw *et al.* 1976).

Murphy *et al.* (2017b; S. Murphy and N. Leseberg, pers. comms) make the distinction between roosting and feeding habitat requirements of the Night Parrot at Pullen

Pullen, with dense cover at ground level characterising daytime roost sites (typically *Triodia*) and productive vegetation patches used for nocturnal foraging, as in run-on and floodplain environments. We observe that the habitat of most or all observations made during the day can be assumed to be where the parrots were roosting. The most significant feature of these habitats may not be the plant species but the shelter they provide – dense low cover that often happens to be *Triodia* but can be any other structurally suitable plant.

Habitats in the Cooper Creek drainage

In the Cooper Creek drainage in south-west Queensland and north-east South Australia, 19th and early 20th century Night Parrot observations were made in two broad habitats: *Triodia* hummock grassland on red sands (C. Sturt, 12 February 1845, cited by Leseberg *et al.* 2020; H. J. Lewis, 1922, record 17), and samphire low shrubland on saline flats and floodplains (J. M. Stuart, October 1845, record 1; Andrews 1883, record 5). The February 1845 observation in south-western Queensland ('we flushed a ground parrot', 'Dark green speckled black. It rose and fell like a quail', Davis 2002: 156) was most likely to the west of Orientos Homestead at about 28° 05′ S, 141° 25′ E (*pace* Leseberg *et al.* 2020 who positioned it further east). Parker's 'bassia flats' at Cooroomunchena represent a third broad habitat: ephemeral (and short-lived perennial) low chenopod shrubland. The habitat around Stuart's presumptive locality, *ca* 10 km south of Lake Lady Blanche, had only a sparse cover of samphire during a survey in October 2013, but under suitable (wetter) conditions would probably support a flora similar to Parker's Cooroomunchena habitat (JR, personal observations).

Above-ground plant growth varies enormously in the Cooper Creek floodplains over time depending on flooding, local rainfall and grazing history. In the Kanowana Lakes region long-lived perennials, such as Coolibahs, are generally sparse to absent away from the river channels, particularly in the heavier clay soils, where annual species, biennials and short-lived perennials predominate but only after floods or heavy rains. Three of the dominant shrub species in the heavier soils of the floodplains, Lignum, Nitre Goosefoot and Golden Goosefoot *Chenopodium auricomum*, shed their leaves as the soils dry out, while short-lived perennials like Tangled Poverty Bush die and the surface area is mostly bare ground, as recorded in August 2015 (Table 2) and witnessed in September 2020. Brown-head Samphire, the dominant and perhaps only samphire species occurring on floodplains in the Kanowana region, occurs on more saline soils (Gillen and Drewien 1993; Gillen 2010), and while retaining its leaves during drought is prone to extensive mortality events if subject to lengthy inundation (JR, personal observations).

The vegetation in the area occupied by the Night Parrot around Cooroomunchena in 1979 is therefore likely to be highly variable, in terms of floristic composition and biomass, depending on antecedent conditions. At the time of Parker's observations, following the above-average rainfall of 1973-76 and 1978-79 (Web4), the country was probably in optimal and even exceptional condition. As well as the dense stands of Tangled Poverty Bush documented, there may have been a rich flora of short-lived, autumn-winter growing-season species, including daisies (Asteraceae), 'annual' *Atriplex* species and other chenopods, as well as many of the species listed in Table 2 and Appendix 3. However, in the more customary extended drier periods, these same floodplains carry scant vegetation, and we believe these habitats would be unsuitable for Night Parrots under such 'normal' conditions.

The preceding speculation leads us to consider the Night Parrot's residency status in the Cooper Creek region. All the evidence from six years of intensive study of a population on the Pullen Pullen Reserve (Diamantina River drainage) in

Table 2. Visual estimates of mean cover and height of woody and more substantial herbaceous plants around two automatic sound recorders, located in 2015 on the eastern margin of 'Lake Cooroomunchena', Cooper Creek, at *ca* 27° 47′ 30″S, 139° 32′ 0″E. Only the groundlayer species and categories at the bottom of the table sum approximately to 100%, as the cover of shrubs and trees was estimated in different strata.

Species	Lifeform	Cover (%)	Height (m)
Eucalyptus coolabah	Tree	3.1	7.2
Acacia salicina	Tall shrub-Small tree	1.1	3.8
Acacia stenophylla	Tall shrub-Small tree	0.3	3.3
Hakea leucoptera	Tall shrub-Small tree	0.1	3.0
Eremophila bignoniiflora	Tall shrub	0.5	3.8
Acacia oswaldii	Tall shrub	<0.1	2.8
Acacia victoriae	Tall shrub	3.7	2.2
Acacia murrayana	Shrub	0.5	1.4
Eremophila longifolia	Shrub	<0.1	1.4
Duma florulenta	Shrub	5.3	1.3
Chenopodium nitrariaceum	Shrub	0.6	1.2
Acacia ligulata	Shrub	0.8	1.2
Rhagodia spinescens	Shrub	<0.1	1.0
Atriplex nummularia	Shrub	<0.1	0.8
Enchylaena tomentosa	Small shrub	2.2	0.9
Tecticornia indica subsp. *leiostachya*	Small shrub	0.1	0.6
Sclerolaena intricata	Small shrub	0.5	0.2
Teucrium racemosum	Small shrub	0.3	0.2
Sclerolaena diacantha	Small shrub	0.1	0.1
Senecio lanibracteus	Robust forb	0.4	1.0
Crotalaria eremaea	Robust forb	0.4	1.0
Solanum oligacanthum	Robust forb	0.7	0.6
Swainsona laxa	Forb	0.7	1.2
Salsola australis	Forb	1.0	0.2
Haloragis aspera	Forb	0.7	0.1
Zygochloa paradoxa	Hummock grass	2.0	1.0
Cynanchum floribundum	Hummock grass (Forb)	0.4	1.0
	grasses	*13*	
	ephemerals	*3*	
	litter	*13*	
	bare ground	*58*	

western Queensland points to the species being sedentary, with adults occupying stable roost sites in Bull Spinifex *Triodia longiceps* (Murphy *et al*. 2017b; S. Murphy and N. Leseberg, pers. comms). A GPS-tracked bird there was found to travel widely each night, within a radius of about 10 km from its roost site, to (presumably) feed in alluvial landscapes supporting very different vegetation to that around roost sites (Murphy *et al*. 2017b).

The distribution of Lobed Spinifex in the Strzelecki Desert about Cooper Creek is patchy but, in the more richly coloured dunes away from the downwind margins of floodplains, patches of *Triodia* can be moderately dense (Reid and Gillen 1988). There are examples of these *Triodia* patches near Stuart's specimen locality south of Lake Lady Blanche (JR, personal observations), in the Coongie Lakes district (Reid 2000) and around Cooroomunchena (Wilson 1980; JR, personal observations), while there are also extensive dunefields within the region that are dominated by Lobed Spinifex, e.g. east of the upper Strzelecki Creek, south of Innamincka, and between the Cooper floodplain and gibber plains around Mungeranie (LAB 1986; Reid and Gillen 1988; JR, personal observations).

Extensive patches of samphire are also widely distributed in the Cooper Creek region (LAB 1986; Reid and Gillen 1988; Gillen and Drewien 1993; Gillen 2010), being especially prominent in the North-West Overflow of the North-West Branch, west of Coongie Lakes, and the lower reaches of Cooper Creek, including downstream of Waukatana WH (Badman 1989; Gillen and Drewien 1993; Gillen 2010). Nitre Bush has also concealed a roosting Night Parrot (P. Gee, record 33), but this species is less widely distributed in the Cooper Creek region, occurring as extensive stands mainly in the lower reaches of Cooper Creek and Strzelecki Creek, such as the Cobbler Sandhills.

We conclude, therefore, that structurally suitable roosting and nesting habitats exist throughout most of the region. However, there are areas of floodplain largely devoid of dunes with *Triodia*, and devoid of samphire, which may be occupied only temporarily by Night Parrots; the Cooroomunchena area is an example of such a landscape. We speculate that some local nomadic behaviour by the species would allow for the temporary occupation of productive floodplain landscapes following large floods and sequences of heavy rainfall, when the luxuriant vegetation would provide a diversity and ample supply of seeds. Presumably the Night Parrot could make temporary roosts in the more substantial individuals of Tangled Poverty Bush, or in samphire or Lignum which would generally be present in or about such landscapes.

CONCLUSION

This review includes reports of the Night Parrot from many parts of South Australia, which reflect its historical extent of occurrence. More recent reports are restricted to the far north and north-east of the State and Flinders Ranges. In no respect should these widespread reports be construed as challenging the Night Parrot's accepted status as rare and endangered (Garnett *et al.* 2011; Murphy *et al*. 2017a, b, 2018), recently as Critically Endangered (Leseberg *et al*. in press). The records are few and are the product of years of arid zone experience by many careful observers, some long unrewarded in their quest (e.g. Kimber in Olsen 2018; Ellis 1982). We are uncertain how to interpret this sparse record and whether it indicates the continuous presence of Night Parrots across northern South Australia in very low densities, as inferred by Leseberg *et al.* (2020). The species' exceptional capacity to remain hidden, as reported here, might support that inference. Alternatively, we do not discount the possibility that the very occasional valid sightings are of birds that have dispersed from more productive portions of the species' range in Queensland and WA.

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Web6: https://www.naturalresources.sa.gov.au/aridlands/news-resources/news/Night_parrot_an_elusive_bird
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Web8: https://earthexplorer.usgs.gov (accessed 18/10/2020)

APPENDIX 1. South Australian Night Parrot records

Here we list only reports for which we have obtained reasonable documentation, either directly or through reliable third person sources. Included are all accepted by Shane Parker in his SAMA file document, shown as (SAP). In many cases exact details are not known and may be given as at the nearest named place with only an approximate date. Each record is numbered according to its listing in Table 1 and, with the exception of doubtful records, on the map (Figure 2). The records are grouped according to geographical region of SA. One record from Victoria is included in the Murray Mallee region because it is very close to the border with SA and because it is a southerly record of potential significance.
Abbreviations: HS = Homestead, SA = South Australia, WA = Western Australia, WH = Waterhole.

North East

1. East of Lake Toontoowaranie, 1845 (SAP)
John McDouall Stuart was the surveyor on Captain Charles Sturt's expedition to Central Australia, which by October 1845 was in the Coongie Lakes, Cooper Creek region. While crossing 'a plain of great breadth' on which was growing 'samphire, salsolae, and mesembryanthemum', Stuart shot the specimen of 'a beautiful ground parrot' (Sturt 1849, Vol. 2: 34-35). It is not clear whether this occurred on 15 or 16 October (Sturt 1849); in his journal Sturt gave the date for the locality as the 16th (Davis 2002) but without reference to either Stuart or the parrot. Reid (2000) assessed the likely locality

as some 20 km east of Lake Toontoowaranie and south of Lake Lady Blanche.

Speculation concerning Gould's presumed error in the specimen's initial identification (see Introduction) allows that he sent (Forshaw *et al*. 1976) or even sold it (Olsen 2018: 30) to Lord Derby, in whose collection it passed to the World Museum, Liverpool, where it now resides (D640c, Figure 1; Fisher 2017). An entry for the specimen in the Derby Stock Book in Liverpool under *Pezoporus formosus* [= *wallicus*] provides support for such suggestions: 'D640c. Presented by Capt. Sturt per Mr Gould, Nov. 1847' (Clem Fisher *in litt.* to AB 9/11/2018). Yet Sturt made direct donations to Lord Derby, and Sauer (2001) published several of Derby's letters to Gould that highlight Sturt's generous intentions towards Derby. Moreover, one box of specimens intended for Derby did go astray, not to Gould (*pace* Olsen 2009) but to another un-named collector and retrieval of that box, perhaps containing the Sturt/Stuart specimen, was facilitated through Gould's establishment; we find no evidence that Gould sold Derby any Sturt material (Sauer 2001). It is plausible that Sturt knew that Gould would not need another Ground Parrot specimen and included it among those intended for Derby. Gould might never have possessed it and almost certainly never saw it. In 1928 Gregory Mathews reidentified the specimen and Forshaw *et al.* (1976) brought it to the world's attention.

5. Cooper Creek, 1875 (SAP)
F. W. Andrews (1883) wrote that he 'shot some specimens at Cooper's Creek in 1875 … They were in that district observed to conceal themselves during the day in the thick patches of shrubby samphire, on the salt flats bordering on the creeks and on Lake Eyre.' This was during the Lewis Lake Eyre Expedition of 1874-1875 but only one specimen was reported among the expedition's collection; it is now in Museum Victoria (NMV B36256, Black 2012; Forshaw *et al.* 1976). Andrews's statement is misleading, since Lewis's journal (Lewis 1876) shows that Andrews was directed away from Lake Eyre because there was 'nothing for him to collect' there. He rejoined the main party to explore Cooper Creek during May 1875 from about Lake Hope upstream and was camped on a lagoon at 27° 25′ 49″ S between 17-25 May, with full moon on 20 May. Around full moon was the most likely time when Andrews collected Night Parrots, as evidenced in a letter (State Records of SA GRG19/333) he sent from Moonaree, Gawler Ranges, 25 November 1883, to the SA Institute Museum Director J. W. Haacke: 'next moon is the time at which I have always obtained night parrots there.' The stated latitude of the lagoon is at Munjoorooanie WH and that appears likely to be the collection locality of the Night Parrot.

9. Innamincka Station, approx. 1880-1885 (SAP)
Alfred Walker (*ca* 1851-1933) was manager of Innamincka Station, Cooper Creek, and saw Night Parrots there 'in the eighties'. They disappeared from the district 'after an invasion of cats which came from New South Wales'; the last parrot was seen in 1885 (Campbell 1915; Whitlock 1924). No habitat information was given but during Walker's careful management of the station from 1880 to 1908, whenever floodwaters of the Cooper Creek receded, 'the feed grew so luxuriously that sometimes it was thick and tall enough to hide the cattle' (Anon. 1933).

17. Between Mungeranie and Lake Appadare, 1922
Hurtle John Lewis (1884-1939), familiar with Night Parrots in the late 1890s, said that 'after the great 1902 drought' they vanished from most parts (Lewis 1931). The last he observed were 'in the big spinifex [*Triodia*] bunches between Mungerannie [HS] and Lake Appadare', Cooper Creek, in 1922. Two birds 'hopped' from a spinifex clump beneath Lewis's camel's feet, on the top of a large sandhill; both 'gave three little squealy chirps, then flew a short way and rested in the spinifex.' Their nest, secreted inside the spinifex, contained three small white eggs. Lewis was born at Beltana, Flinders Ranges, and was a dogger (Rufus 1930) and kangaroo shooter

(World War I service records, Web5). He wrote articles in SA newspapers in the 1920s and 1930s about life in the Flinders Ranges, northern SA and western Queensland, so probably encountered Night Parrots in several localities in the 1890s.

20. Mulka, 1931
In the early 1930s Mounted Constable George Aiston was living at Mulka HS on the Birdsville Track, north of Cooper Creek, and reported that his cat had caught what he thought was a Night Parrot and taken it up on top of a shed. When asked to recover feathers, Aiston explained that after more than three inches [76 mm] of rain in March, any feathers would be mixed up in the rotting thatch of the shed (Vox 1952). That rain event took place in March-April 1931 (*The Advertiser and Register*, 2 April 1931: 10, 9 April 1931: 11) so the parrot was caught some time before then.

25. Lake Kopperekoppinna, 1977
While travelling cross-country in mid May 1977, Joan and John Osborne made a stop towards evening, among dunes with spinifex near a boomerang-shaped lake, in overcast conditions with light drizzle. While out of the vehicle, Joan saw a bird walk out of one spinifex clump near her and into another clump: 'definitely a parrot, greeny-brown with a fat head and a fanned scruffy tail.' The recollected locality (as related years later to JR) was confused but concluded as between Lakes Kopperekoppinna and Gregory, and thus south-east of Cooper Creek on Etadunna Station.

26. Eastern shore of 'Lake Cooroomunchena', Cooper Creek, 1979
See main text for full report.

28. Dalhousie Springs, 1982
On 24 September 1982 at 7.30-8.00 pm, while driving to Alice Springs with vehicle lights on high beam, R. G. (Dick) Kimber flushed a parrot with a green back and yellow belly that had been drinking from a pool of water on the road about 17 km NW of Dalhousie Springs (*in litt.* to S. A. Parker 28/9/1982). The bird flew low to the ground and landed about 20 metres away at a little gilgai surrounded by a dense scatter of 2 ft high saltbushes but could not be flushed from there; spinifex and samphire occurred within 1-2 km of the area. Kimber was not confident of its identity so the record remains doubtful.

29. Lake Walpayapeninna, 1986
Daryl Bell reported 'three bright green medium sized parrots with short tails' at the southern end of Lake Walpayapeninna, Cooper Creek, in July 1986 (Badman 1989: 69). He observed them through the scope of a rifle over the course of about an hour soon after sunrise as they fluttered from shrub to shrub, remaining near the ground at all times. Their legs and tails were short, and they were unlike any parrot seen previously, a mottled green and the size of a fat 'budgie' (Budgerigar *Melopsittacus undulatus*). They were in moderately dense samphire, Old-man Saltbush and stunted Coolibahs (*in litt.* to AB 7/11/2018, 7/11/2020).

30. Lake Toontoowaranie, 1987
At about 9.00 pm on 2 February 1987, while driving along the south-western margin of Lake Toontoowaranie (Coongie Lakes region) at about 20 km/h, Julian Reid (Reid 2000) flushed two plump perhaps greenish (colour 'bleached' by headlights) parrot or pigeon shaped birds about 5-10 m ahead. They rose off the track quail-like and flew unerringly directly ahead and out of sight. The habitat in the vicinity comprised patchy, open Lignum, Golden Goosefoot and Tangled Poverty Bush shrubland on the edge of a floodplain, with the most prominent 'annuals' being the small saltbushes, *Atriplex pseudocampanulata* and *A. crassipes*, a spurge *Euphorbia wheeleri*, purslane *Portulaca oleracea*, Nardoo and Roly-poly *Salsola australis* (data from Site 4W, in Reid and Gillen 1988).

31. Lake Marradibbadibba, 1987
At about 9.00 pm on 12 August 1987, Julian Reid (Reid 2000) heard a small group of birds, giving

a repeated, distinctive but unrecognised guttural call, as they flew from the south directly towards the southern shore of Lake Marradibbadibba (Coongie Lakes region). The calling stopped as the birds drew level with the shore about 100 m to 200 m distant and resumed about two minutes later, as the same guttural call was heard from the birds returning south. Also audible was the sound of wing beats, distinct yet different from those of Bourke's Parrots *Neopsephotus bourkii*. The unseen birds were assumed to drink at the bare shoreline, and a sparse fringe of Coolibahs grew *ca* 10 m back from the water's edge. The birds were flying over sand dunes sparsely vegetated with Sandhill Canegrass and (in patches) Lobed Spinifex.

39. Deparanie Waterhole, 2005
An hour or two after sunset one evening in October 2005 Jake Gillen, camped at the eastern end of Deparanie WH (*ca* 40 km upstream of Cooroomunchena WH, see record 26), Cooper Creek, heard one or two birds calling while flying immediately to the east and overhead. The call was a double frog-like sound 'rook rook' or 'roke roke' or 'gruk-gruk, gruk-gruk' with the first note slightly higher than the second. This call was preceded by a plain (not shrill) whistle call. The calls sounded like two individuals communicating. The habitat was Cooper Creek floodplain with Coolibah and Lignum and open patches with ephemeral vegetation.

41. Kallakoopah Creek, 2009
About 20 minutes after sunset on 8 July 2009, a typically fast-flying parrot was seen by Richard Green and viewed immediately through binoculars. It was small with a very short tail and the wing shape and movements were atypical, wings straight, not swept back, and rounded, not pointed, wingbeats fast and fluttery. It made one circle around before continuing in its original direction. The bird was in view for about 10 seconds before it disappeared behind the tree canopy. It was flying about five to eight metres above the ground, so was viewed chiefly from side on. The locality was reported as Warburton River but, according to the coordinates provided, would have been Kuncherinna WH, Kallakoopah Creek (SARC 13, Black *et al.* 2020).

44. Kalamurina Sanctuary, 2017
An ABC report featured a fairly fresh, unweathered feather said to have been found by John Young in the nest of a Zebra Finch at Kalamurina Wildlife Sanctuary in July 2017 and confirmed as a Night Parrot feather at the Western Australian Museum (McCarthy 2017). It also showed the finch nest lining with the Night Parrot feather but unlike the former, this feather appeared weathered. The patterns on the two feathers were also recognisably different. When only the neater of the two was presented to SAMA in September 2018, its representative asked the Australian Wildlife Conservancy (AWC) for details about the provenance of both feathers. AWC requested but failed to obtain answers from Young, and so appointed an independent panel of inquiry, which found insufficient evidence to confirm the presence of Night Parrots on Kalamurina (Menkhorst *et al.* 2020).

45. Coongie Lakes, 2019
Acoustic recorders set up in the Coongie Lakes Ramsar project site by SA Arid Lands NRM staff captured possible Night Parrot calls, later analysed by Nick Leseberg and Steve Murphy (Web6; R. Brandle *in litt.* to AB 16/6/2020). Two calls were the Pallid Cuckoo *Cacomantis pallidus*-like calls, which are problematic whenever they are detected, a third being a faint 'didit' call that could not be assigned to another species (S. Murphy *in litt.* to AB 23/9/2020). Further investigation is continuing in the area.

Gawler Ranges

2. Nonning Station, 1867 (SAP)
This was a live bird (collector unknown) forwarded by Charles Ryan, pastoralist and lessee of Nonning Station, to Ferdinand von Mueller of Melbourne who sent it by ship to the Zoological Society of London, where it was

received on 17 November 1867 (Sclater 1867; Olsen 2018: 38). The bird died near the end of January 1868 and was preserved as a skin and sternum plus pectoral girdle (Murie 1868) and is now in the Natural History Museum, Tring (BMNH 1868.4.15.3/BM 1990.7.1, Black 2012). White (1913d) stated that F. W. Andrews 'made his headquarters at Nonning' when collecting in the Gawler Ranges but he is most unlikely to have been responsible for this bird; the first documented receipts of Andrews's birds from the Gawler Ranges were in 1871 (Black 2014).

3. Yardea Station, 1872 (SAP)
A specimen collected by F. W. Andrews on 12 November 1872 (three days before full moon) at Yardea Station is in the Australian Museum (AM O17831, Forshaw *et al.* 1976). Another specimen (AM O17832) bears the same date but its locality is simply recorded as 'Gawler Ranges'; it too was almost certainly from Yardea. According to S.A. White, Andrews's collecting locality of the SAMA specimen (B8118) was 'a small well south-west of Lake Gairdner' (Anon. 1911); Yardea HS is situated some 33 km south-west of the lake and the well may have been on Yardea Station, but see the next record.

4. Murnea Rockholes, early 1870s (SAP)
This locality, 8 miles from (13 km south of) Moonarie HS (now Moonaree) has been widely assumed to be one of F. W. Andrews's main Night Parrot collecting localities and, although better described as west of Lake Gairdner, could be the 'small well south-west of Lake Gairdner' (Anon. 1911, see above) if White had mis-interpreted a rockhole as a well. In a letter Andrews wrote from Moonaree HS to SA Institute Museum Director J. W. Haacke on 25 November 1883, he said:

> My journey tomorrow is 8 miles through nothing but heavy sand. I shall take all my things and rations and not return here but work away until Mr Davies calls for me, when I shall go on to Yardea. Next moon is the time at which I have always obtained night parrots there.

Horton *et al.* (2018: 257-258) assumed for this and other reasons that Yardea was Andrews's main collecting locality for Night Parrots. However, detailed reading of Andrews letters archived in the SAMA Bird Section and State Records of SA (GRG19/333) shows that the Moonaree Station/Murnea Rockholes area was the main focus for his apparently unsuccessful attempt to find Night Parrots in 1883 and therefore likely to have been where he collected at least some of his specimens in the 1870s. This is supported by a letter from then SA Institute Museum Curator F. G. Waterhouse to E. P. Ramsay at the Australian Museum, 24 August 1874, stating that 'our collector went expressly nine miles' to collect Night Parrots (Ramsay Papers, Mitchell Library; Olson 2018: 42-43) – possibly the '8 miles' from Moonaree HS to Murnea Rockholes stated by Andrews in his letters of 1883. There are, however, no known specimens labelled as from Moonaree or Murnea. A letter Andrews wrote on 17 December 1883 to SA Institute (Museum) Secretary Robert Kay stated that the rockholes were 'in the mallee sandhills', and further evidence for the habitat is provided by his collection there of Malleefowl *Leipoa ocellata* (Andrews 1885). The only extensive area of deep sand within 'eight miles' of Moonaree HS is a band running roughly east-west to the south and west of the homestead (Wakelin-King 2009) and Murnea Rockholes are immediately south of it.

7. Coralbignie Station, 1880
This record has not been verified. Referring to his own 'Coralbignie Camp' some four miles (6.5 km) NE of Coralbignie HS on the track to Nonning, Sutton (1926) noted that F. W. Andrews had obtained the Night Parrot 'near this place in 1880'. He added 'but there are thousands of acres of porcupine grass [*Triodia*] on the Gawler Ranges and its spurs round about Coralbignie and Nonning' (Sutton 1926: 178), so it is possible he was referring to a collection

made on Nonning Station. Furthermore, we have no evidence that Andrews collected Night Parrots in 1880 (Horton *et al.* 2018; Olsen 2018).

8. Between Lakes Gairdner and Acraman, possibly 1880
A specimen with this information, collected by F. W. Andrews, is in the American Museum of Natural History (AMNH 623833; Forshaw *et al.* 1976; Greenway 1978) and is the holotype of Mathews' (1915: 129) subspecies *Geopsittacus occidentalis whiteae* (Mathews number 8954). This locality was probably on Moonaree Station, or possibly Yardea. S. A. White stated that an early owner of Nonning Station obtained the specimen from Andrews and sent it to a relative in Scotland (Rufus 1929); Mathews persuaded its Scottish owner to part with it for £50. The entry in Mathews' Daybook states: '8954 – South Australia, Newman 22-4-12', Newman being the person he bought the specimen from (M. LeCroy, AMNH, *in litt.* to S.A. Parker 3/1/1980). The possible year of collection is in doubt, as above.

35. Yardea Station, 1992
One late morning towards the end of September 1992, Allan Lees flushed two parrots from flourishing one-metre high 'cottonbush' [Silvertails] *Ptilotus obovatus* on southward-sloping rocky ground above a sandy flat near the northern boundary of Yardea with Moonaree Station, about 5 km SW of Murnea Rockholes. Each bird flushed from almost under his feet, about 15 seconds and 5 m apart, and rose abruptly to about 1.5 m before flying low and directly away downslope, becoming lost beneath a small stand of Mulga 100 m distant. Each uttered an alarm call of 6-7 syllables, resembling that of a Budgerigar. *Triodia* was abundant on hills to the west and samphire equally so on the shores of Lake Gairdner to the east. The observer is red-green colour-impaired but assessed the parrots as similar in size, shape and in their strong flight to a Musk Lorikeet *Glossopsitta concinna*; he particularly noted yellow in the tail between its darker centre and outer edge. He had visited the Murnea Rockholes area about annually for more than 20 years, hoping to encounter a Night Parrot, and was uncertain of his identification at the time. The birds were distinguished from quail and other parrots that occur there, larger than a Budgerigar and differing from Port Lincoln Parrot [Australian Ringneck] *Barnardius z. zonarius* and Mulga Parrot *Psephotellus varius* in flight pattern and tail length. Publication of images of a Night Parrot in flight in WA has enhanced his belief in the identity of his birds. The year 1992 remains the wettest on record for the Gawler Ranges and Eyre Peninsula (Web4).

North West

6. Cootanoorina Station, 1870s to 1880s (SAP)
John McDonald lived on Cootanoorina Station in the late 1870s to early 1880s and reported that Night Parrots were fairly numerous at that time but were only ever seen singly when flushed from *Triodia* after the clumps were disturbed such as during mustering. The birds would fly 20 to 40 yards, drop to earth suddenly, then run off at right angles to the line of flight. When flying to and from waterholes in the evening, apparently several birds in company, they frequently uttered 'a sweet low two-note whistle'. He observed several nests in *Triodia* and also one in a samphire bush 'in the vicinity of the dry salt lakes' (McGilp 1931). S. A. Parker (unpublished notes) considered that this was most likely near Lake Conway and with Terry Sim made a field trip to that lake in September 1978; they found no evidence of Night Parrots.

11. Macumba Creek, 1899
Brothers Angus and Kennie McKenzie took a lease of '700 to 800 miles of Macumba Creek country' in about 1899 (Vox 1938, 1950). When asked if he had ever seen or heard the Night Parrot, the former said that he had caught one in tall grass, but it got away from him. He told Sir Edward Stirling, who took him to view parrot specimens at the Museum and asked him to pick out the Night Parrot. McKenzie 'selected one with green and black feathers, and that satisfied

Sir Edward' (Vox 1950).

12. Tomkinson, Mann and Musgrave Ranges area, 1902/1907
In a letter (held SAMA Bird Section) of 1 March 1968 to Patrol Officer David Stewart (Weapons Research Establishment, Woomera), Patrol Officer B. J. Verburgt described a sighting of Night Parrots in central northern WA in August 1966, made by himself and guide Tommy Dodd, an elderly Aborigine living at Musgrave Park (Amata) (Web7). Notes with the letter state that 'Tommy Dodd accompanied the Hann Expedition in 1902 or 1907 when several of these [Night] parrots were collected in the Tomkinson, Mann and Musgrave Range areas.' Bushman and explorer Frank Hugh Hann made two journeys from Laverton, WA, to Oodnadatta, SA, and back in 1903-1904 and 1906-1907 (Donaldson and Elliot 1998). His diaries occasionally mention birds, usually those shot for eating, but no Night Parrots; however, the diary for Oodnadatta to Laverton in 1904 is missing and could potentially have noted the capture of Night Parrots.

18. Macumba Station, 1926 (SAP)
J. B. Cleland visited Macumba Station during the first week of January 1927 and was told by Mr Kempe, the station manager, that the Night Parrot 'had been seen unquestionably by one of Mr. Kempe's hands a few months previous to our visit in "spinifex" (*Triodia*) country near the station' (Cleland 1927). By this locality Cleland would almost certainly have meant near the homestead and the date may have been around September 1926.

19. Wantapella Swamp, late 1920s
R. G. (Dick) Kimber made notes of an 8 August 1974 conversation with Frank Sprigg who was told of the then elderly prospector Charlie O'Toole's recollection of seeing Night Parrots in the 'level stony desert land with spinifex' in the area of Wantapella Swamp in the late 1920s. O'Toole and other workmen had heard them fly in at night and, while riding, an occasional bird had been flushed in daylight. 'They flew very low to the ground, in a wave-motion, then landed a very short distance away and ran very fast, keeping low and concealed' (*in litt*. Kimber to S. A. Parker 7/1/1985). Kimber also found evidence in the State Library of South Australia that explorer R. T. Maurice recorded a 'green porcupine parrot'; this was in an unannotated list of mostly mammals that appears to have been pinned to another document dated 1897 (PRG 762/3/2/21 & 22). Elsewhere in the Maurice papers, Kimber had noted that the parrot may have been captured in a net near the SA/NT/WA border around 1896 (*in litt.* to IM 29/11/1990) but an examination of files there by Kimber in January 1990 and by AB on 21/12/2018 and 4/1/2019 (PRG 762/3) failed to rediscover the relevant document.

21. Near NT border, 1933
At 'an abandoned station near the border of South and Central Australia', shortly before February 1933, two Aborigines flushed a Night Parrot from porcupine grass while out rabbiting. Not having seen them since childhood, they were excited to inform "Old Jack" of Oodnadatta, who considered the report reliable enough for him to load his camels with rations and make a search. While still fairly numerous in the early 1880s, the Night Parrot was by 1933 considered extinct in the area (Barrett 1933).

22. 100 miles NW of Oodnadatta, 1934
A newspaper report of March 1934 stated that a bushman had seen a Night Parrot 'about 100 miles [160 km] north-west from Oodnadatta' and that 'Recently several experienced bushmen have reported having seen Geopsittacus Occidentalis in the far north of South Australia and west of the railway to Alice Springs' so that 'naturalists have reason to believe that the night parrot, for many years regarded as "lost," or on the verge of extinction, still exists' (Anon. 1934).

27. Between Watson and Cook, and between Ooldea and Fisher, early 1980s?
Sid Dooling, Welfare Officer, reported that Night

Parrots had been seen between the above railway sidings on the Nullarbor Plain. They were 'sighted only at night, feeding in pairs; green olive with dark markings through it; longer tail and legs than budgie.' Dooling made it clear that he recognised Inland Dotterel *Peltohyas australis*, Port Lincoln Parrot, Eastern Bluebonnet *Northiella h. haematogaster* (near Tarcoola), Australian Bustard *Ardeotis australis* (in big numbers that year) and Owlet-nightjar *Aegotheles cristatus* (near Immarna) (notes made by AB at Watson, south of Maralinga, 27 August 1983).

32. South of Marla, 1989
On 29 September 1989 Bob Eveston was transporting stock from the Alice Springs area south along the Stuart Highway. Darkness fell at Kulgera (25°50′ S), and as he was driving in the dark, he noticed a bird hit the front of the truck some distance south of Marla. He reached R. (Dick) Gloster's property Albemarle Station, 150 km south of Wilcannia NSW, three days later, where Gloster noticed the bird caught in the radiator grill. It was patterned or speckled green and yellow and had a parrot's bill. Using a number of bird identification guides, he determined that the bird was a Night Parrot, but threw it away before realising its significance. Later he noticed that photographs in Inder (1991) of the Night Parrot found by Boles in October 1990 agreed exactly with the bird he had removed from the radiator grill. He was well acquainted with birds in the area of his property and remained confident of the Night Parrot identification. (Pers. comm. to IM 23/7/1991; per Joanna Gloster *in litt.* to AB 11/11/2018.)

33. Angle Pole Waterhole, 1989
On 10 October 1989 Philip (Phil) and Ifeta Gee parked by a relatively isolated 1.5 m diameter Nitre Bush immediately beside Angle Pole WH, about 7 km NW of Oodnadatta in the floodplain of the Neales River, in an area of Nitre Bush with scattered *Acacia salicina* and *A. victoriae* but no *Triodia*. The Gees boiled the billy for morning tea and bird-watched within three feet (< 1 m) of the bush. Their terrier was harassing what they assumed was a rabbit in the bush, but after half an hour of harassment a parrot ran out and flew off in front of Phil. The dog gave chase but Phil called it back and the parrot landed on the ground about 15 m away. Phil observed it with binoculars for about 30 seconds in flight and on the ground. His immediate thought was that it looked like a Night Parrot and he noted that its cryptic colouring was yellower than he might have expected, more yellow than green. He also noted that it was plump, it gave a piercing look from its near-side eye as it flew by, and its flight was low (chest-height) and rather clumsy. He remains in no doubt that it was a Night Parrot. (P. Gee, pers. comm. to PH, 2018, 2020.)

36. 55 km east of Welbourn Hill, 1993
Returning to Mintabie one evening in August 1993, R. (Bob) Sim was driving along the Oodnadatta to Marla Track when, just on dark at 55 km east of Welbourn Hill, a bird flew from the roadside into the lights of the vehicle, where it was briefly visible. It was identified as a probable Night Parrot based on its size and colour, that identification reinforced by his observation (40) below. Recent rains had resulted in extensive growth of seeding green grasses. (*In litt.* to AB 5/3/, 30/4/, 27/10/2018.)

37. Arckaringa, 1995
In late September 1995 while spotlighting after dark on the road north of a biological survey camp, Ralph Foster saw a group of five stocky green parrots fly diagonally from the left rear through the headlights for 2 to 3 seconds about 5 to 6 m ahead and into the darkness to the right. The vehicle was travelling at approx. 40 km/h and the birds, on a similar trajectory, were travelling faster with a reasonably rapid wing beat and a direct flight. Foster saw them well and thought they were possibly Night Parrots. The impression was of an all green bird with paler, yellower flanks. The locality was a flat with reasonably good grass and forb cover but no *Triodia* unless in nearby rocky hills. (Pers. comm. to PH, April 2018.)

38. Near Port Augusta, 2001
One evening in late November 2001, Maxine and Glyn Francis were driving along a levee bank about 12 km SSE of Port Augusta, in an area of samphire flats with mangrove swamps 200-300 yards (metres) away. They saw two parrots on the ground ahead, appearing to pick up bits off the side of the road. As they proceeded the birds flew ahead several times, flying low and always landing on the ground, and calling softly to each other. They watched the birds for about 10 minutes until it was too dark to see where they went. The parrots were dumpy with short tails and a heavier build, and softly mottled green. Their posture was more horizontal; the birds did not 'sit up'. At the time, they did not know what the parrots were; they were unfamiliar with neophemas and did not consider Night Parrot. In mid-2018 Maxine saw a Facebook discussion about Night Parrots, including video footage, and immediately felt that their parrots were the same (pers. comm. to PH 2001, 2002, 2018). PH visited the site in December 2018 and found the habitat suitable for Elegant Parrots *Neophema elegans*; confusion with that species could not be ruled out.

40. 30 km west of Oak Valley, 2007
At 8 am on 27 September 2007, a warm and sunny morning, R. (Bob) Sim, Principal at Oak Valley School, was driving on Business Road to Tjuntjuntjara, 30 km west of Oak Valley. A bird rose from a very green roadside patch of vegetation in a football-oval sized depression that had contained shallow water extending 100 metres to the north following good rains. The open area contained Mulga and scattered spinifex and shrubs including chenopods but was surrounded by extensive areas of dense spinifex in open mallee. Similar green patches were dotted along each side of the road, up to several acres (a few hectares) in extent over at least 40 kms. Grasses were at the stage of seeding. The bird was flushed by the approaching vehicle and flew up, almost hitting the bull bar and passing the windscreen and driver's open window, before diving back into vegetation. It initially spread both wings and, being close as it was flushed, it gave a very good view. It was immediately recognised as a Night Parrot by shape, the size of a well-fed Red-rumped Parrot, plump with a rather stumpy tail; distinctive colouring, green and yellow above, more yellow below, and 'herring bone' or cross-hatched plumage. In both this and Sim's sighting above, the birds' immediate response on being startled was to return to ground cover rather than fly into the distance. (*In litt.* to AB as 36 above.)

Flinders Ranges

14. Between Port Augusta and Mount Brown, before 1911
In October 1911 S. A. and Ethel White made a field trip to the Port Augusta district (White 1912b). S. A. White's field notes for 12 October 1911 state that the man in charge of horse-drawn transport for the latter part of this trip was T. Ash (State Library of South Australia PRG 335/49/23/2). Previously the Whites had been at Mount Brown in the ranges and on 12 October they made their way down to the plain where they reached 'a piece of country covered in low acacia & tobacco trees where Ash had seen Geopsiticus [*sic*] some time ago. We hunted all through it but failed to find a trace of them. Shot male white-winged wren, …' That White-winged Fairywren *Malurus leucopterus*, a male now held in SAMA, bears a label stating that it was collected in 'salt bush south of Port Augusta'. Thomas Catterns Ash (1871-1957) moved with his family from Moonta to Port Augusta in 1880 (Anon. 1927), so his observation of Night Parrots was most likely made at some time from the early 1880s to early 1900s.

23. Neuroodla, 1963-1970 (SAP)
On five occasions Brian Powell observed what he believed to be Night Parrots about eight miles (13 km) west of Neuroodla Railway Siding, usually flushing them while mustering cattle (Powell 1970). The habitat was of annual and perennial saltbush *Atriplex* spp. with some

bindii *Sclerolaena* sp. and Blackbush *Maireana pyramidata*; there was no *Triodia* for 'several miles' distant. When flushed the birds would fly approximately 50 metres keeping very low to the ground and on landing would quickly rush to cover. Powell (1970) gave no dates but had made the observations after arriving in the region in 1963.

24. Partacoona, 1969 (SAP)
On 15 August 1969 at about three miles (5 km) north of Partacoona HS, Brian Powell (Powell 1970) flushed a single bird while droving sheep across an area of Wards Weed, annual saltbush, bindii and spear grass *Austrostipa* sp.; there was an area of *Triodia* two miles (3 km) to the west. Powell observed the bird for 15 minutes and from as close as six feet (2 m), noting that it was dark green with an overlay giving it a mottled appearance, and had a yellow cheek patch and dark feathers along the edge of the wing. It was the same size as or larger than a Red-rumped Parrot, squatted very tightly to the ground and when disturbed darted from the bush very quickly, hugging the ground closely. It preferred to run for cover and would only fly when really pressed. Powell (1970) commented in relation to this parrot and those seen west of Neuroodla, that they were almost impossible to find unless nearly trodden on.

34. SE of Arkaroola, 1990
On 27 April 1990 Brett Schuppan was with fellow geology students from Flinders University halfway up a steep quartzite gully a few km SE of Arkaroola. A boulder became dislodged, flushing a bird from a spinifex clump to Schuppan's left (*in litt.* to *Australian Geographic* 12/11/1990; pers. comm. to IM 5/2/1991). The bird flew a few metres in front of him, close to the ground, before dropping into spinifex 20–30 m to his right. He recognised it as a Night Parrot as he was familiar with its picture from field guides. It appeared dark green with the black mottling standing out and a body shaped like a large Budgerigar with a 'stumpy' tail. He attempted to flush the bird a second time but was unsuccessful.

42. Hookina Creek, 2014
NW of Hawker near Hookina Creek in mid July 2014, David Hunter, an experienced station worker, was moving cattle along a fenceline and through a gutter when he saw a small parrot walking/hopping around in the shallow, sandy gutter. He was able to approach on his motorbike to within 2 m. The bird was calling. It was 'a carbon copy' of the recently released John Young Night Parrot photos, 'darker than a budgie', its tail was 'not like a normal parrot tail, more rounded/broad at the end' and its beak was different from other parrot beaks, having a 'broader, dished' shape. The site is in gently undulating country supporting Blackbush nearby and at the time of the sighting had a thick carpet of ankle-high green Wards Weed and Cannonball *Dissocarpus paradoxus* following significant rainfall in April of that year. The site is approximately 20 km from Powell's observations in thick flowering Wards Weed. Reece and Lynn Pedler visited the site on 27 August 2014 and observed Elegant Parrots, with which the observer is familiar and which he is confident were not what he had reported earlier. During visits over the following 20 months, the area was searched, fencelines, finch and martin nests examined, and remote camera traps were set, which detected high numbers of feral cats and foxes. With Steve Murphy, two SM3 sound recorders were deployed in early April 2015, one recording continuously at the site until July 2017, while the second was moved within a 10-15 km radius, including to nearby hills supporting *Triodia*. No Night Parrot calls were detected (R. Pedler *in litt.* to AB 16/10/2019). The observer is familiar with the parrots of SA's arid zone but has not seen one like this before or since (pers. comm. to AB 25/10/2020).

43. Wooltana Station, 2015
At 4.50 pm on 28 August 2015, as Andy Bennett was driving south and approaching a cattle grid about 400 m south of Wooltana Homestead, a bird flew from right to left about 15-30 cm from the ground, passing about 3-4 metres directly ahead. It was olive green, larger than a

Budgerigar or Red-rumped Parrot but smaller than an Australian Ringneck. There was extensive black spotting across the side of the head and on the breast and neck. Its large head and non-protruding bill identified it as a parrot and its fairly uniformly green wings without patches of blue or other colour were noteworthy. The habitat was of saltbush, possibly bluebush, and some acacia (?Mulga); there may have been *Triodia* in the ranges a few hundred metres to the west. Bennett stopped and searched for about 20 minutes and returned on the following two evenings, noting the time of sunset at the site as 5.40 pm. As his actions show, he strongly suspected a Night Parrot but is uncertain, its tail appearing slightly longer than shown in the Pizzey and Knight field guide (*in litt.* to AB 24/9/2020, 3/11/2020).

North-eastern Eyre Peninsula

10. Port Augusta region, *ca* 1881
For the first part of the field trip that S. A. and Ethel White made to the Port Augusta district in October 1911, their transport driver was Norman Richardson. White (1912a) described him as 'an old bushman' and his response to White's enquiry about Night Parrots was 'Why yes, they used to be in these parts once, but I have not seen them for many years now. I mind some 30 years ago I used to burn the porcupine grass to make these birds fly.' Norman Alexander Richardson (1855-1941) of Port Augusta held all the mail contracts for the Gawler Ranges and north-west districts (Port Augusta to Yardea and to Tarcoola) for 42 years from 1876 (Richardson 1925). He was also a pastoralist and from the late 1880s onwards owned several stations to the north-west of Port Augusta. As there is little or no *Triodia* around Port Augusta, the question is where did Richardson consider was 'in these parts'? The nearest *Triodia* is in the adjacent Flinders Ranges, but it seems more likely that Richardson saw the Night Parrots in *Triodia* on north-eastern Eyre Peninsula or in the Gawler Ranges (see also the Mount Whyalla record below).

15. Mount Whyalla, before 1912 (SAP)
S. A. White had been told by an un-named bushman that Night Parrots once occurred at Mount Whyalla (White 1913d). In 1912 the Whites found a fairly thick scrub of Black Oak *Casuarina pauper* at the base of the mount, and spinifex with a few acacia bushes further up its slopes, but after beating the spinifex found no sign of the Night Parrot (White 1913c, d). Olsen (2018) stated that it was the Whites' driver T. C. Ash who was the bushman informant, but this may not be so because White (1913d) referred to Ash as 'our driver' and 'our man (Thos. Ash)' and it seems unlikely that in the same article he would also refer to him anonymously as 'a bushman'. Ash had a varied working life sinking dams, wheat tallying, running a livery stable, working on the railways, racing horses and prospecting (Anon. 1952). White (1913b) noted that Ash had experience as a drover and had 'a splendid knowledge of the country for many hundreds of miles around Port Augusta', so he could have been termed a bushman. It is more likely however that the bushman was Norman Richardson (see the record immediately above) who had seen Night Parrots 'in these parts' many years previously. White's field notebook for the 1912 trip has not survived (Linn 1989) and so cannot confirm the bushman's identity.

Murray Mallee

13. Ned's Well, 1910 (SAP)
In October 1911 S. A. White and his wife met a camel driver who told them that the previous year, while carting water with camels from Ned's Well for the Brown's Well railway survey, he had seen, among the spinifex, birds which answered to the description of Night Parrots (White 1911, 1913a). The Whites travelled to the mallee in November 1911 and made the second of their three overnight camps at Ned's Well, some 10 km NNW of present-day Karoonda. There they beat the spinifex which extended 'for miles around the camp' but found no sign of Night Parrots. The Brown's Well railway

extended from Tailem Bend east through Karoonda to Brown's Well (near Paruna) where it opened in April 1913 (D. P. Smith, Australian National Railways, *in litt.* 2/11/1979 to SAP). The Night Parrot observations would have occurred between April and November 1910, the likely period during which the camel team worked from Ned's Well (Anon. 1910a, b, c). Further clues to the habitat at Ned's Well are given by White's collection there of three Red-lored Whistlers *Pachycephala rufogularis* (SAMA B54352; AMNH 659348, 659349) in 1911. Critical requirements for this species are *Triodia* and broombush in mallee that is 5-40 years post-fire, usually with a dense understorey and open canopy of less than 10% projected cover (Higgins and Peter 2002). However, Shane Parker noted in his 1983 SAMA exhibition on the Night Parrot that the original vegetation around Ned's Well had been almost completely cleared for agriculture.

16. North of Bellbird Bore, Victoria, near the SA border, 1913 (SAP)
In September 1913 F. E. Howe and T. H. Tregellas visited the camp of a Victorian government boring party under the supervision of J. J. Scarce, at Lingerandye (or Lingerandie or Cliff) Bore, NNW of Murrayville (Howe and Tregellas 1914). From there they moved camp north to Bellbird Bore and walked for some distance further north. Scarce told them he had met with Night Parrots 'a few miles farther north than we reached in September'. The birds were in thick, large *Triodia* and were seen feeding out on the edges of the grass, where it spread onto a small plain. There were round burrows right through each grass clump. No date was given but it was probably not long before September 1913. Distances given by Howe and Tregellas (1914) are misleading but Howe and Ross (1933) gave further details of the locations of the bores, so the approximate position of Scarce's observation can be confidently set at about 10 km north of Bellbird Bore or 51 km NNW of Murrayville (17 km NE of Peebinga in SA, about 1 km east of the border). This is now within the Murray-Sunset National Park. Menkhorst and Isles (1981) detailed another Night Parrot sighting made by Scarce, some 70 km to the SE and close to a series of observations made by Evan Walton during 1954-1959 at Ross Spring, also in north-western Victoria.

APPENDIX 2. Plant species which frequently form components of the Lignum and Lignum-Nitre Goosefoot shrublands classified by Gillen and Drewien (1993; floristic associations 8 & 9) in the Kanowana Lakes region, Cooper Creek. The Parker Night Parrot Cooroomunchena locality was classified by Gillen and Drewien (1993) as Lignum shrubland.

a) Perennial associates
Tree: *Eucalyptus coolabah*
Shrubs*: Duma florulenta, Chenopodium nitrariaeceum, Atriplex nummularia, Senecio lanibracteus*
Subshrubs*: Tecticornia indica* subsp. *leiostachya, Sclerolaena intricata, Solanum oligacanthum*
Forbs*: Rutidosis helichrysoides, Teucrium racemosum, Ethuliopsis cunninghamii, Haloragis aspera, Dentella pulvinata, Frankenia* spp., *Wahlenbergia* spp., *Boerhavia schomburgkiana*

b) Annual associates
Forbs*: Alternanthera nodiflora, Trianthema triquetra, Portulaca oleracea, Stemodia florulenta, Atriplex spongiosa, Atriplex intermedia-crassipes* complex, *Schenkia australis, Zygophyllum ammophilum, Tetragonia tetragonioides, Tribulus terrestris, Phyllanthus lacunarius*
Grasses*: Dactyloctenium radulans, Tragus australianus*

APPENDIX 3. Additional plant species, listed by family, observed a) around two automatic sound recorders, located at *ca* 27° 47′ 30″S, 139° 32′ 0″E, and b) additional species in the broader Cooroomunchena district (August 2015, September 2020).

a) Around sound recorders
Amaranthaceae*: Ptilotus polystachyus*
Asteraceae*: Gnephosis eriocarpa, Polycalymma*

stuartii, Pterocaulon sphacelatum, Senecio gregorii
Boraginaceae*: Heliotropium curassavicum, Trichodesma zeylanicum*
Chenopodiaceae*: Atriplex velutinella*
Euphorbiaceae*: Euphorbia inappendiculata*
Fabaceae*: Cullen* sp., *Tephrosia sphaerospora*
Goodeniaceae*: Lechenaultia divaricata*
Loranthaceae*: Amyema preissii*
Malvaceae*: Abutilon otocarpum, Sida ammophila*
Phyllanthaceae*: Phyllanthus lacunarius*
Plantaginaceae*: Stemodia florulenta*
Poaceae*: Aristida holathera, Eragrostis basedowii, Eragrostis dielsii, Eragrostis setifolia, Sporobolus mitchellii, Triraphis mollis*
Portulacaceae*: Portulaca intraterranea, Portulaca oleracea*
Solanaceae*: Nicotiana velutina*
Zygophyllaceae*: Tribulus eichlerianus, Zygophyllum howittii*

b) In broader Cooroomunchena district
Aizoaceae: *Glinus lotoides, Minuria denticulata, Tetragonia tetragonioides, Trianthema triquetra*
Amaranthaceae*: Alternanthera denticulata*
Araliaceae*: Trachymene glaucifolia*
Asteraceae*: Brachyscome ciliaris, Calotis hispidula, Calotis porphyroglossa, Rutidosis helichrysoides, ?Leiocarpa brevicompta*
Chenopodiaceae*: Atriplex spongiosa, Sclerolaena bicornis*
Convolvulaceae*: Convolvulus* sp.
Cyperaceae*: Cyperus gymnocaulos, Fimbristylis dichotoma*
Euphorbiaceae*: Euphorbia tannensis*
Fabaceae*: Crotalaria cunninghamii, Crotalaria smithiana, Glycine canescens, Senna artemisioides, Sesbania cannabina, Swainsona phacoides*
Frankeniaceae*: Frankenia* sp.
Gentianaceae*: Schenkia australis*
Loranthaceae*: Lysiana exocarpi*
Malvaceae*: Hibiscus krichauffianus, Malva preissiana*
Nyctaginaceae*: Boerhavia* sp.
Poaceae*: Aristida contorta, Dactyloctenium radulans, Diplachne fusca, Enneapogon avenaceus, Setaria dielsii, Triodia basedowii, Tripogon loliiformis*
Proteaceae*: Grevillea stenobotrya*
Rubiaceae*: Dentella pulvinata*
Solanaceae*: Solanum nigrum*
Zygophyllaceae*: Zygophyllum howittii*

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Bird Notes

Plains-wanderers in the North West and Nullarbor regions, South Australia

IAN HOPTON AND GRAHAM CARPENTER

INTRODUCTION

The Plains-wanderer *Pedionomus torquatus* is an iconic and critically endangered species found predominantly in temperate grasslands throughout south-eastern Australia, with recent reports mostly from the Riverina district of New South Wales and northern plains of Victoria (Baker-Gabb *et al.* 1990; Baker-Gabb 1998; Commonwealth of Australia 2016; Antos and Schultz 2020).

More recently, sparse populations have been discovered on red clay plains in south-west Queensland (Baker-Gabb 1998; Rich 2016) and eastern South Australia west of Broken Hill (Baxter 2011; Bellchambers and Baker-Gabb 2006; Baker-Gabb 2016), plus there have been several isolated reports from stony gibber plains in the far north-east of SA (Rogers 2002, 2008, 2010 and 2011; Rogers and Cox 2015). Elsewhere in South Australia the species has largely disappeared from the grassed districts of the Adelaide Plains, Mid North, Yorke Peninsula, southern Eyre Peninsula and Murray Mallee (Condon 1968; Bennett 1983; Baker-Gabb 1990).

There are very few reports from the North West region of SA and a previous report from the Nullarbor Plain (in Ryan *et al.* 2012) is considered unconfirmed (see below). The species has not been recorded in Western Australia. Bennett (1983) reported possible sightings in the Northern Territory at Erldunda Station (on the Stuart Highway about 90 km N of SA border) just prior to 1980.

This note details further records from the North West region.

PREVIOUS REPORTS IN THE NORTH WEST OF SA

Simpson (1933) had a Plains-wanderer walk into his cottage while staying at Edward's Creek in July-August 1933, 'but could not catch it', and noted that the species 'is rare about here'. [Edward Creek was a railway station on the old Ghan line, located on Nilpinna Station at 28° 21′ 0″ S, 135° 50′ 59″ E].

An observation by C. O. Fuller in August 1964 near Everard Park [now Mimili], is listed in Condon's (1968) *A Handlist of the Birds of South Australia*.

One was reported by L. Schulze on 17 October 1966 at Ingomar Station, as listed in the 1966-67 Bird Report (Glover 1968).

Another included in the 1971-72 Bird Report (Glover 1973) was an observation near Bon Bon Station by O. M. Smith on 25 August 1971.

Read *et al.* (2000) had two sightings when residing in the Roxby Downs district, in August 1990 and October 1996, both within the township itself. They considered that regeneration of local grasslands by reducing total grazing pressure and eradication of foxes, cats and rabbits would improve local habitat for the Plains-wanderer, although it is yet to be reported from the nearby Arid Recovery reserve where this management has occurred.

More recently, one was seen by C. James on the Mount Dare track, Hamilton Station, on 6 July 2004 (Rogers 2008) and another was reported by P. Koch at Pernatty Station in October 2007 (Rogers 2010).

Ryan *et al.* (2012) reported an opportunistic sighting of a Plains-wanderer during a survey of the biodiversity of the Nullarbor Plain in South Australia in April 2012. A bird was seen briefly from a moving vehicle on 4 April by C. Pahl, A. Smyth and J. Allan about 32 km NW of Nullarbor Roadhouse. A. Smyth has provided further information (*in lit.* to GC - 19 June 2020) that the bird was within 10 m of the vehicle when first seen, then walked purposefully away for about 10 seconds between low vegetation, making it hard to keep track of. When lost from view, J. Allan exited the vehicle and scoured the area on foot in an attempt to flush the bird, without success. Because there was a wombat burrow nearby, it was thought that the bird may have hidden there. Smyth noted that it wasn't quail-like in its posture - it was so upright, long-legged and more wader-like than any quail. It reminded her of a Ruff *Calidris pugnax* in stance. The bird was generally buff-coloured with blended darkish patterning, giving an overall pale, nondescript appearance. The legs were also pale. At first, she thought it was a wader, but it didn't make sense habitat-wise. She believed it was probably a male Plains-wanderer but was not 100% sure of the identification due to the brevity of the sighting.

J. Allan (pers. comm. to GC) also indicated that the sighting was very brief and thus was not confident with the identification. As such this report is considered unconfirmed, but possible. It followed a wet period in the district, with 80 mm of rainfall at Nullarbor Station in December 2011 (Bureau of Meteorology (BOM) data).

Among SA Museum specimens, the nearest to the

Figure 1. Location of Plains-wanderer sighting on the Nullarbor, 9 September 2018. Image Ian Hopton

North West were collected at and near Streaky Bay, Eyre Peninsula, in August 1974 (B56779) and on 1 May 1990 (B46363).

RECENT OBSERVATIONS

1. 1 July 2008. While driving just after dusk on the Stuart Highway just north of the Ingomar Homestead turnoff (29°37′ 30″ S, 135° 07′ 50″ E), Deb Hopton and IH saw two Plains-wanderers in the car headlights. One bird, immediately identified as a female Plains-wanderer by the obvious spotted neck-ring and upright stance, was in the centre of the road and did not appear to move as the vehicle passed over it. A second bird, not seen clearly, was on the edge of the road. Believing the bird on the road had been killed, the vehicle was stopped and reversed but no sign of either bird could be found. The habitat in the immediate vicinity was a brown gibber plain with scattered low saltbush *Atriplex* sp., copper-burrs *Sclerolaena* spp. and annual grasses.

2. August 2008. A female Plains-wanderer was observed by IH at the same location as 1. above, under the same circumstances. Both observations were in a relatively dry period with no significant rain reported at Coober Pedy (the nearest official recording site about 50 km to the north - BOM data) since December 2007.

3. 9 September 2018. While undertaking access track rehabilitation work on the Nullarbor Plain, a male Plains-wanderer was observed by IH at close range for about 30 seconds from an elevated cab of a tractor driven slowly along a vehicle track WNW of Koonalda Homestead (31° 10′ 00″ S, 129° 17′ 40″ E). Although no binoculars or camera were at hand, the bird was immediately identified as a Plains-wanderer based on its upright stance, long legs, slender neck, rounded head and relatively long, tapered bill compared with a buttonquail *Turnix* sp. It stood out as different from the numerous Little Buttonquails *Turnix velox* and few Inland Dotterels *Peltohyas australis* seen over previous days. The bird could not be relocated after the tractor was stopped and a search was made on foot. The habitat in the vicinity was Pearl Bluebush *Maireana sedifolia* low shrubland over Bladder Saltbush *Atriplex vesicaria* (Figure 1). The observation followed a relatively wet period (40 mm in June and August 2018 – BOM data) that had produced a good cover of Spear-grass *Austrostipa* sp.

DISCUSSION

Reports suggest that Plains-wanderers are very irregular visitors to the North West region of South Australia, including the Nullarbor Plain. Most reports are from July to October, during or following wet periods. Little is known generally of their movements, even in preferred habitat, with birds remaining in much reduced numbers during drought (Harrington *et al.* 1988). Early studies suggested that in southern districts the species arrived mainly in good seasons after the end of the quail-hunting season (June 30) (e.g. D'Ombrain 1926), suggesting that some move seasonally. This would be consistent with the movements inferred from atlas data of more common 'grassland' specialists such as Little Buttonquail and Brown Songlark *Cincloramphus cruralis*. Although confounded by seasonal differences in conspicuousness, these species are thought to move south through the inland in spring and north in autumn, either directly or in an anticlockwise circuit (Griffioen and Clarke 2002).

Although areas generally favoured by Plains-wanderers are red-brown clay soils vegetated with native herbs and grasses (Baker-Gabb *et al.* 1990), it is evident from the Ingomar records and recent reports in the far North East of South Australia (Bennett 1983; Baker-Gabb 1990; Ehmann in Rogers 2002; Einoder in Rogers 2011; Rogers and Cox 2015) that brown gibber plains can also provide suitable habitat at times (see habitat illustrated in Rogers and Cox *l.c.*). This habitat is also prevalent at the site of Simpson's (1933) records.

The Nullarbor has vast sparsely vegetated

treeless areas dominated by native grasses and Ward's Weed *Carrichtera annua* that appear structurally suitable (NPWS 2002), although calcrete or limestone substrate has not previously been considered as potential Plains-wanderer habitat (Baker-Gabb *et al.* 1990; Commonwealth of Australia 2016). It is also noted that Pedler and Burbidge (1995) did not locate Plains-wanderers on the Nullarbor Plain while conducting extensive surveys for the Nullarbor Quailthrush *Cinclosoma alisteri* in October - November 1991, and June - July and December 1992. This survey included the very wet year of 1992 with total rainfall at Nullarbor of 470 mm (BOM data).

More observations are required to determine whether the Plains-wanderer is more than just a very irregular visitor to the region. Future use of satellite tracking technology could also confirm whether the species makes regular long-term movements.

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Yellow-tailed Black Cockatoos feeding on Common Stork's Bill *Erodium cicutarium*

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The Yellow-tailed Black Cockatoo *Zanda funerea* occurs throughout south-eastern Australia west to Eyre Peninsula, with closely related taxa in south-west Western Australia. Its diet is relatively well known and includes both native and introduced seeds. Dawson's (1994) review reported that *Z. funerea* fed on an enormous variety of native and exotic seeds and flowers, but rarely on the ground.

The Common Stork's Bill (Wild Geranium or Corkscrew Grass) *Erodium cicutarium* is a common annual weed to about 20 cm high in temperate pastures throughout the world including Australia (Jessop and Toelken 1986). After flowering it produces a fruit with five seeds each about 10 mm x 1 mm, surmounted by a long (10 cm) straight awn. When ripe the seeds separate and the awns spiral, drilling the seed into the soil. There are several other species of *Erodium*, both native and introduced, that are common in grassy habitats in South Australia, although *E. cicutarium* produces the most prolific and largest fruit.

On the morning of 27 September 2009, I observed fifteen *Z. funerea* on the ground in a paddock about 5 km SW of Victor Harbor on Fleurieu Peninsula. The group comprising both adult males and females was scattered over about 20 m. I approached via a nearby shelter belt to within 20 m and watched for about 10 minutes without disturbing the birds. The pasture was unimproved with predominantly Capeweed *Arctotheca calendula*, clovers *Trifolium* spp. and *E. cicutarium*. The cockatoos walked to each plant and either bit off the immature fruits of *E. cicutarium*, or occasionally first held the fruit with the left foot. The fruit was held sideways in the bill with the awn clearly visible, then rotated by the bill to extract the unripe seeds. Several Galahs *Eolophus roseicapilla* were also feeding on *E. cicutarium* in a similar manner nearby. I had previously seen a flock of about forty *Z. funerea* on the ground nearby on 1 October 2007, but was unable to determine what the birds were doing. Up to 50 *Z. funerea* regularly visit this area to feed on the seed of pines (*Pinus radiata*) or less often on wood-boring grubs extracted from the stems of Drooping Sheoaks *Allocasuarina verticillata*. I have also observed *Z. funerea* feeding on the ground, extracting seeds from partly consumed discarded cones under pine trees.

Higgins (1999) lists *Erodium* seed in the diet of most parrots and cockatoos that occur in temperate southern Australia. In Western Australia, the Short-billed or Carnaby's Black Cockatoo *Z. latirostris* regularly feeds on *Erodium* seed, particularly in the more developed farming districts (Saunders 1980). In some areas it is the cockatoo's main food when seeding (September to October), although due to its short fruiting period was of limited use to rear nestlings (Saunders 1977). On Kangaroo Island, Baxter (2015) noted *Z. funerea* on the ground eating both seed-heads of 'Corkscrew Grass' (*Erodium* sp.) and excavated corms of Guildford Grass *Romulea rosea*. L. Pedler (pers. comm.) also saw *Z. funerea* feeding on unripe *Erodium* near Eleanor River on Kangaroo Island in September 1995; he also observed them in September-October in several subsequent years in the same paddocks and in the vicinity of Kingscote, where they were assumed to be feeding again on unripe *Erodium*. Another instance was reported in Dawson (1994) by Mr B. Vogel of *Z. funerea* feeding on immature seeds of *E. cicutarium* near Bordertown in the South East of SA. Lendon (1973) saw a flock of

over one hundred feeding on the ground near the western entrance of Flinders Chase National Park, Kangaroo Island in April 1965, but did not report what was eaten. It is unlikely that *Erodium* seed would have been available at that time of year.

The observations reported here add to our knowledge of the range of introduced plants in South Australia exploited as food by *Z. funerea*, which help to supplement its limited and dwindling supply of native foods.

During its short fruiting period *Erodium cicutarium* provides a source of seed for a wide variety of parrots and cockatoos in temperate Australia, including *Z. funerea*. However, this species is generally regarded as a pasture weed and is easily reduced or eliminated by more intense pasture management or tillage.

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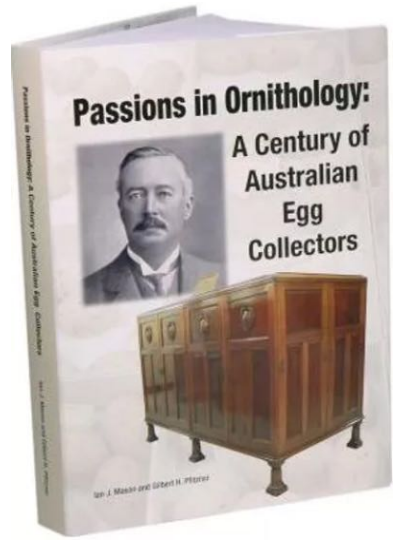
Book Review

Passions in Ornithology: A Century of Australian Egg Collectors

IAN J. MASON AND GILBERT H. PFITZNER, 2020



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Numerous photographs
Website: https://cameroncortes03.wixsite.com/oology-100-years

Collections of bird eggs in Australian museums consist almost entirely of formerly private collections that have been donated over the last hundred or so years. Documentation accompanying them is variable and many questions arise as to dates and localities of the clutches and, at times, even the identity of the collectors. Some 20 years ago, as they searched for information about the collections in their care at CSIRO's Australian National Wildlife Collection in Canberra, Mason and Pfitzner decided to address these problems in order to improve the quality of the collection data for research and conservation purposes. They explored the lives and field work of Australia's egg collectors and, even before the widespread electronic availability of historical documents, they amassed huge amounts of information by searching literature and library records, talking to collectors or their families and descendants, locating collectors' field notebooks, and obtaining collection information from other museums.

Mason and Pfitzner's intention was to publish their findings in a book, to which most collectors still living agreed. But the problem of finding a publisher or the funds to produce the book remained unsolved, and the project was shelved in 2008. Fortunately, an elderly benefactor recently provided funding in the hope of seeing the book in print, and within a short time the authors resurrected their work, added information now available online, and published *Passions in Ornithology* in May 2020.

Following the Preface outlining the authors' rationale for the project, the Introduction provides useful summaries of the development of ornithology in Australia, of the international trade in bird skins and eggs in the 19th and early 20th centuries, of the establishment of fauna regulations through the 20th century and its effect on egg collecting, and of the documentation of ecosystem declines by oologists and the scientific legacy provided by their collections.

Biographies of more than 300 egg collectors, in alphabetical order by surname, constitute the main part of the book. They range from a few sentences to several pages in length and include collectors of many clutches to those who took only small numbers. It is clear that egg collecting did not appeal to women or was considered an inappropriate activity, as the collectors were all men with only two exceptions. One was Clara Larcher née Sloan (1898-1988) who collected some 120 clutches in the Mackay district, Queensland, for E. M. Cornwall from 1909 to 1914. The other was the remarkable Jane Ada Fletcher (1870-1956), teacher, photographer, writer, natural historian and life member of the RAOU. Like Clara, Jane did not build her own egg collection, but collected for others from 1908 to 1919, including for Gregory Mathews.

Each biography provides dates and locations for where the collector lived, worked and travelled, as far as is known, as well as family background and other activities they were involved in. Many made collections of other objects, whether natural history such as insects, or inanimate, such as telephone pole insulators and whisky containers in the case of Charles Allen. The authors often provide information on the system of set marks used by the collector to identify individual clutches or sets (the same set mark being written on each egg within a clutch) and the current locations of their archived notebooks and correspondence.

Whittell's (1954) *The Literature of Australian Birds* similarly provided biographies of Australian ornithologists, but the overlap with *Passions in Ornithology* is not great and this new book complements Whittell's very well, particularly with regard to more recent collectors. Many collectors did not publish so were never included in Whittell, but, for those who did, Mason and Pfitzner direct the reader to Whittell's lists of their publications. The recent volumes of *Contributions to the History of Australasian Ornithology* (Memoirs of the Nuttall Ornithological Club) likewise include much biographical material, but these focus more on institutions and only the more prominent private collectors. The sheer depth of Mason and Pfitzner's investigations also ensures that there is limited overlap. It is pleasing to see that for South Australian collectors the authors have made extensive use of Birds SA's *Historical Series* articles, mostly written by Penny Paton.

Following the biographies of the main collectors is a list of nearly 2,000 incidental collectors of Australian bird eggs, with the number of clutches they collected and the years of collection. The majority collected only one or a few clutches, most likely found abandoned and donated to their local museum, as is the case with my mother, 'Horton, P.M.', who features in the list. A few collected larger numbers, such as 'Moore, S.W.' who is recorded as collecting 288 clutches in 1890-1902, and as the authors note some of these may have been serious collectors, but further information about them is lacking. Lists of acronyms and abbreviations and a gazetteer complete the text.

An outstanding feature of the book is the array of wonderful photographs of the collectors, their vehicles and campsites, and their collections. One of my favourites is of a young Bob (R. F.) Brown in his naval uniform; he may not have considered himself as an egg collector but is included because of his small, boyhood collection that he donated to the SA Museum in 1937 when he was still a teenager. The authors have been able to source images of the majority of collectors, including many of the earlier ones. A large proportion have been provided by family members and other private individuals, so probably have never been published before.

Included with the book is a CD containing further material. Firstly, there are appendices for most of the collectors, each PDF containing scanned examples of egg data cards, scanned correspondence as examples of handwriting, additional photographs, newspaper articles, anecdotes and other information about the collector or family of collectors. Secondly, there is

a Word document with genealogical information for most collectors, additional to that given in the book. All of this supplementary information can also be found on the book's website, and purchasers of the book will be supplied with a password to access the information.

The authors do not condone egg collecting but in recognising that it has occurred they have set out to enhance the quality of information that can be gained from its results, whether it had been undertaken legally or not. The inference is that much 20th century collecting was illegal. However, in the early days egg collecting was considered to be a worthy occupation and we cannot judge the activities of those collectors by the standards of today. The authors note that while there are some currently active collectors operating under permits in Western Australia, most of the more recent collections still in private hands in the eastern states are believed to be inactive. They state in the Introduction that their longer-term goal is for older collections still in private hands to eventually reside in natural history institutions where they will be accessible to future researchers.

Undoubtedly there were 'rogue' collectors, such as Raoul Sunday Bell (1882-1966) whose activities on Norfolk and Lord Howe Islands may have contributed to the demise of endemics there, but what is clear from the book is that many collectors became active conservationists. Dismayed by the decline of birds due to clearing or degradation of native habitats, they worked to protect what was left. Appendix 18 at the end of the Introduction lists a number of prominent examples of collector/conservationists and it is interesting to note that about two thirds of them were South Australian men, such as Erhard Boehm, Jack Hood and Allen Lashmar.

Because of the necessity to publish rapidly, it is inevitable that some of the collector biographies were not written to the authors' satisfaction, errors have been missed, and editing is not as rigorous as it may have been. For example, basic genealogical information is given at the start of each biography and then repeated in its main text – a good idea for the long biographies but not needed for the short ones. In the near future the authors intend to publish a soft-cover supplement containing some 50 revised biographies and a list of errata. It will also feature several more egg collectors not included in the main book, as new information has continued to come to light. Meanwhile, there is a page on the book's website where updates and the list of errata are posted.

Passions in Ornithology will find readership among both historians and ornithologists. The biographies provide a fascinating social history of people whose otherwise disparate lives are drawn together because of their shared interest in oology. To the ornithologist the wealth of personal and family details may seem of questionable relevance but I applaud the authors for incorporating as much information as they have. Seemingly peripheral details may be significant, as illustrated by a recent enquiry to the SA Museum regarding a clutch of Black-fronted Dotterel eggs collected near Cairns in December 1944, purportedly by Allen Lashmar, a Kangaroo Island resident for most of his life. Was the clutch wrongly attributed? From *Passions in Ornithology* and its supplementary information we learn that Lashmar saw active service in World War II and was stationed for a time in North Queensland where he 'took a few sets', so he would indeed have been the collector.

I have thoroughly enjoyed reading Mason and Pfitzner's book and am certain that it will become an important reference work in Australian historical ornithology.

Philippa Horton

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BOOK REVIEW

Passions in Ornithology: A Century of Australian Egg Collectors
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Front cover image:
Royal Spoonbill, Onkaparinga River, 2020
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