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CONTENTS

**DON SETON, BERNICE SETON, MALCOLM WILSON AND
MARJORIE WILSON**

- A Hybrid of Australian King-Parrot *Alisterus scapularis* and Red-Winged
Parrot *Aprosmictus erythropterus* at Bell..... 1

PETER F. WOODALL

- Anti-Predator Display of Blue-faced Honeyeater towards Australian
Hobby..... 4

ROGER JAENSCH, JULIAN REID AND REX ELLIS

- Sightings and Breeding of Pied Heron *Ardea picata* in the Queensland
Channel Country, 1999-2004..... 6

ROBERT BLACK

- Observations of Buff-Breasted Paradise Kingfisher *Tanysiptera sylvia*
Breeding in Byfield, Central Queensland.. 13

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A HYBRID OF AUSTRALIAN KING-PARROT *ALISTERUS SCAPULARIS* AND RED-WINGED PARROT *APROSMICTUS ERYTHROPTERUS* AT BELL

DON SETON, BERNICE SETON, MALCOLM WILSON
AND MARJORIE WILSON

ABSTRACT

The apparent hybridization of Australian King-Parrot *Alisterus scapularis* and Red-winged Parrot *Aprosmictus erythropterus* in the locality of the township of Bell is reported. Observations from late 2003 to March 2005 document the survival of one hybrid individual for at least 18 months. Hybrids were seen with normal birds of either parent species, but not both simultaneously. None is known to have survived longer or, to have attempted to breed.

INTRODUCTION

Bell (151° 27' E, 26° 56'S) is well vegetated with trees and flowering shrubs in an agricultural landscape containing patches of remnant dry vine scrub. It lies approximately 5 km SW of Bunya Mountains National Park (11,700 ha) where both Australian King-Parrot and Red-winged Parrot are common.

OBSERVATIONS

Friends who live in Bell first noticed this most unusually coloured juvenile parrot (Figure 1.) sometime between October and December 2003. It flew into their garden with Australian King-Parrots *Alisterus scapularis* to eat at a birdfeeder. It was first photographed here on 3 February 2004 and again on 7 May 2004 (see Figure 1.) in the company of a single female Australian King-Parrot.

On the 19 October 2004 a member of our family also saw this bird, or one very similar to it, at home 10km SE of Bell. Here it was seen with Red-winged Parrots *Aprosmictus erythropterus* and, a second unusually coloured bird (with a golden wing band and a light yellow head flecked with green).

Later, other people showed us photographs of an unusual parrot which appeared to be "our" original juvenile parrot. They had photographed it feeding in the company of Australian King-Parrots at their home approximately 5 km NE of Bell on 24 October 2004. Reports of further sightings of this bird continued to be made at Bell into 2005. By then we had come to expect it as a regular visitor to 4 or 5 houses where bird seed was provided. On 14 March the bird visited one of our homes (M. & M. W.). On this occasion it flew in with a female King-Parrot thus giving us a great opportunity to observe and photograph it again.

Sadly this colourful bird was found dead at the end of May 2005. It had lived for at least 18 months in the locality of Bell. During this period it was observed by many people and was sometimes accompanied by the other unusual parrot with the light yellow head we first saw on 19 October 2004.

The apparent hybrid's plumage was bright, boldly patterned and distinctive. Its head and underparts to the vent were scarlet and its under tail coverts and upper tail coverts were dark blue. The back of the head and the upper part of the neck were red. The lower neck through to the shoulder, mantle and upper and lower back and rump were green, tinged with blue.

The bird had two striking features. Firstly, a large circular jagged area around the eyes was bright green and secondly, the brilliant yellow of the median and secondary wing coverts (scarlet in the Red-winged Parrot) ended with an upward curve towards the end of the wing. Photographs taken on 7 May 2004, and 19 March 2005, show the red spots showing through the yellow wing coverts (seen quite faintly in Figure 1) grew larger and darker with age.

COMMENTS

Hybridisation in the wild between two distinct species whose ranges broadly overlap is rarely documented, so this sighting is of great interest. From observations as told to us, this bird seems to have lived in a well-defined area, generally in the company of King-Parrots and, occasionally, Red-winged Parrots. It was a lot quieter than the birds it associated with which led us to speculate that it could have been an aviary escapee, or, not as socially developed (given that it could have been sexually dysfunctional).

Red-winged Parrots quickly habituate to people and are easy to approach closely when feeding (Higgins 1999). A wild pairing of a female Red-winged Parrot with a male Australian King-Parrot with unknown result is cited in Higgins (1999).

Forshaw (1981) records that the Australian King Parrot in captivity has produced hybrids with the Green-winged King Parrot *Alisterus chloropterus*, the Red-winged Parrot *Aprosmictus erythropterus*, the Crimson Rosella *Platycercus elegans* and the Superb Parrot *Polytelis swainsonii*. An *Alisterus scapularis* x *Aprosmictus erythropterus* hybrid occasionally occurs in the wild and was described by Gould as a

separate species, *Aprosmictus insignissimus*.

ACKNOWLEDGMENT

We wish to thank our neighbours, friends and family who live at Bell for contributing their sightings to this note. Geoff Smith kindly provided the photograph. An anonymous referee generously commented on this article.

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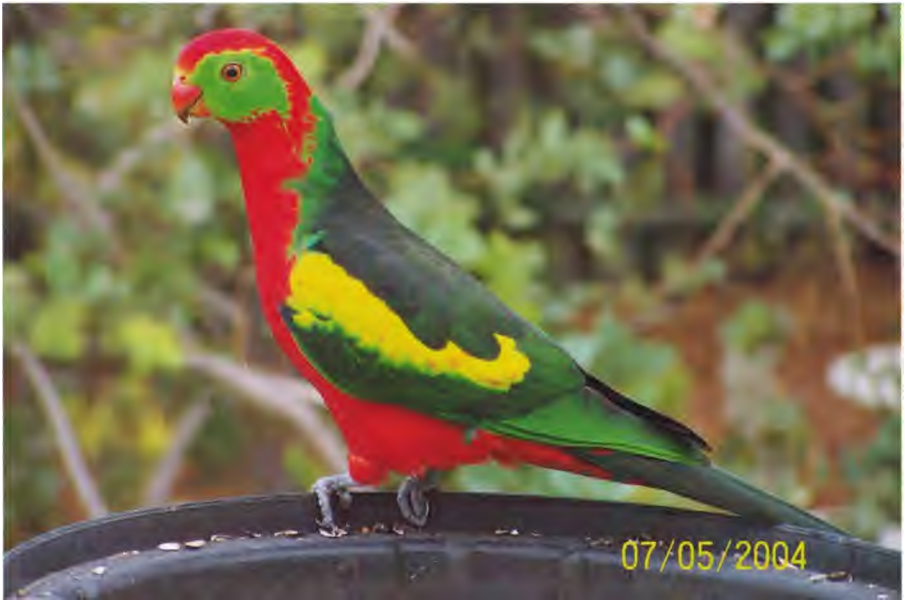


Figure 1: A hybrid of Australian King-Parrot and Red-winged Parrot at eight months of age (approx.) (Geoff Smith)

ANTI-PREDATOR DISPLAY OF BLUE-FACED HONEYEATER TOWARDS AUSTRALIAN HOBBY

PETER F. WOODALL

The Blue-faced Honeyeater *Entomyzon cyanotis* mobs potential predators (Longmore 1991, Woodall 1994, Higgins *et al.* 2001) but its social and interspecific displays are little studied (Higgins *et al.* 2001).

On 28 May 2005 at 08:20 hrs. I observed through binoculars two Australian Hobbies *Falco longipennis* perched on high cables near a support pylon for power transmission crossing Minnippii Parklands, 9 km east of Brisbane City. Shortly afterwards four Blue-faced Honeyeaters flew up to the pylon and perched on cables within 1 – 2 m of the hobbies. One of the honeyeaters approached one of the hobbies, perched within c. 40 cm of it and performed a slow forward somersault (360° roll) around the cable. It then approached the other hobby similarly and performed another forward somersault around the cable. Then a second Blue-faced Honeyeater approached to within c. 40cm of the first hobby and performed a forward somersault on the cable. These displays lasted c. 5 min in total and then the honeyeaters flew away leaving the hobbies still perched on the cable, unmoved. The displays produced no apparent reaction from either hobby. Because they were too distant, and I was looking into the sun, I could not determine if the honeyeaters were adults or immatures. I heard no sounds from birds of either species although quiet calls would have been inaudible.

Dow (1975) described similar “inverted clinging” and “wing waving” by Noisy Miners *Manorina melanocephala* performing intraspecific displays. Brown (1986) reported an upside-down display from a Blue-faced Honeyeater where it approached to within 3 m of an immature Australian Magpie, landed on a branch or telephone wire and hung upside-down for c. 1 min until the magpie flew closer. They both flew off with the roles of pursuer and “pursuee” alternating several times and landed about 2 m apart until the honeyeater again moved closer, hung upside down and then both flew off again, alternating the lead, to repeat a third cycle of hanging upside down. Brown (1986) interpreted this episode as interspecific play because the birds cooperated and exchanged roles in the chase. This interpretation is unlikely in the behaviour I observed since there was no apparent interaction between the species and it is unlikely that play behaviour would have been directed at two potential predators.

Perhaps it was an antipredator display and a “signal of unprofitability” (Alcock 2001: 201) indicating to the hobbies that the group of four honeyeaters were too large and/or too confident to be treated as prey? Australian Hobbies feed mainly on small birds weighing less than 75g but will take birds up to 350g (Marchant & Higgins 1993). Blue-faced Honeyeaters weighing 84–123 g (Higgins *et al.* 2001) are in the upper end of the weight range of potential prey for Australian Hobbies. Clearly more observations are required to determine the function of this unusual behaviour. An anonymous referee reviewed this article prior to publication.

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**SIGHTINGS AND BREEDING OF PIED HERON *ARDEA PICATA*
IN THE QUEENSLAND CHANNEL COUNTRY,
1999-2004**

ROGER JAENSCH, JULIAN REID AND REX ELLIS

ABSTRACT

The presence and breeding of Pied Heron *Ardea picata* is reported from wetlands of the Queensland Channel Country within the Lake Eyre Basin. A summary of sightings from the Georgina (Eyre Creek) and Diamantina River systems during moderate to major floods in the period 1999 to 2004 is presented. A small breeding colony in the Eyre Creek wetlands in autumn 2001 is described. Increased frequencies of sightings of this mainly near-coastal heron in the arid inland may reflect a recent temporary expansion of its range or more effective surveys of waterbirds recently conducted in the Channel Country at more appropriate times. Recurrence of breeding will depend on the guaranteed free flow of water in rivers of the Channel Country to provide suitable habitat.

INTRODUCTION

Published records of Pied Heron *Ardea picata* from the Channel Country in Queensland are few (McFarland 1992, Johnson & Eddie 2000, Barrett *et al.* 2003). We present new records (Table 1.), including a breeding record, and further details in support of those mapped in *The New Atlas of Australian Birds* (Barrett *et al.* 2003). The distribution of the Pied Heron in Australia until now has been regarded as principally northern and north-eastern (Blakers *et al.* 1984, Marchant & Higgins 1990).

Broad channelised floodplains and associated swamps and lakes characterise the Cooper, Diamantina and Georgina (Eyre Creek) river systems and are a prominent feature of the Channel Country bioregion (Department of The Environment and Heritage 2004). Moderate to major floods in one or more of these systems provided extensive habitat for waterbirds in Queensland during the northern wet season (summer-autumn) in 2000, 2001 and 2004.

We conducted surveys of waterbirds in flooded wetlands of the Channel Country using light aircraft, boats and four-wheel drive vehicles during the period 1999 to 2004. Observing waterbirds in flooded Channel Country can be difficult and uncomfortable because tracks are impassable, birds are widely dispersed at low densities, temperatures are high and many biting insects are abundant.

Observations of rare and threatened species, migratory shorebirds and waterbird abundance and breeding in the Channel Country during these surveys are reported elsewhere (Baxter *et al.* 2001; Jaensch & McFarland 2002; Jaensch 2003a, 2003b, 2004a, 2004b; Costelloe *et al.* 2005).

OBSERVATIONS

Five Pied Herons were seen (by RJ) on the Eyre Creek causeway of the Birdsville to Bedourie road (24° 55.0'S, 139° 39.0'E: ca. 64 km SSE of Bedourie) on 10 March 1999. At this time water was present in Eyre Creek and the nearby lakes were receding. We did not revisit this area in 1999. Johnson and Eddie (2000) first reported this initial encounter with Pied Herons in the Channel Country.

Major flooding in the Georgina River system occurred in March 2000 inundating the Eyre Creek wetlands. We saw no Pied Herons during aerial and ground surveys of waterbirds in this and other extensively flooded Channel Country river systems in March, April, May, June, August and November of 2000.

Building on the inundation that persisted from the March 2000 flood, a particularly large flood in January 2001 ran through the Georgina River – Eyre Creek system into South Australia and joined the Diamantina – Warburton system. In January 2001, at the peak of the flood, one of us (RJ) conducted ground surveys at several inundated wetlands in the Eyre Creek, Diamantina and Cooper systems, but no Pied Herons were seen. Later, on 23 March 2001 we (JR, RJ) saw three Pied Herons in a vast inundated lignum *Muehlenbeckia florulenta* swamp (24° 54.7'S, 139° 36.4'E) approximately 4.3 km WNW of the 1999 sighting, beside a lake in the Eyre Creek wetlands. The three birds were briefly observed from a light aircraft and flushed from among many hundreds of egrets, spoonbills and ibises that were nesting in the lignum. Their ages could not be determined.

In late March 2001 one of us (RE) was conducting an independent safari by boat on Eyre Creek. At a waterhole in the main channel of Eyre Creek (24° 52.0'S, 138° 55.4'E), approximately 70 km downstream (W) of the 23 March aerial sighting, approximately 20 Pied Herons were counted in a breeding colony of Straw-necked Ibis *Threskiornis spinicollis* and Great Egret *Ardea alba*. At least six to eight active Pied Heron nests were briefly seen in Coolabah, *Eucalyptus coolabah* trees. One nest contained chicks estimated to be two weeks old.

The aerial survey of 23 March (JR, RJ) passed along this channel, starting from a point approximately 11 km downstream (8 km farther WSW) and continuing downstream. Another egret-ibis breeding colony along 2 km of channel near that point was observed, but no Pied Herons were seen. Water was still present on some parts of the drying floodplain surrounding these colonies.

In March 2001 other visitors also recorded Pied Herons on Eyre Creek (24° 40.0'S, 139° 32.0'E), upstream and approximately 30 km NNW of the causeway (Barrett *et al.* 2003, Birds Australia & WildlifeLink 2005).

Table 1: Pied Herons in the Georgina (Eyre Creek) and Diamantina wetlands.

DATE	LOCATION AND NUMBER	BREEDING
10 March 1999	Georgina (5)	-
23 March 2001	Georgina (3)	-
(late) March 2001	Georgina (20)	6-8 nests
17-19 April 2001	Georgina (17 incl. juvs.)	-
March to June 2001	Georgina (up to 30)	-
25 March 2004	Diamantina (1)	-

It is possible that more than one group of Pied Herons was breeding in the Eyre Creek wetlands in March 2001 because we (JR, RJ) recorded at least 10 active, mixed-species breeding colonies (Costelloe *et al.* 2005). Pied Herons commonly nest in trees among other colonial species (Marchant & Higgins 1990) and, though no Pied Heron nests were seen from the air in this survey, detection of all nesting birds is difficult in aerial surveys.

Observations of Pied Herons in these wetlands in the following month add further weight to the possibility of more than one breeding colony of this species. On 17-19 April 2001 one of us (RJ) counted 17 Pied Herons, including many immatures, at two sites. Six birds were at the junction of the tree-lined Eyre Creek channel and a small lake (24° 55.1'S, 139° 36.2'E) and 11 around a Coolabah-lined waterhole at the end of a sand-dune (24° 51.1'S, 139° 32.1'E). These sites were approximately 1.0 km SSW and 10.0 km NW of the 23 March aerial sighting and both contained apparently suitable breeding habitat for Pied Herons. Other visitors also saw immature birds within groups of Pied Heron at the causeway on 17 April (datasheet for Australian Bird Atlas: A. Silcocks pers. com.) and on 12 May 2001 (R. Dowling and G. Palmer counted 30 herons, Birds Queensland website). Pied Herons were present at the causeway until at least June 2001 (Barrett *et al.* 2003, Birds Australia & Wildlife-Link 2005).

Due to continent-wide drought no substantial floods occurred during 2002 or 2003. We (JR, RJ) conducted aerial and ground surveys at remnant water bodies in May 2002 and February 2003 but no Pied Herons were seen.

In January 2004 the Channel Country floodplains were partly refreshed by moderate-sized floods in all principal rivers. The flood in the Diamantina produced high water levels and wide inundation but passed quickly. On 25 March 2004 one of us (RJ) saw

a single adult Pied Heron standing on a stump at water level in a drying lignum swamp at a minor waterhole (25° 34.1'S, 140° 15.5'E) on the Diamantina floodplain in Queensland. Thirty pairs of Straw-necked Ibis and 28 pairs of Royal Spoonbill *Platalea regia* were attending nests in this waterhole swamp.

The Diamantina site is about 95 km SE of the Eyre Creek causeway. Waterbirds were breeding in colonies in the Eyre Creek wetlands in March 2004. A colony at 24° 54.7'S, 139° 36.4'E and the nearby tree-lined channel of Eyre Creek were partly surveyed (RJ) by boat but no Pied Herons were sighted.

In all of our sightings Pied Herons were readily identified by their small size and yellow legs from the much larger, grey-legged White-necked Heron *A. pacifica*.

CONCLUSIONS

There are few published records of Pied Heron breeding in Queensland and most are from the Gulf of Carpentaria coast and the NE coast (Marchant & Higgins 1990). Our record of breeding Pied Heron in the Eyre Creek wetlands in March 2001 appears to be the first for the Channel Country bioregion and Lake Eyre Drainage Division.

Pied Herons were recorded well beyond their usual range in Australia in 2000 and 2001. In addition to the above-mentioned records the species was also reported in Queensland west of Cooper Creek near the South Australian border (26° 12.3'S, 141° 4.7'E) in July 2000 (an immature bird, description supplied), on the Cooper Creek near Innamincka (SA) in August 2000 (16 days later and 168 km distant from the previous record but no description supplied), in the Macquarie Marshes (NSW) in January 2001 and in the lakes system of the Barkly Tablelands (NT) in June 2001 (Barrett *et al.* 2003, Jaensch 2003c, Birds Australia & WildlifeLink 2005, A. Silcocks pers. com.). At the Macquarie Marshes at least 20 pairs bred in the Wilgara Wetland (30°S, 147°E) in January 2001 (E. & C. Fisher & R. Jones pers. com.), a first breeding record for New South Wales (Marchant & Higgins 1990).

There have been no further reports of breeding by Pied Heron at either the Eyre Creek wetlands or Wilgara Wetland. Conditions in the Eyre Creek wetlands may have been suitable in 2004 but the wooded colony site at Wilgara received no substantial inundation in the period from 2002 until at least autumn 2005 (E. & C. Fisher pers. com.). The two breeding records in 2001 indicate that Pied Herons can establish small, temporary inland breeding colonies in suitable habitat far from their normal breeding range.

Vagrant Pied Herons are occasionally reported farther south in inland Queensland (e.g. Roma (26° 35'S), Johnson & Eddie 2000) and may travel as far as Victoria (Disher 1974).

We believe that the greater numbers of Pied Herons reported from the Channel Country during the survey period than previously are the result of more suitably timed

intensive surveys conducted in the most suitable habitat. Even so, we suspect that greater survey effort or refinements would have revealed that there were more birds present, particularly in 2000 and 2001.

An explanation for the presence in the Channel Country of this normally northern species is that it uses inland habitats by periodically following the progress of major floods along inland-flowing river systems. As observed, pioneer birds would arrive in these wetlands during summer-autumn which is the usual time of flooding. Pied Herons could move along the corridors provided by the Georgina and Cooper river systems, whose headwaters are just 270 km short of the Gulf of Carpentaria and 270 km W of Townsville, respectively. Roshier *et al.* (2001) also implied that this connection between northern Australian and Lake Eyre Basin wetlands at times of major flooding provides a route into the interior for dispersing waterbirds.

In 2000 and 2001 the sub-humid middle zone of the Northern Territory received very high rainfall and there were unusual inland occurrences of waterbirds such as the Pied Heron (Jaensch 2003c). Part of the Georgina River system originates in that zone in the eastern Barkly Tableland (NT) and would have provided suitable habitat and a connection to the Channel Country in both years. Movement of waterbirds from the coast to the far inland could have occurred in two stages with birds reaching the arid zone in the second year. Rare combinations of such serial events may explain the intermittent records of northern waterbirds in the inland.

There is ample historical evidence (Marchant & Higgins 1990, Baxter *et al.* 2001) that Australian waterbirds can be periodically prevalent outside their normal ranges. Generally this reflects unusually wet years (or decades) in the area of incursion, or in the species' breeding areas (leading to wide post-breeding dispersal). The records could possibly also be a manifestation of changes in climate caused by global warming, with tropical conditions and species extending polewards (see Baxter *et al.* 2001, Chambers *et al.* 2005). However, historical and present data are inadequate for forming confident conclusions on changes in waterbird status in arid Australia over the past 100 years.

The Pied Heron is mainly associated with wetland habitats and breeds in inundated trees (Marchant & Higgins 1990). Potential changes to flows in Channel Country rivers through regulation or water harvesting will reduce the frequency, duration and extent of downstream inundation of waterbird habitats. This concern applies to small as well as large flows because wetland habitat can be created cumulatively. Small floods can increase the extent, persistence and productivity of subsequent large floods.

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**OBSERVATIONS OF BUFF-BREASTED PARADISE KINGFISHER
TANYSIPTERA SYLVIA BREEDING IN BYFIELD,
CENTRAL QUEENSLAND**

ROBERT BLACK

ABSTRACT

A breeding range extension for the Buff-breasted Paradise Kingfisher *Tanysiptera sylvia* south to Byfield, north east of Rockhampton in Central Queensland is reported. Presence of the species in Byfield from January 1985 and breeding from February 1993 are recorded, along with observations of its breeding behaviour. Buff-breasted Paradise Kingfishers arrive in Byfield by late November during the dry season and delay breeding until substantial rainfall (>30mm) occurs. Observation suggests that approximately 20 pairs bred in Byfield in recent years. Regular excavation of surplus unused nest chambers ('dummy' nests) is described and may have contributed to low observed predation rates (twice in six years).

INTRODUCTION

Buff-breasted Paradise Kingfishers are summer breeding migrants to the rainforests of northeast Queensland from New Guinea (Higgins et al.1999, Legge and Heinsohn 2001). Previous studies record the species breeding in the Mackay district at least 170 km N of Byfield (Andrews et al.1991). A study of the Shoalwater Bay Military Training Area by CSIRO (Schodde et al.1992 unpubl.) recorded it breeding in rainforest pockets in the Training Area, about 10 km N of Byfield. Byfield and the Shoalwater coast lie within an outlier of the Central Queensland Coast bio-region, a wetter 'island' within the dryer Brigalow Belt bio-region (Sattler and Williams, 1999).

On 23 January 1985 a kingfisher became trapped in my house in Byfield (22° 51.07'S, 150° 37.45'E). The house is 300 metres above sea level in a small clearing in tropical notophyll rainforest (regional ecosystem 8.12.3, Sattler and Williams, 1999). After hand catching and releasing the kingfisher two identification books (Frith *et al.* 1979, Slater, 1970) were consulted. Both showed the Buff-breasted Paradise Kingfisher's southern limit as Paluma (19°10'S, 146°025'E) about 700 km N of Byfield. Although the bird had bright orange underparts, a deep blue back and unmistakable straight-topped red beak, it had no obvious white tail plumes, and no positive identification was made at this time. Subsequent experience suggests that this was a female Buff-breasted Paradise Kingfisher, late in the nesting season, which had broken tail plumes from entering and leaving the nest hollow.

On 10 February 1993 a Buff-breasted Paradise Kingfisher was seen flying up into a tree by a road, 200 m from my house. A nest with young was found in a terrestrial termite mound beneath this tree. The nest was observed regularly until the young emerged. Although this nest was not used again, nest-mounds with signs of repeated

previous use were found in September 1997, and successful breeding has been observed each year since.

METHODS

Kingfishers nesting within a 100 m radius of my house were studied each breeding season from 1997. Searches were made of all known termite mounds in this area, starting when the first calls of returning Buff-breasted Paradise Kingfishers were heard. These were repeated every three days until eggs were seen. The number of eggs laid could usually be counted through the nest entrance.

Buff-breasted Paradise Kingfishers in Byfield are extremely wary. In an early observation attempt two observers sat quietly in good cover 15 m from the nest mound for about 30 minutes. Emerald Doves *Chalcophaps indica* walked and fed within touching distance, but the kingfishers stayed away from the nest, making soft alarm trills. Concern for the nestlings led us to abandon this attempt. Experience showed that the kingfishers tolerated observer in a hide near the nest site and these were used to observe their behavioural subsequently. In some years hides could be built at previously favoured mounds before the arrival of the kingfishers.

Familiarity with the kingfisher's calls has made recording of arrival and departure dates more reliable. Adult and immature departure dates could be separated by the differing calls. Nestlings called and looked out of the nest tunnel in response to movement (probably seeking food from incoming parents) and this aided their counting.

RESULTS

Arrival time in Byfield of the first Buff-breasted Paradise Kingfishers ($n = 7$ years) ranged from 31 October to 23 November (Table 1). Arrival seemed to occur at night as first calls for the season were heard in the early morning. Departure dates of adult kingfishers ($n = 7$ years) ranged from 1 March to 20 April. Juvenile birds departed approximately three weeks after the adults.

From 1997 to 2000 only one nest was found in the study area. In 2001 and 2002 two nests were found, but one of these showed signs of previous use, and had been overlooked, in earlier years. In 2003 and 2004 three active nests were found. All nests were tunnelled into terrestrial termite mounds made of black soil, under a canopy of either undisturbed or regrowth rainforest (regional ecosystem 8.12.3, Sattler & Williams, 1999). Mounds used for nesting were typically 40 cm high and 40 cm across. The largest mound was 70 cm high and 50 cm across. All nest tunnels observed were on the downhill side of mounds, even on nearly level terrain. The entrance tunnels were typically 4 cm across and the kingfishers often had to squeeze through them. Some mounds were strongly favoured and re-used each summer until the termite colony stopped repairing the excavations.

Un-repaired mounds were rarely used for nesting, however one favoured mound was re-used twice despite not having the entrance tunnels in-filled by termite (see Plate 1). The location of this mound on an almost vertical bank approximately 2 m high, with the entrance tunnel facing downhill, made predation far more difficult than a typical nest mound with an entrance only 20 cm above ground-level.

Each year the kingfishers also made 'dummy' nests with completely formed chambers at the same time as those in which eggs were laid. The number of 'dummy' nests roughly equalled the number of nests used for breeding. Mounds were often used this way over a number of years and were rarely used for egg laying. However in January 2005 two eggs were laid in a 'dummy' nest about three days after a nest 100 m away was predated, and nearly three weeks after all other egg laying. Dates of first egg laying ranged from 7 December to 4 January ($n = 6$ years). Although two clutches were observed before substantial rain, they were both abandoned. All successful clutches were laid after falls of at least 30mm (see Table 1). Out of 12 successful nests observed eight contained clutches of four, three contained clutches of three and a clutch of two eggs was laid late in the season (after predation of a nearby nest). All eggs hatched in the observed nests, after approximately 23 days incubation. Fledging periods observed ranged from 24 to 26 days ($n = 12$ clutches). The young left the nest over a period of two to four days and flew directly from the entrance to a low branch. They then moved up to a branch 3 m to 4 m above the nest, where they called loudly for food for several days. Parents were observed feeding their young with grasshoppers, moths, spiders, geckos and skinks.

Table 1: The relationship between date of egg-laying and rainfall over 30mm.

ARRIVAL	RAIN > 30 mm	FIRST EGGS	ARRIVAL - EGG LAYING (Days)	RAIN - EGG LAYING (Days)
17/11/1999	1/12/1999	10/12/1999	23	9
31/10/2000	16/11/2000	7/12/2000	37	21
23/11/2001	16/12/2001	26/12/2001	33	10
5/11/2002	24/12/2002	4/1/2003	60	11
2/11/2003	5/12/2003	26/12/2003	54	21
19/11/2004	15/12/2004	20/1/2005	44	18

No nest predation was observed in the years before the 2003/2004 breeding season, when a 20-day-old clutch was taken. The following season the same mound was predated, the eggs being eaten by a Spotted Python *Antaresia maculosa*. No predation of nestlings by goannas was observed.

DISCUSSION

The Byfield district lies within an outlier of the Central Queensland Coast bioregion, a wetter 'island' within the dryer Brigalow Belt (Sattler and Williams, 1999). This bioregion, centred on Mackay, contains high rainfall areas that support tropical rainforest the main breeding habitat of the Buff-breasted Paradise Kingfisher.

Table 1 shows the intervals between the dates of arrival of the kingfishers in Byfield and egg laying vary from 23 to 60 days annually. Legge and Heinsohn (2001) recorded Buff-breasted Paradise Kingfishers arriving at Iron Range 'when the first major rains fell after the dry season'. In Byfield the onset of the wet season is less reliable and often later than at Iron Range and the kingfishers usually arrived in the late dry season. Egg laying appears to be delayed until soon after the first substantial rain (Table 1). Two clutches were laid before the onset of rain. Both were abandoned with laying occurring in nearby mounds after rain.

The observation of 'dummy' nests suggests caution may be needed in assessing egg predation when the observers are not on site for the start of nesting. These fully formed nests without eggs could appear to have been predated. There are few references to these unused nests in published studies, however Gill reports 'not all burrows excavated are used as nests' (Gill, 1964).

There are many unused apparently suitable nesting mounds in Byfield and few signs of territorial aggression. Clutch size was greater in Byfield than observed at Iron Range (Legge and Heinsohn 2001). At Iron Range 'clutch size varied from two to three' while at Byfield most clutches were of four eggs. Legge and Heinsohn described the Iron Range population as being very competitive for nest-sites and suggested the kingfishers were using all suitable mounds. The Byfield population appeared to still have potential for expansion, with considerable areas of suitable habitat not occupied. These observations suggest a relatively recent colonisation of the Byfield district by the species. The number of calls heard each year appears to be increasing and more nests are being found than in earlier years. Based on the known nesting sites in the district, a minimum of 20 pairs bred in Byfield in recent years, and the area of suitable habitat suggests a probable breeding population of about 30 pairs.

Have Buff-breasted Paradise Kingfishers been overlooked in Byfield (and in other sites south of the wet tropics), or has their range extended south in recent decades? They were not recorded south of the Paluma Range until 1981, when they were reported at Finch Hatton Gorge, west of Mackay (Nix, 1984). They have since been studied in the Mackay area (Andrews *et al.* 1991). In February 1992 breeding Buff-breasted Paradise Kingfishers were recorded in the Shoalwater Bay Military Training Area (Schodde *et al.* 1992 unpubl.) Discussions with Byfield residents with extensive experience in the forests back to the 1930's did not reveal any record of the species before 1985. Although they are very elusive, occasional change sightings of this unmistakable bird do occur and it is unlikely that they could have been overlooked for so long. Buff-breasted

Paradise Kingfishers probably started breeding in Byfield in the early 1980's, as part of a southward movement occurring at that time.

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Plate 1: The favoured termite mound showing three season's nest tunnels.

NOTES

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