AUSTRALIAN BIRD WATCHER 2002, 19, 161–171

Nest-site and Breeding-season Data for the Crimson Finch *Neochmia phaeton* in Australia

MICHAEL K. TODD

Queensland Parks & Wildlife Service, P.O. Box 2066, Cairns, Queensland 4870
(Present address: New South Wales National Parks & Wildlife Service, P.O. Box 1049, Griffith, N.S.W. 2680)

Summary

The nest-site preferences of the two subspecies of Crimson Finch *Neochmia phaeton* (Black-bellied *N.p. phaeton* and White-bellied *N.p. evangelinae*) were examined. Most breeding took place during the wet season. The nominate subspecies *phaeton* often used artificial structures when available, including roof rafters, telegraph poles, an air-conditioner and a boat. Both subspecies preferred to nest between the fronds of trees with palm-like leaves, mostly *Pandanus* or *Corypha*. *N.p. evangelinae* used a narrower range of sites for constructing nests than did *N.p. phaeton* and, so far in Australia, has not been recorded using artificial sites.

Introduction

The Crimson Finch *Neochmia phaeton* is a grass-finch widely distributed in Australia with up to three different subspecies having been described, although currently only two are recognised (Boles 1987, Schodde & Mason 1999). The nominate subspecies, the Black-bellied Crimson Finch *N.p. phaeton*, has a disjunct distribution from the west Kimberley, Western Australia, to the Leichhardt River, Queensland, and from the Cairns region of Queensland to Rockhampton in the east. Its eastern population is thought to have declined in range and abundance (Blakers *et al.* 1984). The White-bellied Crimson Finch *N.p. evangelinae* occurs on Cape York Peninsula, Queensland, and in southern New Guinea, and is classified as Endangered in Australia (Garnett & Crowley 2000), its range having contracted earlier last century. It currently has a patchy distribution on both the eastern and western coasts of Cape York Peninsula. The decline of both subspecies of the Crimson Finch in eastern Australia fits the pattern of decline in many tropical savanna birds (Woinarski 1993, Franklin 1999).

The breeding season and related behaviour of the Crimson Finch have been mentioned briefly in many publications. Some authors have noted that the Black-bellied subspecies in natural habitat most frequently nests within the foliage of pandanus trees *Pandanus* spp. (Barnard 1926, Immelmann 1985, Verbeek *et al.* 1993). Its use of artificial nest-sites when they are available, such as under the eaves and on the rafters of buildings, has also been noted (Whitlock 1925, Slater 1959, Immelmann 1985, Roberts 1989). Immelmann (1985) found most nests of the eastern population of the Black-bellied subspecies in low bushes or trees such as pineapples or banana trees, rather than in buildings. Other nest-sites recorded have included orange trees (Barnard 1926), banana trees (Boekel 1980), tree-hollows (Boekel 1980, Immelmann 1985), among flood debris (Wilson 1998), in a tussock of grass, and under a jutting piece of bark (Immelmann 1985).

The only nest-site recorded for the White-bellied subspecies in Australia was in pandanus at the Archer River on Cape York (MacGillivray 1918), although in Papua New Guinea nest-sites reported for this subspecies have included sedges fringing water, a fork amongst foliage in a small shrub, and the grass roof of a hut constructed solely of bush materials (Coates 1985).

Black-bellied Crimson Finch *Neochmia phaeton phaeton*.

Plate 40 Photo: Michael K. Todd

Black-bellied Crimson Finches have been recorded breeding at all times of the year with the possible exception of the mid dry season (August). Immelmann (1985) described the breeding season of this subspecies as being between January and April but extending until June in settled areas. Slater (1959) found nests between February and July but, as no observations were made during December

White-bellied Crimson Finch *Neochmia phaeton evangelinae*.
Plate 41 Photo: Michael K. Todd

and January, he may have missed the start of the breeding season. Nests have been recorded between December and April in the Northern Territory (Storr 1977, Boekel 1980), during June and July in western Queensland, and between September and June in eastern Queensland (Storr 1984). The most southerly breeding record of the eastern population of this subspecies was in April (Wilson 1998).

The sole breeding record of the White-bellied Crimson Finch in Australia was also in April (MacGillivray 1918). In Papua New Guinea, however, breeding has been reported in February (Mayr & Rand 1937, Coates 1985), March, April (Assem 1960 in Coates 1985), September (Rand 1942 in Coates 1985), November and December (Coates 1985).

Methods

Fieldwork was carried out from October 1998 until July 2000: at Pormpuraaw on the western coast of Cape York Peninsula, Queensland, from December 1998 until May 1999; and in the East Kimberley district of Western Australia from November 1999 until May 2000. All research outside these dates was carried out in the Lakefield National Park on the eastern coast of Cape York Peninsula. All of these sites (exact positions withheld) are within the monsoon belt of northern Australia and thus have extremely seasonal rainfall. Most of the rain falls between December and March, with occasional storms during October and November before the wet season and storms in April following the wet season.

Between the beginning of October 1999 and April 2000, 1684 mm of rain (more than double the wet-season average of 770 mm) was recorded at the Frank Wise Institute, where most of the fieldwork in the East Kimberley was conducted. Almost 880 mm of this fell in March and April 2000. At Pormpuraaw, 1793 mm of rain fell between November 1998 and April 1999, which also exceeds the wet-season average (approximately 1200 mm). Rainfalls recorded at the stations nearest to Lakefield National Park were 1645 mm (1998–99 wet season) and 1588 mm (1999–2000 wet season) at Musgrave (nearest to Nifold Plain) and 1181 mm and 1248 mm, respectively, at Laura (nearest to New Laura). The average wet-season rainfall for Musgrave is approximately 1100 mm and for Laura 900 mm.

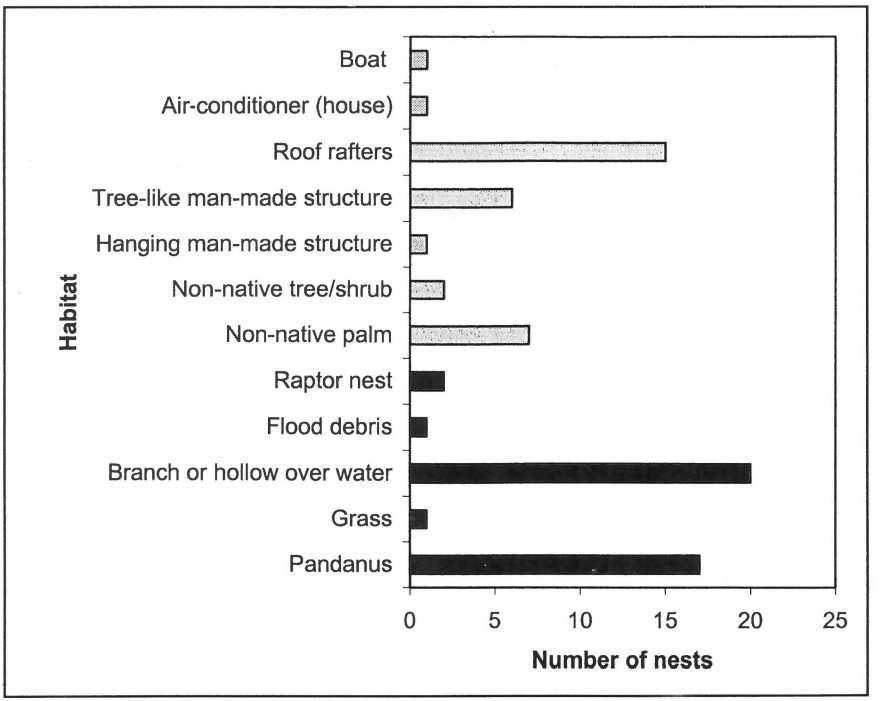

Figure 1. Sites used for nesting by Black-bellied Crimson Finch *N.p. phaeton*. Dark bars indicate natural sites, light bars represent artificial sites. From data collected by the author and from the RAOU Nest Record Scheme.

The site selected by Crimson Finches for nest construction was recorded for all nests located. Data from the Royal Australasian Ornithologists Union (RAOU) Nest Record Scheme (NRS) were also examined. The height of each nest above the ground was recorded, and its location was classified into one of 14 categories (Appendix 1) that have been defined as natural or artificial. Natural sites included living vegetation, hollows in branches, flood debris and nests of raptors; artificial sites were those constructed by humans. Some finches were captured in mist-nets, and were colour-banded and examined to see if a brood-patch was present before being released.

Results

Nest-sites

Data were available for a total of 74 nests of the nominate subspecies *phaeton*. Forty-one of these were located in natural sites: 17 were in *Pandanus* and 20 were on branches or in hollow branches over water (Appendices 1–2). Nine of the artificial nest-sites were introduced plant species, and 24 were man-made structures, particularly roof rafters (15 nests). Favoured introduced plants were garden-planted trees including *Livistona* and *Cocos* species. The most remarkable nest-site was one built on repeatedly on a regularly used tourist-operator's boat (MT pers. obs.). One nest was built within the active nest of an Osprey *Pandion haliaetus* (MT pers. obs.) and another within the nest of a Whistling Kite *Haliastur sphenurus* (NRS data). Thus, when considering all nests recorded for subspecies

Table 1
Nest characteristics of Crimson Finch *Neochmia phaeton*. The categories are not mutually exclusive. Data for both old, disused and active nests are included.

	Subspecies *phaeton*	Subspecies *evangelinae*
Number of nests	74	13
% in natural sites	55	100
% in trees with palm-like leaves[a]	31	85
% on branches or in hollow branches over water	27	0
% on roof rafters	20	0
Average height of nest above ground (m)	2.45±2.18	3.47±2.90
Median height of nest above ground (m)	1.9	3.0

[a]This includes both native and introduced species

phaeton, 31% were in trees with palm-like leaves, 27% were on branches or in hollow branches over water, and 20% were supported by roof rafters of man-made structures (Figure 1).

In contrast, none of the 13 nests of subspecies *evangelinae* was in an artificial site, even when these were available (Appendices 1–2). All of the nests of this subspecies found at Pormpuraaw were situated in *Pandanus*, whereas two of the four nests in the Lakefield National Park were in *Corypha* palms. The remaining two Lakefield nests were in bushes at heights of 3 metres and 1.5 metres. Thus 85% of the nests of subspecies *evangelinae* were in trees with palm-like leaves (Table 1).

Height of nests above the ground

The average height of nests above the ground of the nominate subspecies was 2.45 metres, and the median height was 1.90 metres (Table 1). Although these were lower than for subspecies *evangelinae*, the difference was not significant statistically (*t* test, $P>0.05$) and was probably because *Corypha* palms are usually taller than *Pandanus* or man-made structures.

Breeding season

There are breeding records of subspecies *phaeton* throughout the year, although most are during the wet season (85% between January and May). All records for subspecies *evangelinae* were clustered between January and May. The presence of brood-patches on adult birds of both subspecies also suggested that most breeding starts early in, and continues until the end of, the wet season (Figure 2).

Discussion

Although the Crimson Finch is commonly recorded, there has been little published on the species' breeding behaviour. Only 31 records were available from the RAOU Nest Record Scheme for the nominate subspecies and none for subspecies *evangelinae*. This study adds another 57 breeding records: 44 for Black-bellied *phaeton* and 13 for White-bellied *evangelinae*.

Although most breeding records of the nominate subspecies are during the wet season, there are records for almost all months of the year, which suggests that the breeding season is not rigid but is possibly linked with the onset of rain.

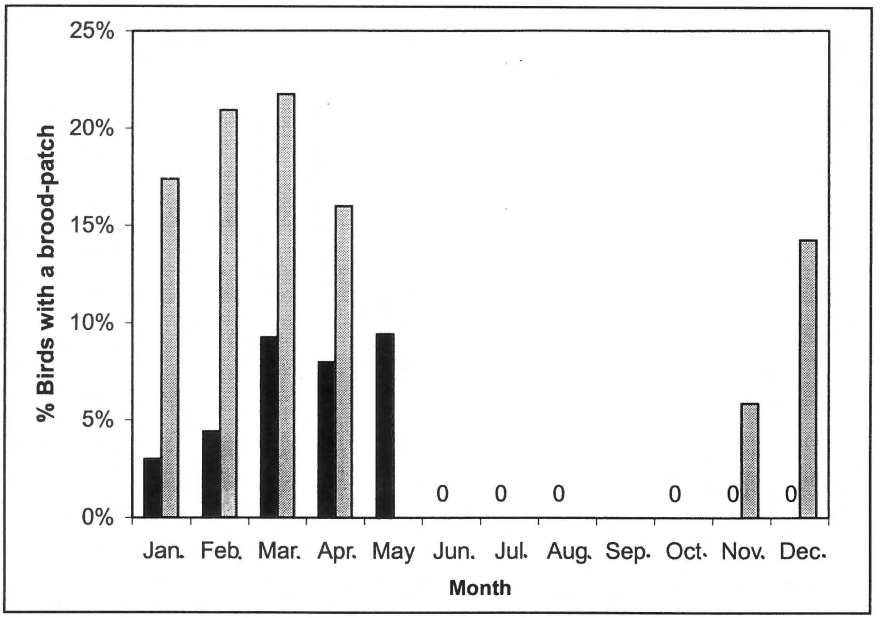

Figure 2. Percentage of adult Crimson Finches with a brood-patch that were captured in mist-nets between 1998 and 2000. No attempts were made to capture subspecies *phaeton* between May and October. No *evangelinae* individuals captured between June and December possessed a brood-patch and so these months are indicated by 0. Dark bars represent data for subspecies *evangelinae* and light bars for subspecies *phaeton*.

This subspecies starts breeding much earlier than most other northern Australian grass-finches, which wait until later in the wet season (Tidemann *et al.* 1999, MT pers. obs.). Such earlier breeding may reflect the higher proportion of insects in the diet of the Crimson Finch than in some of the grass-finches that breed later, for example the Star Finch *N. ruficauda* and Chestnut-breasted Mannikin *Lonchura castaneothorax* (MT pers. obs.). The brood-patch data also strongly suggest that the Crimson Finch (both subspecies) is a wet-season breeder.

Crimson Finch nests were usually found in trees with palm-like leaves, with *Pandanus* species being used most frequently, as also noted previously (Barnard 1926, Immelmann 1985, Verbeek *et al.* 1993). Where the two most southerly populations of subspecies *evangelinae* exist (in the Mitchell River area of the western coast and in the Normanby River area of the eastern coast of Cape York Peninsula), *Pandanus* is less abundant than *Corypha elata*, a palm with a more restricted range. Because *Corypha* palms are so tall and the crevices between their fronds are so deep, nests built there are almost impossible to locate except by observing the activity of parent birds (MT pers. obs.). Nests in *Corypha* palms are therefore likely to be more common than is suggested by the data here. Nests in both *Pandanus* and *Corypha* appear to offer considerable protection from terrestrial predators.

The other nest-site frequently used by subspecies *phaeton* was branches or hollows in branches over water. At Kununurra, W.A., 18 nests were found in hollows of emergent trees that had been killed when this lake was created in the

1960s (Appendix 2). As similar nests have been found in more natural creek settings (MT pers. obs.), the Lake Kununurra nests probably reflect the Crimson Finch's normal behaviour. Some of the nests at Lake Kununurra were up to 50 metres from the nearest emergent vegetation on land, and the surrounding water probably provided protection from predators. In contrast with its closest relative the Star Finch (Christidis 1987), which typically builds nests in grasses (MT pers. obs.), only one Crimson Finch nest has been found in grass (Canegrass; NRS data).

The nominate subspecies of the Crimson Finch builds nests in artificial structures to a greater extent than does any other Australian grass-finch. This was noted in the 1920s (Whitlock 1925), so is not a recent behavioural adaptation. The suggestion that the eastern population of this subspecies does not often use artificial structures as nest-sites (Immelmann 1985) is not supported by data from the RAOU Nest Record Scheme. Although the other subspecies, *evangelinae*, occurs in situations where it could use artificial structures as nest-sites, there are still no records of its having done so in Australia. The nest of subspecies *evangelinae* recorded in the grass roof of a hut in Papua New Guinea (Coates 1985) is not readily interpreted as being in an artificial structure since the hut's roof was constructed from native grasses.

The nominate Black-bellied subspecies of the Crimson Finch appears to be more flexible than the White-bellied subspecies *evangelinae* in nest-site selection, but it is not known whether this contributes to the wider distribution and greater abundance of the former subspecies. Future research could, therefore, compare the breeding success at nests at the different sites.

Acknowledgements

I am grateful to Dr Stephen Garnett of the Queensland Parks & Wildlife Service for providing the opportunity to conduct research on the Crimson Finch as well as advice during the project and comments on the manuscript; Greg and Liza Craig, John Barton and Eric Rosendale for support and advice on Lakefield National Park; John Taylor and the Pormpuraaw Council for making research possible at Pormpuraaw; and Tony Start who made research possible at Kununurra. I am also grateful to Geoff Lodge for alerting me to the presence of nests on Lake Kununurra and the Western Australian Department of Primary Industries for assisting with accommodation. Funding was provided by the Cape York Natural Heritage Trust and the Cooperative Research Centre for the Sustainable Development of Tropical Savannas.

References

Barnard, H.G. (1926), 'Birds of the Cardwell District', *Emu* **26**, 1–13.
Blakers, M., Davies, S.J.J.F. & Reilly, P.N. (1984), *The Atlas of Australian Birds*, Melbourne University Press, Melbourne.
Boekel, C. (1980), 'Birds of Victoria River Downs Station and of Yarralin, Northern Territory Part 2', *Australian Bird Watcher* **8**, 205–211.
Boles, W.E. (1987), 'Comments on the subspecies of Australian native and introduced finches', *Emu* **87**, 20–24.
Christidis, L. (1987), 'Phylogeny and systematics of estrildine finches and their relationships to other seed-eating passerines', *Emu* **87**, 119–123.
Coates, B.J. (1985), *The Birds of Papua New Guinea*, vol. 2, Dove Publications, Alderley, Qld.
Franklin, D.C. (1999), 'Evidence of disarray amongst granivorous bird assemblages in the savannas of northern Australia, a region of sparse human settlement', *Biological Conservation* **90**, 53–68.
Garnett, S.T. & Crowley, G.M. (2000), *The Action Plan for Australian Birds 2000*, Environment Australia, Canberra.
Immelmann, K. (1985), *Australian Finches*, Angus & Robertson, Sydney.
MacGillivray, W. (1918), 'Ornithologists in North Queensland', *Emu* **17**, 180–212.

Mayr, E. & Rand, A.L. (1937), 'Results of the Archbold Expeditions. 14. Birds of the 1933–1934 Papuan Expedition', *Bulletin of the American Museum of Natural History* **73**, 1–248.
Roberts, C. (1989), 'Port Smith's Crimson Finches', *Australian Aviculture* **43**(10), 261–262.
Schodde, R. & Mason, I.J. (1990), *The Directory of Australian Birds: Passerines*, CSIRO, Canberra.
Slater, P. (1959), 'Breeding periods of birds in the Kimberley Division, Western Australia', *Western Australian Naturalist* **7**, 35–41.
Storr, G.M. (1977), 'Birds of the Northern Territory', *Western Australian Museum Special Publication* **7**.
Storr, G.M. (1984), 'Revised list of Queensland birds', *Records of the Western Australian Museum* Supplement **19**.
Tidemann, S.C., Lawson, C., Elvish, R., Boyden, J. & Elvish, J. (1999), 'Breeding biology of the Gouldian Finch *Erythrura gouldiae*, an endangered finch of northern Australia', *Emu* **99**, 191–199.
Verbeek, N.A.M., Braithwaite, R.W. & Boasson, R. (1993), 'The importance of *Pandanus spiralis* to birds', *Emu* **93**, 53–58.
Whitlock, F.L. (1925), 'Ten months on the Fitzroy River, north-western Australia', *Emu* **25**, 69–89.
Wilson, G.W. (1998), 'More southern records of the Crimson Finch', *Sunbird* **28**, 61–63.
Woinarski, J.C.Z. (1993), 'Australian tropical savannas, their avifauna, conservation status and threats', in Catterall, C.P., Driscoll, P.V., Hulsman, K., Muir, D. & Taplin, A. (Eds), *Birds and their Habitats: Status and Conservation in Queensland*, 45–65, Queensland Ornithological Society.

Received 20 November 2000, revised January 2002

Appendix 1
Nest-site classification: n=natural, a=artificial

Nest-site	*Site*	*Classification*
1	*Pandanus*	n
2	*Corypha*	n
3	Other native tree/shrub	n
4	Grass	n
5	Branch or hollow over water	n
6	Flood debris	n
7	Nest of raptor	n
8	Non-native palm	a
9	Non-native tree/shrub	a
10	Hanging man-made structure	a
11	Tree-like man-made structure	a
12	Roof rafter	a
13	Air-conditioner (house)	a
14	Boat	a

Appendix 2
Nests of the Crimson Finch located in the present study by M. Todd and reported in the RAOU Nest Record Scheme. Codes for nest-site and origin appear in Appendix 1.

Subspecies *evangelinae*: All data from M. Todd, present study

Nest no.	*Location*	*Characteristics of nest*				*Details*
		Site	*Origin*	*Height above ground (m)*	*Nest-tree height (m)*	
1	Pormpuraaw, Qld	1	n	1.7	2.3	*Pandanus*
2	Pormpuraaw, Qld	1	n	3	4	*Pandanus*
3	Pormpuraaw, Qld	1	n	4.2	5	*Pandanus*
4	Pormpuraaw, Qld	1	n	0.8	2	*Pandanus*
5	Pormpuraaw, Qld	1	n	3	4.5	*Pandanus*
6	Pormpuraaw, Qld	1	n	3	3.5	*Pandanus*
7	Pormpuraaw, Qld	1	n	5.5	5.8	*Pandanus*
8	Pormpuraaw, Qld	1	n	4	5.5	*Pandanus*
9	Pormpuraaw, Qld	1	n	3	4.5	*Pandanus*
10	Lakefield NP, Qld	2	n	0.4	6	*Corypha elata*
11	Lakefield NP, Qld	3	n	3	6	*Dendrolobium umbellatum*
12	Lakefield NP, Qld	3	n	1.5	1.8	Dead shrub
13	Lakefield NP, Qld	2	n	12	16	*Corypha elata*

Subspecies *phaeton*: (a) Data from M. Todd, present study

Nest no.	*Location*	*Characteristics of nest*			*Details*
		Site	*Origin*	*Height above ground (m)*	
14	L. Kununurra, W.A.	5	n	1.5	Branch hollow
15	L. Kununurra, W.A.	5	n	1	Branch hollow
16	L. Kununurra, W.A.	1	n	0.6	*Pandanus*
17	L. Kununurra, W.A.	5	n	0.8	Branch hollow
18	L. Kununurra, W.A.	5	n	1	Branch hollow
19	L. Kununurra, W.A.	5	n	1	Branch hollow
20	L. Kununurra, W.A.	5	n	1	Branch hollow
21	L. Kununurra, W.A.	5	n	0.5	Branch hollow
22	L. Kununurra, W.A.	5	n	1.5	Branch hollow
23	L. Kununurra, W.A.	7	n	10	Osprey nest
24	L. Kununurra, W.A.	5	n	2	Branch hollow
25	L. Kununurra, W.A.	5	n	1.5	Branch hollow
26	L. Kununurra, W.A.	5	n	0.2	Branch hollow
27	L. Kununurra, W.A.	5	n	1	Branch hollow
28	L. Kununurra, W.A.	5	n	1.8	Branch hollow
29	L. Kununurra, W.A.	5	n	0.3	Branch hollow
30	L. Kununurra, W.A.	5	n	1	Branch hollow
31	L. Kununurra, W.A.	5	n	1	Branch hollow
32	L. Kununurra, W.A.	5	n	1	Branch hollow
33	L. Kununurra, W.A.	5	n	0.8	Branch hollow
34	Frank Wise Institute, Kununurra, W.A.	10	a	1.5	Hanging ornament
35	Frank Wise Institute, Kununurra, W.A.	12	a	3	Roof rafter
36	Frank Wise Institute, Kununurra, W.A.	8	a	1.8	*Livistona*

Appendix 2 - Subspecies *phaeton*: (a) Data from M. Todd, present study cont'd

Nest No.	*Location*	*Characteristics of nest*			*Details*
		Site	*Origin*	*Height above ground (m)*	
37	Frank Wise Institute, Kununurra, W.A.	12	a	2	Roof rafter
38	Kona Lakeside, Kununurra W.A.	12	a	2.5	Roof rafter
39	Kona Lakeside, Kununurra W.A.	12	a	2.5	Roof rafter
40	Kona Lakeside, Kununurra W.A.	12	a	2.5	Roof rafter
41	Kona Lakeside, Kununurra W.A.	12	a	2.5	Roof rafter
42	Kona Lakeside, Kununurra W.A.	12	a	2.5	Roof rafter
43	Kona Lakeside, Kununurra W.A.	14	a	1	Boat
44	Frank Wise Institute, Kununurra, W.A.	8	a	1.5	*Livistona*
45	Frank Wise Institute, Kununurra, W.A.	8	a	1.5	*Livistona*
46	Frank Wise Institute, Kununurra, W.A.	8	a	1.5	*Livistona*
47	Bullock's Crossing, Ord River, W.A.	1	n	2.5	*Pandanus*
48	Bullock's Crossing, Ord River, W.A.	1	n	2	*Pandanus*
49	Bullock's Crossing, Ord River, W.A.	1	n	3	*Pandanus*
50	Bullock's Crossing, Ord River, W.A.	1	n	4	*Pandanus*
51	Bullock's Crossing, Ord River, W.A.	1	n	3	*Pandanus*
52	Stoney Creek, Parry Creek Rd, W.A.	1	n	1.5	*Pandanus*
53	Stoney Creek, Parry Creek Rd, W.A.	1	n	1.5	*Pandanus*
54	Stoney Creek, Parry Creek Rd, W.A.	1	n	2	*Pandanus*
55	Limestone Creek, L. Argyle, W.A.	5	n	0.8	Branch hollow
56	Kununurra, W.A.	8	a	3	*Cocos nucifera*
57	Dillon Rd, Smithfield, Qld	8	a	1.5	*Cocos nucifera*

Appendix 2 - Subspecies *phaeton*: (b) Data from RAOU Nest Record Scheme (NRS)

Nest No.	*Location*	*Characteristics of nest*			*Details*	*NRS observer*
		Site	*Origin*	*Height above ground (m)*		
58	Innisfail, Qld	–	–	–		R. Gill
59	S. Johnstone River, Qld	11	a	11	Electric- light pole	R. Gill
60	Pingin Hill, Qld	8	a	1.5	Inside bunch of bananas	R. Gill
61	Macarthur River, N.T.	9	a	1	Top of dead tomato bush	R. Carruthers
62	Macarthur River, N.T.	12	a	2.4	Roof rafter	R. Carruthers
63	Macarthur River, N.T.	12	a	2.4	Roof rafter	R. Carruthers
64	Macarthur River, N.T.	12	a	2.4	Roof rafter	R. Carruthers
65	Garradunga, Innisfail, Qld	11	a	3	Lighting object	J. & P. Klapste
66	Garradunga, Qld	11	a	7	Electric-light pole	J. & P. Klapste
67	Garradunga, Qld	11	a	6.3	Signal pole	J. & P. Klapste
68	Garradunga, Qld	11	a	6.3	Signal pole	J. & P. Klapste
69	Garradunga, Qld	11	a	6.3	Signal pole	J. & P. Klapste
70	Daradgee, Innisfail, Qld	12	a	2.6	Roof rafter	J. & P. Klapste
71	Daradgee, Qld	12	a	2.6	Roof rafter	J. & P. Klapste
72	S. Alligator Highway, N.T.	7	n	8	Whistling Kite nest	W. Mason
73	Fitzroy Crossing, W.A.	13	a	2	Air-cond. (house)	R. Drummond
74	Manning Gorge	1	n	2.5	*Pandanus*	M. Howard
75	Edmonton, Qld	1	n	2.5	*Pandanus*	N. Marr
76	Edmonton, Qld	1	n	2.5	*Pandanus*	N. Marr
77	Edmonton, Qld	1	n	2.5	*Pandanus*	N. Marr
78	Connors River, Lotus Creek Rd, Qld	6	n	4	Flood debris in eucalypt	G. Wilson
79	Halifax, Ingham area, Qld	9	a	1.6	Live plant	B. Heinrich
80	Edith Falls, N.T.	5	n	0.6	Dead fallen branch over water	T. Hunt
81	Edith Falls, N.T.	1	n	0.6	*Pandanus* over water	T. Hunt
82	Jack's Waterhole, Durack River, W.A.	12	a	6	Roof rafter	J. Paton
83	Jack's Waterhole, Durack River, W.A.	12	a	6	Roof rafter	J. Paton
84	Jack's Waterhole, Durack River, W.A.	12	a	6	Roof rafter	J. Paton
85	Lawn Hill Gorge NP, Qld	1	n	1.5	*Pandanus* over water	K. Lloyd
86	Edith Falls, N.T.	1	n	0.5	*Pandanus* over water	V. Witten
87	Edith Falls, N.T.	1	n	0.5	*Pandanus* over water	V. Witten
88	Campbell Creek, Gregory NP, Qld	4	n	1.1	Canegrass over water	D. Franklin