

THE SUNBIRD



Journal of the
QUEENSLAND ORNITHOLOGICAL SOCIETY
Birds Queensland

Volume 43

Number 1

June 2013

THE SUNBIRD

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The Secretary
PO Box 3784
South Brisbane BC Qld 4101

Front cover: Female Black Falcon near Gundagai, NSW, February 2013. Photograph by Caroline Zuccon.

ISSN 1037-258X

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RECORDS OF THE GOLDEN-HEADED CISTICOLA, YELLOW CHAT, TAWNY GRASSBIRD AND EASTERN GRASS OWL IN THE CHANNEL COUNTRY FOLLOWING SEVERAL WET YEARS

ROGER JAENSCH, LYNN PEDLER, GRAHAM CARPENTER
& ANDREW BLACK

ABSTRACT

We report observations of the Golden-headed Cisticola (*Cisticola exilis*), Yellow Chat (*Epthianura crocea*), Tawny Grassbird (*Megalurus timoriensis*) and Eastern Grass Owl (*Tyto longimembris*) from floodplains of the Queensland Channel Country in 2012. Habitat was lignum shrub communities, commonly with dense knee- to waist-deep seasonal forbs, sedges and grasses, on dry floodplain with shallow gutters. There are few or no previous records of these birds from natural habitats in Queensland's Channel Country. These occurrences in 2012 may have been due to unusually favourable conditions following a cluster of wet years. Extent of habitat in which these species were recorded suggests these species may be more widespread and numerous on the floodplains than previously recognised.

INTRODUCTION

The Channel Country biogeographical region is principally arid but is dissected by several river systems occupying floodplains that are commonly more than 10 km wide. Supplied by rainfall in wetter tropical regions, these rivers provide corridors of seasonally lush vegetation, which typically contrast starkly with the habitats of dry, surrounding land systems. In the upper and middle reaches, major floods occur on average about every 2–3 years but timing, extent and pattern of inundation vary greatly year-by-year and between the river systems. Less often, about once every 10 years, substantial rainfall occurs in the arid zone and the entire landscape is green, for several months. Even less often, roughly once every 30 years, major floods and local rain occur simultaneously, in two or more consecutive years, creating exceptionally favourable conditions for birds both on and off floodplain. In the lifetime of some readers (and authors) this phenomenon has occurred thrice: 1954–1956, 1973–1977 and 2009–2012 (Costelloe *et al.* 2004; McMahan *et al.* 2005; BOM 2013a, 2013b; Kotwicki 2013).

During 2012, we conducted field work on floodplains of Eyre Creek, Diamantina River and Cooper Creek, in the Queensland Channel Country (Figure 1), to ascertain the present distribution and habitats of the Grey Grasswren (*Amytornis barbatulus*). In the course of this work we recorded the Golden-headed Cisticola (*Cisticola exilis*) (two sites, four pairs), Yellow Chat (*Epthianura crocea*) (at least four sites, hundreds of birds), Tawny Grassbird (*Megalurus timoriensis*) (three sites, mostly pairs) and Eastern Grass Owl (*Tyto longimembris*) (one site, one bird). These four bird species are either new to the region or rarely reported (Golden-headed Cisticola, Tawny Grassbird), or uncommonly documented in the region's natural habitats (Yellow Chat, Eastern Grass Owl). We describe these sightings and provide notes on another species, the Plum-headed Finch (*Neochmia modesta*), to encourage and guide further field investigations in the region. Findings in relation to the Grey Grasswren are contained in reports published by the South Australian Arid Lands Natural Resources Management Board which are available from AB.

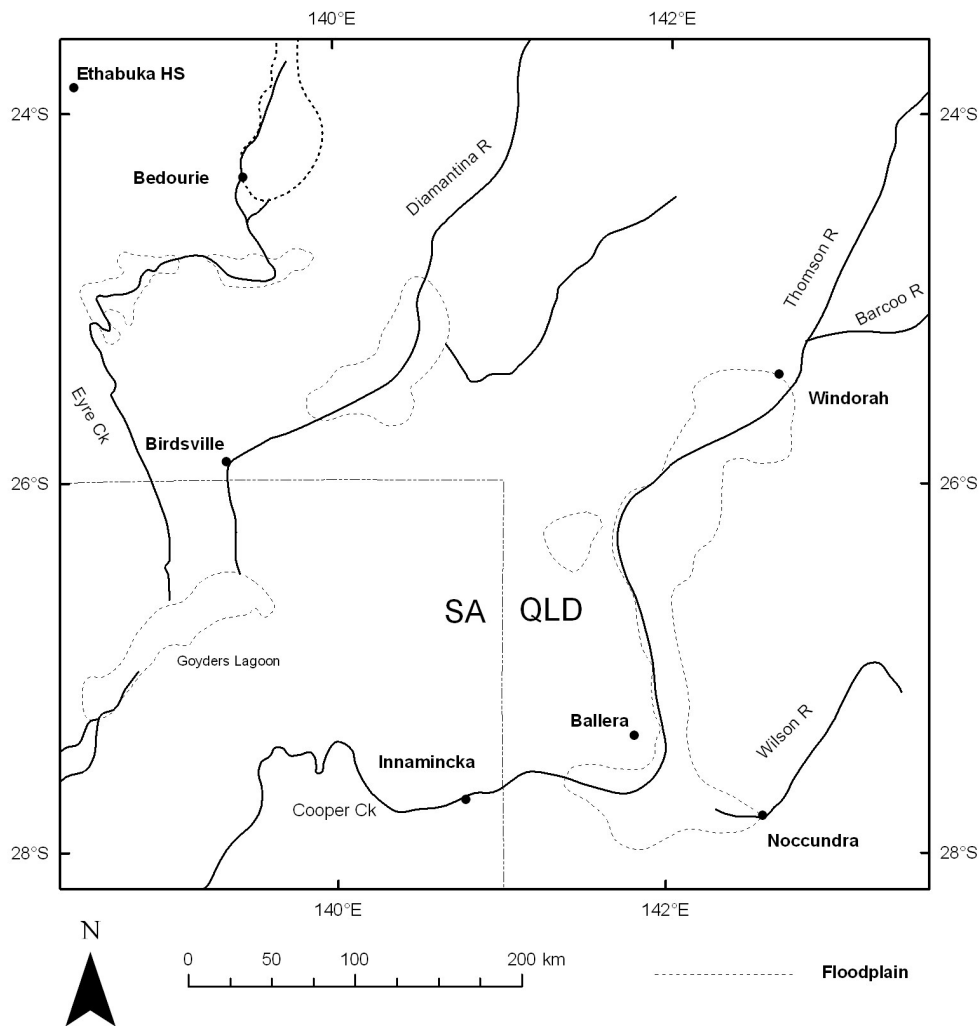


Figure 1. Location of towns, rivers and other features in the Channel Country.

OBSERVATIONS

Golden-headed Cisticola

On 18 and 19 April 2012, LP, GC and AB were searching partially inundated lignum (*Muehlenbeckia florulenta*) at Cuttaburra Crossing along the southern edges of Eyre Creek floodplain between Lake Machattie and Lake Koolivoo (24°55.75'S, 139°39.02'E; all co-ordinates provided are in WGS84), about 70 km S of Bedourie. LP and GC observed separate pairs of cisticolas which climbed to the tops of large lignum clumps in response to squeaking sounds made by the observers. A third pair was found 0.5 km farther into the lignum community. Other prominent components of the vegetation were tall nut-heads (*Epaltes cunninghamii*) and tall seeding channel millet (*Echinochloa turneriana*).

A pair of cisticolas was again seen at the latter site on 18 August 2012, and on 19 August another pair was found downstream in recently-flooded open lignum over green herbage, mainly Cooper clover (*Trigonella suavissima*), 32 km to the WNW (24°47.90'S, 139°21.57'E), north-west of Lake Mipia.

Identification of all cisticolas as the Golden-headed Cisticola was based on their small size, short tail, plain pale buff of underparts and dark-streaked crown and back. The few calls heard were the typical short buzzes and repeated liquid 'tliip tliip' calls of Golden-headed Cisticolas familiar to us from locations such as the lower River Murray wetlands.

Yellow Chat

While looking for grasswrens on the floodplain of Cooper Creek in the afternoon of 4 November 2012, LP and GC found Yellow Chats at a site (27°53.25'S, 141°50.00'E) near the SW side of Little Tooley Wooley Waterhole. Alerted by the species' distinctive, high-pitched piping 'pee pee pee' call, we saw several groups that included males in near-complete breeding plumage among lignum, perched in dead belalie (river cooba) (*Acacia stenophylla*), on bare ground (a gravel road), on wire fences or flying over. Subsequently, we found more birds in the vicinity and estimated that at least 100 Yellow Chats were present, along with many Orange Chats (*E. aurifrons*).

The dominant habitat was sparse to dense lush shrubland of lignum up to 3 m high and more than 2 m wide, with scattered belalie and tussocks of tall grass, thought to be *Poa fordeana*, in shallow braided gutters emanating from the ends of the waterhole. Vegetation between the lignum gutters varied from extensive closed swards of nut-heads typically about 1 m high,

to more open sedgeland of spike rush (*Eleocharis pallens*) and very open areas with little more than mats of nardoo (*Marsilea* sp.) The chats were at ground level in the more open areas but they also perched atop the tall shrubs and several were visiting remnant shallow pools of water in a minor channel, probably to drink or bathe (shade temperature was around 40°C).

Later that day, RJ and GC heard then saw three to five Yellow Chats in similar habitat but with more nut-heads and less lignum, 3.4 km farther south (27°55.09'S, 141°50.20'E), near a water-filled artificial depression (borrow pit or dam).

The next day (5 November), in searing midday heat and persistent wind, we recorded Yellow Chats around Yetally Waterhole (27°58.85'S, 141°45.71'E), near the southernmost part of the Cooper Creek floodplain in Queensland and 12.5 km SSW of the first sighting. Based on calls, the Yellow Chats here comprised a few tens of individuals among several hundred Orange Chats. The chats were mostly on the ground sheltering in the shade of large lignum shrubs, which was the dominant vegetation, the site otherwise being mostly bare. As observers passed by, the birds were flushed onto dry cracked mud with patches of forbs less than 10 cm high, or perched on stumps or branches of dead belalie. The waterhole was close to drying out, water being ankle deep and tens of metres from the lignum; the majority of the chats were near a scooped-out dam that held deeper water and some were visiting the water's edge.

Toward evening of 5 November, many Yellow Chats were calling at a site (27°58.57'S, 141°44.73'E) about 1.8 km WNW of Yetally Waterhole and about 2.0 km inside the floodplain. In this area, at least five males in near-complete breeding plumage were seen on wire fences among extensive, green closed cover of nut-heads and seedlings or suckers of young lignum and belalie. Much of the lignum shrubland had been burnt to ground level within the last few years and there were a number of blackened belalie stumps.

During our survey of 4–5 November 2012, Yellow Chats were often heard and/or seen on the treeless Cooper Creek floodplain, sometimes within loose flocks of dozens or hundreds of Orange Chats. Our impression was that Yellow Chats were widespread and abundant at this time. Most of our records were in lush vegetation near persistent small bodies of water.

Tawny Grassbird

On 5 November 2012, roughly 700 m S of Little Tooley Wooley Waterhole, LP flushed a Tawny Grassbird along a lignum gutter in treeless floodplain (27°54.26'S, 141°50.21'E). This was soon relocated and a second individual was found by RJ and GC; RJ regularly sees this species near his home in south-eastern Queensland. The first bird was identified by its rufous crown with few streaks, back with dark-centred feathers, unstreaked underparts and long heavy tail. It was highly vocal, issuing clucking and trilling calls typical of the species, while perching atop the vegetation. Habitat comprised short small shrubs of lignum and dominance of nut-heads sward – which proved difficult to walk through – between gutters. A creeper, twin-leaf bedstraw (*Asperula gemella*), was prevalent atop the lignum shrubs.

Later, about 2.5 km to the SSE (27°55.45'S, 141°50.86'E), in identical habitat RJ located a second pair, eventually seen by all of us. The next day (6 November), a single Tawny Grassbird was seen by LP in gutters with large lignum shrubs and green sward of nut-heads and twin-leaf bedstraw in the intervening areas (27°58.97'S, 141°44.67'E), about 1.7 km W of Yetally Waterhole and 12.5 km SW of the first sighting.

With vast areas of similar habitat unsearched, and three records despite hot windy weather, it seems likely that these were not isolated individuals.

Eastern Grass Owl

At 14:00 h on 6 November 2012, GC flushed an Eastern Grass Owl from dense dry spike-rush (*Eleocharis pallens*) up to 30 cm tall on Cooper Creek floodplain (27°25.56'S, 141°58.66'E) about 17 km east of Ballera Gas Centre. Conditions were overcast with drizzle to light rain and threat of heavier rain. All of us saw this bird when it was flushed again soon after and confirmed the identification based on three principal characters: extensive and prominent dark barring to the flight feathers, rich tawny-buff upperparts and particularly long legs that dangled well beyond the tail as the bird flew and landed among sedges 200 m away. It appeared distinctly larger than an Eastern Barn Owl (*T. javanica*) and with substantially longer wings and more laboured flight.

Habitat at this site was lignum of medium density and height in shallow gutters, with leafless and thin shrubs of northern bluebush (*Chenopodium auricomum*) over dry spike rush and nardoo in the intervening areas.

DISCUSSION AND CONCLUSIONS

Range extensions

The normal range of the Golden-headed Cisticola in Queensland is mainly in the coastal catchments and there are no published records in the Channel Country biogeographical region (Higgins *et al.* 2006; Pizzey *et al.* 2012). A published record from Longreach, upriver on the Cooper Creek system is in the adjacent Mitchell Grass Downs bioregion and the nearest known regular occurrence of the species to the 2012 Eyre Creek locality sightings is near Mount Isa, about 470 km to the north (Higgins *et al.* 2006). At Ethabuka Wildlife Reserve in far western Queensland about 160 km NW of Bedourie, Julian Reid (personal communication) saw groups of 1–4 birds at seven locations in *Triodia* in sand-dunes of the Simpson Desert and at a few sites on the narrow floodplain of Mulligan River in the week of 25 June 2011. East of the Channel Country bioregion but also far inland of normal range, RJ saw a single cisticola, assumed to be *C. exilis*, on the upper floodplain of the Warrego River (27°45.78'S, 145°44.38'E) 34 km N of Cunnamulla on 22 May 2012. Habitat at the site was knee-deep Mitchell grass (*Astrebla* sp.) and Queensland bluegrass (*Dichanthium sericeum*) covering floodplain that was predominantly treeless. This site is more than 200 km south and west of documented range in the upper Warrego and Maranoa catchments (Higgins *et al.* 2006).

The normal range of the Tawny Grassbird in Queensland also is mainly in the coastal catchments (Higgins *et al.* 2006, Pizzey *et al.* 2012) and our records in 2012 reported here are far from this. There is just one published record in the Channel Country: a specimen was obtained at “Nappa Merry [Merrie], SWQ”, less than 100 km north-west of our records, on 18 August 1975 (map on p. 178 in McFarland 1992; Table 3 in Reid 2000, J. Reid personal communication; D. McFarland personal communication); precise location and habitat apparently were not documented.

These records may represent changes in distributions in response to a series of wet years (see below) and/or reflect an increase in survey effort (see below).

Occurrence in natural wetlands

Many of the published reports of Yellow Chats in the Channel Country are from artificial wetlands, notably the overflow swamps of bore drains (e.g. Black *et al.* 1983, Higgins *et al.* 2001), although substantial occurrence in natural wetlands has been demonstrated recently (Jaensch 2004). Our

records from several sites on the Cooper Creek floodplain confirm the occurrence of Yellow Chats in natural wetlands and indicate much higher numbers than previously recognised. Other than one or two records west of or near Windorah towards the edge of the floodplain (Jaensch 2004, Higgins *et al.* 2001), our records are the first from the Cooper Creek floodplain in Queensland.

Similarly, many records of the Eastern Grass Owl in the Lake Eyre Basin are from wetlands associated with bore drains or mound springs (Higgins 1999). This owl is regarded as occurring sporadically in the interior, with a record from Bedourie in December 1990, and several records from the north-east of South Australia during 1975–1977 and in 1993 (Cox 1976; Read 1995; Higgins 1999). Our record from dry sedge and lignum swamp on the Cooper Creek floodplain, Queensland, is a rare confirmation that this species uses the extensive natural, but temporary, wetland habitats.

The impact of clusters of wet years

While it is possible that these birds have been simply overlooked in the past, it is equally likely that they have ventured into the Channel Country in the last three or four years to exploit unusually favourable conditions. Rainfall across the Channel Country was well above average during the three calendar years 2010 to 2012, and in 2010 it was the highest on record over large areas (BOM 2013a; Table 1). Major floods occurred during the northern wet season in the Channel Country's river systems from 2008–2009 to 2011–2012 (e.g. see BOM 2013b). This combination of local rainfall and clusters of major floods caused and sustained prolific growth of vegetation on the floodplains, much of which remained evident during our surveys in November 2012.

Table 1. Rainfall data (mm) for selected stations in the Lake Eyre Basin.

Station	Position in river system	Annual mean	2009 total	2010 total	2011 total	2012 total
Longreach QLD	Middle-upper catchment, Cooper Creek system	449	483	886	343	473
Windorah QLD	Middle catchment, Cooper Creek system	296	342	731	623	341
Urandangi QLD	Upper catchment, Georgina River system	303	483	671	512	371*
Bedourie QLD	Middle catchment, Georgina River system	200	206	637	690	147

Source: Bureau of Meteorology, Climate Data Online

* indicates incomplete data

Recent reports of other species within the Lake Eyre Basin may be considered as range extensions associated with the recent wet conditions. RJ saw at least 30 Plum-headed Finches with larger numbers of Zebra Finches (*Taeniopygia guttata*) in the mostly dry bed of Wilson River near Noccundra Hotel on 5 November 2012. The Plum-headed Finch is known to occur in the Channel Country (e.g. Windorah: Pizzey *et al.* 2012) and other recent records of the Plum-headed Finch from the Channel Country and adjacent arid regions include two from South Australia: Cullyamurra Waterhole in July 2011 (Dennis 2012) and Cordillo Downs, Kachumba Plain in September 2011 (J. van Weenen personal communication); and one from Queensland: a pair at Cooper Crossing, mid July 2012 (McBride 2012).

It remains to be seen whether these species will stay in the area through less favourable years, die out or retreat across increasingly hostile country to their core ranges. Similar phenomena may have occurred in the exceptionally wet mid-to-late 1970s, as illustrated by the abovementioned record of the Tawny Grassbird in 1975, and may recur in future clusters of wet years.

Timing and focus of field investigations

The Channel Country is increasingly visited by amateur and professional ornithologists but remains poorly studied relative to its vast extent and diverse habitats, and few surveys occur during hot months or soon after floods. Public roads are few and mostly unsealed, and access routes may be closed after relatively light, local rainfall. No national parks offer year-round public access to large areas of the region's most prominent feature: broad floodplains with myriad channels. Therefore the sparseness of records of the species reported here is partly due to the timing and focus of previous field investigations.

Surveys conducted with access to pastoral leasehold land in the less comfortable seasons have expanded knowledge of the region's avifauna. For example, region-wide surveys during or soon after major summer-autumn floods (e.g. Reid *et al.* 2009) revealed globally significant numbers of migratory and locally breeding waterbirds and confirmed the occurrence of several rarely recorded waterbirds and passerines in the floodplain shrublands of several rivers (e.g. Baxter *et al.* 2000; Carpenter 2002; Jaensch & McFarland 2002; Jaensch *et al.* 2005). Our records further extend knowledge of the Channel Country's avifauna.

Implications for research and conservation

Ornithologists should be aware of the possibility of discovering more of the abovementioned and other bird species in the Channel Country in the

immediate future and after any recurrence of clustered wet years. No special techniques are required, given that we found many birds unintentionally, mainly under hot and windy conditions, in common habitats. If major flooding does not occur in 2012–2013 a steady loss of the dense seasonal vegetation may follow on the Cooper Creek floodplain through collapse and uprooting by wind, an outcome that we witnessed in its drier parts. Furthermore wildfires, deliberately lit or from lightning strike, may quickly remove extensive areas of cover.

Under natural flood regimes, the Channel Country floodplains have considerable conservation value (Jaensch 2009) and further discoveries of both species richness and occurrences of rare species add significantly to that assessment. The Cooper Creek and Georgina-Diamantina River systems are presently unregulated through the Queensland Government's water resource planning and Wild Rivers declarations but conservationists should be vigilant to counter any possible future reversals. Records such as ours contribute important information for informing water resource planning and decision making.

Meanwhile, long term impacts on the bird species reported here of present land use on the Cooper Creek floodplain, including rangeland cattle grazing and oil/gas extraction, are unclear. Provision of additional water points by the oil/gas industry may prolong the occurrence of species such as the Yellow Chat after the beneficial effects of major floods have declined. Far greater impact on avifauna that are present following clusters of wet years may result from the burning of floodplain vegetation, although the long term effects of this have not been systematically studied.

ACKNOWLEDGMENTS

We acknowledge the financial support of the South Australian Government through the South Australian Arid Lands Natural Resources Management Board, which made our 2012 expeditions possible. Cooperation and advice, including permission to use company roads, was provided by SANTOS Ltd., notably Daniel Thomson, Mark Bennett, Peter Rogers and Anthony Western. The managers of S. Kidman Company grazing leases at Durham Downs (Jon Cobb) and Narylco (Ian Halstead) and of Orientos (Rodney and Jenny Betts) also assisted us in terms of property access and advice. The manager of Noccundra Hotel kindly provided storage facilities. John Thompson of the Queensland Herbarium, Brisbane, assisted with identification of plants. Helpful comments or information were kindly provided by Dane Panetta, Denise Elias, Julian Reid and David McFarland.

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R. JAENSCH*, 11 Glen Frew Street, Kenmore, Qld 4069

L. PEDLER, PO Box 58, Koolunga, SA 5464

G. CARPENTER, 24 Dryden Road, Black Forest, SA 5035

A. BLACK, South Australian Museum, North Terrace, Adelaide, SA 5000

*Corresponding author: roger.jaensch.bne@gmail.com

OBSERVATIONS ON HUNTING AND BREEDING BEHAVIOUR OF THE BLACK FALCON (*FALCO SUBNIGER*)

S.J.S. DEBUS & A.E. ZUCCON

ABSTRACT

Observations on the Black Falcon (*Falco subniger*) are presented that add to previous, incomplete studies of the falcon's breeding biology and behaviour, vocalisations, prey and hunting methods. Observations are mostly from two Black Falcon pairs that were monitored at separate locations (Gundagai and Tamworth) in the New South Wales sheep–wheat belt. At the nest of the pair at Gundagai (which later failed at the downy chick stage), the male brought food to the incubating female, but was not seen to share incubation; a Brown Falcon (*Falco berigora*) later briefly occupied the failed, vacated nest, but did not subsequently use it. The pair of Black Falcons at Tamworth was often observed to hunt feral Rock Doves (*Columba livia*), sometimes co-operatively. The pair apparently did not breed, and appeared to experience competition for potential nest sites from other raptors and corvids. A fresh juvenile specimen, found road-killed near the suspected nest area of a second pair at Tamworth, is described. Observations on interactions with other raptors are also presented, along with brief notes on Black Falcon hunting and roosting in Queensland.

INTRODUCTION

Inland Queensland is a stronghold of the Black Falcon (*Falco subniger*) (e.g. Barrett *et al.* 2003), yet the species is unstudied in that state. Overall, the Black Falcon (Figure 1) remains the least-studied of the readily observable Australian falcons. Several recent, incomplete studies were conducted on its food and hunting, breeding behaviour, and other aspects of its biology, but covered only parts of the breeding cycle (Debus *et al.* 2005; Debus & Olsen 2011; Debus & Tsang 2011; Barnes & Debus 2012; Debus 2012a). Besides these recent studies, there have been only brief anecdotal reports of the falcon's hunting behaviour and food (Falkenberg 2011; Sutton 2011; Bartram 2012; Debus 2012b; Rawsthorne 2012; Stowe 2012; Ley 2013). The roles of the sexes and parental time-budgets (e.g. nest attendance, feeding rates) in the incubation and early nestling periods have yet to be determined, although the Black Falcon photograph and caption in Olsen (1995, p. 128) provides some insight into male–female relations (i.e. female dominance,



Figure 1. Black Falcon near Monto, Qld, September 2011. Photo: Chris Barnes.



Figure 2. Dark-coloured Brown Falcon near Wagga Wagga, NSW, April 2013. Photo: Caroline Zuccon.

male submission) at the nest. Falcons, including the Black, do not build nests, but (other than cliff- or cavity-nesting species) rely instead on stick nests built by accipitrid raptors or corvids (e.g. Marchant & Higgins 1993; see Debus 2012c for a summary of other aspects of the falcon's biology and ecology).

In 2012, AEZ found an active Black Falcon nest near Gundagai (35°04'S, 148°04'E) on the South-west Slopes of New South Wales. Although the nest ultimately failed at the downy chick stage, we present what details on breeding behaviour (incubation and early chick phases) were obtainable, along with supplementary observations of Black Falcons in the district.

Also in 2012, SD attempted to find active Black Falcon nest(s) in the Tamworth district (North-west Slopes of NSW; 31°05'S, 150°55'E), in order to extend the previous incomplete studies (Debus *et al.* 2005; Debus & Tsang 2011; Debus 2012a). The aim was to document and quantify a complete breeding cycle from nest selection to independence of juveniles, and obtain population data (e.g. density, breeding success) if more than one nest could be found. However, only two pairs (versus three or four in 2009–2010) could be found, and no nest was located, despite weekly searching over winter–spring and the focal pair often being active in and around Tamworth city. We present observations on that pair in relation to hunting behaviour and interactions with other raptors during the breeding season, and describe a juvenile specimen. Supplementary observations by SD of hunting and roosting behaviour of Black Falcons in Queensland in 2011 and 2012 are also presented.

These collective observations help to shed a little more light on the Black Falcon's breeding behaviour, vocalisations and hunting behaviour. The falcon has been listed as Vulnerable under the NSW *Threatened Species Conservation Act 1995*, owing to its significant decline in reporting rate in the south-eastern Australian sheep–wheat belt, apparently related to loss and degradation of, and increasing competition for or interference with, nest sites and breeding habitat. Comprehensive biological and ecological information on this species is now more necessary, to inform and guide the falcon's conservation and management. As the species ranges through Queensland, and relevant human impacts may apply at least in the state's southern agricultural zone, the Black Falcon warrants greater ornithological attention in Queensland than it has received previously.

STUDY AREAS AND METHODS

Gundagai, NSW

AEZ found an occupied Black Falcon nest in the agricultural Murrumbidgee Valley near Gundagai in May 2012. The nest tree was on private farmland ~50 m from a public road. Monthly monitoring of the nest commenced on 12 May, when the male was first seen in the tree. When the pair was seen in the nest tree in the late afternoon/evening of 6 July, the nest was thereafter kept under frequent observation by AEZ from the road verge (approximately weekly at first, then almost daily as breeding activity progressed), with photographs taken with a high-powered zoom lens whenever possible. Observations continued until the nest failed in September 2012, with a 3-hour watch on the day that failure was suspected, and an all-day watch two days later from 0530 h (still dark, thick fog, sunrise at 0600 h) to 1800 h. The nest tree was not climbed.

Tamworth, NSW

The study area is described elsewhere (Debus *et al.* 2005; Debus & Tsang 2011). From late April to late November 2012 SD, occasionally assisted by L. Tsang, searched for occupied Black Falcon nests. Search effort consisted mostly of weekly visits of 1.5 days' duration to the activity centre of the Tamworth pair (occasionally an additional day per week), walking along wooded agricultural river flats and floodplains, inspecting (from the ground, by binoculars or telescope) stick nests in woodland trees, waiting at vantage points, and slow driving on rural back roads. The study was also publicised in the Tamworth press (*Northern Daily Leader*, *Tamworth Times*, *Tamworth City News*), calling for sightings and reports of active nests; some responses were accompanied by photographs or video of raptors. Credible reports were followed up by field check, and by sustained watches where reports were verified by subsequent sightings.

Queensland

Opportunistic observations of Black Falcons were obtained by SD (i) during a bird survey of Bladensburg National Park near Winton (221°23'S, 143°02'E) on 6–15 May 2011, and (ii) during a faunal survey of a rural property near Chinchilla (26°44'S, 150°38'E) on 8–12 May 2012.

RESULTS

Gundagai

Breeding

The male Black Falcon was initially seen in the nest tree on 12 May. The pair of Black Falcons was occupying the tree on 6 and 21 July 2012, and the female was incubating on a stick nest (apparently that of a raven *Corvus* sp.) in that tree on 28 July (incubation inferred from the female's posture and the calculated hatching and laying dates; see below). The nest was in the centre of the tree's crown: a densely foliated remnant eucalypt in a paddock, ~50 m from a quiet rural back road. The male was less disturbed by human presence than was the female. The incubating female was seen to leave the nest once for 30 seconds, apparently flushed by the noise of the car door when the observer arrived.

On 28 July in late afternoon (1630 h) the female was incubating, and the male dropped food to her at the nest, where she consumed it. The same behaviour was witnessed on 4 August (1615 h); the male stood on the nest while she fed, then he flew off 10 minutes later (1625 h). On 15, 18 and 28 August the female was sitting on the nest. On 5 August and 8 September, in the male falcon's absence from the nest area, a lone Black-shouldered Kite (*Elanus axillaris*) repeatedly swooped the sitting female, calling aggressively as it did so. The kite appeared not to have a mate or nest in the area.

On 8 September, by which time two chicks had hatched (see below), the male falcon brought a freshly killed Eastern Rosella (*Platycercus eximius*) to the nest in the afternoon (1555 h). As he arrived at speed, the rosella appeared to be whole and unplucked. He landed on the edge of the nest, and the female stood up and jumped on the prey as he released it from his foot. He immediately retreated to the nest branch, where he stayed a few seconds then left. The female tore at the prey and fed from it on the nest, but feeding of chicks could not be seen through obscuring foliage.

On 11 September, two downy white chicks were just visible (and photographed) in the female's absence. Based on a comparison with the photographic series of known-age Peregrine Falcon (*Falco peregrinus*) chicks in Olsen (1995, p. 157), they were about 2 weeks old (between the stages shown and described for days 8 and 15, i.e. acquiring second down, strong enough to peer over the nest rim). In development, they were between the 10-day-old Grey Falcon (*Falco hypoleucos*) chicks shown in Hollands (2003) and the 18-day-old Black Falcon chicks shown in Cupper & Cupper (1981, p. 90), and similar to the Peregrine chicks in Cupper & Cupper (1981) inferred

to be ~11–12 days old. Hatching of the Black Falcon chicks at Gundagai would have been in late August and, allowing 5 weeks for incubation (Marchant & Higgins 1993), laying would have occurred in mid to late July.

On 13 September, there was no activity at the nest from midday to 1330 h, and at 1350 h a Brown Falcon approached the nest. During the all-day watch on 15 September to ascertain the outcome, only the male Black Falcon attended the nest tree, and then only in the morning when he was first seen (as the fog lifted) perched in the tree at 0750 h. Throughout the morning of the 15th, the male mostly perched and preened (>2.5 h), and on that day there was no other Black Falcon activity or sign of life at the nest. Once, the male was chased off by two Australian Magpies (*Cracticus tibicen*), calling in distress as he flew (a Peregrine-like cackling ‘kak-kak-kak-kak’), but he returned (1000 h) to the tree again, this time close to the nest, towards which he peered. Finally, he was harassed by a pair of Nankeen Kestrels (*Falco cenchroides*) that had an active nest in a hollow in the same tree, and he left by 1030 h, not to return that day. Ravens also chased the male when he was alone, after the female had abandoned the nest, but they did not approach the nest tree while the female was present.

During the all-day watch, in the Black Falcons’ absence, a light-coloured female Brown Falcon arrived at the nest tree (1450 h), calling, while being mobbed by the kestrels. She took off and circled the tree, landed beside the nest then moved to the centre of the nest, calling loudly and repeatedly, and peered deep into the nest cup. After 2 minutes of occupying the nest, the Brown Falcon left the tree, and did not return that day nor appear at the nest during subsequent checks. It was thus apparent that by 15 September, the Black Falcons’ breeding attempt had failed at the downy chick stage, and that a Brown Falcon showed interest (if temporarily) in the now-vacated nest.

On the morning of 25 September apparently the same pair of Black Falcons was resighted 6 km from the nest, the male distinctive by his exceptionally light-coloured plumage. He was eating what looked like a bird, while the female stood watching ~2 m away, both on the earth bank of a stock dam.

Interactions with other raptors

On 4 January 2012, between Gundagai and Wagga Wagga, one female Black Falcon and three Peregrine Falcons were seen chasing and repeatedly dive-bombing a Wedge-tailed Eagle (*Aquila audax*), for at least 2 minutes. The eagle found shelter in a tree, and the falcons departed separately. In level

flight the Black Falcon kept up with the Peregrines. However, the Peregrines climbed and dived more steeply than the Black Falcon.

Hunting

On 11 September 2012, while the female falcon was absent from the nest and chicks (see above), a large Black Falcon was seen chasing a flock of Common Starlings (*Sturnus vulgaris*) 6 km from the nest. However, it could not be confirmed that the falcon was the breeding female.

In September 2012, an apparently juvenile male Black Falcon (by its size and very dark plumage, and its approachability) was perched for two consecutive days in a dead eucalypt ~4 km from the above nest site (i.e. suggesting another, successful, falcon pair and nest in the district). The falcon appeared to be waiting for a parent to deliver food, but it once chased a Turquoise Parrot (*Neophema pulchella*) unsuccessfully.

In the Gundagai region, Black Falcons (both sexes) are attracted to stubble fires in autumn: two fires in the nest district were attended by seven and three falcons, respectively, and one fire between Gundagai and Cootamundra was attended by 12 Black Falcons. The falcons flew through thick smoke, diving to within a half a metre of the ground or sometimes landing on the ground very close to flames, on the edge of the burnt area, to eat unidentified terrestrial prey.

Tamworth

No active nest was found of the focal (or any other) Black Falcon pair at Tamworth in 2012, despite the many active and inactive stick nests checked; most were occupied by Australian Ravens (*Corvus coronoides*) or Whistling Kites (*Haliastur sphenurus*) (one pair of which also used an alternative nest as a feeding platform). In early September at sunset, a Black Falcon (apparently of the focal pair) flew into a riparian tree that contained two old stick nests and apparently stayed there (to roost?), but a week later one of these nests was confirmed as an active (incubating) Brown Falcon's nest. In October–November there was no sign of the focal pair of Black Falcons having fledged young, and it appeared from the observations reported herein that, although they had been interested in nests occupied by other raptor species, they did not breed. One pair of ravens vigorously defended their previous nest, being rebuilt in 2012, against any raptors up to Little Eagle (*Hieraeetus morphnoides*) size that approached it during the ravens' pre-laying phase.

The press publicity resulted in several reports from the public of genuine Black Falcons, as well as of Brown Falcons that lay informants had

misidentified from the Black Falcon illustration in Cayley (1984). From these field-checked mistaken reports (and photos) of 'Black Falcons', it is evident that laypeople, and some birders, still confuse dark Brown Falcons with Black Falcons: partly from inaccurate information and/or illustrations in the older, superseded field guides, but also through insufficient knowledge of identification features (relative lengths of exposed tarsi versus thigh feathers on perched falcons; flight style; wing attitude (dihedral versus anhedral) when soaring/gliding; and the prominent underwing barring on even the darkest Brown Falcons: see Figure 2 herein, and Debus 2012c). Despite the identification issues, the press publicity generated much interest, goodwill and some useful sightings, though no occupied Black Falcon nests, and is a potentially helpful adjunct to future such studies.

Interactions with other raptors

Several observations were made of Black Falcons, apparently of the focal pair, harassing other raptors in 2012, near the Tamworth pair's activity centre during the breeding season:

1. In early September, a female falcon stooped three times in quick succession at a soaring Little Eagle, soared, then made a mock stoop at a Straw-necked Ibis (*Threskiornis spinicollis*) in a soaring flock, before departing. However, the attack on the eagle lacked the ferocity of an attack by a Black Falcon on a soaring Square-tailed Kite (*Lophoictinia isura*), noted elsewhere (Debus 1996).
 2. In early September, a male Black Falcon suddenly joined a Brown Falcon in briefly chasing/stooping at a flying Whistling Kite (near the kite's active nest). The Black Falcon then soared, and the Brown Falcon switched its attention, trying to catch up and engage the Black Falcon. The latter outperformed the Brown and soared higher, making a short feint at the much lower Brown Falcon. The Brown then performed display dives as it descended, possibly because there were by now three Brown Falcons in the air (two of which occupied the nearby stick nest, referred to above).
 3. In early September, a soaring male (?) Black Falcon made a short (mock?) stoop towards a flying Black-shouldered Kite, but the kite then repeatedly swooped the falcon, causing the latter to roll and fend it off.
 4. In early September, a soaring male falcon was harassed by a Whistling Kite near the kite's active nest, but the falcon outmanoeuvred and outclimbed the kite, soared, and made a brief V-dive (see Marchant & Higgins 1993; Whelan 2013). In July, a Black Falcon and a Whistling Kite had soared around the active kite's nest (L. Tsang personal communication),
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the falcon apparently showing interest in the nest, although the kite did not defend its nest strongly at that stage (pre-laying or incubation).

Vocalisations

In late September 2012, in the early afternoon (~1615 h), the male of Black Falcon pair C (of Debus & Tsang 2011) was carrying prey towards a suspected new nest on private land apparently ~1 km north of that pair's nest C (of 2010), and therefore inaccessible for further investigation. He gave a deep, soft Peregrine-like cackle of three notes when mobbed by birds. (Pair C and their active nest of 2010 were located ~14 km south-west of Tamworth, and ~18 km west of the main activity centre of the focal Tamworth pair.)

Juvenile specimen

A freshly road-killed, fully grown juvenile Black Falcon was found ~2 km from the suspected nest area of pair C in late November 2012, i.e. almost 2 months after local fledging dates (cf. Debus *et al.* 2005; Debus & Tsang 2011). Its fresh plumage and the symmetrical fault-bars across its rectrices indicated recent fledging, and its rectrices and outer primaries were fully emerged and no longer ensheathed at the base. This specimen, now lodged with the Australian Museum, was overall dark slaty-brown with slightly paler (brown-streaked) cheeks; a white, finely brown-streaked chin; slight, dull-rufous dorsal fringing; slight, narrow basal barring under the outermost primaries; and a pale-tipped tail. Its cere was brown, its facial skin (bill base, orbit) pale blue, and its legs and feet pale blue-grey. A male by dissection, it was in good body condition (albeit probably dehydrated from lying in the sun), weighed 616 g, and its stomach contained the remains of a Common Starling, including both feet (L. Tsang personal communication).

Hunting

Most observations (all by SD in 2012 unless stated otherwise) concerned hunting behaviour of the focal pair of Black Falcons in the rural fringe and hinterland of Tamworth city, including two events within the city. Terminology for search and attack methods, which have specific definitions in the raptor literature, follows previous papers (Debus & Tsang 2011; Debus 2012a).

1. In late June, mid morning (~0930 h), a soaring male (?) falcon made a long, shallow glide with bursts of Peregrine-like wing-beats into a rural village. The intended prey and outcome were unseen, but the foray was likely to have been a direct flying attack (i.e. with continuous wing-beats) at urban exotic birds.

2. In late June, mid morning (~0915 h), a male falcon was perched on a paddock fencepost on a quiet back road, and showed a large crop bulge; immature magpie fresh remains were on the ground below (feathers, head and neck, wings, legs).
 3. In late June, late morning (~1150 h), a pair of falcons was hunting feral Rock Doves (*Columba livia*). The soaring male made a long, shallow glide with bursts of rapid wing-beats, at a milling flock of doves as the female was flying below the flock (she had flushed the doves, keeping them in the air); the attack was unsuccessful. Later (~1400 h), the pair was over the city, chivvying a high-swirling flock of Rock Doves; one dove broke away and the male falcon tail-chased and stooped, but he failed to capture it.
 4. In mid July, late afternoon (sunset), a male (?) falcon was observed by SD in low, fast direct flight at rooftop height past farm buildings, for >2 km, apparently fast contour hunting; the falcon was unsuccessful, as it was then located a few minutes later soaring, empty-footed, by L. Tsang (personal communication).
 5. In early August, mid morning (~0940 h), a male (?) falcon was chivvying a flock of Rock Doves over the city, and later (1245 h) soaring around a tightly swirling flock of doves on the rural fringe, but he gave up and departed.
 6. In mid August, around midday, a female (?) falcon, with a Brown Falcon, repeatedly hawked insects low over sheep grazing in a paddock, sometimes swooping almost to the ground close to the sheep. The Black Falcon landed on a nearby power pole, but was chased off by the Brown Falcon.
 7. In mid August, early afternoon (~1345 h), a soaring male falcon performed a V-dive, or possibly an abortive/feinted stoop, soared, then made a long, descending glide that became a low direct flying attack, out of sight beyond trees. A few minutes later (~1400 h), the female (?) falcon was chivvying a swirling flock of Rock Doves in the same area, then broke away and made a long, shallow stoop across riparian woodland (outcome unseen, but there were open fields on the other side of the river).
 8. In mid August, late morning (~1050 h), a male (?) falcon was chivvying a circling flock of Rock Doves, but gave up and soared away.
 9. In mid August, late morning (1130 h), a male (?) falcon was soaring over paddocks; it made a long, angled direct flying attack among trees in a homestead garden (outcome unseen).
 10. In mid August, mid afternoon (~1425–1435 h), a male (?) falcon was soaring over grassy paddocks, searching widely in a circuit to the apparent
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extremity of his hunting range (at the limit of SD's 8× binoculars); the falcon returned, made a long, low glide at a flock of ground-feeding Galahs (*Eolophus roseicapillus*), which flushed and milled, then he resumed soaring and departed.

11. In mid January 2013, late morning (~1035 h), a falcon was observed by L. Tsang (personal communication) in the area frequented by Black Falcon pair C of Debus & Tsang (2011). The falcon was soaring above a paddock with a hayshed and feedlot silos, circling slowly for ~1 minute; it quickly and sharply banked, descending rapidly, and began flapping with quick shallow wing-beats (2/sec), its carpals flexed. It gathered speed, flew directly towards the hayshed/silos and flushed a ground-feeding Crested Pigeon (*Ocyphaps lophotes*), the falcon's wing-beats increasing to 3–4/sec as it attacked. The pigeon flapped hard, apparently at full speed; the tail-chasing falcon was level with the pigeon while closing, but rose slightly as it attempted to grab the pigeon from above. The falcon missed, pulled up, its speed and momentum carrying it quickly back up to soaring height, then it soared away.

Queensland

In May 2011, in Bladensburg National Park, a Black Falcon flying in to its roost at sunset gave a low moaning 'karr' call like a deep, soft whine or wail. The roost site was a bare branch in the exposed top of a dead (or dead-topped) eucalypt on a creekline. This prominent site was used, presumably by the same individual, at dusk on at least one subsequent evening that week. This roost contrasted with two roost sites observed opportunistically by SD on the North-west Slopes of NSW in September 2012, near Narrabri and Bingara: in both cases, at sunset a Black Falcon flew in to perch on a horizontal limb within the canopy of a living woodland eucalypt, and remained there until dusk (in failing light).

Near Chinchilla, in May 2012 towards midday, a Black Falcon attacked a flock of Apostlebirds (*Struthidea cinerea*) foraging on a back road, by making a shallow dive between trees lining both sides of the road. Unsuccessful as the flock 'exploded' into flight with alarm-calls and sheltered in the trees, the falcon soared up and disappeared into the distance. A few days later, within an hour after sunrise a few kilometres from the hunting incident, two Black Falcons (male and female) were perched together, high on the exposed branches of a dead-topped woodland eucalypt, near a wooded creekline. It was not possible to confirm that this behaviour was (as suspected) conspicuous perching near an occupied nest in the pair's pre-laying phase, but it does suggest that such behaviour in May–June may reveal a falcons' nest nearby (there were vacant corvid nests in the wider area).

DISCUSSION

The inferred laying date at Gundagai, together with those in the Tamworth district (Debus *et al.* 2005; Debus & Tsang 2011), suggest that the Black Falcon's peak laying month in NSW is July, and that future studies should therefore search for occupied nests in May–June. From the limited observations, there was no evidence that the male Black Falcon shared incubation when he brought prey to the incubating female. However, it is likely that sustained observations will confirm male incubation (when the female is off feeding on his catch), as in other falcons (e.g. Marchant & Higgins 1993). Thus, the roles of the sexes and parental time-budgets (e.g. nest attendance) during incubation and the first week or so of the downy chick phase require further study.

We infer from the road-killed juvenile that it was ranging 2 km from the nest at about 2 months post-fledging: another small insight into the Black Falcon's little-known post-fledging period (Debus *et al.* 2005; Barnes & Debus 2012). The killed juvenile provides a further example, to those of Debus & Olsen (2011), of collisions with vehicles and other man-made objects as a cause of unnatural mortality for this species in the sheep–wheat belt.

The juvenile specimen was similar in plumage and bare parts to other descriptions and reviews of Black Falcon fledgling/juvenile characters (Debus *et al.* 2005; Debus & Olsen 2011) that challenge earlier published information (e.g. in Marchant & Higgins 1993). The specimen's weight was near average for passively collected males (e.g. road kills; see Debus & Olsen (2011) for revised weights for the sexes of this species, and Schoenjahn (2011) for a critique of published falcon weights).

Combining the various studies and reviews (Debus *et al.* 2005; Debus & Tsang 2011; this study), and using the standard terminology (e.g. Carlier 1995), it appears that the Black Falcon's main adult vocalisations are:

- (1) A cackle similar to, but deeper and softer than, that of the Peregrine Falcon;
 - (2) A faster, guttural ('rattle') version of the cackle;
 - (3) The creaking call or 'ee-chip', rather high and squeaky in the male (in display flight), and deep and guttural ('double cluck') in the female;
 - (4) The wail, also sometimes called the whine, usually high-pitched (by the female around the nest, e.g. when begging to the male or when copulating), but deep and soft in some other (little-studied) contexts.
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Our observations of hunting behaviour and prey provide variations to, or supplement, those events previously described (mainly of solitary Black Falcons hunting: Debus *et al.* 2005; Debus & Tsang 2011; Debus 2012a). These variations relate mostly to the Tamworth pair sometimes hunting birds co-operatively in 2012 (as also observed by Debus 2012b).

As an Australian endemic falcon, a representative of the ‘great’ or ‘desert’ falcons, which include the Lanner Falcon (*Falco biarmicus*), Laggar Falcon (*F. jugger*) and Gyrfalcon (*F. rusticolus*), and having flight capabilities comparable to the Peregrine, the Black Falcon is well worthy of further study, with many knowledge gaps yet to fill. In particular, its conservation status in NSW suggests that further information on its biology and ecology is needed, to inform management of its habitat and possible threats. Accessible areas, with apparently sufficient numbers of Black Falcons for meaningful study and within easy reach of tertiary institutions, include the western Darling Downs, the NSW Riverina and Liverpool Plains, the Victorian northern plains, and the South Australian wheat belt. Research in Queensland could contribute much, because of the likelihood of finding sufficiently dense falcon populations. Other areas worth investigating, besides those in the state’s southern inland agricultural zone, include the dry coastal Lockyer and Fassifern valleys (G. Czechura personal communication).

ACKNOWLEDGMENTS

AEZ thanks William Zuccon for his persistence in searching for Black Falcons, leading to the discovery of the nest, and Caroline Zuccon for her enthusiasm and skill in photographing raptors. SD thanks the following: Leah Tsang and Murray Eden for field assistance and curation of the specimen; Geoff Mitchell (Tamworth Birdwatchers) and Larissa Schwenke for information; Steve and Robbie van Hemert for their interest, assistance and permission to observe on their land; Greg and Madelon Blaxland for their generous hospitality and accommodation; the many informants and landholders who provided sightings and/or access; and the Tamworth press (especially Jacqui van Aanholt) for publicising the project. SD’s research travel was kindly supported by BirdLife Northern NSW. SD also gratefully acknowledges the facilities of the University of New England. We thank Leah Tsang, Jonny Schoenjahn, Richard Noske and Denise Elias for helpful comments on a draft.

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*S.J.S. DEBUS**, Honorary Associate, Division of Zoology, University of New England, Armidale, NSW 2351

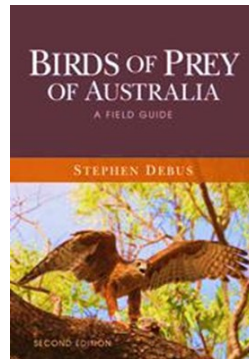
A.E. ZUCCON, P.O. Box 2, Gundagai, NSW 2722

*Corresponding author: sdebus@une.edu.au

BOOK REVIEW

Birds of Prey of Australia *A Field Guide (Second Edition)*

By Stephen Debus. Illustrated by Jeff Davies



Published by CSIRO Publishing (in association with Birdlife Australia), 2012
Paperback, 208 pages, AU\$39.95
<http://www.publish.csiro.au>

As with the first edition, published some 15 years ago, this book has close links to HANZAB (Volume 2). It has been completely revised, however, and contains 15 years of new data. The Introduction is useful and covers the topics: What is a raptor?; Kinds of raptors; Identification; Food and hunting; Behaviour; Breeding; Handling raptors; Threats and conservation; and Taxonomic and geographical scope.

Part 1 is in the form of a modern field guide using HANZAB plates for the illustrations. The text is more than adequate and covers the topics usually contained in a field guide. There are no distribution maps, which I feel would have been useful. Part 1 also mentions unconfirmed vagrants and doubtful species. A very helpful addition is 'Difficult species-pairs', which includes split images to help with identification. Most hard-to-identify species are covered. There are also good quality soaring photos of all of Australia's resident Accipitridae and Falconidae species, including some males and females as well as some juveniles.

Part 2 is the 'Handbook' section and again this covers all resident species and includes considerably more information than that contained in the 'Field Guide' section. While no maps are included here, the text covering distribution is quite comprehensive. The final section of the book covers 'Threats, Conservation and the Future'.

Stephen Debus is one of the foremost raptor experts in Australia, having a wealth of knowledge gained from his years of field experience and studies. *Birds of Prey of Australia* is well written and enables us to share his knowledge. It will appeal to anyone who has an interest in raptors and particularly those who really want to identify the more challenging species that turn up on occasions. As someone who has used the first edition, I will certainly be carrying this new book with me on field trips. I recommend it highly.

Roy Sonnenburg

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FLEAY, D.H. 1973. Nesting habits of the brush turkey. *Emu* 36: 153–163.

FRITH, H.J. (Ed.) 1976. Mallee fowl. In *Complete Book of Australian Birds*, pp. 136–137. Reader's Digest: Sydney.

IUCN 2006. *2006 IUCN Red List of Threatened Species*. www.iucnredlist.org Accessed 14 October 2006.

SERVENTY, D., SERVENTY, V.N., & WARHAM, J. 1971. *The Handbook of Australian Sea-birds*. Reed: Sydney.

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