

Galaha

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When Europeans arrived in Australia, galahs were typically inland birds, quite sparsely distributed. Now they range from coast to coast, and are common. Why did this change occur? Why didn't it occur earlier? Galahs feed on the ground. They found Australia's dominant inland grasses too tall to get at the seed, so relied on an agency to shorten them: Aboriginal grain cropping before contact, introduced stock after it.

On 3 July 1817, near the swamps filtering the Lachlan to the Murrumbidgee and further inland than any white person had been, John Oxley wrote, 'Several flocks of a new description of pigeon were seen for the first time... A new species of cockatoo or paroquet, being between both, was also seen, with red necks and breasts, and grey backs. I mention these birds particularly, as they are the only ones we have yet seen which at all differ from those known on the east coast' [1].

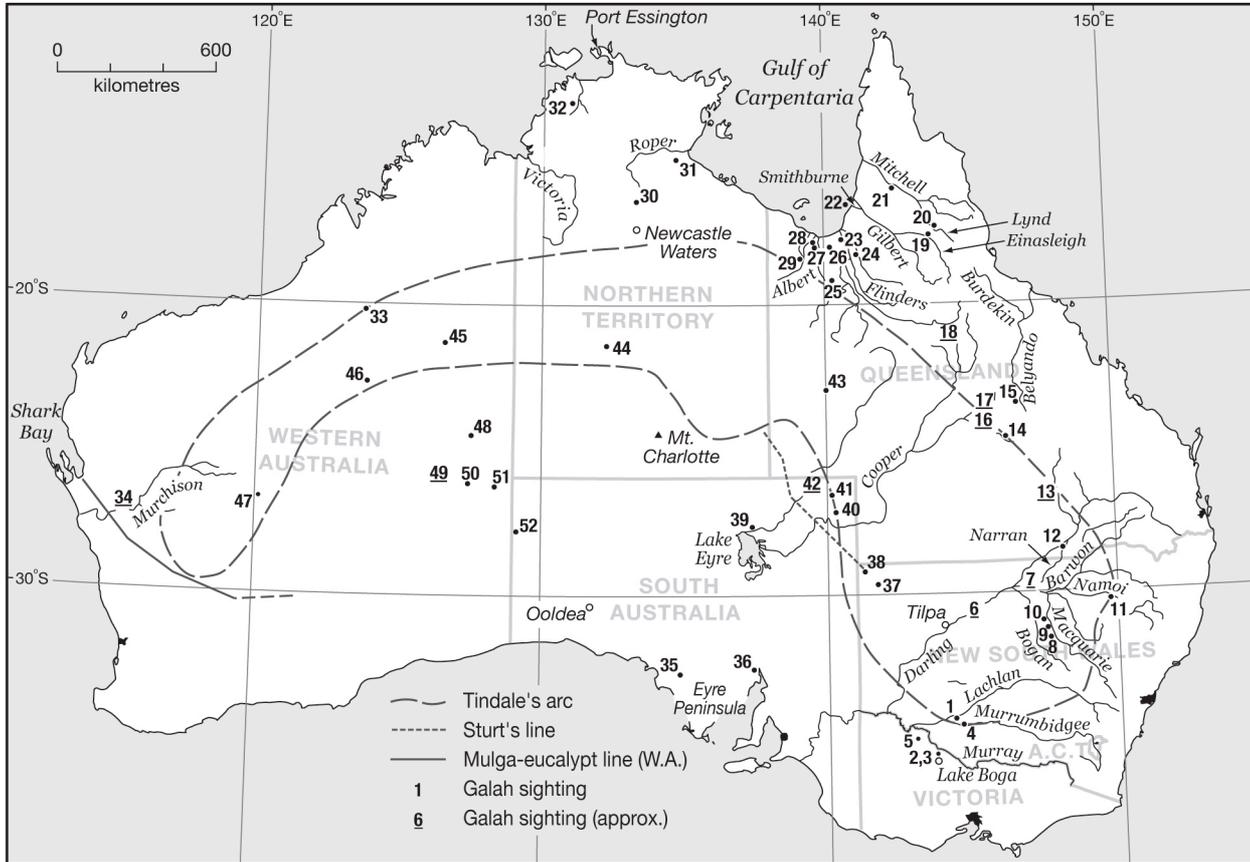
Allan Cunningham, Oxley's botanist, also saw the birds. 'We shot a brace of pigeons of a new species...', he noted, 'Some other strange birds were observed (supposed to be Parrots), about the size and flight of a pigeon, with beautiful red breasts', and next morning, 'They are of a light ash colour on the back and wings, and have rich pink breasts and heads' [1]. In the manner of science parrot and pigeon were shot, and within a few months John Lewin in Sydney drew the first known depictions of them [53].

Thus were the Crested Pigeon (*Ocyphaps lophotes*) and the Rose Cockatoo or Galah (usually *Cacatua roseicapilla*) introduced to the world. In London in 1822 Coenraad Temminck described the pigeon [54], and on 27 December 1817, six months after Oxley saw it on the Lachlan, Louis Vieillot described the galah from a specimen in the Paris Museum. He did not know where it was from, noting 'I suspect it was found in the Indies' [55]. Its label states that it was 'given to [Francois] Peron at Port Jackson' [56]. Neither place was near galah country, but both statements may be correct. In July 1986 Ian Rowley found the specimen to be the western form, so it was not from the Lachlan. He and others speculate that Nicolas Baudin's men, including Peron, collected it at Shark Bay in 1801 [57]. Baudin's two ships, first one then the other, stayed there 66 days, and Baudin and two naturalists, Peron and Stanislas Levillain, listed all "new" birds found. None were parrots or cockatoos, and galahs were not reported at Shark Bay until 1923 [58]. Levillain sailed directly to the Indies, where he died in December 1801. Peron found his bird collection at Port Jackson, and in time delivered what survived to the Paris Museum, where Vieillot worked on it [59]. If a galah was included, probably it was not got in Australia. Yet if Vieillot's specimen came from someone else at Port Jackson, who? Flinders had not yet seen the west coast, while the only known early reports of galahs on any coast are from the Gulf of Carpentaria, and they are not the western form. Possibly Levillain traded a skin in the Indies, was too ill to record it, and left it for Vieillot to find. Possibly. It is a puzzle.

It is not the only puzzle about these beautiful and tractable birds. To find them in 1817 Oxley went down the Lachlan, and detoured south towards the Murrumbidgee. Galahs are common on both rivers. Why were there none in 1817?

The map locates early galah sightings around Australia [1-52], starting with Oxley's [1]. Some are first sightings, others first reports probably first

sightings. Some are not precise: Charles Sturt did not record galahs on the Darling but later told the ornithologist John Gould that they were there [6], and Thomas Mitchell did not record them on the Darling or the Barwon but recalled them there [7]. On the other hand Oxley in 1818 and Sturt in 1828 were clear that they did not see galahs or crested pigeons until the lower Macquarie [8-9].



Galah locations

- Names in *italics* indicate a region only. Sources are in matching notes 1-52.
- | | |
|-----------------------------------------------|-----------------------------------------------|
| 1. John Oxley, Allan Cunningham 3-4 Jul 1817. | 27. Leichhardt 2 Aug 1846. |
| 2. Joseph Hawdon 11 Feb 1838. | 28. William Landsborough 8 Oct 1861 (report). |
| 3. Edward John Eyre May 1838. | 29. Landsborough 22 Nov 1861. |
| 4. Eyre 8 Jan 1839. | 30. John McDouall Stuart 28 Apr 1862. |
| 5. Wilhelm Blandowski Dec 1856-Aug 1857. | 31. Leichhardt 18 Oct 1845. |
| 6. <i>Charles Sturt to John Gould.</i> | 32. JWO Bennett 8 May 1869. |
| 7. <i>Thomas Mitchell</i> 4 Aug, 16 Sep 1846. | 33. PE Warburton 8, 9, 25 Oct 1873. |
| 8. Oxley 23 June 1818. | 34. <i>Robert Austin</i> Oct 1854. |
| 9. Sturt 19 Dec 1828. | 35. Stephen Hack June 1857. |
| 10. Alfred Norton Sep 1859. | 36. James Hawker 5 Oct 1842. |
| 11. John Gould Dec 1839. | 37. Sturt 19 Jan 1845. |
| 12. Mitchell 4 Aug 1846. | 38. Sturt 1845-6: Sturt's line. |
| 13. <i>S Diggles</i> 1866-70. | 39. John Lewis 14, 17 Jan 1875. |
| 14. Mitchell 4 Aug 1846. | 40. William Wills 19 Dec 1860. |
| 15. Mitchell 16 Sep 1846. | 41. McKinlay 28 Dec 1861. |
| 16. <i>Carl Lumholtz</i> 1881. | 42. <i>McKinlay</i> Mar 1862. |
| 17. <i>K Broadbent</i> 1889. | 43. Wills 8 Jan 1861. |
| 18. <i>AW Stirling</i> 1882-3. | 44. Stuart 1 May 1860. |
| 19. Frank and Alec Jardine 7 Sep 1864. | 45. David Carnegie 5-10 Oct 1896. |
| 20. Leichhardt, John Gilbert 27 May 1845. | 46. George Keartland 15 Oct 1896. |
| 21. Ludwig Leichhardt 20 June 1845. | 47. Keartland 13 July 1896. |

22. John Lort Stokes 8 Aug 1841.
23. Stokes 29 July 1841.
24. John McKinlay 27 May 1862.
25. McKinlay 6 May 1862.
26. Leichhardt 30 July 1845.

48. Ernest Giles 10 Apr 1874.
49. *John Forrest* Aug? 1874.
50. David Lindsay 10 Aug 1891.
51. Lindsay 5 Aug 1891.
52. WR Murray 28 June 1901.

In February 1838 Joseph Hawdon, a good bushman, took stock down the Murray. Not until he reached Lake Boga in north-west Victoria did he note 'great numbers of rose-coloured parrots' [2]. That May another good bushman, Edward John Eyre, edging the mallee north with 300 cattle, also reached Lake Boga. 'Here', he recalled, 'I first saw the beautiful rose cockatoo' [3]. In 1839 he took cattle down the Murrumbidgee, and five days before the Lachlan swamps, he 'now began to meet with the beautiful rose cockatoo and other graceful crested pigeons - both in considerable numbers' [4].

He was at an edge of their range. In 1836 Mitchell visited both Oxley's Lachlan campsite and Lake Boga, naming birds but not galahs or crested pigeons [60]. John Cotton wrote three books on British birds before he settled in Victoria, and in 1848 published a list of 140 birds without naming galahs or crested pigeons [61]. In old age the observant Murray pioneer Edward Curr named white cockatoos, and after five years in south-west Victoria GH Haydon listed 'all' its birds, but neither noted galahs or crested pigeons [62]. Nor did HL Wheelwright, a professional hunter in Victoria who in 1860 wrote a book on the habits and habitats of all manner of animals, birds and reptiles [63], nor in the eastern Riverina did WH Breton in 1832 or the naturalist George Bennett in 1833, though both noted white and black cockatoos [64]. In October 1839 Louisa Meredith, who travelled widely, first saw a galah in a cage at Parramatta [65]. Galahs are now common in all these districts.

Linguists suppose the word "galah" is from the Ngiyampaa language of the Wailwon people, whose country ran from near Brewarrina east to the lower Namoi and south-east almost to Gilgandra. Gulargambone ("with young galahs") and the nearby rail siding of Gular are in their country. The first known European to write the word, George Bennett in 1860 ('kilaw'), learnt it on the Bogan [66], probably in Wailwon country; the next, John McKinlay ('gulas'), probably learnt it on the Darling where he lived for some years [67]. Wailwon neighbours, including the two great confederacies of inland New South Wales, Wiradjuri south and Kamilaroi north, also knew the word. The Wiradjuri used it for the bird, the Lachlan, and the Milky Way, they all having the same soul, *gular* [68]. Where an Aboriginal word for "galah" is known, its domain broadly matches galah limits early Europeans noted [69], but words can no longer map pre-contact galahs. Many languages are lost or incomplete; some added the word when the bird entered their country after contact [70]; others knew a word but not the bird. The southern Wiradjuri for example knew *gular*, but it was their country Oxley and Eyre crossed without seeing the bird. Nonetheless all these languages are well inland. The inference is clear: in most of south-east Australia at contact, there were no galahs.

In Queensland too the birds were restricted. On the Barcoo in 1846 Mitchell saw two galahs, 'none of these birds having been seen by any of the party since we crossed the Culgoa' [12, 14]. Not far away Carl Lumholtz stated in 1881, 'No sooner is the range passed than we met with the red-breasted cockatoo, which is never found on the eastern side' [16]. 'Barcaldine seems to be almost the eastern limit of the range of this bird in the district', K Broadbent echoed in 1889, 'It is common there, occurring as soon as one has passed two or three miles beyond the "Divide"' [17]. The Jardines [19] and Ludwig Leichhardt [20-1] crossed most of Queensland before they met galahs on Cape York rivers flowing north. In the lower Gulf John Lort Stokes of the *Beagle* noted galahs in 1841 [22-3], the only early sightings known on any coast and the first known by a ship-based expedition. Stokes was a keen naturalist, and scientists on board collected hundreds of birds around the Australian coast, but no crested pigeon,

and galahs only here [71]. In the same corner of the Gulf many later travellers reported first sightings, and in September 1857 John Elsey told Gould that it was 'the favourite resort of the Rose Coc[k]atoo'. Elsey had come east from the Victoria without previously seeing galahs; travelling south-east, he lost them on the upper Burdekin, not far from where the Jardines, travelling north-west, first saw them [72]. Leichhardt twice noted galahs on the lower Gulf, but not again until he was approaching the Roper [26-7, 31].

From the many naturalists on South Australia's expedition to establish Darwin, including two full-time bird collectors [73], comes a single record. On 8 May 1869 JWO Bennett, a draftsman at Fred's Pass 65 kilometres south of the new settlement, sent in a galah skin [32]. That suggests that galahs were unknown at both Darwin and Adelaide. Even Fred's Pass may have been too far north: Bennett listed no word for galah although he did for other cockatoos and parrots [74]. An 1878 list of 106 birds shot near Darwin does include galahs, as 'Rare, occasionally seen in small flocks' [75], but in 1840 John Gilbert, a most enterprising collector, told Gould after two months at nearby Port Essington, 'All the parrots I have observed here I have collected'. He names neither galahs nor crested pigeons [76]. Nor does Stokes at Port Essington in July 1839 [77], or another collector, John Macgillivray, after five days at Port Essington and four weeks on Cape York in 1848 [78]. Even a 1966 handbook limited galahs to south of the Roper, although 'towards the end of the dry season wandering parties may reach [the] far north coast' [79].

On the Kimberley coast Baudin, Flinders, Freycinet and PP King listed birds but not galahs or crested pigeons [80]. Galahs were inland from Derby by 1886 [81], but further north FM House collected 43 bird species in 1901, and south of Wyndham JP Rogers made extensive lists in 1908-9: neither noted galahs or crested pigeons [82]. South of the Kimberley galahs were at remote desert waters. PE Warburton saw them three times at Discovery Well in October 1873 [33]. David Carnegie at Helena Spring [45] and George Keartland at Separation Well [46] reported them in October 1896, and that July Keartland saw them near Lake Way [47], but the Gregorys' north-west expeditions did not include them among birds they noted. Despite extensive collecting in south-west Australia, Gilbert found no galahs [83], and Gould wrote, 'I have not seen specimens of this bird from any part of the Swan River colony, neither did I observe it in any part of South Australia that I visited' [84]. Elsey told Gould that the rose cockatoo was only 'found in W. Australia N. of the Murchison in Lat 28 S' [71]. This is the mulga-eucalypt line, mulga north, eucalypts south, which curves south-east from Shark Bay. Experts say it marked the southern limit of rose cockatoos at contact [85], but no early sighting locates the birds on that coast, in 1904 a keen bird man said they were never there [86], and even inland John Forrest trekked east north of the line in 1874 without noting them. The first galah noted east of Perth was in 1914, and south-east in 1918, and in neither region were they common until after World War 2 [87].

Across 1000 kilometres of the Nullarbor no-one reported galahs until South Australia's Gawler Range, where Stephen Hack saw them in June 1857 [35]. Riding from north of Adelaide in October 1842, James Hawker saw his first galah just south-west of Port Augusta [36]. No early report mentions galahs or crested pigeons on Eyre, Yorke or Fleurieu Peninsulas, or anywhere in the settled districts of South Australia [88].

Nowhere did early Europeans settle galah country. At most they travelled through it, and understandably they were vague about the bird's range. 'The Rose-breasted Cockatoo is a bird of the low country entirely', Sturt told Gould, 'and limited in the extent of its habitat, never being found in any great number on the banks of the Darling, or rising higher than 600 feet above the level of the sea. It ... occupies those vast arid plains which lie immediately to the westward of the Blue Mountains' [6]. As Sturt knew, 'immediately' was not strictly correct, and Gould too was vague. In 1848 he

wrote that galahs occupied 'all parts of the interior of the country' plus the north and south coasts [89]. Even if that were true he could not have known it then, and in 1865 he modified it: 'This beautiful Cockatoo is abundantly dispersed over a great part of the interior of Australia' [6]. Convention masked imprecision: the galah became a bird of the dry inland, of the 'depressed interior', as Sturt put it [90].

Yet there too early reports are sparse. In January 1845 Sturt noted galahs at Depot Glen and recalled many from there north [37-8, Sturt's line], but he was the only explorer to find them plentiful over any extent of the Centre. On Burke's fatal journey William Wills saw them only at Coongie Lakes in December 1860 and a month later far to the north, while Hermann Beckler never noted them, and first saw crested pigeons east of Milparinka in February 1861 [40, 43, 91]. In 1874-1875 John Lewis probed in every direction from Lake Eyre, and not for three months, when on the Warburton near the Lake's north-east shore, did he write, 'Here for the first time on the journey I saw a flock of yalah parrots'; at the same spot three days later he was 'shooting crested pigeons and yalah parrots' [39]. North-west of the Lake in November 1858 GH Babbage listed 18 bird species and 'first saw' crested pigeons, but no galahs [92]. John McDouall Stuart crossed half Australia before he reported galahs north-west of Central Mt Stuart in May 1860 [44, 93]. Ernest Giles criss-crossed the Centre several times before first noting galahs in the west Warburtons in April 1874 [48]. That year John Forrest came east from the Murchison, but in hundreds of miles reported galahs only at 'permanent waters' in the desert [49], as did David Lindsay in 1891 [50-1]. In 1901 WR Murray circled from Fowlers Bay north-west into Western Australia, east to Ernabella, and back, noting galahs once, 'a small flock' at Wells' Rockhole in the Great Victoria Desert [52]. In 1902 he crossed from Fowler's Bay to the north coast, and among many birds reported no galahs, and crested pigeons once, south of the Kimberley [94]. These were men looking for "new" birds. That they rarely reported galahs or crested pigeons is telling.

Galahs were confined and uncommon because they feed on the ground. They 'forage on ground in open', a handbook states, 'rarely among tall or dense cover. Often feed on open plains' [95]. They eat tree seed, juicy grass stems and roots, berries, nuts, insects and larvae, but they prefer grain [96], so they seek short grass. Most native grasses are tall. Short grasses are rarely both widespread and dominant in the inland, and commonly grow among tall grasses. The most widespread grass at contact, kangaroo grass (*Themeda triandra*), can hide children. Others, like plains grass (*Stipa aristiglumis*), Mitchell grass (*Astrebla* spp), Flinders grass (*Iseilema vaginiflorum*), native oatgrass (*Themeda avenacea*), bristly love grass (*Eragrostis setifolia*) and most tussock grasses (*Poa* spp) and native millets (*Panicum* spp) are too tall for galahs [97]. Yet tall grasses dominated both sides of the galah perimeter at contact. How could that have restricted the birds?

Another map is laid on the galah map. Norman Tindale published it in 1974, to show 'the principal areas where there are indications of major dependence on grass seed foods' by Aborigines [98]. It distinguishes a grain arc from a generally higher rainfall belt on its coast side, and the arid Centre inland. Broadly, inside the arc people depended largely on grass seed, outside it they did not. On the coast side tubers, roots or bulbs (hereafter tubers) generally grew reliably enough to depend on [99]; on the arid side neither tubers nor seeds were certain, so both were needed [100]. As with Tindale's better known tribal boundaries map, on the ground the arc's boundaries are seasonally oscillating zones, while its coast side had places where people needed seed, and within it lay wetlands supporting tubers. The arc is not watertight, but it floats well.

It can exist because everyone preferred tubers - even Europeans liked their taste [101]. Where they were reliable grass seed was never or rarely eaten.

Tuber eaters ring the coast side. East of Lake Victoria on the Murray in 1844 Sturt noted that 'herbs and roots certainly constituted their principal food' [102], and a Lake Boga district pioneer recalled,

no native tribes could gain their living more easily, as their river was full of fish, and the country abounded in game, while quantities of small yams were obtained on the river flats, and the root of one of the large rushes was edible. The natives obtained a kind of arrowroot from it, which they occasionally made into cakes [103].

On the Kimberley coast JRB Love wrote, 'A very remarkable peculiarity of the Worora is that they do not gather any grass seeds for food... The country... is particularly well provided with grass seeds, some of which are as large as oats and densely abundant... Yet the Worora do not use this food'. Instead they ate yams and fruit got in the hills [104]. After 17 years among Queensland Aborigines, in 1863 James Morrill described their rich variety of animal and plant food. He did not mention grass seed, and he detailed only tubers:

one of which grows at the tops of the mountains is the best eating called "moogoondah", it is white, sweet, firm, dry, and grows in red clay soils. There is another, lower down, at the foot of the mountains, in the scrub, called "mulboon", which is soft and more moist and is very nice eating. There is another root rather of a sticky nature when cooked, grown on the mountains, not in the scrub, but in the grass, and white like a turnip, with a small thin leaf, called "cornool". There is another smaller and darker in its colour, but in other respects very much like it, called "cahnan". Another, a creeper which grows on the high banks of the fresh water rivers, with a small green leaf, the leaves very thick, called "boan". There is another, similar to a turnip, but smaller, called "manoon". There is one which runs in and out among the grass with a little blue flower, called "cardoala" or "cardoabar", and many others more or less like them [105].

Collecting, husking and grinding seed is dull, slow work. No-one did it unless they had to. Inside the arc people had to, even if sometimes they could also eat tubers [106]. The Martu of the Little Sandy Desert, for example, gathered yams and bulbs from special places, but ate over 40 seed species, more than any other group on record, and burnt sandplains to promote millet [107]. Other central Australians used at least 15 grass species [108], but in southern South Australia and in Arnhem Land these same species were ignored 'in favour of various fruits, roots and tubers' [109]. Skilled Arnhem women could gather a kilo of yams in half an hour, whereas a kilo of seed might take skilled desert women six hours to collect, husk and mill [110]. Similarly, in inland New South Wales bulrush (*Typha* spp) shoots on spring or summer floods. On the snow-fed Riverina rivers people could expect that, so bulrush was a staple, but on the Darling and the Barwon they could not, so grain was [111].

Conversely, on the arc's coast side were places where people needed seed, and within it lay wetlands where tuber dependence, as distinct from use, was possible. Where the Lachlan feeds Willandra Billabong, Mitchell saw people eating bulrush

exactly resembling wheaten flour... affording at all times a ready and wholesome food. It struck me that this gluten which they call Balyan, must be the "staff of life" to the tribes inhabiting these morasses, where tumuli and other traces of human beings were more abundant than at any part of the Lachlan that I had visited [112].

A week later Mitchell made 'in a short time, some excellent cakes of it; and they seemed to me lighter and sweeter than those prepared from common flour. The natives gather the roots and carry them on their heads in great bundles, within a piece of net... this was obviously their chief food among the marshes' [113].

Mitchell was in western Wiradjuri country. Ian White shows that western Wiradjuri ate bulrush and tubers but could not rely on them and depended on grain, whereas eastern Wiradjuri could make tubers a staple, so rarely or never ate seed. Tubers in the eastern hills gave way to bulrush in river-fed wetlands further west, and to seed in dry country [114]. That can be seen today. The hills just west of Wagga have few grindstones; the overflow land further west to beyond Narrandera has thousands. Most are small and by creek or swamp middens, probably for bulrush. A few out on the dry plains are larger, true millstones. Still further west millstones increase, but not until the middle Darling, the Barwon, the Bogan and the lower Macquarie, all in galah country, are they common [115].

Untended grain obviously suits ground-feeding birds, but both tubers and grain were farmed as well as gathered, so two differences in husbandry mattered: whether seed grasses were protected, and when they were burnt.

Farming yams such as *warran* (*Dioscorea hastifolia*) in the south-west [116] and *murnong* (*Microseris scapigera*) in the south-east [117] cleared big tracts of land. In Western Australia Europeans found yam paddocks covering many square miles, carefully dug over. In April 1839 George Grey was just south of the Murchison in Western Australia, a galah boundary at contact. He found *warran* grounds extending 'as far as we could see... fuller of holes than a sugar plantation, all of which had been dug by the natives to extract their favourite yams'. Nearby were wells, paths and villages [118]. People turned soil, transplanted, re-planted tops near reeds or fruit, pulled weeds and lived semi-sedentary village lives [119]. In 1851 a settler even thought his Aboriginal neighbours 'very little addicted to hunting and very few of them are even expert at tracking a kangaroo. This may result from the great variety of edible roots, particularly the A-jack-o or warang, which grows here in great abundance and to a very large size' [120]. In south-west Victoria a similarly specialised economy had yam fields and stone-hut villages near intricate canal and weir systems to farm eels [121]. Tubers may also have been farmed elsewhere [122]. All this cleared grass. In tuber country galahs were on unreliable ground.

Of course tuber farming did not destroy all the grass, but since it was tall it was not the grass, but how it was cropped, that kept galahs in grain country. Seed people chose lake or swamp margins or overflow land, blocked channels to irrigate and extend it [123], sowed there crops like *Panicum* (millet) [124], watched the season to know when to return to harvest, and reaped the crop by pulling or stripping with stone knives. On the Darling in June 1835 Mitchell found that

the grass had been pulled, to a very great extent, and piled in hay-ricks, so that the aspect of the desert was softened into the agreeable semblance of a hay-field. The grass had evidently been thus laid up by the natives, but for what purpose we could not imagine... we found the ricks, or hay-cocks, extending for miles... All of the grass was of one kind, a new species of *Panicum*... and not a spike of it was left in the soil, over the whole of the ground [125].

Mitchell did not yet comprehend what he saw, but near the Macquarie marshes on 15 February 1846 he noted that *Panicum* 'was called by the natives "coolly"... the gins gather it in great quantities, and pound the seeds between stones with water, forming a kind of paste or bread' [126]. On the Narran three weeks later he wrote,

Dry heaps of this grass, that had been pulled expressly for the purpose of gathering the seed, lay along our path for many miles. I counted nine miles along the river, in which we rode through this grass only, reaching to our saddle-girths, and the same grass seemed to grow back from the river, at least as far as the eye could reach through a very open forest [127].

'Through this grass only': one grass over so great an area suggests planting and, on overflow land, weeding. Reports like these don't come from tuber country, but in seed country several early travellers noted grain cropping. In 1882 AC Gregory recalled,

On Cooper's Creek, the natives reap a Panicum grass. Fields of 1,000 acres are there met with growing this cereal. The natives cut it down by means of stone knives, cutting down the stalk half way, beat out the seed, leaving the straw which is often met with in large heaps; they winnow by tossing seed and husk in the air, the wind carrying away the husks. The grinding into meal is done by means of two stones... sometimes dry and at others with water into a meal. On the Victoria River and the west coast this grass is not found in such large quantities as in the interior [128].

The Victoria and the west coast were tuber districts.

Grain crops were also on floodplains off the big rivers. In north-west New South Wales on 13 March 1845, Daniel Brock found a creek floodout 'quite like a harvest field. The seed which supplies the natives with a nutritious food grows here in season in great quantities. In every hollow we found the remains of the natives' labor in the shape of straw, from which they had beaten out the seed' [129]. Sturt too saw 'a boundless stubble the grass being of the kind from which the natives collect seeds' [130].

Even claypans might be cropped. In 1857 WH Suttor crossed 'the great, almost treeless, level plain' from the lower Lachlan to the Darling near Tilpa:

Our camp for the night was on a low sand ridge covered with hophush scrub. It stands like an island in the level waste and had been visible on the horizon for hours before we reached it. There is a small morass close by where the wild blacks have scooped out a small hole, which was filled with rain water. We were about 100 miles from anywhere. The wild blacks had been here lately, as we learned from the heaps of grass straw scattered about, from which they had thrashed the seeds... We pitched our tents and made luxuriant beds of the grass straw [131].

So tuber growers cleared grass but grain growers spilt seed, left straw and stubble, and exposed roots. For galahs the difference was crucial. Growers today, concerned to save every grain, leave enough to feed flocks of galahs for months. Aborigines did no less, and they spilt grain deliberately, to seed the next crop. Tuber and seed divided Australia into country which repelled galahs, and country which attracted them.

When land was burnt also mattered. Most tubers flower in late spring - early summer, then die back. Most inland grasses ripen in late summer. Everyone burnt their grass at some time, but seed people would never burn ripening seed. Tuber people they did exactly that, to expose tubers after they died back, to improve their taste, and to keep grass sparse and give tubers and herbs space [132]. On the Namoi on 23 December 1831, when tubers had died back but grass was heading, Mitchell saw 'All the country beyond the river... in flames, and indeed, from the time of our arrival in these parts, the atmosphere has been so obscured by smoke, that I could never obtain a distinct view of the horizon'. That same day he walked through fields of white amaryllis in bloom [133]. He was in tuber country. Yet on 19 August 1835 he saw burnt plains on the Bogan and lower Macquarie [134]. That would kill tubers, but promote grass. Mitchell was in seed country, and galah country. Where he met galahs on the Macquarie and Narran in January - March 1846 he wrote often of how hot it was, but as often of 'verdant grasses' still ripening in March [135]. Where John Lewis first met galahs and crested pigeons near Lake Eyre in the 1874-1875 summer he found plenty of grass, none of it burnt [39]. In other words, inside Tindale's arc people protected grass until it seeded; outside it they did not. Where people ate seed it was available to galahs; where they ate tubers it was not.

Seed country gave galahs a bonus: stored seed. On the Finke near Mt Charlotte in 1870, Christopher Giles

discovered a native granary. This was a rude platform built in a tree, about 7 or 8 feet from the ground, on this were placed in a heap a number of bags made of close netting. Dismounting, I climbed the tree to examine the bags, and was astonished to find that they contained different kinds of grain, stored up for the winter, or rather the dry season... the legs of our [stolen] trousers and the sleeves of our shirts, tied up at each end, [were also] filled with seeds [136].

North of Newcastle Waters in March 1871 AC Ashwin

chanced upon a native encampment... [with] large wooden dishes four and five feet long filled with grass seed as large as rice with the husk or the skin on the seed. I think it was a species of rice which grows in the flooded country 40 or 50 miles in extent and north of Newcastle Waters. There must have been about a ton of seed stored there in 17 large dishes, full and all covered with paper-bark. The dishes were nearly all five feet long and a foot deep, scooped out of solid wood [137].

The rice was probably native rice, *Oryza australiensis*, a tall relative of domestic rice which grows in a band above the north edge of Tindale's arc. The flooded country was where Stuart reported galahs in April 1862, when rice was ripe or dropping [30]. Ashwin found there six large wooden dishes full of rice stored in trees and covered with paperbark. He boiled a bagful. It was good: 'pity we did not take more', he wrote [138]. Drying and storing grain stretched the time when galahs might find it, giving them cause to stay in seed country.

Yet they went beyond the arc. The map shows them at desert waters, and at three northern locations [30-2, 48-52]. These were seed places. Galahs also ranged three districts fringing the arc: near Lake Boga [2-3], the lower Gulf of Carpentaria [19-29], and the Channel country [40-2]. Why?

Even inside the arc grain was not plentiful year round, otherwise galahs would have been more common. From late winter to mid summer it could be scarce, the spilt grain eaten or growing, the rest in store. Galahs then needed off-season supplements, which all three regions had. Each grew saltbush, and each had swamps, overflow land or coastal flats supporting fruits low enough for ground feeding, such as samphire (*Halosarcia* spp).

The first European reports of galahs were at swamp/saltbush margins on the Lachlan, Murrumbidgee and Macquarie. It is striking how often those galahs were not eating grain. Between July and January Oxley, Cunningham, Eyre and Sturt saw them at swamps eating samphire and the like, or on fringing plains eating saltbush berries. Sturt told Gould that the galah 'feeds on Salsolae [samphire or saltbush]' [11], and claimed that the crested pigeon's appearance was 'a sure sign of our approach to a country more than ordinarily subject to overflow; since on the Macquarie and the Darling, those birds were found only to inhabit the regions of marshes, or spaces covered by the acacia pendula [boreel], or the polygonum [lignum]' [139]. Today birdmen find galahs only 'occasionally' in saltbush [140]. The birds Oxley and others saw were at an edge of their country. Seed based them in the arc, saltbush and swamp let them range beyond [141].

They did not go far, perhaps not beyond the ten kilometres of their daily foraging. The rivers had no feed. The Lachlan flooded in winter or spring, scant help to Australia's summer-flourishing grasses, and even 200 kilometres above the swamps there was little grass. Oxley described there 'a barren level country, the ground rather studded than covered with grass, and that only in patches, by far the greater part producing no grass at all'. Approaching the swamps he reported 'morasses' edged by 'barren scrub', 'a rotten, red, sandy loam, on which nothing grew but the usual production of marshes', plains 'entirely barren' or with 'a few scattered bushes', 'no grass out of the

marshes for the horse to feed upon', and so on [142]. Of the Murrumbidgee below Hay Sturt declared, 'Neither bird nor beast inhabited these lonely and inhospitable regions, over which the silence of the grave seemed to reign. We had not, for days past, seen a blade of grass'. Even at the Lachlan junction he wrote, 'the most unaccountable circumstance to me was, that it should be entirely destitute of vegetation' [143]. Above Hay in January 1839 Eyre found the plains 'overrun with salsolaceous plants... There was often very little grass in the flats and even when there was they were so small that our numerous sheep and cattle soon ate everything up' [144]. But on the day he met galahs and crested pigeons near the swamps he noted the country changing to 'immense and very fine alluvial flats' and 'great quantities of a prickly bushy shrub of a salsolaceous kind growing on the plains, which bore yellow or red berries in the greatest abundance [nitre bush *Nitraria billardieri*]... The natives ate them, stones and all, in vast quantities, as also did the birds' [145].

The Murray too had little grass upstream. In August 1842 Henry Lewes wrote of Moira run near Echuca,

The small strips of plain near the swamp were covered with *mesembryanthemum* [pig-face] and salt-bush. The higher plains were entirely bare of any vegetation whatever but occasional salt-bushes. The box forests skirting the plains had here and there a few tufts of dry grass ... [Over] a very large extent of the surrounding country, the same appearance of intense drought and sterility pervaded the whole [146].

Curr recalled of this district, 'the salt-bushes occasionally attained the height of twelve feet, standing twenty or thirty feet apart [old man saltbush *Atriplex nummularia*]; in other localities a dwarf variety of this plant prevailed [bladder saltbush *A. vesicaria*], and grew so close as almost to crowd out the grass entirely' [147]. Aborigines allowed that because this was tuber country [148]. Above and below Echuca lay vast reed beds - bulrush usually, of no use to galahs.

All three rivers suggest that saltbush and swamp could supplement but not supplant grain. Between the Murray and Lake Boga there was grain. Hawdon noted the Murray country changing near Lake Boga. Upstream in January 1838 he wrote of the plains near Echuca, 'Very little Grass grows upon them, but they are covered with salsuginous plants', with 'a great number of bushes similar to those found on the sea coast, with a juicy and rather a salt-tasted leaf, of which the cattle appeared very fond... We could now scarcely find scarcely sufficient grass for the stock, but the reeds answered every purpose'. On the lower Loddon on 3 February he repeated, 'the plains have a thin sprinkling of small tufts of grass, but are for the most part covered with the salsuginous plant vulgarly called Pig's face'. But on 10 February, a day before he first saw galahs near Lake Boga, he wrote, 'The grass on these plains is similar to that on Manaroo downs, growing large tufts. A stock station might be formed here, and it is the first situation worthy of a grazier's notice that I have seen since leaving... the Goulburn River' [149]. Hawdon was still in tuber country [150], but only on finding grass did he find galahs. That and saltbush let the birds scratch a living.

Possibly they merely foraged the Lake Boga district, as much travellers as the men who saw them. After eight months there in 1856-1857, Wilhelm Blandowski concluded that crested pigeons ranged north of the line of the Murrumbidgee, and galahs roughly east and north of the Murray - Murrumbidgee junction [5]. Both points are north of Lake Boga. Foragers or settlers, conceivably galahs reached the lake by following the Murray up from the Darling, for whereas the Riverina rivers flooded in winter or spring, the Darling flooded in summer. Like Egypt's Nile, that grew grain. Mitchell remarked of the Darling,

The surface of the plains nearest the river is unlike any part of the earth's face, that I have elsewhere seen. It is as clear of vegetation as a fallow field... Grass is only to be found on the banks of the river, and, strictly speaking, the margin only can be considered alluvial, for

this being irrigated and enriched by floods, it is everywhere abundantly productive of grass, though none may appear in the back country [151]. The Darling supported galahs, though as Sturt put it 'never in any great number' [6], and galahs could range far if they had to, as their numbers at desert waterholes indicate. Yet they had no cause to quit the Darling's grass margins, and no-one reported good grass or galahs on the Murray below the Murrumbidgee. On the contrary Hawdon declared that country 'plains of poor soil, without timber occasionally sprinkled with small bushes, but with scarcely any appearance of grass' [152], and Sturt thought it 'unpromising and barren. Except on the immediate banks of the River Murray there is neither water nor feed' [153].

More probably galahs followed a corridor of opportunity down the Murrumbidgee to the Murray. This was possible despite a 180 kilometre wide belt of what are loosely called grey cracking clays extending from north of Boort across the Murray and the Lachlan swamps to north of Ivanhoe. In the Riverina these are largely impermeable, and on drying shrink and open deep cracks which would snap tree roots, so saltbush dominates. The spaces between bushes can be 'almost bare throughout the year, even under good seasonal conditions'. Even today, when grazing has promoted such grass species as *Chloris*, this is not good grass country. This set eastern limits to both Aboriginal and galah seed getting. But the Murray - Lake Boga cracking clays are younger, more water-stable, richer in humus, and crack less deeply. As Hawdon saw, they can carry good grass [154].

Good grass also flourished on younger cracking clays on the lower Gulf [155]. On the Albert on 3 August 1841 Stokes described 'an extensive plain, covered with long coarse grass, above which was occasionally seen the head of a kangaroo' [156]. He was on red to black cracking clays dominated by such summer flourishing perennials as Gulf Bluegrass (*Dicanthium fecundum*) and Brown Top (*Eulalia aurea*) [157]. These are too tall for galahs, but Stokes saw people shortening them. He watched them digging tubers and others further off 'burning the bush', but also walked over 'long coarse grass', obviously unburnt. People were both harvesting tubers and protecting grain. Near swamps on the Flinders Stokes saw flocks of galahs 'scattered' over the plains [158], presumably eating roots and stems, and in the 1845 dry season Leichhardt reported 'large flocks' doing just that on newly burnt land on the Lynd [20].

Roots alone would not persuade galahs to quit the arc: they were available inside it. The lower Gulf had other off-season supplements. All early galah sightings there were in the dry season, when grass was not in head, and all but five were on or by coastal flats: 'saline clay plains... at their greatest extent in Australia in the gulf' [159]. These supported 'herbfields' [160] including samphire and other short plants, and galahs. Off Van Diemens Inlet on 8 August 1841 galahs perched on the *Beagle's* rigging [22], and on 20 June 1845 Leichhardt saw them 'very numerous' feeding on the plains and swamps of the Mitchell [21], just as Oxley and others saw outflinders by the Lachlan and Macquarie swamps. Year-round food made the lower Gulf a 'favourite resort' for galahs, where they fed 'on the broad open plains in flocks of 50 to 200' [161].

The Channel country notches the arc because its swamps and floodplains offered alternatives to seed so lay outside Tindale's definition, but seed mattered. In 1879 Samuel Gason wrote of the Dieri of the lower Cooper, 'Their food is principally vegetable... In a dry season they subsist mainly on ardoe [*nardoo Marsilea drummondii*], but in a good season, with plenty of rain, they have an ample supply of seeds... They gather also then plenty of plants, herbs, and roots' [162]. The Channel country's overflow soils are cracking clays which need a lot of water before they grow seed, but the Queensland rivers came down in three of every four summers on average, 'making the summer grasses of the floodplains the most valuable resource in the area' [163]. Burke and Wills famously proved that the middle Cooper was nardoo country: no early traveller reported galahs there. But 100 kilometres north-west, and four days after he

first saw a galah, Wills found 'heaps of grass... about the plains, from which they ['the blacks'] had beaten the seeds' [164], and Gregory found 1000 acre millet crops on the Cooper harvested with stone knives [165]. The local Dieri had a word for galah: *killunkilla* [166]. They and their neighbours could not depend on seed, but used it enough to feed galahs.

Thus Aboriginal plant use set the galah's limits. Since contact galahs have been Australia's most successful colonists, spreading more evenly over the continent than rabbits, mice or Europeans. Dozens of first sightings track their spread. In Victoria they were within ten miles of Melbourne by 1912 and in the city by about 1950, reached Portland in the 50s, Geelong in 1956, and Gippsland by the 1960s. They arrived just west of Sydney in 1941 and were in the city by 1955. In south-east Queensland they crossed the Divide in 1951 and reached Brisbane soon after, though not the Springsure district until 1975. In the north they were at Port Essington, Darwin and Derby by 1889, and populated the southern Northern Territory in the 20s and 30s. In Western Australia they reached the northern wheat belt by 1908, Perth in the early 50s, and the south coast in the 70s. South Australian reports trace their spread into Eyre Peninsula and to Adelaide in the early 20s, to Naracoorte in 1925, and Victor Harbor and Kangaroo Island about 1930. They reached cold country at Adaminaby in 1957 and Canberra about 1978. In 2009 only a few pockets await them [167].

In their semi-arid homeland too galahs are now common where once there were none or few [168]. Birdmen reported their spread into new locations in central and northern South Australia during the 20s [169], and in central Australia during the 30s [170]. On bird watching trips south-west and north-west of Alice Springs in 1935 and 1936, JB Cleland saw one galah and 12 crested pigeons [171]. He saw more of both birds than had Giles or Murray; he could not have counted either now.

Galahs did not increase and spread simply because they were cockatoos. Other cockatoos, notably little corellas (*Cacatua pastinator gymnopsis*) have also spread, but so have crested pigeons. At contact the pigeons ranged a little more widely than galahs, being better adapted to aridity [172] and ready to nest in bushes, but they too preferred the inland. Oxley, Cunningham, Eyre, Sturt, Mitchell, Austin and Lewis all saw them with galahs [1, 4, 9, 15, 34, 39, 173]. Since contact they have vastly expanded their range, and become common in their old haunts. Gould considered them 'exclusively an inhabitant of the plains of the interior' [174], but they are on the coast now [175]. They confirm that changes in circumstance let galahs increase and spread.

Why? In 1976 one authority thought 'a slight deterioration of the inland climate during this century' forced galahs out [176]. That evokes global warming so would also apply to crested pigeons, but far from being driven from their original ranges both birds have increased there. Other observers suggest that drought can force galahs to migrate where numbers have built up and resources are suddenly depleted [177], but galahs spread in good seasons too, and why would a drought impel an inland exodus after contact but not before? Aboriginal predation might explain why galahs were numerous at some desert waters, or rather less numerous in populated country, but between 1788 and the 1860s smallpox roughly halved Australia's Aboriginal population, including in galah country [178]. Presumably this halved Aboriginal predation on galahs, in some places generations before Europeans arrived, giving galahs decades to increase and spread. Yet within the arc early Europeans rarely found galahs in anything like today's numbers, and outside it usually found none.

Most experts say that galahs spread because farms provided more water and more seed. One handbook states, 'Clearing for agriculture, planting of cereal crops and provision of water has allowed range to expand into formerly forested areas' [179], and another, 'It has greatly increased its numbers and range this

century, owing to the proliferation of stock watering points and the establishment of wheat and other grasses' [180].

Galahs have indeed spread since 1915, when wartime wheat prices expanded cropping [181], and as growers know too well, water and grain together can increase galah numbers dramatically. But separately each is a fragile explanation for their spread. If only water were lacking at contact, galahs could have quit the inland along rivers like the Murray, the Burdekin, the Victoria and the Murchison. They did not. Was seed lacking? As for seed, almost all inland bird species now colonising Australia prefer seed, but three problems confront European grain as an explanation.

First, galahs began to spread before there was any agriculture. On first seeing them 'in great numbers' on the Namoi frontier in December 1839, Gould wrote, 'I was informed by the natives of the Namoi that the bird had but recently arrived in the district, and they supposed it had migrated from the north' [11, 182]. At Hay in June-July 1860 Mrs James Foott was eating galah stew long before she could have eaten home-grown bread [183]. By 1890 Western Australian galahs had spread south of the Irwin River and 100 kilometres below the mulga-eucalypt line which confined them at contact [184], but was not yet cropland.

Second, galahs expanded into areas where there never was agriculture, such as Darwin, the Kimberley coast, the Macdonnell Ranges [185] and the Nullarbor. In 1918, after 30 years on Nullarbor Station near Koonalda, Tom Brown listed the Nullarbor's birds: none were galahs or crested pigeons [186]. Every year between 1917 and 1922 birdmen took the new Trans-Continental Railway into the Nullarbor to find "new" birds. None saw galahs; SA White found crested pigeons numerous around Tarcoola, but no-one saw them on the Nullarbor [187]. Most searchers stopped at Ooldea, where early travellers like Giles and Murray saw neither bird. Yet there in 1923 AG Bolam claimed that both were common [188]. The pigeons probably came from the north [189]. A 1908 list of 124 species between Kalgoorlie and Eucla described galahs as 'Rare; a few were seen near the coast' [190]. They can only have followed coastal mallee from South Australia where they were spreading west [191], then moved north to Ooldea, with its ancient water but far from any European crop. Today Nullarbor crops are rare, but galahs are on the coast and inland [192].

Third, when galahs (and pigeons) did spread onto European cropland, when they reached its far edge they kept right on going, over mountains, onto beaches, into cities. Cropland was but an especially bountiful sector of the long journey galahs made to the coast.

No doubt in places Europeans let galahs onto tuber country when they stopped Aborigines burning which let more grass head, but early settlers too burnt enthusiastically - until they built fences. That began in the 1860s [193]. By then galahs were on the move.

By then stock were shortening the grass. Alan Newsome has shown how euros and red kangaroos multiplied and spread in the Centre and the Pilbara when cattle arrived. Cattle mowed the tall grasses, forcing them to re-shoot as low 'marsupial lawns'. Euros and red kangaroos prefer, probably need, green feed, and the new lawns let them expand their range and numbers until many thousands occupied country where at contact they were rare or unknown [194]. In Queensland in 1887 Alfred Norton noted that the effect of grazing 'is to keep the grass short' [195]. In the Riverina stock grazing and trampling replaced tall grasses with short grasses and herbs, and by 1865 had opened the Riverina to kangaroos [196]. All over Australia tall grasses faded under cattle [197].

That let galahs colonise Australia. There was no agriculture when Gould saw galahs 'recently arrived' on the Namoi in 1839, but eight years earlier Mitchell found cattle and stockmen there, and they stayed after he left [198].

Early stockmen were nomadic herders, neither clearing nor planting, ever chasing grass. By 1860 in eastern Australia and by 1890 in the north, the pastoral frontier lay inside Tindale's arc. By 1860 Riverina and northern Victorian head stations had at most a few acres under crop, but short grasses were dominating their frontages, and galahs had arrived [199]. Between 1880 and 1885 sheep or cattle stocked the south Kimberley [200]; by 1886 galahs were reported inland from Derby [201], while along the Fitzroy in 1896 Kearsland saw galahs in 'great flocks at all waters', and a 'wide range in the North-West' [202]. The Nullarbor was stocked before galahs were reported [203], and stocking the Centre made galahs common. Galahs, crested pigeons and no doubt other birds and animals quitting the arc rarely found crops, but always found sheep or cattle.

Does all this matter? It shows that before and after contact, what people did to the land shaped where birds lived and did not live, and how well they fared in their home ranges [204]. The changed behaviour of animals and plants might therefore signal how and how much Aborigines and non-Aborigines have changed the land. It must have been dramatically different then than now, including in much we take for granted. Since many Australians want to restore the land more nearly to its condition then, as much as possible we should learn what that was, to clarify what we want to conserve, and what we can.

Galahs offer clues. For example, do they signal grain land? Before and after contact people farmed grain, but like galahs, since contact it has largely reversed location. Once it was a product of the dry inland; now it is grown in tuber country. That is a revolutionary, and unnoticed, transformation. In a world where food demand will one day outstrip supply, can that be reversed? This would create more cropland, since native grains flourish in Australia's low fertility soils whereas imported grains do not. After a lifetime of study, in 1890 the New South Wales Government Botanist Fred Turner listed dozens of native grains which could usefully be harvested. He favoured *Astelba triticoides* var *lappacea*, which has 6 inch (15 cm) heads, clean, firm, disease free and easily husked [205]. Might this or the grains Mitchell, Ashwin and Love noted be grown on Australia's ancient croplands? Again, yams, reeds and bulbs seem unlikely to replace grain as staples in Australia, yet they are tasty and nutritious. Where are they being conserved? Aboriginal crops might teach future Australians what to farm.

The galah exodus touches broader questions.

1. Why did humans begin growing grain? In Australia no-one ate it unless they had to. Was that true of early grain growers elsewhere? Did they turn from hunter-gathering to farming not from choice and wealth, but from need and poverty? Did desperation, not inclination, set farmers on the road to what we call civilisation? Did they think they were stepping backward, not forward?

2. Why did crops make people elsewhere stay put? Aborigines grew crops as distinct as yams and millet. Yams store poorly and are best fresh, tethering to the crop people who might otherwise have travelled. Grain allowed travel in country otherwise difficult, but harvesting and processing it was slow. Thus both yams and grain imposed semi-sedentism, which in turn increased dependence on the crop. Yet neither led to permanent residence. Did people elsewhere live by their crops not to grow them, but to protect them? In that light, the power of Aboriginal spiritual sanctions protecting land is impressive.

3. Finally, how has the earth changed? Galahs have been great adaptors, first to Aboriginal Australia, then to a vastly changed European Australia. Similarly global warming has let or obliged species to move into new habitats or retreat from old. What else might we learn from such plant and animal histories? Might they not signal critical changes, showing us and warning us of other quiet but momentous revolutions on our planet?

Notes

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1. J Oxley, *Journals of Two Expeditions into the Interior of NSW* [1820], Adelaide 1964, 95-6; I Lee, *Early Explorers in Australia*, London 1925, 252.
2. J Hawdon, *Journal of a Journey from NSW to Adelaide*, Adelaide 1952, 26.
3. J Waterhouse (ed.), *Edward Eyre's Autobiographical Narrative 1832-1839*, London 1984, 152.
4. Waterhouse 180.
5. W Blandowski, 'Recent discoveries in natural history on the Lower Murray', *Trans Phil Inst Vic* 2, Jan-Dec 1857, 135.
6. J Gould, *Handbook to the Birds of Australia* [1865], Melbourne 1972, vol 2, 8-9.
7. TL Mitchell, *Journal of an Expedition ... Tropical Australia*, London 1848, 261, 311.
8. Oxley 230.
9. C Sturt, *Two Expeditions ... Southern Australia* [1833], Adelaide 1963, vol 1, 24.
10. A Norton, 'Notes of travel 1859-60', *Proc RS Qld* 18, 1904, 84, 86.
11. Gould 1865 vol 2, 8-9.
12. Mitchell 261.
13. S Diggles, *Ornithology of Australia*, Brisbane 1866-70, part 13, np.
14. Mitchell 261.
15. Mitchell 311.
16. C Lumholtz, *Among Cannibals* [1889], Canberra 1980, 40.
17. K Broadbent, 'Birds of central Queensland', *Proc RS Qld* 5, 1889, 26.
18. AW Stirling, *The Never Never land ... North Queensland*, London 1884, 169.
19. FJ Byerley (ed.), *Narrative of the Overland Expedition of the Messrs Jardine* [1867], Bundaberg 1995, 3.
20. L Leichhardt, *Journal of an Overland Expedition in Australia* [1847], Adelaide 1964, 272; AH Chisholm, 'Birds of the Gilbert Diary', *Emu* 44, 1944, 150; AH Chisholm, *An Explorer and his Birds*, Melbourne 1945, 20.
21. Leichhardt 297.
22. JL Stokes, *Discoveries in Australia* [1846], Adelaide 1969, vol 2, 325.
23. Stokes vol 2, 299.
24. J McKinlay, *Journal of Exploration*, Adelaide 1962, 100.
25. McKinlay 88.
26. Leichhardt 350.
27. Leichhardt 354.
28. W Landsborough, *Journal* [1862], Adelaide 1971, 7.
29. Landsborough 22.
30. JM Stuart, *The Journals of John McDouall Stuart* [1865], Adelaide 1975, 337.
31. Leichhardt 441.
32. Bennett to Hoare 8 May 1869, PRG 294/2, Mortlock Library, Adelaide.
33. PE Warburton, *Journey Across the Western Interior of Australia* [1875], Adelaide 1968, 232-3, 242.
34. R Austin, *Journal of Assistant Surveyor R. Austin*, Perth 1855, 273.
35. S Hack, *Explorations 1857, South Aust Parl Pprs* [SAPP] 156/1857-8, 4.
36. R Linn & F Hawker, *Bungaree*, Adelaide 1992, 18.
37. C Sturt, *Narrative of an Expedition into Central Australia* [1849], Adelaide 1965, vol 1, 250.
38. Sturt 1849 vol 2 appendix, 11, 36.
39. *Journal of Mr Lewis's Lake Eyre Expedition 1874-5*, SAPP 19/1876, 12, 13.
40. W Wills, *A Successful Exploration*, London 1863, 183.
41. McKinlay 35.
42. McKinlay 59.
43. Wills 198.
44. Stuart 172.

45. D Carnegie, *Spinifex and Sand* [1898], Melbourne 1973, 273.
46. AJ North, *List of Birds Collected by the Calvert Exploring Expedition*, Adelaide 1898, 169; JG Hill, *The Calvert Exploring Expedition*, London 1905, 13, 16.
47. North 169; Hill 13, 16.
48. E Giles, *Geographic Travels in Central Australia* [1875], Bundaberg 1993, 184.
49. J Forrest, *Explorations in Australia* [1875], London 1969, 263-4.
50. D Lindsay, *Journal of the Elder Scientific Expedition 1891-2*, Adelaide 1893, 72.
51. Lindsay 75.
52. WR Murray, *Report re exploration trip of RT Maurice, 1901 and 1902*, SAPP 43/1904, 11.
- ***
53. Galah 1817 PIC T1623 LOC 709; pigeon 1819? T1624 LOC 710, National Library of Australia (NLA).
54. HM Whittell & DL Serventy, *A Systematic List of the Birds of WA*, Perth 1948, 6.
55. *Nouveau Dictionnaire d'Histoire Naturelle* vol 17, Paris 1817, 12.
56. Ian Rowley, 13 July 2006, quoting label 1540 in the *Museum National d'Histoire Naturelle du Paris (MNHN)*; confirmed Michel Tranier, *MNHN*, 18 Sep 2006.
57. Information Ian Rowley 9 May 2002; I Rowley, *Behavioural Ecology of the Galah... in WA*, Sydney 1990, 3. See also PJ Higgins (ed.), *Handbook of Australian, New Zealand & Antarctic Birds*, vol 4, Melbourne 1998, 104; R Schodde, 'New subspecies', *Canberra Bird Notes* 13, 1988, 120; R Schodde & I Mason, *Zoological Catalogue of Australia*, Canberra 1997, vol 37.2, 103; HM Whittell, *The Literature of Australian Birds*, Perth 1954, 61-75, 711-12; Whittell & Serventy 48, 54-5.
58. SJJF Davies & GS Chapman, 'The status of birds... Shark Bay', *Emu* 75, 1975, 57; FL Whitlock, 'Notes from... Shark Bay', *Emu* 20, 1920, 168-86 & 21, 1921, 128-30.
59. N Baudin journal, MS11, folder 3, 151 & N Levillain journal, MS11, folder 24, 71, NLA; C Cornell (trans), *The Journal of Post Captain Nicholas Baudin*, Adelaide 1974, 207; C Cornell (trans), *Voyage of Discovery to the Southern Lands [Peron, 1824]*, vol 1, Adelaide 2006, 97; F Horner, *The French Reconnaissance*, Melbourne 1987, 174, 179; *Nouveau Dictionnaire* vol 17, 7; E Duyker, 'Levillain, Stanislas (1774-1801)', *Dictionnaire de Biographie Mauricienne* 57, 2005, 1994-5; Horner 357-9.
60. TL Mitchell, *Three Expeditions into the Interior of Eastern Australia* [1839], Adelaide 1965, vol 2, 62, 141-2.
61. J Cotton, 'A list of Victorian birds', *Tas J of Natural Science* 3, March 1848, 361-5; G Mackaness (ed.), *The Correspondence of John Cotton... 1842-1849*, Sydney 1953; A McEvey, *John Cotton's Birds*, Sydney 1974.
62. EM Curr, *Recollections of Squatting in Victoria* [1883], Adelaide 1968, eg 171; GH Haydon, *Five Years' Experience in Australia Felix* [1846], Melbourne 1983, 103-9.
63. HL Wheelwright, *Bush Wanderings of a Naturalist*, London 1860.
64. WH Breton, *Excursions in NSW, WA & VDL 1830-33*, London 1834, eg 237; G Bennett, *Wanderings in New South Wales* [1834], Adelaide 1967.
65. LA Meredith, *Notes and Sketches of NSW* [1844], Melbourne 1998, 61.
66. G Bennett, *Gatherings of a Naturalist*, London 1860, 277.
67. McKinlay 35 (28 Dec 1861); "gulah" 59, 88, 100 (4 Mar, 6, 27 May 1862).
68. I & T Donaldson (ed.), *Seeing the First Australians*, Sydney 1985, 77; B Gammage, *Narrandera Shire*, Adelaide 1986, 13; DR Horton (ed.), *Encyclopedia of Aboriginal Australia*, Canberra 1994, vol 2, 946, 1139; WS Ramson (ed.), *The Australian National Dictionary*, Canberra 1988, 267.
69. For example EM Curr (ed.), *The Australian Race*, Melbourne 1886, vol 2, 212; TH Johnston, 'Aboriginal names... in the Eyrean region', *Trans RS SA* 67, 1943, 283; WE Stanbridge, 'On the astronomy and mythology of the Aborigines of Victoria', *Trans Phil Inst Vic* 2, Jan-Dec 1857, 139; AC Stone, 'The Aborigines

- of Lake Boga, Victoria', *Proc RS Vic* 23NS, 1911, 448; FH Wells, 'The habits... of the Aborigines on the Diamantina, Herbert and Eleanor Rivers', *Report Aust Ass Advancement of Science* 5, 1893, 517, 520; S Gason in JD Woods (ed.), *The Native Tribes of South Australia*, Adelaide 1998, 286.
70. Information John McEntee, Erudina Station, South Australia, 15 Aug 2007.
71. Stokes vol 1, 481; Whittell 1954 pt 1, 100-107.
72. Eley to Gould, 29 Sep 1857, Gould Pprs MS1217, NLA. See also Gould 1865, vol 2, 8-9; Diggles pt 13, np.
73. MG Kerr, *The Surveyors*, Adelaide 1971, 48-9, 119.
74. In Woods, 311-12.
75. G Masters, 'Notes on a collection of birds from Port Darwin', *Proc Linn Soc NSW*, 1878, 274. Following EP Ramsay, 'Tabular list of all the Australian birds at present known', *Proc Linn Soc NSW*, 1878, 192, AJ North, *Descriptive Catalogue of the Nests and Eggs of Birds*, Sydney 1889, 251, lists galahs at Derby, 'Port Darwin and Port Essington' as one location, and the Gulf of Carpentaria. The lists are too broad: they name NSW, Victoria and SA as habitats but not elsewhere in Queensland or WA.
76. AH Chisholm, 'John Gilbert and some letters to Gould', *Emu* 38, 1938, 195-7.
77. Stokes vol 1, 381-401.
78. Whittell 1954 pt 1, 96, 114-5.
79. GM Storr, *List of Northern Territory Birds*, Perth 1966, 33.
80. Whittell 1954 pt 1, 61-2, 70-2, 75.
81. EP Ramsay, 'List of WA birds collected... at Derby and its vicinity', *Proc Linn Soc NSW* (2nd series), 1886, 1096, but see text at note 196.
82. FM House in FS Brockman, *Report on Exploration of the North-West Kimberley 1901*, WAPP 2/1902, appendix C, 53; GM Mathews, 'On the birds of north-west Australia', *Emu* 9, 1909-10, 4-16, 53-65, 238-41. See also RJ Sholl, 'Journal of an expedition... in North-Western Australia', *JRGS* 36, 1866, 203-27.
83. HM Whittell, 'A review of the work of John Gilbert in WA', *Emu* 42, 1942, 112-29, 216-42, 289-305.
84. Gould 1865 vol 2, 9-10.
85. Higgins 106; Rowley 3; DL Serventy & HM Whittell, *Birds of WA*, Perth 1976, 53, 61, 276; FL Whitlock, 'On the East Murchison', *Emu* 9, 1910, 192.
86. T Carter, 'Birds occurring in the region of the North-West Cape', *Emu* 3, 1904, 172. Also JW Mellor, 'Upon the Murchison', *Emu* 20, 1921, 138.
87. For examples JR Masters & AL Milhinch, 'Birds of... Northam', *Emu* 74, 1974, 235; AF Crossman, 'Birds seen at Cumminin Station, WA', *Emu* 9, 1909, 84-90; T Carter, 'Birds of the Broome Hill district', *Emu* 23, 1923, 141; FE Parsons, 'South-west Australian birds', *South Aust Ornithologist* [SAO] 7, 1923, 42-9.
88. For example GF Angas, *Savage Life and Scenes in Australia and NZ* [1847], New York 1968; AM Morgan, 'The birds of the south-eastern part of South Australia', *SAO* 4, 1919, 7-20; SA White, 'Birds recorded from the early days ... for the Reed Beds district', *SAO* 4, 1919, 101-14.
89. J Gould, *Introduction to the Birds of Australia*, London 1848, 71.
90. Sturt 1849 vol 2 appendix, 36.
91. H Beckler, *Journey to Cooper's Creek*, Melbourne 1993, 146.
92. BH Babbage & PE Warburton, *Northern Explorations*, SAPP 151/1858, 10.
93. Stuart 172. See also SR Morton & DJ Mulvaney (ed.), *Exploring Central Australia*, Sydney 1996, 294.
94. Murray SAPP 43/1904, 39 (24 Aug 1902).
95. Higgins 105.
96. Higgins 108 and RE Johnstone & GM Storr, *Handbook of WA Birds*, Perth 1998, 280-1 list galah foods including several grain staples.
97. JH Leigh & JC Noble, *Riverine Plain of NSW*, Canberra 1972, 17; I Lunt, *Plains Wandering*, Melbourne 1998, 31-7, 114-16.
98. NB Tindale, *Aboriginal Tribes of Australia*, California 1974, 99. The map implies that galahs were less in seed country than along its edges, but only because it locates first or early sightings. See also J Flood, *Archaeology of the Dreamtime*, Sydney 1989, 237-8; A Keast (ed.), *Ecological Biogeography of Australia*, The Hague 1981, vol 3, 1866; RL Kirk, *Aboriginal Man Adapting*, Oxford 1981, 75; I McBryde in PK Lauer (ed.), *Occ Pprs in Anthropology* 6,

- Brisbane 1976, 63-6; DE Yen, "Sahul agriculture and Australia", *Antiquity* 69, 1995, 841.
99. B Gott, 'Aboriginal fire management in south-eastern Australia - aims and frequency', Native Solutions Conference paper, Hobart, July 2000 and *J Biogeog* 32, 2005, 1203-8; Tindale 99. See also TF Bride (ed.), *Letters from Victorian Pioneers* [1898], Melbourne 1983, 360; Curr 1886 vol 1, 289, 297, 302, 338, 422; vol 2, 78-9, 378, 403; vol 3, 20, 90, 161; Hawdon 41; J Penney, 'Encounters on the river... 1820-1920', La Trobe Hist PhD 1989, 32, 36.
100. DG Brock, *To the Desert with Sturt*, Adelaide 1975, 133-4; D Nash, 'Aboriginal gardening: Plant resource management in three Central Australian communities', ANU Anth MA, 1993, 65, 128-34; G Sweeney, 'Food supplies of a desert tribe', *Oceania* 17, 1947, 290-5.
101. Brock 25; Bowen Hist Soc, *The Story of James Morrill* [1863], Bowen 1965, chap 3 np; E Rolls, *Visions of Australia*, Melbourne 2002, 193-4.
102. Sturt 1849 vol 1, 100.
103. AAC Le Soeuf recollections 34-6, A2762, Mitchell Library. See also M Pearson, 'Seen through different eyes... the upper Macquarie river region', ANU Prehist PhD, 1981, 335, 347-8.
104. JRB Love, *Stone Age Bushmen of Today*, London 1936, 77, also 15-16, 71.
105. Morrill chap 3 np. Is 'manoon' *murnong*? *Murnong* is a Victorian word. Its use on the central Queensland coast, if use it is, suggests that the plant too was carried north.
106. For example S Cane, *Pila Nguru: The Spinifex People*, Fremantle 2002, 165-6; Cane in DR Harris & GC Hillman (ed.), *Foraging and Farming*, London 1989, 110-11; Gott 2005; F Myers, *Pintubi Country, Pintubi Self*, Canberra 1986, 74.
107. PM Veth & FJ Walsh, 'The concept of "staple" plant foods in the Western Desert', *Aust Ab Stud* 1988/2, 20-2; Walsh in DA Saunders et al (ed.), *Australian Ecosystems (Proc Ecological Soc Aust 16)*, Sydney 1990, 28-9.
108. Cane in Harris & Hillman 99-102; Flood 237-8; P Latz, *Bushfires and Bushtucker*, Alice Springs 1995, 53-6; Nash 65; MA Smith, 'The antiquity of seedgrinding in arid Australia', *Arch in Oceania* 21, 1986, 29.
109. P Clarke, "Contact, conflict, and regeneration: Aboriginal cultural geography of the Lower Murray, South Australia", Adelaide Geog & Anth PhD 1994, 181-2; DJ Mulvaney & J Golson (ed.), *Aboriginal Man and Environment in Australia*, Canberra 1971, 205. See also Jones & Meehan in Harris & Hillman 122-8; Smith 1986, 31.
110. Compare Cane 111 with Jones & Meehan 125 in Harris & Hillman.
111. H Allen, 'Where the Crow Flies Backwards: Man and Land in the Darling Basin', ANU Anth PhD 1972, 49, 73-6; H Allen, 'The Bagundji of the Darling Basin: cereal gatherers in an uncertain environment', *World Arch* 5, 1974, 309, 311-13; B Gott, 'Cumbungi, Typha species: a staple Aboriginal food in southern Australia', *Aust Ab Stud* 1991/1, 33-50; Kirk 75; I White, 'Dimensions of Wiradjuri', ANU Prehist Bach L 1986, 58-62. For seed-tuber distinctions see Allen 1974, 309-13; Curr 1886 vol 1, 289, 297, 302, 338, 422; vol 2, 78-9, 378, 403; vol 3, 20, 90, 161; J Dawson, *Australian Aborigines* [1881], Canberra 1981, 15; Flood 237-8; Kirk 75; R Lawrence, 'Aboriginal habitat and economy', ANU Geog MA, 1968, 55-7; Pearson 335, 347-8.
112. Mitchell 1839 vol 2, 53.
113. Mitchell 1839 vol 2, 61.
114. White 4, 56-9.
115. Information Jack Golson 24 Mar 2006; Allen 1972, 80. On NSW millstones see PG Gresser, 'Small camp-sites of the Aborigines - central western NSW', *Vic Naturalist* 82, 1965, 235; McBryde in RVS Wright (ed.), *Stone Tools as Cultural Markers*, Canberra 1977, 239; Mulvaney in Mulvaney & Golson 375; G Seddon, *Searching for the Snowy*, Sydney 1994, 116; White 56-9; Tindale in Wright 347.
116. SJ Hallam, *Fire and Hearth*, Canberra 1975; SJ Hallam, 'Yams, alluvium and "villages" on the west coastal plain' in GK Ward (ed.), *Archaeology at Anzaas*, Canberra 1986, 116-32.
117. B Gott, 'Ecology of root use by the Aborigines of southern Australia', *Arch in Oceania* 17, 1982, 59-67; B Gott, 'Murnong - *Microseris scapigera*: a study of a staple food of Victorian Aborigines', *Aust Ab Stud*, 1983/2, 2-18; B

Gott, 'Use of Victorian plants by Koories' in DB Foreman & NG Walsh (ed.), *Flora of Victoria*, Melbourne 1993, 1, 195-211; Gott 2005.

118. Grey in HS Chapman, *The New Settlement of Australind*, London 1841, 44; G Grey, *Journals of Two Expeditions of Discovery [1841]*, Adelaide 1964, vol 2, 8-12, 20.

119. D Bates, *The Native Tribes of WA*, Canberra 1985, 261; R Gerritsen, *And Their Ghosts May be Heard*, Fremantle 1994, 82-7, 92-102; R Gerritsen, *Nhanda Villages of the Victoria District WA*, Canberra 2002; R Gerritsen, *The Traditional Settlement Pattern in Southwest Victoria Reconsidered*, Canberra 2000; N Green, *Nyungar - The People*, Perth 1979, 116, 121, 138, 198-9; Gregory in H Ling Roth, 'On the origin of agriculture', *JRAI* 16, 1886, 131; Hallam 1975, 12-15; Hallam in Harris & Hillman 136-9, 146; Hallam in Ward 116-18; GF Moore, *A Diary of Ten Years of an Early Settler in WA*, London 1884, 74, 81; G Seddon, *The Old Country*, Cambridge 2005, 71; Walsh in Saunders 34-5.

120. Burges in Gerritsen 1994, 85-6.

121. H Lourandos, *Continent of Hunter-Gatherers*, Cambridge 1997.

122. For other references to tuber/root eaters and/or farmers see Batey in D Frankel, 'An account of Aboriginal use of the yam-daisy', *Artefact* 7, 1982, 44; P Beveridge, 'Of the Aborigines ... of the lower Murray', *Proc RGS NSW*, 1883, 19-74; CCL Lower Darling report 14 Jan 1852, 4/7153, in Supreme Court Misc Corres COD 294B, NSWSR; Angas 1847 vol 1, 89; RM & CH Berndt, *A World That Was*, Melbourne 1993, 108-9; AH Campbell, 'Elementary food production by the Australian Aborigines', *Mankind* 6, 1965, 208-9; Chase in Harris & Hillman 42-54; AH Chisholm, *Strange New World*, Sydney 1955, 221; PA Clarke, 'The importance of roots and tubers ... for southern SA Aborigines', *J Anth Soc SA* 23/7, 1985, 4-6, 9; Dawson 19-20; Flood 236; B Gott, 'Cumbungi, *Typha* species: a staple Aboriginal food in southern Australia', *Aust Ab Stud*, 1999/1, 33-50; Horton 95; RA Hynes & AK Chase, 'Plants, sites and domiculture: Aboriginal influence upon plant communities in Cape York Peninsula', *Arch in Oceania* 17, 1982, 40; G Karskens, *Holroyd... Western Sydney*, Sydney 1991, 13-14; Keast vol 3, 1833; H Lourandos, 'Change or stability?: hydraulics, hunter-gatherers and population in temperate Australia', *World Arch* 11, 1980, 245-64; J Mathew, *Two Representative Tribes of Queensland*, London 1910, 92; Nash 95, 128-34; N Williams, *The Yolngu and their Land*, Stanford 1986, 93; Yen in Harris & Hillman 59-60.

122. Tindale 102; Tindale in Wright 347.

124. Information Laurent Doussot, 18 June 2004; Nash 128-34.

125. Mitchell 1839 vol 1, 237-8. Mitchell saw people digging for yams in the same area: vol 1, 238.

126. Mitchell 1848, 60, also 89-90.

127. Mitchell 1848, 90. On 20 March 1846 Mitchell saw people further up the Narran harvesting another seed, probably portulaca, which he had also noted on the Darling a decade earlier. Mitchell 1848, 98; Mitchell 1839 vol 1, 238.

128. Gregory in Ling Roth 132. See also HM Tolcher, *Conrick of Nappa Merrie*, Adelaide 1997, 46 (Betoota, further north).

129. On the same day and creek Brock saw people harvesting roots: Brock 133-4.

130. Sturt 1849 vol 1, 294. See also HJ Finnis (ed.), 'Dr John Harris Browne's journal of the Sturt Expedition 1844-1845', *South Australiana* 5, 1966, 39; W Jones, 'Up the Creek: hunter-gatherers in the Cooper Basin', *UNE Arch Hons* 1979, 112-3, 144-9.

131. In Gresser 233, also 234. See also JC Noble, *The Delicate and Noxious Scrub*, Canberra 1997, 71. For other accounts of grain growing see Allen 1972, 76-7; Allen 1974, 313-4; A Lady (A McPherson), *My Experiences in Australia*, London 1860, 215; Sturt 1849 vol 1, 285, 294-6; vol 2, 140.

132. Gott 1993, 196; Gott 2005; Green 138.

133. Mitchell 1839 vol 1, 52.

134. Mitchell 1839 vol 1, 315.

135. Mitchell 1848, 43-79.

136. C Giles, 'The Adelaide and Port Darwin Telegraph Line', *J SA Electrical Soc* 1-2, Feb-Nov 1888, 7.

137. AC Ashwin, 'From South Australia to Port Darwin', *JRGS SA* 32, 1930-31, 64.
138. Ashwin 66. On storing see Allen 1972, 78-9; RA Gould, 'Uses and effects of fire among the Western Desert Aborigines of Australia', *Mankind* 8, 1971, 23; Howitt in RB Smyth, *The Aborigines of Victoria* [1876], Melbourne 1972, 302; Tindale in Wright 346-7; Veth & Walsh 1988, 20; JG Withnell, *The Customs and Traditions of the Aboriginal Natives of North Western Australia* [1901], Adelaide 1965, 9.
139. Sturt 1833 vol 2, 51, also 61; Sturt 1849 vol 2 appendix, 44.
140. Higgins 104-5, 107.
141. Higgins 107.
142. Oxley 39-40, 87-95, 98; also Lee 252.
143. Sturt 1833 vol 2, 59, 62.
144. Waterhouse 179.
145. Waterhouse 180-1.
146. P Donovan, *A History of the Millewa Group of River Red Gum Forests*, Sydney 1997, 15.
147. Curr 1883, 186.
148. Curr 1886 vol 1, 289, 297, 302, 338, 422; vol 2, 78-9, 378, 403; vol 3, 20, 90, 161; Penney 32, 36.
149. Hawdon 19, 21, 25.
150. G Krefft, 'On the manners and customs of the Aborigines of the Lower Murray and Darling', *Trans Phil Soc NSW* 1, 1866, 361, 370.
151. Mitchell 1839 vol 1, 300, 302.
152. Hawdon 39.
153. C Sturt, *An Account of a Journey to SA* [1838], Adelaide 1990, 15-16.
154. I thank Jim Noble for help with this paragraph. See also A Barnard (ed.), *The Simple Fleece*, Melbourne 1962, 412; Gresser 234; Leigh & Noble map 5, 12-15, 19, 21; Mitchell 1839 vol 1, 216; CWE Moore, 'The vegetation of the southeast Riverina NSW', *Aust J Bot* 1, 1953, 515, 517-18; RM Moore (ed.), *Australian Grasslands*, Canberra 1975, map 70.
155. Information Barney Foran 12 Apr 2002; Moore 1975, map 70, 95, 250; P Sattler & R Williams (ed.), *The Conservation Status of Queensland's Bioregional Ecosystems*, Brisbane 1999, 2/1-3.
156. Stokes vol 1, 312.
157. Sattler & Williams 2/2-7, 42-3.
158. Stokes vol 1, 294, 310, 316, 299.
159. Sattler & Williams 2/1. See also Stokes vol 1, 326.
160. Sattler & Williams 2/1.
161. Elsey to Gould, 29 Sep 1857, MS1217; also Gould 1865 vol 2, 8-9.
162. Gason in Woods 259, also 257, 287-8.
163. Jones 1979, 11, 43, also 42-4, 48, 77, 109.
164. Wills 188.
165. See text at note 128.
166. Gason in Woods 286.
167. For examples of spread see or compare M Blakers et al, *The Atlas of Australian Birds*, Melbourne 1984, 245; JB Cleland, 'An enumeration of the birds between Port Augusta and Clare', *SAO* 7, 1923, 21-3; Diggles pt 13 np; AB Facey, *A Fortunate Life*, Fremantle 1981, 148-9; JM Forshaw, *Australian Parrots*, Brisbane 2002, 136-8; Higgins 106; KA Hindwood & AR McGill, *The Birds of Sydney*, Sydney 1958, 60; ES Hoskin, *The Birds of Sydney*, Sydney 1991, 99; HEA Jarman, 'Some bird observations about the City of Adelaide', *SAO* 13, 1935, 119-21; Johnstone & Storr 281; M Lenz, 'The breeding bird communities of three Canberra suburbs', *Emu* 90, 1990, 148-50; T Low, *The New Nature*, Melbourne 2002, 129-31; M McNaughton, *Australian Parrots and Finches*, Adelaide 2002, 31; GM Mathews, *The Birds of Australia*, London 1917, vol 6 pt 3, 227-9; information Henry Nix 25 Jan 2008 (Gatton); North 1889, 251; AJ North, *Nests and Eggs*, Sydney 1912, vol 3, 89-91, 257; Rowley 5, 7-8; DA Saunders & J Ingram, *Birds of Southwestern Australia*, Sydney 1995, 120; DA Saunders and PJ Curry in Saunders 1990, 306; T Saunders, 'Parrots of the Sydney Region', *CBOC Newsletter* 27 (3), 2005, 2; Serventy & Whittell 277; TG Souter, 'Birds of mid-Yorke Peninsula',

SAO 16, 1942, 27; information Bill Squire 16 June 2006 (Springsure); J Sutton, "An ornithological trip around Eyre Peninsula", SAO 7, 1923, 132, 138-9; SA White, 'Four ornithological trips to the Nullarbor Plain', *Emu* 18, 1919, 189-98; White SAO 1919, 109. Galahs visited some places earlier, sometimes decades earlier, before settling. Dates also try to exclude local and short-lived appearances such as in Melbourne in 1903, Adelaide in 1916, Sydney in 1920, and Canberra in the late 30s.

168. Morton & Mulvaney 352-3; M Shephard, *The Simpson Desert*, Adelaide 1992, 35.

169. SA White, 'A central Australian expedition', *Emu* 21, 1922, 92; SA White, "The country traversed by the scientific expedition of Professor Edgeworth David to the Finke River", *RGSA SA* 24, 1923, 44.

170. AC Robinson et al (ed.), *A Biological Survey of the Anangu Pitjantjatjara Lands South Australia*, Adelaide 2003, 259; Mathews 1917 vol 6 pt 3, 227.

171. JB Cleland, 'Notes on birds in central Australia ... Ayers Rock', SAO 13, 1935, 193-4; JB Cleland, 'Notes on birds seen between Alice Springs and the Granites', SAO 14, 1938, 127. See also Morton & Mulvaney 352-3; Storr 33.

172. P Sabat, 'Birds in marine and saline environments', *Revista Chilena de Historia Natural* 73, 2000, 1-16.

173. See also Austin 257; Whittell 1954 pt 2, 28.

174. Gould 1865 vol 2, 139.

175. For examples of spread see or compare AEJ Andrews (ed.), *Stapylton With Major Mitchell*, Hobart 1986, 60-1, 91; Angas vol 1, 219; Blakers 232-3, 664; Broadbent 28; *Canberra Bird Notes* 13, 1988, 13; HJ Frith, *Pigeons and Doves of Australia*, Sydney 1982, 243-4; HM Hale & NB Tindale, 'Observations on Aborigines of the Flinders Ranges', *Records SA Museum* 3, 1925, 57; Hawdon 39, 51; PJ Higgins & SJ Davies (ed.), *Handbook of Australian, NZ & Antarctic Birds*, vol 3, Melbourne 1996, 904-5; Hindwood & McGill, 17; Hoskin 97; FM Irby, 'Crested pigeons in the east', *Emu* 41, 1941, 20; Lenz; Low 128-31; Mitchell 1839 vol 1, 79, 122, 256, 309; Murray SAPP 43/1904, 39; North 1889, 277; JB Paton, 'Birds of the Gawler Ranges', SAO 26, 1975, 182; Ramsay 1878, 195 but see note 75; Robinson 2003, 259; Saunders & Curry in Saunders 1990, 306; Saunders & Ingram 115; Serventy & Whittell 264; Stone 448; Storr 31; Sturt 1833 vol 1, 23; vol 2, 51; Sturt 1849 vol 2 appendix, 44; Warburton 169; White SAO 1919, 109; White 1922, 91.

176. Serventy & Whittell 61, 277.

177. For example Low 130.

178. N Butlin, *Our Original Aggression*, Sydney 1983, 24; Curr vol 1, 213-15, 252; vol 2, 73; MC Hartwig, 'The progress of white settlement in the Alice Springs district... 1870-94', Adel Hist PhD 1965, 30-32; Mitchell 1839, 307.

179. Higgins 105, also 106.

180. Johnstone & Storr 281. See also Forshaw 135-6; McNaughton 30-1; Rowley 1-2, 156; Saunders & Ingram 120.

181. Gammage 110.

182. Gould 1865 vol 2, 9.

183. J Foott, *Sketches of Life in the Bush*, Sydney 1872, 13-14.

184. Mathews 1917 vol 6 pt 3, 228; Rowley 5, 7-8, 11. In 1890 WA had 33,820 acres under wheat, mostly west or south-west of Perth: E Dunsdorfs, *The Australian Wheat-growing Industry*, Melbourne 1956, 533.

185. Storr 33.

186. T Brown, 'Nullarbor Plain', *PRGSA SA* 19, 1918, 141-53, esp 147-8.

187. JB Cleland, 'Notes on the birds of Ooldea', SAO 7, 1923, 17-21; AS Le Souef, 'Notes on birds seen...' & 'Notes on birds observed at Ebor and the Nullarbor Plain', *Emu* 20, 1921, 140-4 & 21, 1921, 125-8; White *Emu* 1919; White 1923; FL Whitlock, 'Notes from the Nullarbor Plain', *Emu* 21, 1922, 170-87; Whittell 1954 pt 2, 40.

188. AG Bolam, *The Trans-Australian Wonderland*, Melbourne 1923, 41.

189. J Ford & EH Sedgwick, 'Bird distribution in the Nullarbor Plain and Great Victoria Desert region', *Emu* 67, 1967, 99-124; M Shephard, *The Great Victoria Desert*, Sydney 1995, 52-3.

190. CG Gibson, 'Birds observed between Kalgoorlie and Eucla, WA', *Emu* 9, 1909, 76.
191. JN McGilp, 'Birds of the Nullarbor Plain', *SAO* 11, 1931, 150; Paton 183; Sutton 132, 138-9.
192. I thank Peter Gifford for advice on mallee, water and galahs on the coast and the Nullarbor. See also Shephard 1995.
193. Gammage 55-6.
194. AE Newsome, 'An ecological comparison of the two arid-zone kangaroos in Australia', *Quarterly Review of Biology* 50, 1975, esp 394, 402, 408-10; Newsome in Morton and Mulvaney 287, 294-7.
195. A Norton, 'On the decadence of Australian forests', *Proc RS Qld* 3, 1887, 20.
196. Leigh & Noble 21.
197. Curr 85; Lunt 29; Moore 1953, 515, 517-8 map; Moore 1975, 78; Noble iv; Penney 241, 281; E Rolls, *They All Ran Wild*, Sydney 1984, 488; JMB Smith (ed.), *A History of Australasian Vegetation*, Sydney 1982, 123-4; F Turner, 'Fodder plants and grasses of Australia', *Report Aust Ass Advancement of Science* 2, 1890, 588.
198. Mitchell 1839 vol 1, 44, 110, 137-8, 141.
199. Foott 13-14; Gammage 42; Leigh & Noble 21.
200. M Durack, *Kings in Grass Castles*, London 1959, esp 212.
201. Ramsay 1886, 1096, continued 1887, 170.
202. North 1898, 169.
203. See text at note 186.
204. Low 7-21, 60-71.
205. Turner 592-3. See also CL Davies et al, 'Perennial grain crops for high water use', Report 05/024, *Rural Industries R & D Corp*, Canberra 2005, and its annotated bibliography, 21-8.