

The pre-European distribution of the Galah, *Eolophus roseicapilla* Vieillot: reconciling scientific, historical and ethno-linguistic evidence

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Abstract

Before its 20th century expansion the Galah, Eolophus roseicapilla, was considered a bird of the inland but its pre-European distribution has received scant and only recent attention. Galahs were unknown to early colonists until explorers travelled deep into the Murray-Darling, Cooper and Diamantina catchments. They were later found around the Gulf of Carpentaria and in the southern Kimberley, Pilbara and deserts of Western Australia. European and indigenous sources accord that Galahs were not established in Central Australia until the closing decades of the 19th century. In 19th century South Australia Galahs occurred only in the far northeast, along the Diamantina and Cooper drainages, and indigenous language groups elsewhere generally had no name for them. Their reported occurrence in the Gawler Ranges appears erroneous. In the pre-European period, the three presently recognised subspecies existed as almost or actual allopatric populations, although it is likely that eastern E. r. albiceps was in contact with northern E. r. kuhli. We find that the Galah's range expansion was not entirely centrifugal, as previously assumed, because it occurred towards the centre as well as coastwards.

INTRODUCTION

Many Australian native birds have declined in abundance and range since European colonisation (Garnett, Szabo and Dutson 2011), while others have benefited from changes since settlement, expanding in population size and colonising new areas. The successful management of both increasers and decliners

depends on understanding the ecology and earlier distribution of the species involved.

The Galah, *Eolophus roseicapilla*, is one of Australia's most widespread and familiar birds, and under some circumstances can be considered invasive or a pest (Bomford and Sinclair 2002; Joseph 2014). Yet no comprehensive review of the species' pre-European distribution is found in the ornithological literature (Rowley 1990). The historian Bill Gammage (2009a, b) undertook such a review in the context of Aboriginal land management. Here we extend his findings through a further search for historical records and review some that are ambiguous or anomalous.

An historical anomaly

Higgins (1999) showed that, post settlement, the Galah expanded its range coastwards in every State, chiefly from the 1920s, but noted a single inconsistency, a rapid decline in the Gawler Ranges, South Australia (SA) by the late 1890s (Paton 1975). Gammage (2009a, hereafter simply Gammage) found few pre-1900 records from SA, apart from two in or near the Gawler Ranges. One of us (AB) has long held that the early Gawler Ranges records are an artefact arising from the misnaming of Major Mitchell's Cockatoo, *Cacatua [Lophochroa] leadbeateri*, (hereafter Major Mitchell).

Identification of pink- or rose-coloured cockatoos

Critical to the use of historical data is the need for clarity on names applied not only to the Galah but to the species with which it may

have been confused, the Major Mitchell, then named 'Leadbeater's Cockatoo'. Both are impressive pink cockatoos that, in colonial times, occupied parts of the Australian continent that few Europeans visited. Explorers, surveyors and pastoral pioneers encountered them in new country and wrote of them in diaries and reports, but the birds and their names were unfamiliar.

While the indigenous name 'Galah' was adopted increasingly from the 1860s and 1870s (Fraser and Gray 2013, Gammage, citations herein), convenient names for the other cockatoo, 'Major Mitchell' and 'Pink Cockatoo' only came into general use around the turn of the century (Campbell 1900, North 1912).

Through much of the 19th century, Latham's (1823) name 'Rose-coloured Cockatoo', Gould's (1840-48) 'Rose-breasted Cockatoo' and Sturt's (1849) 'Rose Cockatoo' were therefore available and likely to be applied to either species. Hence, there is ample room for confusion. For example, Stuart's fourth party (Stuart 1865) saw 'rose-coloured cockatoos' in Central Australia (CA) but their identification as Galah is uncertain since that observation was made within the distributional range of the Major Mitchell.

Even Waterhouse (1863), recently appointed Curator at the South Australian Institute Museum, mixed the English names of the two birds, calling the Galahs he saw at Howell's Ponds on Stuart's sixth expedition Mitchell's Rose-breasted Cockatoo, *Cacatua eos*, a lapsed scientific name for the Galah. He would have listed Leadbeater's Cockatoo or *Cacatua leadbeateri* if they had been what he saw there.

Where the Galah was known to indigenous language groups

Indigenous names are an untapped resource for understanding the Galah's early distribution that can complement the European record. The premise on which we explore this potential is that any language group can reasonably be

expected to have had a traditional name for such a conspicuous bird if it was resident in or a common visitor to their country or immediately neighbouring country in the pre-European period. Further, it is argued that if the Galah arrived in a region more recently, then a name might be borrowed or based on that used by neighbours, familiar with the bird.

Caution is needed because incorrect applications of such names have occurred, e.g., 'kakalyalya', a widely used name for the Major Mitchell (e.g. Goddard 1996, Glass and Hackett 2003), was wrongly assigned to Little Corellas, *Cacatua sanguinea*, by Serventy and Whittell (1967). Fraser and Gray (2013) appear to have erred by applying to the Major Mitchell the name 'kilaa', one of the many ways in which 'Galah' was transcribed in inland New South Wales.

Our examination will be interrogated against knowledge of the present distribution of the Galah, and of its subspecies (Schodde and Mason 1997) and phylogeography (Engelhard *et al.* 2015), and complemented by the traditional knowledge of Galahs by indigenous groups. Particular attention is paid to records from CA and SA in order to address issues identified above, including the purported late 19th century decline in the Gawler Ranges.

METHODS

Historical literature and museum records

We reviewed the distributional summaries of Campbell (1900), North (1912) and Gammage and their sources. We reviewed original reports, aware that some might represent misidentifications of the Major Mitchell. We examined specimen records and archival documents in the South Australian Museum, Adelaide (SAMA), and published reports of explorers and surveyors.

Ethno-linguistics

We sought indigenous language names for the Galah from published and unpublished sources.

From them we provide those names of language groups of CA and SA and immediately adjacent inland Western Australia (WA) and western Queensland (Qld). We sought names of all cockatoo species (not shown) before accepting that a name for the Galah was correctly applied.

RESULTS

There are no 19th century Galah skins from SA in SAMA and the only records are of those collected north and east of Lake Eyre by F. W. Andrews in 1875. There are two skins from CA, SAMA B52032 labelled 'central Australia, 1890' and SAMA B52037, 'MacDonnell Ranges 1898', and an egg clutch from C. E. Cowle, SAMA B2789, 'Finke River, 5 August 1896'.

Early reports of the Galah are listed in Tables 1-3, those from eastern Australia in Table 1, northern Australia in Table 2 and western Australia in Table 3. Other records of rose or pink cockatoos that we find most probably to have been of the Major Mitchell are listed in Table 4.

All listed records of the Galah are mapped in Figure 1.

A list of indigenous names for the Galah is presented in the Appendix.

In reviewing indigenous names, source documents of the late Pastor John Pfitzner, active at Hermannsburg CA in the 1970s and 1980s, included the observation that 'many older Aborigines are aware that Galahs arrived in Central Australia only with European settlement' (J. Pfitzner personal data cards accessed by GB).

DISCUSSION

We have evaluated the Galah's pre-European distribution through two principal lines of enquiry; first, through reports of European travellers during the early years of exploration and survey; and second, by identifying those indigenous language groups whose familiarity

with the Galah is shown by their having their own name for it. We focussed on an identified anomaly in the Galah's more recent distributional expansion, a possible late 19th century decline in the Gawler Ranges SA. We sought SA records in view of their evident paucity.

The Gawler Ranges anomaly

Paton (1975) noted that neither Chenery (1903) nor White (1913) had recorded Galahs in the Gawler Ranges, but that Stephen Hack had earlier named 'Cockatoo Springs' after birds that he took to be that species. She therefore 'surmise[d] that there was a very marked drop in the Galah population at the beginning of the [20th] century.'

Hack (1857) had been conducting a survey of the Gawler Ranges for pastoral settlement and wrote of 'a large flock of the red-breasted Cockatoo, which I fancy had only just left the water.' Five years later Josiah Bonnin (1907) also examined the area for its pastoral potential and listed birds seen, that included 'pink cockatoos' but not Galahs. Major Mitchells, but not Galahs, were listed by every ornithologist who visited the Gawler Ranges, including those cited above.

Before the 20th century the Galah barely reached the WA/SA border at 129° E (Table 3, Figure 1) and the western subspecies extends, even now, only to 132° E in the south (see below). The early occurrence of Galahs in the Gawler Ranges (135°-137° E) is therefore highly implausible. Hack, unfamiliar with either cockatoo, appears to have applied the wrong name to the birds he saw flying away from Cockatoo Springs.

An earlier observation, cited by Gammage, was made by James Hawker while searching for a missing settler of the Port Lincoln district (Hawker and Linn 1992). From east of the Gawler Ranges, the party turned south and on 5 October 1842, 'shot three parrots and a rose cockatoo' to provide 'a scanty meal' (Table 4). Further west Goyder also used the name 'rose cockatoo' (Sheldrick 2013) for those he shot near Fowlers

Table 1. Early records of the Galah in eastern Australia

Observer	Place and date	Name given	Reference	Notes
John Oxley	Lower Lachlan, July 1817	Between a cockatoo and parrot with red neck and breasts and grey backs	McAllan 2003, Gammage	First records and specimens from eastern Australia
John Oxley	Lower Macquarie, June 1819		Gammage	
Charles Sturt	Lower Macquarie, December 1828	The rose-coloured and grey parrots mentioned by Mr Oxley	Gammage, Sturt 1833	
Charles Sturt	Darling River, 1828-9	Rose Cockatoo	Gammage, Sturt 1849	Reported in retrospect
Charles Sturt	Murray River, 1831	Pink-breasted Cockatoo	Sturt 1833, Stenhouse 1930	An unknown stretch of the river
Thomas Mitchell	Darling River		Gammage, Mitchell 1848	Reported in retrospect
Joseph Hawdon	Lake Boree near Swan Hill, February 1838	Rose coloured parrots	Gammage, Hawdon 1952	Lake Boga in Gammage
E. J. Eyre	East of Bogan Lake, May 1838	Beautiful rose cockatoo described by Captain Sturt	Gammage, Waterhouse 1984	
E. J. Eyre	Lachlan Marshes, February 1839	Slate grey and rich rose	Gammage, Dutton 1967	
John Gould	Lower Namoi, December 1839	Rose-breasted Cockatoo	Gammage, Gould 1840-48	
Thomas Mitchell	Belyando River Qld, August 1846	Rose-coloured paroquets of the Barwan	Gammage, Mitchell 1848	Coastally flowing river. Identity as Galah equivocal.
Thomas Mitchell	Barcoo River, September 1846	Rose cockatoo	Gammage, Mitchell 1848	Identification here seems unequivocal
Charles Sturt	Depot Glen, northwest NSW, 1845-46	Rose Cockatoo	Gammage, Sturt 1849	
Charles Sturt	Cooper Creek, Coongie Lakes, 1845	Rose Cockatoo	Gammage, Sturt 1849	
Charles Sturt	Goyder Lagoon, 1845	Rose Cockatoo	Sturt 1849	
William Wills	Cooper Creek, Coongie Lakes, December 1860		Gammage, Joyce and McCann 2012	

Table 1 continued

Observer	Place and date	Name given	Reference	Notes
William Wills	Near Wills Creek, Georgina catchment, Qld, January 1861		Gammage, Joyce and McCann 2012	
John McKinlay	Cooper Creek, Coongie Lakes, December 1861	Gulas	Gammage, McKinlay 1862	
John McKinlay	Diamantina River, March 1862	Gulahs	Gammage, McKinlay 1862	
John McKinlay	Corella River Qld, May 1862	gulah	Gammage, McKinlay 1862	Coastally flowing river
F. W. Andrews, John Lewis	Lower Warburton River, January 1875	Yalah parrots	Gammage, Lewis 1876	Specimens taken there and possibly near Goyder Lagoon or on Cooper Creek
A. W. Stirling	Thomson River, 1882-3		Gammage	

Table 2. Early records of the Galah in northern Australia

Observer	Place and date	Name given	Reference	Notes
Elsy, Leichhardt, officers of the <i>Beagle</i> , Jardine brothers	Southeast coastal Gulf of Carpentaria, Cape York Peninsula		Gammage	
Charles Elsey	'The country around the Gulf is their favourite resort.'	<i>Cacatua eos</i>	Gammage, Gould 1865	'travelling southeast, lost them on the upper Burdekin, not far from where the Jardines first saw them.'
John Gilbert	Beside the Lynd and Mitchell Rivers, May 1845	<i>Cacatua eos</i>	Gammage, C. Fisher pers. comm.	
Ludwig Leichhardt	Near the Roper River, NT, October 1845		Gammage	
John McDouall Stuart's party	Howell's Ponds, NT, April-May 1862	Mitchell's rose-breasted cockatoos <i>Cacatua eos</i>	Gammage, Waterhouse 1863	<i>Cacatua eos</i> , synonym used by Gould 1840-48

Table 2 continued

Observer	Place and date	Name given	Reference	Notes
H. V. Barclay	Near Jervois Range northeast of Alice Springs, May 1878	Grey and pink parrots	Gammage 2009b, Barclay 1878	Four, eaten by surveying party. Uncertain subspecies or intergrade
Charles Winnecke	East of Tennant Creek, May 1879	Gular parrots	Gammage 2009b, Winnecke 1882	'Large flocks of gular parrots and pigeons'. Uncertain subspecies or intergrade
Charles Winnecke	East of above record, June 1879	Gular parrots	Winnecke 1882	'Immense flocks of gular parrots and flock pigeons'. Uncertain subspecies or intergrade
T. H. Bowyer-Bower	Inland from Derby, WA		Gammage, Ramsay 1886	
Thomas Cornock	Renner Springs, NT, 25 April 1891	Rose-breasted Cockatoo	Cornock diary, SAMA archives	Two specimens, identity confirmed by A. H. C. Zietz, SA Institute Annual Report 1890-91
George Keartland	Fitzroy River, Kimberley, 1897	Rose-breasted Cockatoo	North 1898	Calvert Expedition. 'Great flocks'
Charles Chewings	South of Winnecke Creek, Tanami Desert, NT, 1909	Galah	Chewings 2010	
J. P. Rogers	Wyndham, Kimberley WA, April 1909	Rose-breasted Cockatoo (Galah)	Mathews 1916-17	A pair
J. P. Rogers	Bend of the Ord, 30 miles south of Wyndham, May 1909	As above, in Mathews	Mathews 1916-17	rare
J. P. Rogers	160 miles south of Wyndham, May 1909	As above	Mathews 1916-17	numerous
J. P. Rogers	Fitzroy River, July 1911	As above	Mathews 1916-17	Very large flocks after the wet season. Flock of 500

Table 3. Early records of the Galah in western Australia

Observer	Place and date	Name given	Reference	Notes
Stanislas Levillain	Peron Peninsula, 9 August-3 September 1801	Un Kakatoy á tete hupe, col rose etc.	Gammage, Schodde, Black and Fornasiero 2016, Joseph <i>et al.</i> 2016	Baudin Expedition. The holotype, MNHN-ZO-MO-2004-92
Robert Austin	Near Murchison River, October 1854		Gammage, Gould 1865	Southern limit in the west, according to Elsey
Ernest Giles	Rawlinson Range WA, April 1874	Galars	Gammage, Giles 1875	A large flock
Peter Egerton-Warburton	Wells in northern Great Sandy Desert, October 1875	Gular parrots	Gammage, Warburton 1968	Twice sustained a starving party
David Lindsay	South of Rawlinson Range, August 1891	Galars, galas (pink cockatoo)	Gammage, Lindsay 1893, Stirling and Zietz 1892	'flocks of galars', 'great numbers of galas'. Specimens taken, not located in SAMA recently
D. W. Carnegie	Helena Spring, Great Sandy Desert 1896	Galah	Gammage, Carnegie 1898	
George Keartland	Great Sandy Desert, 1896	Rose-breasted Cockatoo	Gammage, North 1898	'In great flocks at all waters'
Richard Maurice	Wells' Rockhole, east of WA/SA border, June 1901	Galah parrots	Gammage, Murray 1904	'A small flock came to water.' First accepted record in western SA
Tom Carter	Ashburton and Gascoyne Districts, Pilbara WA	Rose-breasted Cockatoo	North 1912	Date not given
Tom Carter	Coast between the Gascoyne and Wooramel Rivers	Rose-breasted Cockatoo (Galah)	Campbell 1900	Nesting in mangroves, date not given
F. B. L. Whitlock	Near Marble Bar, Pilbara, May-October 1908	Rose-breasted cockatoo (Galah)	Whitlock 1909	
F. B. L. Whitlock	East Murchison District, June-September 1909	Red-breasted Cockatoo or Galah	Whitlock 1910	Nesting

Table 4. Early records of cockatoos most likely to be Major Mitchells

Observer	Place and date	Name given	Reference	Notes
James Hawker	South of Gawler Ranges, October 1842	Rose cockatoo	Gammage, Hawker and Linn 1992	Probable Major Mitchell. See text
Stephen Hack	Cockatoo Springs, Gawler Ranges SA, June 1857	Red-breasted cockatoo	Gammage, Hack 1857	Probable Major Mitchell. See text
John McDouall Stuart	Mount Barkly, north of Central Mount Stuart, May 1860	Rose-coloured cockatoo	Gammage, Stuart 1865	Date and locality suggest this record is of the Major Mitchell
G. W. Goyder	North of Fowlers Bay, August 1862	Rose cockatoo	Sheldrick 2013	Probable Major Mitchell. See text
Richard Maurice	North of Ooldea, 1901	Cockatoo (red crested)	Murray 1904	Major Mitchell. See text

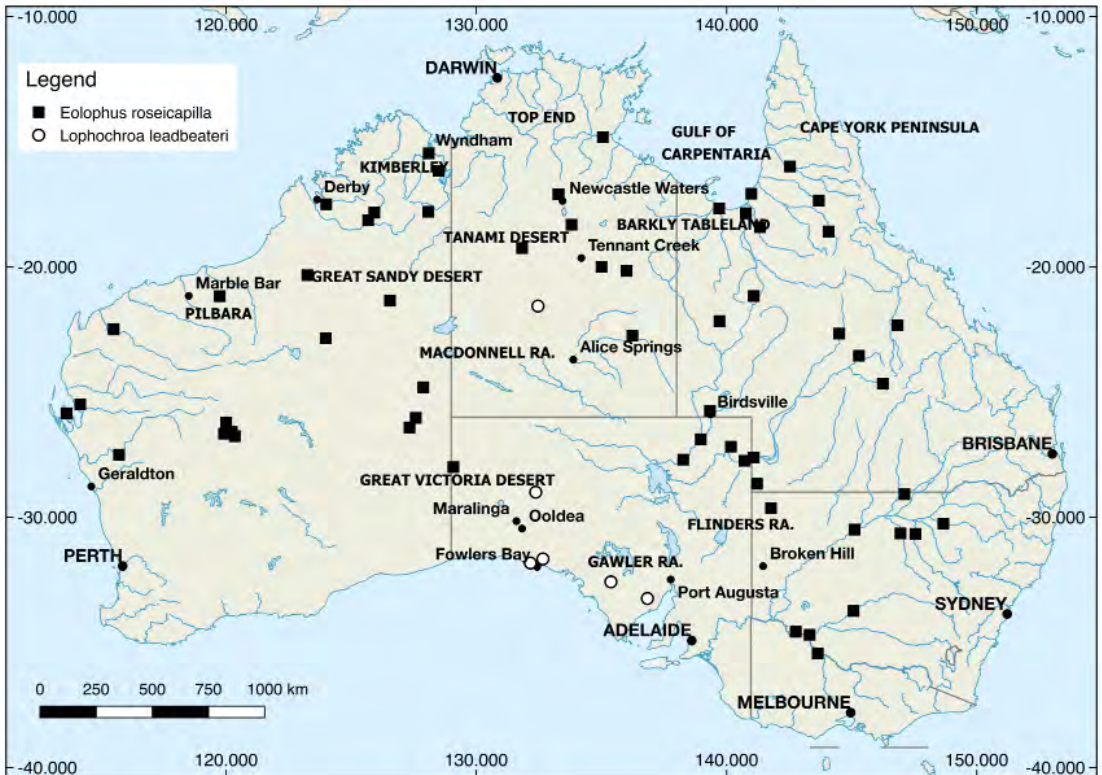


Figure 1. Localities of historical records listed in Tables 1-4.

Bay, in the same area where Eyre (1845) had referred to 'red-winged cockatoos', clearly Major Mitchells (Table 4). In 1908-9 R. C. Chandler collected 39 bird species in the Yellabinna, between the Nullarbor Plain and the Gawler Ranges but not Galahs. Other ornithologists brought the total for that region to 60 during later decades and all included Major Mitchells but not Galahs (Black and Longmore 2004).

The first unambiguous record of Galahs in western SA was by Richard Maurice's party at Wells' Rockhole in the Great Victoria Desert near the WA border in 1901 (Table 3), a subsequent observation being of 'red-crested [i.e. Major Mitchell] cockatoos' (Table 4).

When Sutton (1924) reported Galahs in the Gawler Ranges, including a flock of 31 on Nonning Station, he was informed that they had only been seen on the property in recent years.

A search for further SA records

Gould (1840-1848, 1865) did not see the Galah in SA but wrote of its presence in the colony, perhaps on the basis of Sturt's (1833) specimen from an unnamed stretch of the River Murray (Table 1). Nor was it listed among over 200 species that Governor George Grey forwarded to the British Museum in 1841-1842 (AB personal notes from Zoological Accession Register 1841-1844, Natural History Museum, London). Neither Eyre (1845), Goyder (1858, 1860) nor Babbage (1858) reported Galahs during exploration in and west of the Flinders Ranges.

Sturt (1849) saw Galahs in Goyder Lagoon near the present day Birdsville Track in 1845. This is his only unambiguous reference to them in SA although he is likely to have seen them earlier near Cooper Creek, as Gammage inferred.

No early record is known from the Musgrave Ranges of northwest SA, the Galah being considered absent there even during 20th century visits by White (1915) and McGilp (1935), although the former saw them at Oodnadatta and

the latter learnt of their apparently progressive expansion westward.

The Galah was unlisted in SAMA documents (Waterhouse 1863-1877) among at least 53 species F. W. Andrews collected from the Murray-Darling anabranch area and Murray Mallee between 1865 and 1867, or the nearly 100 species Frederick Schultze collected from southern SA between 1866 and 1868. Nor do SAMA documents (Waterhouse 1863-1877, 1874-1882a, b) include the Galah among at least 65 species Andrews collected from the Gawler Ranges between 1873 and 1883 or 41 species Frank Gibson forwarded from the Flinders Ranges between 1864 and 1870. The first Galahs received were nine from Andrews, following the Lake Eyre Expedition of 1874-1875 (Table 1). They had first been seen on the lower Warburton River near its entry into Lake Eyre (Lewis 1876) and specimens might have been taken there or upstream near Goyder Lagoon or on Cooper Creek.

Clark (1889) reviewed 39 species of native parrots of SA and NT. Of the 'Rose-breasted Cockatoo or Galar (*Cacatua roseicapilla*)', he commented that, while Gould had written that it could be found in SA, Clark had never seen one in the wild and did not know in which part of the colony it might occur. He observed that it 'inhabit(ed) the country bordering the Murray and Darling beyond our eastern boundary'. Later, Clark (1890) repeated his understanding that the 'rose-breasted cockatoo is, or was, found in large numbers in the Upper Murray and Darling' but added that it also occurred 'near Cooper's Creek, in our colony.'

Like Gammage we find no record of the Galah from SA's southern districts during the 19th century. White (*in litt.* to Mathews 1916-17) referred to it as a bird of the 'inland districts' and Ashby (Mathews *loc. cit.*) first saw apparently resident Galahs on the Adelaide Plains only in May 1916, having seen a group of 13 in the suburbs several times 'some years' earlier.

In summary, nineteenth century records of the Galah in SA were restricted to the Diamantina and Cooper drainages in the far northeast.

Central Australia

During the 1894 Horn Expedition to CA, the Galah was not among 78 species collected and a further 22 identified, but the naturalist George Kearland was shown a cage containing young budgerigars and a single 'rose-breasted cockatoo' near the Alice Springs Telegraph Station (North 1896). He was advised that such birds 'not otherwise seen' might be obtained in summer, when they came to water. During the Barclay Expedition of 1911 (Hill 1913), the Galah was not recorded before reaching Camp 3 on Lander Creek (River) at c. 22° 02' S near the fringes of the Tanami Desert. Yet two years later S. A. White (1914) saw them 'in great numbers' in the foothills of the MacDonnell Ranges (c. 24° S) with 'flocks of up to several hundreds.'

The 1890 specimen from 'central Australia' (SAMA B52302) appears to be of the western subspecies *roseicapilla* (AB pers. obs.) but it is otherwise undocumented and its provenance is therefore uncertain. Cowle's egg clutch (SAMA B2789), confirmed as that of the Galah and not Major Mitchell (AB and P. Horton pers. obs.), and the 1898 specimen (SAMA B52307), provide more persuasive evidence of the perhaps irregular occurrence of Galahs in CA at around that time.

The Galah's early distribution: evidence from indigenous language groups

The Arandic language groups of CA had no traditional name for the Galah but borrowed names, after its arrival, from neighbours in the east, north and southeast, where Galahs were familiar (see Appendix).

In South Australia, it was chiefly those language groups from the Diamantina and Cooper drainages who had traditional names for the Galah. In the Flinders Ranges a name was acquired from Cooper Creek neighbours after the Galah appeared in their country.

The only other groups who had a traditional name were from the north-western ranges and far west coast and we infer that they knew the bird only through their close cultural ties with neighbours from the western desert language groups (see Discussion and map in Appendix).

Subspecific identification

The Galah comprises three subspecies: *E. r. roseicapilla* (Vieillot, 1817), the pink-crowned form in the west; *E. r. albiceps* (Schodde, 1989), the pallid-crested eastern form; and *E. r. kuhli* (Mathews, 1912), a smaller and paler bird in the tropical north. The distributional limits of those subspecies were described by Schodde and Mason (1997) and confirmed by Engelhard *et al.* (2015).

Since subspecies are geographical replacements of one another, interpretation of the Galah's early distribution is enhanced by reference to them. Most records in Table 1 are confidently assigned to *E. r. albiceps*, those in Table 2 to *E. r. kuhli*, and those in Table 3 to *E. r. roseicapilla* (Figure 2).

Only four records are of ambiguous identity, McKinlay's on the Corella River in northern Qld (Table 1), and Barclay's and Winnecke's in CA (Table 2). These will be discussed further.

Genetic insights

Engelhard *et al.* (2015) examined mitochondrial and nuclear DNA diversity in a phylogeographic study of the Galah and found a broad concordance between the core ranges of the three subspecies and distinct eastern, western and northern mitochondrial DNA haplogroups. They found relatively narrow zones of intergradation between subspecies (as above, Figure 2) and a correspondingly limited overlap of haplogroups, with the notable exception of Australia's mid longitudes south of 20° S (Figure 3). They found a broad spread of all three haplogroups in CA and far western and north-western SA and, elsewhere in SA, an overlap of eastern and northern haplotypes, the latter right through to the southern coast

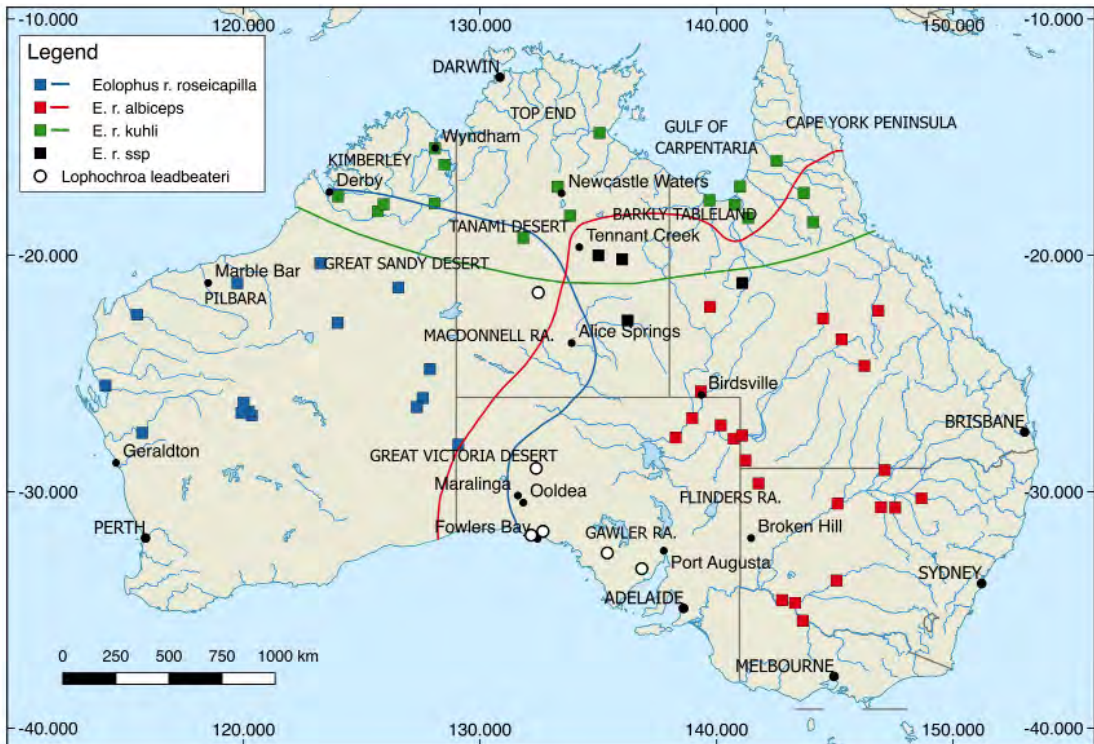


Figure 2. Approximate present distributional limits of Galah subspecies, including intergrades, after Schodde and Mason (1997) and Engelhard *et al.* (2015), allowing most historical records to be assigned to subspecies.

(Figure 3). That extensive zone of mitochondrial DNA overlap is where we have identified few or no historical records.

Reviewing the evidence

Gammage found that the Galah occupied the middle reaches of the Murray and Darling Rivers and their tributaries, and extended north into the catchments of the Barcoo, Thomson, Diamantina and Georgina Rivers, including the Warburton and Cooper Creek, northeast of Lake Eyre. These records are of the eastern subspecies *E. r. albiceps*.

Further north, reports from around the Gulf of Carpentaria, Keartland's (North 1898) and Rogers' (Mathews 1916-17) observations in the southern Kimberley, and Chewings' (2010) in the Tanami Desert are referable to *E. r. kuhli*.

In the distribution of western *E. r. roseicapilla* Galahs extended inland from the Murchison,

Gascoyne and major Pilbara rivers (Table 3, Serventy and Whittell 1967) to the wells and waterholes of the Great Victoria and Great Sandy Deserts, and Rawlinson Range 128° E.

We find that early colonial records in and south of the Gawler Ranges (Hawker, Hack) and near Fowlers Bay (Eyre, Goyder) were of Major Mitchells and that the three Galah subspecies were then distributed in an almost horseshoe pattern around CA and were absent from much of SA (Figure 4).

The western *roseicapilla* and eastern *albiceps* subspecies were then separated by a minimum distance of 800 km across the western Lake Eyre Basin and eastern Great Victoria Desert and twice that distance further south. To what extent either of those two subspecies was in contact with northern *kuhli* is uncertain.

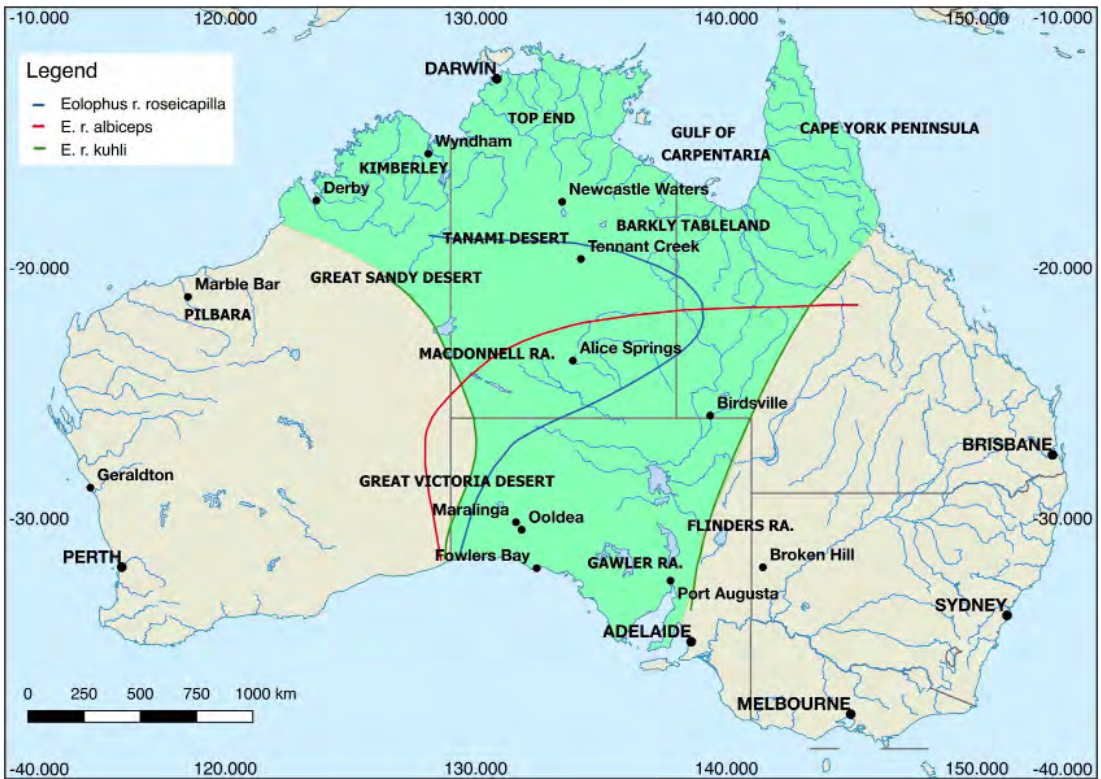


Figure 3. The inferred distributional limits of western, northern and eastern haplotypes (from Engelhard *et al.* 2015). Note that the overlap between western and eastern haplotypes approximates the zone of intergradation between subspecies *roseicapilla* and *albiceps* (Figure 2), whereas northern haplotypes extend, as shown by green shading, through CA and SA to the southern coast.

Eley and others hinted at a distributional gap across the Burdekin catchment, where a zone of intergradation now exists between *albiceps* and *kuhli* (Schodde and Mason 1997, Engelhard *et al.* 2015). The closest historical records between them appear to be those of Wills in the upper Georgina catchment (*albiceps*), and McKinlay on the coastward draining Corella River north of the Selwyn Range (identity uncertain) (Table 1).

Barclay's and Winnecke's records east and southeast of Tennant Creek in the late 1870s (Table 2) are also of uncertain subspecific identity and might represent an intergradient population, lying between the Georgina catchment and the Barkly Tableland.

Galahs became established in CA only in the late 1890s, according to both European and indigenous sources. Any interaction between

roseicapilla and *kuhli* across the northern Great Sandy or Tanami Deserts was and remains undefined (Schodde and Mason 1997, Johnstone and Storr 1998). There is evidence therefore that eastern *albiceps* may have been in reproductive contact with northern *kuhli* but little indication that western *roseicapilla* and the latter were (Figure 4).

The pre-European distributions of the three subspecies inferred above are mirrored in their genetic relationships (Engelhard *et al.* 2015). Those authors showed western and eastern haplotypes at opposite ends of their unrooted network, linked genetically only through northern haplotypes. The Galah's subsequent range expansion across southern Australia's mid longitudes has resulted in secondary contact between western and eastern subspecies, long isolated unless through northern *kuhli*.

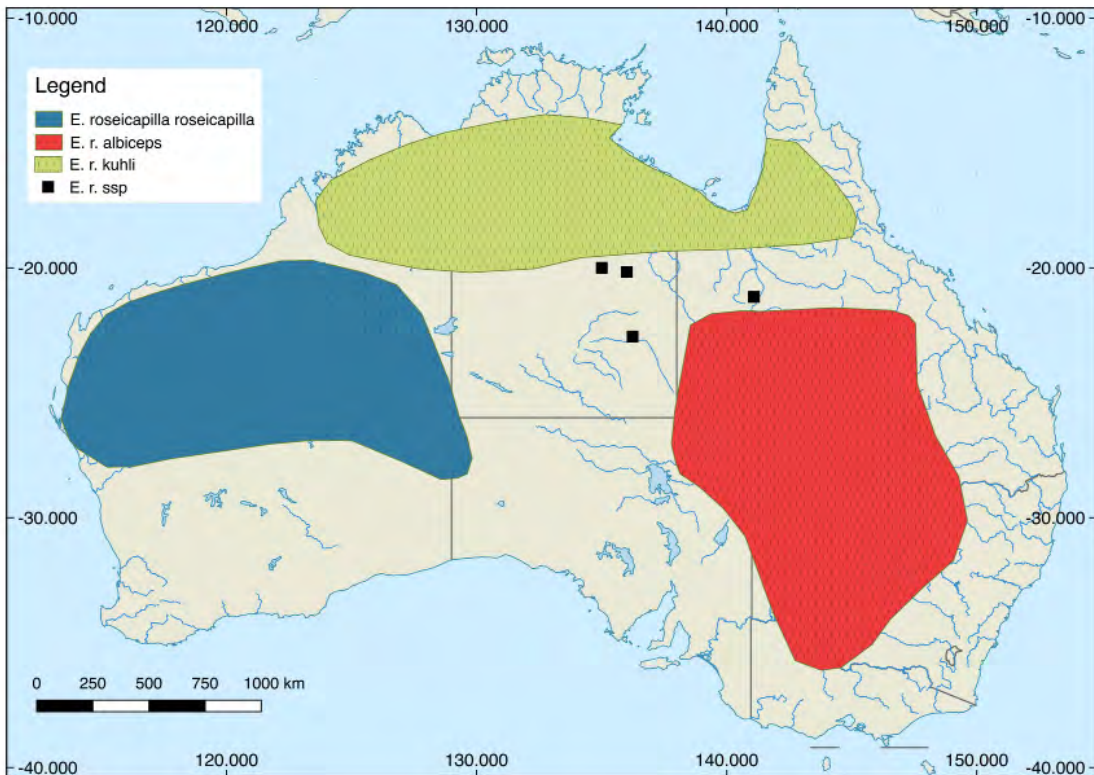


Figure 4. The inferred distributions of the three Galah subspecies in pre-European times. Compared with present distributional limits (Fig. 3), there has been little change in the distribution of northern *kuhli* but major expansion by the other two subspecies.

Was the Galah's range expansion solely the result of land use change?

Close geographical details and timing of the Galah's range expansion have not been a focus of this study but almost all previous reviewers have commented that it expanded from the inland with the establishment of new and permanent water sources and vegetation clearance for cereal growing during the 20th century (Rowley 1990, Johnstone and Storr 1998, Higgins 1999).

Serventy and Whittell (1967) postulated a deterioration of the inland climate as a contributory cause but there is no evidence that inland populations declined. Rather, they too expanded, as Forshaw (1980) observed. The former opinion is pertinent to the most closely documented period of the Galah's expansion into agricultural country from the 1920s and 1930s, and could account for an earlier phase across

pastoral rangelands, as dams and bores became widely established.

Rowley (1990) commented that, before their post-European expansion, Galahs were confined to within flying distance of tree-lined watercourses and were released from their ecological constraints by the provision of abundant water and palatable crops. That does not take account of the presence of Galahs at wells and waterholes of the western deserts in the middle of the 19th century or of their expansion into CA at a time when pastoral activity there relied on unmodified riverine water sources.

The absence of a traditional name in CA and information that Galahs 'arrived with the Europeans' is reflected in the Horn Expedition's failure to encounter them in 1894. Yet Cowle's clutch from the Finke River in 1896 showed

that it had bred there by then. Its changed status through seasonal or irregular visitor to breeding resident occurred over a few decades at the end of the 19th century and Barclay and Winnecke possibly witnessed early evidence of its expanding range, perhaps from the nearby Georgina catchment.

The use of an acquired eastern name is suggestive of their arrival from that direction. It is also plausible, as discussed above, that *kuhli* and *albiceps* were already in contact in the upper Georgina catchment and that expansion involved an intergradient population. The presence now of northern haplotypes throughout SA in the absence of the northern phenotype might be explained by such early genetic introgression although a full analysis of that anomaly is beyond the scope of this study. Whether western *roseicapilla* populations were also expanding is less clear but its phenotype and western haplotypes now occupy much of CA (Figures 2 and 3).

It is apparent then that the Galah was in an expansionary phase in CA during the late 19th century, perhaps reflecting an amelioration in climate during the preceding millennium, that allowed increasing aboriginal occupation of Australia's deserts (Smith 2013). We find no persuasive evidence that European changes accounted for it. Furthermore, the expansion nationally was not entirely centrifugal, as has been assumed previously. A great part of the centre and central south of the continent contained no Galahs and expansion into those areas was largely towards the centre.

Summary of pre-European distribution

Through much of the colonial period Galahs were distributed in three relatively discrete populations, corresponding to its three recognised subspecies.

E. r. roseicapilla. Murchison and Gascoyne Rivers and Pilbara, inland to wells and waterholes of the Great Sandy and Great Victoria Deserts, and Rawlinson Range.

E. r. kuhli. Southern Kimberley east through the Tanami Desert and Barkly Tableland to drainages of the south-eastern Gulf of Carpentaria.

E. r. albiceps. Drainages of the Georgina-Diamantina and Cooper, and middle reaches of the Murray-Darling Basin.

A potential zone of interaction between *E. r. kuhli* and *E. r. albiceps* in the upper Georgina catchment and Barkly Tableland is identified as a possible centre of early expansion of the species.

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APPENDIX: ABORIGINAL NAMES FOR GALAH

1. South Australia

Diyari (Cooper Creek) = kilankila (Austin 1981)

Yandruwandha (Innamincka and Strzelecki) = kilangkila (Breen 2004)

Wangkangurru (Lower Warburton and Simpson Desert) = kilakila (Reuther 1981) or kilangkila (Hercus 1994)

Arabana (west of Lake Eyre) = kilangkila (Hercus 1994)

Guyani (south of Lake Eyre); no name known (L Hercus per JM).

Adnyamathanha (North Flinders Ranges) = kilankila (borrowed, probably from Diyari) (McEntee and McKenzie 1992)

Parnkalla (western slopes of Flinders Ranges near Port Augusta, north-eastern Eyre Peninsula, eastern Gawler Ranges and west to Woomera); no name known (Schürmann 1844)

Wirangu (western Gawler Ranges and Eyre Peninsula from Streaky Bay to Head of Bight and Ooldea) = bira-bira (Tindale, in Hercus 1999) or beera-beera (Sullivan 1928)

Kukarta (North of the Gawler Ranges and west to the Great Victoria Desert); no name known (Black 1920, Platt 1966, 1972)

Ooldea groups (including western 'spinifex people' of the Great Victoria Desert) = beear-bear (Bates, in Condon 1955)

Pitjantjatjara (Northwest ranges) = piyar-piyarpa (Goddard 1996)

Yankunytjatjara (Northwest ranges) = piyar-piyar (Goddard 1996)

2. Central Australia (Arandic groups)

Kaytetye (Wauchope, Davenport Range, c 400 km north of Alice Springs) = elentye or kelelkelelke (Turpin and Ross 2012)

Anmatyerr (Ti Tree, Reynolds Range c 150 km north of Alice Springs) = ilentye, lyenty or kerlelkerlelp or uneng atyetyek [red chest] (Green 2010)

Alyawarr (200-300 km northeast of Alice Springs) = ilenty (Green 1992)

E Arrente (Harts Range, c 150 km northeast of Alice Springs) = ilentye or inweng-athetheke [red chest] (Henderson and Dobson 1994)

W and C Arrente (Hermannsburg, Alice Springs) = ilentye (Henderson and Dobson 1994, Breen 2000)

Lower Arrente (SA border c 400 km south of Alice Springs) = ilyenty or angkil-angkil (GB unpublished vocabulary)

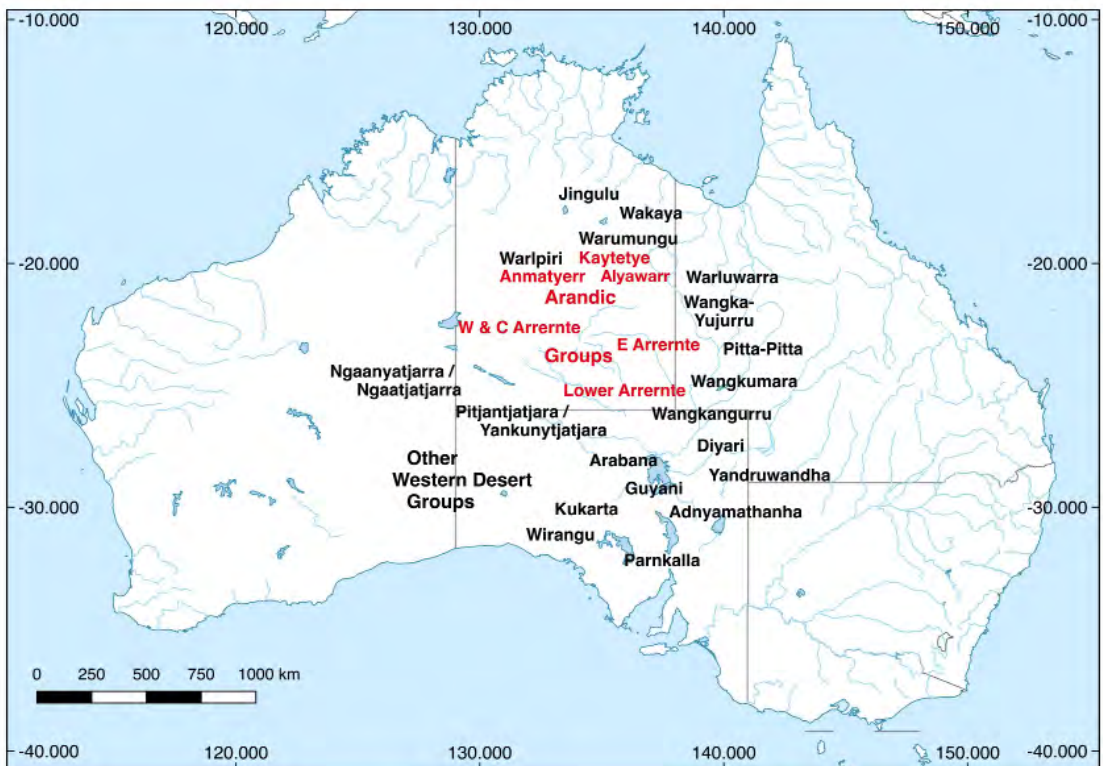


Figure 5. Indigenous language groups of CA and SA and their near neighbours. Arandic groups are shown in red.

3. Mid Northern Territory

Warlpiri (Tanami Desert) = kirlilkirililpa or kirlilkirililkipa (D. Nash pers. comm.)

Warumungu (Tennant Creek) = kirlirrkirlirr or kirlilkirilil (J. Simpson pers. comm.)

Wakaya (Barkly Tableland) = kilakila (GB unpublished vocabulary)

Jingulu (Newcastle Waters area) = gililigila (PS field records), kilikilidi (Pensalfini 2011)

4. Inland Western Australia

Ngaanyatjarra/Ngaatjatjarra (Warburton Range/Rawlinson Range) = kinturrka or piyarr-piyarr(pa) (Glass and Hackett 2003)

'Western Desert' = kinturrka (Douglas 1988)

5. Western Queensland

Wangka-Yujurru (lower Georgina catchment) = ngilintja (GB unpublished vocabulary)

Pitta-Pitta, their eastern neighbours = kilintja (Blake 1979, Dixon and Blake 1979).

Warluwarra (Georgina/ Urandangie) = gilagila (GB unpublished vocabulary)

Wangkumara (SW Qld) = kilampara (GB unpublished vocabulary)

DISCUSSION

In CA, all Arandic groups (Figure 5) have at least one name for the Galah, mostly transcribed as 'ilentye' but acquired, we infer, from Georgina River, Qld neighbours the Wangka-Yujurru and Pitta-Pitta whose names are respectively 'ngilintja' and 'kilintja'. 'Deletion of initial consonants is regular in Arandic languages.

Two northern groups, Kaytetye and Anmatyerr, have an alternative name, respectively 'kelelkelelke' and 'kelelkerlelp', that are similar to those of their northern neighbours, the Warlpiri of the Tanami Desert ('kirlilkirililpa') and Warumungu of Tennant Creek ('kirlilkirilil'). The fact that the initial 'k' of those names was not

deleted in Kaytetye and Anmatyerr suggests that the words were only recently borrowed.

The Anmatyerr have a third name 'uneng atyetyek' and the Eastern Arrernte a second name 'inweng-athetheke', both simply translating as 'red chest', suggesting strongly that the Galah was new to them. The Lower Arrernte of the SA border region had a second name 'angkil-angkil', said by speakers of that language to have been borrowed from SA. This is consistent with the change needed from 'kilangkila' of the adjacent Wangkangurru, the first syllable and final 'a' being dropped and the word duplicated.

Since the name 'ilentye' is a borrowed one we infer that the pre-European distribution of the Galah did not include country in which that name is used. Its southern limit might then have been situated at about the latitude of Tennant Creek or 20° S, i.e. the present southern limit for the northern subspecies *kuhli*.

In the northeast of SA, the Diyari and Yandruwandha (Cooper Creek) and Wangkangurru (Warburton) had similar names, 'kilankila', 'kilangkila' or 'kilakila', a duplication of the onomatopoeic 'gilaa' of inland NSW (Gammage, Fraser and Gray 2013). Many languages contain the 'gila' or 'kila' element, often duplicated or combined with another element, but with the stress on the first syllable, not the second as in 'gilaa' or 'galah'.

The Adnyamathanha (northern Flinders Ranges) had no name for the Galah and, for a period after Galahs moved into their country late in the 19th century, referred to it only with the name of the Little Corella 'warrandhu' (Schebeck n. d., JM and GB personal data). Later, they borrowed 'kilankila' from a neighbouring group, probably the Diyari. Beginning with a 'k', the name is inconsistent with a traditional Adnyamathanha word.

The Arabana from west of Lake Eyre had the name 'kilangkila' of their northern Lake Eyre

Wangkangurru neighbours, but there was no name for the Galah among their southern neighbours Guyani or among Parnkalla or Kukarta further south and west in SA (Figure 5). Thus most indigenous language groups in SA who had a name for the Galah were north and east of Lake Eyre in the Diamantina and Cooper drainages.

Otherwise only the Wirangu in the far west and Pitjantjatjara and Yankunytjatjara in the far northwest of SA had names for the Galah. The Wirangu, with the name 'bira-bira' (Tindale, in Hercus 1999) or 'beera-beera' (Sullivan 1928), had cultural links with Western Desert people and all visited the famously reliable waters at Ooldea (Figures 1 and 3) where the name was rendered 'bear-bear' by Daisy Bates (Condon 1955).

Present orthography provides the name 'piyar-piyar' or 'piyar-piyarpa' for languages of the northwest SA ranges, where Galahs were unreported, and the Warburton and Rawlinson Ranges in WA, in the area where explorers Giles, Lindsay and Maurice saw Galahs. The names are similar or identical, all but Wirangu being closely related dialects of the Western Desert Language. Association with Western Desert groups explains how far western and north-western SA groups had a name for a bird that appears not to have been present in their own country.

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