Probable successful double brooding and brood overlapping in the Galah in the Hunter Region, New South Wales

Kimberley Jane Pryor

PO Box 3168, Thornton, NSW 2322, Australia. Email: kimberleypryor@gmail.com

Received 13 February 2025; Accepted 28 April 2025; Published online 26 May 2025

INTRODUCTION

The Galah *Eolophus roseicapillus* is a small pink and grey cockatoo which is common in grassland and agricultural areas (Higgins 1999). Galahs are monogamous, and pairs usually stay together until one mate dies (Pidgeon 1970). They nest in tree hollows and re-use them in successive years. Galahs usually lay 3-5 eggs from late July or early August to early November (Higgins 1999). Rarely, two females may lay in the same nest (Rowley 1990). The mean interval between eggs is 2.66 days and the median incubation period is 23.4 days (Rowley 1990). The mean nestling period is 49.4 days (Rowley 1990) to 52 days (Smith & Saunders 1986).

Double brooding occurs when females begin a second clutch after successfully raising their first clutch (Trnka & Samaš 2023). Monogamous double brooding occurs when the female re-nests with the same mate (Dowding *et al*. 1999). A female's decision to initiate a second clutch may be influenced by the length of the breeding season, laying date of the first clutch and size of the first clutch (Trnka & Samaš 2023). Double brooding may increase seasonal or lifetime reproductive success (Burley 1980). It is common in many bird species, including Barn Owls *Tyto alba* (Jackson & Cresswell 2017), Little Penguins *Eudyptula minor* (Rowe *et al.* 2020) and Malaysian Plovers *Charadrius peronii* (Yasué & Dearden 2008). It has been reported in Carnaby's Cockatoo (Johnstone *et al*. 2024), but this record is disputed (Saunders & Mawson 2024). Double brooding has also been reported in captive parrots, when conditions are favourable (McGrath 1993).

Brood overlapping occurs when females begin a second clutch before successfully raising their first clutch (Blomqvist *et al*. 2001; Burley 1980; Hill 1986; Surmacki & Podkowa 2022). It is rare when it occurs in the same nest and occurs more often in nest boxes (Surmacki & Podkowa 2022).

Galahs may lay a replacement clutch 12 to 18 days after complete failure of eggs or loss of small young (Rowley 1990). McGilp (1923) and Sindel & Lynn (1989) suggested that Galahs may double brood in good seasons but Rowley (1990) disputes this. Recently, this long-term study found that Galahs may engage in brood overlapping (Pryor 2023).

This note from the present longitudinal study (2002 to 2024 inclusive) describes the successful fledging of one chick from each of two successive overlapping clutches in the same nest box at Thornton (32º24'S 150º38'E), New South Wales. It also provides an update on fledging times of Galah chicks fledged from nest boxes in our suburban backyard.

METHODS

In August 2024, wild Galahs nested in a nest box (Dengate 1997) installed 5.5 m above the ground on a steel pole in our backyard (see Figures 2, 6 in Pryor 2024), near native plants including a *Eucalyptus* sp. (approximately 21 m tall), *Callistemon* spp., *Banksia* spp. and *Grevillea* spp. The nest box had not been cleaned or sprayed for lice and mites since the previous breeding season.

Before a previous breeding season, a wireless webcam had been mounted in the ceiling of the nest box to relay digital video and still images to our mobile phones and computers. Unfortunately, after the first brood of 2024 hatched, it was discovered that the camera was covered with spider web. It was decided to not clean it as this would disturb the nesting birds. Faint images were only possible early on a sunny morning when light entered the nest box.

Photographs of Galah chicks looking out of the nest box were taken with a Canon 5D Mark IV camera with a Sigma 150-600 mm f/5-6.3 DG OS contemporary lens and processed using Canon Digital Photo Professional 4 (www.canon.com).

Sunrise and sunset times were obtained using an online geodetic calculator (Geoscience Australia 2025).

Fledging times relative to sunrise and sunset times were calculated by hand. The nestling periods were estimated using nest box camera observations of eggs and chicks and first sounds of newly hatched young.

For fledging competence, 'flew strongly away' was defined as: dropped <2 m when it first leapt from the nest box, gained altitude once flying and maintained or increased altitude until out of sight.

RESULTS

Opportunistic observations made during the 2024 breeding season are summarised in **Table 1**.

On 9 August 2024, it was assumed that a clutch had been started because an adult Galah slept in the nest box. The number of eggs was not known. Four chicks hatched (**Figure 1**) but only one chick survived to fledge (**Figure 2**). At 0533 h on 24 October 2024, at approximately 45 days of age, Chick 1/2024 flew strongly away with the female parent only.

One day later, on 25 October 2024, a second clutch containing three eggs was discovered in the same nest box (**Figure 3**). Only one chick from the second clutch survived to fledge (**Figures 4, 5, 6**). At 0503 h on 13 January 2025, at approximately 57-62 days of age, Chick 2/2024 flew strongly away with both parents.

From 2008 to 2024 inclusive, 29 Galah chicks fledged (**Table 2**). The fledging of 24 of those chicks was observed and the exact times were recorded. Seventeen chicks (71%) fledged in the morning, and 15 of the 17 (88.2%) fledged within 120 min after sunrise. The average fledging time for all 17 morning-fledging chicks was 61 min after sunrise (**Table 2**). The other seven chicks (29%) fledged in the late afternoon and five of these seven (71.4%) fledged within 120 min before sunset. The average fledging time for all seven afternoon-fledging chicks was 88 min before sunset. Overall, 83.3% of chicks fledged either within 120 min of sunrise or 120 min of sunset (**Table 2**). The ratio of morning-fledging chicks to afternoon-fledging chicks is approximately 5:2.

Figure 1. Clutch 1: On 22 September 2024, four small young were in the nest box. The numbers are on the heads of the chicks. (Webcam mounted in ceiling of nest box was covered with spider web, resulting in poor quality images inside the nest box.)

Figure 2. Clutch 1: Chick 1/2024 with the female parent at 0442 h on 24 October 2024.

Figure 3. Clutch 2: On 25 October 2024, three eggs were in the nest box. The numbers are above the eggs.

Figure 4. Clutch 2: On 3 November 2024, only one egg could be seen. The number is above the egg.

Figure 5. Clutch 2: On 14 December 2025, one chick, Chick 2/2024, was in the nest box. The number is in front of the beak of the chick.

Figure 6. Clutch 2: Chick 2/2024 with the male parent at 0826 h on 11 January 2025.

DISCUSSION

This appears to be only the second report of Galahs beginning a second clutch before a chick from their first clutch has fledged (Pryor 2023). Furthermore, this appears to be the first report of Galahs successfully raising at least one chick from each of two successive overlapped clutches in the same nest box.

It is assumed that the same Galah pair laid both clutches and successfully raised both chicks. Galahs show nest-site fidelity and after complete nest failure, the majority will lay a replacement clutch in the same hollow (Rowley 1990). Although Rowley (1990) reported two clutches of 10 eggs and one clutch of 11 eggs arising from two females laying in the same nest, I could find no reports of a second female laying eggs in an occupied Galah nest in which young had hatched. In this study, in 2022 when I first observed brood overlapping (Pryor 2023) and in 2024, the surviving chick from the first clutch was within days of fledging when the second clutch was initiated. During this time, a pair of Galahs spent hours in and on the nestbox and nearby eucalypt during the day and night. They did not fly up into the eucalypt or away when family members walked in the backyard, suggesting that they were familiar and comfortable with those people. They advertised their territory by wiping their faces on the nest box and pole, removing patches of bark from the eucalypt and performing the heraldic display (raising crest, spreading wings and tail, and screeching) (Pidgeon 1970), if other Galahs flew in (K. P. pers. obs.). Thus, it is highly unlikely that a different pair would have had the opportunity to lay the second clutch. However, it is acknowledged that because the Galahs were not banded, this study cannot provide absolute evidence that the same Galah pair made both successful breeding attempts.

In 2022 and 2024, the Galahs may have double brooded because there was a substantial reduction of their first brood (Blomqvist *et al*. 2001) and/or the sole surviving young from the first clutch did not appear to be strong enough to climb up to the entrance hole and fledge. Chick 1/2022 was not observed looking out of the nest box and Chick 1/2024 was only observed looking out the day before it fledged. Chick 1/2022 was assumed to have finally fledged (flying competence not observed) when it was older than the maximum reported nestling age of 62 days (Smith & Saunders 1986).

Table 1. Opportunistic observations of Galahs breeding in a nest box in a suburban backyard in the Hunter Valley in the 2024 breeding season

Date	Observation
9 August 2024	First saw adult Galah sleeping overnight in the nest box with breast blocking entrance hole
9 September 2024	First brood: First heard young
22 September 2024	Four young had hatched (**Figure 1**)
4 October 2024	Only one young had survived, Chick 1/2024
17 October 2024	Heard Chick 1/2024 being fed
22 October 2024	Both parents were putting fresh leaves in the nest box Parents were not at the nest box overnight Heard shuffling in the nest box
23 October 2024	First saw Chick 1/2024 looking out of the nest box
24 October 2024	Chick 1/2024 fledged at 0533 h [1], 26 min after sunrise at 0507 h with female parent only (**Figure 2**)
25 October 2024	Second clutch: three eggs had been laid (**Figure 3**)
3 November 2024	Only one egg was visible, but others may have been obscured by parent or covered by leaves (**Figure 4**)
14 December 2024	Second brood: Only one young had survived, Chick 2/2024 (**Figure 5**)
29 December 2024	Heard Chick 2/2024 being fed
6 January 2025	Parent fed Chick 2/2024 through entrance hole from external perch
11 January 2025	Chick 2/2024 was being groomed and fed at entrance hole (**Figure 6**)
12 January 2025	Chick 2/2024 perched in entrance hole with toes visible. Chick and parents commenced pre-fledge calling
13 January 2025	Chick 2/2024 fledged at 0503 h, 4 min after sunrise at 0459 h, with both parents

Table 2. Fledging of Galah chicks relative to sunrise and sunset

Chick hatch number / year	Date chick left nest box	Time chick left nest box (h) [1]	Sunrise [2] (h)	Time after sunrise (min)	Sunset [2] (h)	Time before sunset (min)
Chick 1/2008	10/12/08	0500	0444	16	1857	
Chick 1/2012	2/11/12	0641	0458	103	1824	
Chick 2/2012	4.11.12	1650	0457		1826	96
Chick 3/2012	9.11.12	1410	0453		1830	260
Chick 1/2013	19.10.13	1730	0513		1812	42
Chick 2/2013	20.10.13	0618	0512	66	1813	
Chick 3/2013	21.10.13	1758	0511		1814	16
Chick 1/2014	23.10.14	0600	0509	51	1815	
Chick 2/2014	3.11.14	0535	0458	37	1824	
Chick 3/2014	7.11.14	0615	0454	81	1828	
Chick 1/2015	Not observed					
Chick 2/2015	13.11.15	0530	0450	40	1833	
Chick 1/2016	22.10.16	0545	0509	36	1815	
Chick 2/2016	26.10.16	1735	0505		1818	43
Chick 3/2016	27.10.16	1759	0504		1819	20
Chick 1/2017	16.10.17	0610	0516	54	1810	
Chick 1/2018	20.10.18	0540	0512	28	1813	
Chick 1/2019	24.10.19	0613	0508	65	1816	
Chick 2/2019	24.10.19	Not observed	0508		1816	
Chick 3/2019	25.10.19	0540	0507	33	1817	
Chick 1/2020	24.12.20	Not observed	0449		1905	
Chick 2/2020	25.12.20	0740	0449	171	1906	
Chick 1/2021	20.12.21	1640	0447		1903	143
Chick 1/2022	19.11.22	Not observed	0447		1839	
Chick 1/2023	12.11.23	0509	0451	18	1832	
Chick 2/2023	12.11.23	0756	0451	185	1832	
Chick 3/2023	12.11.23	Not observed	0451		1832	
Chick 1/2024	24.10.24	0533	0507	26		
Chick 2/2024	13.01.25	0503	0459	4		

[1]Australian Eastern Standard Time (AEST) in 24-hour format [2]Sunrise and sunset times from Geoscience Australia

However, Chick 1/2024 was estimated to have fledged before the maximum reported nestling age and was observed flying strongly away. In 2008, 2017, 2018, and 2021, Galahs successfully raised only one young but did not start a second clutch (**Table 2**). Therefore, it remains to be elucidated why the female, which is likely to be, but may not be, the same individual, initiated a second clutch in 2022 and 2024.

Key factors driving double brooding in parrots remain to be clarified. One factor is the timing of moulting (McGrath 1993; Rowley 1988). Rowley (1988) found that breeding Galahs start their annual moult when their nestlings have feathers but have not yet fledged. Moulting is under hormonal control (Payne 1972) and usually entails a loss of interest in nesting, the end of the breeding cycle and regression of the gonads (McGrath 1993; Van Sant 2006). The findings described in this note differ from Rowley's (1988) report that Galahs do not lay more eggs if their nestlings are more than 21 days old. It is possible that in 2022 and 2024, one or both of the adult Galahs had a hormonal imbalance that delayed moulting and allowed them to lay more fertile eggs when their nestling was estimated to be more than 40 days old. Another factor is the natural length of the breeding season (McGrath 1993). This may vary in a species' breeding range because different habitats experience different conditions, for example length of day, temperature and rainfall. Thus, a species may be able to double brood in only part of its breeding range. Other factors are yet to be identified.

Double brooding by captive parrots, especially those that double brood in the wild, has been observed by aviculturists (Bruce Watts, Jeff Jones, John Griffith, and John McGrath pers. comm.) For example, the Wheatbelt hybrid, Port Lincoln parrot *Barnardius zonarius zonarius* x Twenty-eight parrot *Barnardius zonarius semitorquatus*, may lay a second clutch in captivity in a suitable climate (McGrath 1993). Kakariki *Cyanoramphus* spp. may nest all year in captivity (Jennings 1978). My pet Cockatiels *Nymphicus hollandicus* successfully raised one young from a clutch of four eggs (hatched 8 August 2015) followed by one young from a subsequent clutch of six eggs (hatched 1 October 2015) (K. P. pers. obs.). Double brooding may occur more readily in captive parrots because they experience food and water security and a controlled climate.

The most interesting finding was that Galahs may engage in a rare breeding strategy, single-nest brood overlapping. A recent study found that this strategy has been reported in only eight bird species (Surmacki & Podkowa 2022). In the present study, it is possible that the 2022 and 2024 Galahs overlapped successive clutches because they are seasonal breeders that usually lay eggs between late July and early November (Rowley 1990). The length of the breeding season determines the number of clutches that can be produced (Burley 1980) and if two clutches are produced, there must be enough time for the second brood to fledge before the breeding season ends (Hill 1986). Chick 2/2024, which was from an overlapped clutch, had the latest fledging date I have recorded (mid-January). Even the 2020 and 2021 chicks, which were from replacement clutches, fledged in late December (**Table 2**). If committing to double brooding, the Galahs may have also needed to brood overlap to raise their young before summer temperatures made the nest too hot (Larson *et al*. 2015). It is possible that they are only likely to engage in this strategy when breeding in a nest box (Surmacki & Podkowa 2022).

In both 2022 and 2024, the second clutch was well underway before the chick from the first clutch fledged. In 2022, three eggs were observed three days before Chick 1/2022 left the nest box. The fourth egg may have also been laid before the chick left. In 2024, three eggs were observed the day after Chick 1/2024 left the nest box. As the interval between Galah eggs is more than two days, at least two eggs and possibly all three eggs may have been laid before the chick left. Such brood overlapping would have been energetically costly, especially to the female (Surmacki & Podkowa 2022), because parents usually provide extra feeding and grooming to a chick before fledging (K. P. pers. obs.) and continue to feed it for six to seven weeks after fledging (Rowley 1990).

The reason only one young survived in each clutch is unknown. It is possible that most of the young were overcome by lice and/or mites because the box was not treated before the adults moved in. If this was the case, it is unclear why only one chick in a brood would be strong enough to resist the parasites. In the present study, in 2009, the sole surviving chick climbed up to the entrance hole but was too weak to hold its head up. It died the next day, and an inspection of the nest box revealed an infestation of lice and/or mites (K. P. pers. obs.). It is also possible that the Galahs did not adequately provision the other chicks. In the present study, in 2008, real-time video from a camera installed in a previous nest box enabled me to witness that Chick

2/2008 was not fed often and was not seen after the third day (K. P. pers. obs.). Others found that slightly less than 50% of eggs have a fledging outcome and that nestlings die due to inclement weather, disease and wounds (Rowley 1990; Smith & Saunders 1986).

Intriguingly, this appears to be the first report of a chick fledging without waiting for the other parent to arrive and help escort it from the nest. Chick 1/2024 may have acted on instinct because it was ready to leave or may have leaned too far forwards from the nest box entrance and had to fly. In this study, chicks fledging with only one parent have only been observed in 2020, when the male parent disappeared. With the help of supplementary feeding, the female parent exclusively raised two chicks for the four weeks prior to fledging. Chick 1/2020 was assumed to have fledged (flying competence not observed) and the next day Chick 2/2020 was observed flying strongly away with the female parent.

The new observations from the 2024 breeding season (**Table 2**) provide further evidence that Galah chicks usually fledge either within 120 min after sunrise or within 120 min before sunset (Pryor 2018, 2024). They are also consistent with studies that found that Galah chicks usually fledge in the morning (Higgins 1999).

CONCLUSIONS

It appears to be very rare but possible for a Galah pair to double brood in the same nest, overlap the two broods and successfully fledge at least one young from each brood in a single breeding season. Double brooding and brood overlapping could increase a Galah pair's seasonal reproductive success.

ACKNOWLEDGEMENTS

I am grateful to Nick Milton for building and installing the nest box and camera and for taking the nest box photographs. I thank Bruce Watts, Jeff Jones, John Griffith and John McGrath for providing information on double brooding and brood overlapping in captive parrots.

REFERENCES

Blomqvist, D., Wallander, J. and Andersson, M. (2001). Successive clutches and parental roles in waders: the importance of timing in multiple clutch systems. *Biological Journal of the Linnean Society* **74**: 549-555. https://doi.org/10.1111/j.1095-8312.2001.tb01412.x

Burley, N. (1980). Clutch overlap and clutch size: alternative and complementary reproductive tactics. *The American Naturalist* **115**: 223-246.

Dengate, J. (1997). 'Attracting birds to your garden in Australia', p.57. (New Holland: Frenchs Forest, New South Wales.)

Dowding, J.E., Wills, D.E. and Booth, A.M. (1999). Double-brooding and brood overlap by Northern New Zealand Dotterels (*Charadrius obscurus aquilonius*). *Notornis* **46**: 181-186.

Geoscience Australia. (2025). Sunrise, Sunset & Twilight Times. https://geodesyapps.ga.gov.au/sunrise Accessed 4 January 2025.

Higgins, P.J. (Ed.) (1999). 'Handbook of Australian, New Zealand and Antarctic Birds Volume 4: Parrots to Dollarbird'. (Oxford University Press: Melbourne, Victoria.)

Hill, W.L. (1986). Clutch overlap in American coots. *The Condor* **88**: 96-97. https://doi.org/10.2307/1367762

Jackson, P. and Cresswell, W. (2017). Factors determining the frequency and productivity of double brooding of Barn Owls *Tyto alba*. *Bird Study* **64**: 353-361. https://doi.org/10.1080/00063657.2017.1363716

Jennings, J. (1978). Breeding Kakariki Parrakeets. *AFA Watchbird* **5**: 26-27.

Johnstone, R.E., Kirkby, T. and Kissane, Z.M. (2024). First record of Carnaby's Cockatoo raising two broods in one season. *Corella* **48**: 24-27.

Larson, E.R., Eastwood, J.R., Buchanan, K.L., Bennett, A.T. and Berg, M.L. (2015). How does nest box temperature affect nestling growth rate and breeding success in a parrot? *Emu* **115**: 247-255. https://doi.org/10.1071/MU14081

McGilp, J.N. (1923). Birds of Lake Frome District, South Australia: Part II. *Emu-Austral Ornithology* **22**: 274-287.

McGrath, J. (1993). The Wheatbelt Hybrid. *AFA Watchbird* **20**: 37-39.

Payne, R.B. (1972). Mechanisms and control of moult. In 'Avian Biology II' (Eds. O.S. Farner and J.R. King) Chapter 3. (Academic Press: New York.)

Pidgeon, R.W.J. (1970). 'The individual and social behaviour of the Galah'. MSc Thesis, Univ. New England, Armidale, NSW.

Pryor, K.J. (2018). Fledging of Galahs nesting in a suburban environment near Newcastle, NSW. *The Whistler* **12**: 1-6.

Pryor, K.J. (2023). Single-nest brood overlapping in the Galah in the Hunter Region, New South Wales. *The Whistler* **17**: 66-68.

Pryor, K.J. (2024). Same-day fledging of a brood of Galahs in the Hunter Region, New South Wales. *The Whistler* **18**: 14-17.

Rowe, L.K., Weir, J.S. and Judkins, A.G. (2020). Breeding of little penguins (*Eudyptula minor*), including multiple brooding, at South Bay, Kaikōura, New Zealand, 2006-2017. *Notornis* **67**: 451-458.

Rowley, I. (1988). Moult by the Galah *Cacatua roseicapilla* in the wheatbelt of Western Australia. *Corella* **12**: 109-112.

Rowley, I. (1990). 'Behavioural Ecology of the Galah *Eolophus roseicapillus* in the wheatbelt of Western Australia'. (Surrey Beatty & Sons in association with CSIRO: Chipping Norton, New South Wales.)

Saunders, D.A. and Mawson, P. (2024). Rebuttal of Johnstone, Kirby, and Kissane's claim about a first record of Carnaby's Cockatoo raising two broods in one season. *Corella* **48**: 70-72.

Sindel, S. and Lynn, R. (1989). 'Australian Cockatoos'. (Singil Press: Australia)

Smith, G.T. and Saunders, D.A. (1986). Clutch Size and Productivity in 3 Sympatric Species of Cockatoo (Psittaciformes) in the Southwest of Western-Australia. *Wildlife Research* **13**: 275-285. https://doi.org/10.1071/WR9860275

Surmacki, A. and Podkowa, P. (2022). An extreme type of brood overlapping in wild-living birds. *The European Zoological Journal* **89**: 527-534. https://doi.org/10.1080/24750263.2022.2058100

Trnka, A. and Samaš, P. (2023). Factors influencing low incidence of double brooding in the Great Reed Warbler. *Journal of Ornitholo*gy **165**: 127-135. https://doi.org/10.1007/s10336-023-02094-4

Van Sant, F. (2006). Problem sexual behaviors of companion parrots. *Manual of parrot behavior*: 233-245.

Yasué, M. and Dearden, P. (2008). Replacement nesting and double-brooding in Malaysian Plovers *Charadrius peronii*: Effects of season and food availability. *Ardea* **96**: 59-72. https://doi.org/10.5253/078.096.0107