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Dry season diet of a Barking Owl *Ninox connivens peninsularis* on Adolphus Island in the north of Western Australia

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The Barking Owl *Ninox connivens* is a medium-sized hawk-owl that is associated with the open forest and woodland environments of mainland Australia (Higgins 1999). Two subspecies are recognised. The larger *N. c. connivens* (males 695 g, females 592 g) occurs in southern and eastern Australia, whilst the smaller *N. c. peninsularis* (males 501 g, females 440 g) is restricted to the north of the continent (Higgins 1999). The Barking Owl is common in the wet-dry tropics, but uncommon to rare and declining in the temperate zone (Debus 2009; Parker *et al*. 2007).

Fleay (1968) described the species as a robust and versatile owl. Dietary studies indicate that it is a non-specialist raptor, capable of killing a wide variety of mammalian, avian and invertebrate prey species, which range from its own size (or even larger) to quite tiny prey items (see Higgins 1999 for review; Debus and Rose 2003; Barnes *et al*. 2005; Debus *et al*. 2005; Stanton 2011; Corbett *et al*. 2014). The diet of the larger and better studied *N. c. connivens* varies among geographical regions. For example, in Victoria and western Queensland, the principal prey were young Rabbits *Oryctolagus cuniculus* and Long-haired Rats *Rattus villosissimus*, respectively (Higgins 1999; Debus and Rose 2003). In temperate areas elsewhere in south-eastern Australia, diets were more diverse, with small- to medium-sized birds, mid-sized arboreal marsupials, (particularly Sugar Gliders *Petaurus breviceps*) and invertebrates being the most common prey (Higgins 1999; Barnes *et al*. 2005; Debus *et al*. 2005; Stanton 2011). The diet of the smaller, tropical *N. c. peninsularis* is poorly known, although Corbett *et al*. (2014) recorded mammal (4 spp.), bird (5 spp.), reptile (1sp.), fish (1sp.) and invertebrate (3 spp.) prey being consumed on the South Alligator River floodplain at Kapalga, Northern Territory. Dusky Rats *Rattus colletti*, Magpie Geese *Anseranas semipalmata*, beetles and other insects were the most common prey items there.

Here we describe the diet of *N. c. peninsularis* from Adolphus Island in the wet-dry tropics of northern Western Australia, The Kimberley islands have impoverished mammal faunas compared with the adjacent mainland (Gibson and McKenzie 2012), but larger islands closer to the mainland, such as Adolphus, can have two to seven species of native rodents. We therefore predicted that the Barking Owl would predominantly exploit rodents on this island.

A 12-day survey was undertaken in August 2008 on Adolphus Island (4138 ha), which is situated in the southern section of Cambridge Gulf, 35 kilometres north of Wyndham. The vegetation is dominated by open eucalypt woodlands, *Acacia* shrublands, grasslands and fringing, low-lying mud flats with extensive areas of mangal (mangrove swamp forest). Standard survey techniques were used to record the island's vertebrate fauna (details in Gibson *et al*. 2015).

A single Barking Owl was observed on three occasions roosting in a cluster of fig trees *Ficus atricha* (15°06'33"S, 128°09'07"E), under which seven fresh, egested pellets were found. The pellets were analysed and their contents quantified using standard techniques described by Debus and Rose (2003). Rodent skulls recovered from the pellets were lodged with the Western Australian Museum and their identification verified. Biomass of prey species was inferred from live animals captured during the survey and from the literature. We measured abundance of ground mammals in the dominant habitat types using baited Elliott traps set for four nights on four different trap lines across two sites on the island, for a total of 1040 trap-nights (Gibson and McKenzie 2012). At each site, two trap lines were in sloping, rocky areas (an *Acacia* wooded hillside with mixed tussock *Triodia* spp. and tall grasses *Sorghum stipoideum* and a treed creek system cut into a hillside with boulders on its upper slopes) and two were in flat areas with sandy soils (a *Eucalyptus*/*Melaleuca* woodland along a drainage line and an open grassland with scattered trees).

Rodent remains were found in all pellets; they comprised the Common Rock Rat *Zyzomys argurus*, Grassland Melomys *Melomys burtoni* and Western Chestnut Mouse *Pseudomys nanus* (Table 1). Overall, these rodents comprised 87% of the dietary biomass, with arthropods and birds being of minor significance. We live-trapped these three rodents, plus the Northern Quoll *Dasyurus hallucatus*, which was not represented in the pellets. The Common Rock Rat was the most abundant rodent, with 29 individuals being captured, whilst the Grassland Melomys and Western Chestnut Mouse were relatively uncommon, with three and two captures being made, respectively. Common Rock Rats were only caught in the rocky habitats, where they were moderately abundant (7.7 individuals per 100 trap nights) in the *Acacia* woodland sites and less abundant along the rocky creek lines (3.5 individuals per 100 trap nights). The other two rodent species were found in the sandy woodland and grassland habitats.

Table 1

Diet of a Barking Owl on Adolphus Island expressed as the minimum number of individual prey items, total prey biomass (g) and % biomass of prey. Values are mean ± standard deviation.

Prey Species	Mean mass (g)	Minimum no. of individuals	Total mass (g)	% Biomass of prey	Relative abundance of mammals (%)
Mammals					
Western Chestnut Mouse *Pseudomys nanus*	22.2 ± 6.9	1	22.2	6.1	5.4
Common Rock Rat *Zyzomys argurus*	37.5 ± 7.8	6	225.0	62.1	78.4
Grassland Melomys *Melomys burtoni*	69.1 ± 26.2*	1	69.1	19.1	8.1
Northern Quoll *Dasyurus hallucatus*	320.0 ± 74.6	-	-	-	8.1
Other prey					
Unidentified bird	20	1	20	5.5	
Grasshopper (Acrididae)	2	5	10	2.8	
Cricket (Gryllidae)	2	3	6	1.7	
Beetle (Coleoptera)	2	3	6	1.7	
Crab (Brachyura)	4	1	4	1.1	

* mostly sub-adults

Although our sample size of seven pellets, presumably from one owl, was very small, we speculate that Barking Owls on Adolphus Island probably took rodents in proportion to their abundance as recorded by live-trapping (Table 1). The apparent habitat separation between the Common Rock Rat and other rodents also suggests that the Barking Owl obtained its prey from a variety of contrasting habitats. The carnivorous Northern Quoll is potentially a dangerous prey item for a Barking Owl, although Oakwood and Spratt (2000) suspected that one took a radio-collared quoll at Kapalga. However, such an event appears to be uncommon, as Corbett *et al*. (2014) did not detect Northern Quolls in the 94 Barking Owl pellets that they collected over a 10-year period at that site.

Birds were scarce on Adolphus Island during the dry season, as there were few plants flowering and we found no fresh water. One potential prey animal was the large arboreal gecko, *Gehyra koira koira*, which was abundant on tree trunks and vertical rock faces on the island. This gecko weighs up to 14 grams and is up to 150 millimetres long (pers. obs.). Elsewhere on the mainland, Barking Owls take roosting birds and arboreal mammals from branches of trees, but there is little evidence that they prey on nocturnal reptiles (Higgins 1999).

Our study, whilst limited by the very small number of pellets obtained, is consistent with the observation by Debus *et al*. (2005) that Barking Owls rely on available mammalian prey. The mean live-capture rate of small- to medium-sized rodents on Adolphus Island was relatively low (3.3 individuals per 100 trap-nights), but the main prey species, the Common Rock Rat, was common in patches of suitable habitat. At Kapalga, Barking Owls exploited the larger Dusky Rat (30–250 g), which was generally in relatively high numbers in this more productive tropical floodplain site (Corbett *et al*. 2014). Collectively, these studies indicate that native rodents are a major prey of the Barking Owl in northern Australia.

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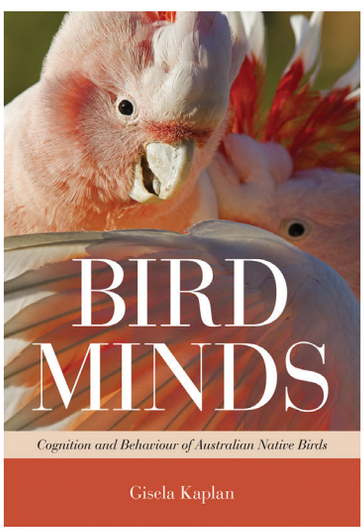
Book Review



Bird Minds:
Cognition and Behaviour of Australian Native Birds

Kaplan, Gisela T. 2015. CSIRO Publishing. Paperback 280 pp, black and white photographs, illustrations and tables, two appendices. ISBN: 9781486300181. RRP $45.00.

This book is an ambitious attempt to draw together a large body of research from a number of scientific disciplines, combined with a lifetime of personal experience, into a single volume book. The result lies somewhere between popular science and a scientific review, making some very complex issues accessible but not overly simplified. The breadth of topics covered is reflective of the author's own background in neurology, ornithology and wildlife care.

The first chapter sets the scene by describing the unique geological and evolutionary history of Australia that has shaped the biota we have today. What I first noticed was how much there is that we simply do not know – a common theme throughout the book. This is followed by eleven chapters describing various aspects of native birds' behaviour and ecology and the cognitive complexities required for each of these attributes. The subjects covered include foraging, tool use, nest building, play, mimicry, learning, emotions, communication and the ability to understand abstract concepts.

What is it that makes Australian birds unique and worth discussing in such depth? The first curiosity is the high number of cooperatively breeding species in Australia. It is with good reason that Australia has been dubbed the land of cooperative breeding i.e. birds that live and breed in groups. This is obviously a topic about which the author is passionate and a large part of the book is dedicated to these species. Secondly, Australian birds are relatively long-lived compared to most northern hemisphere birds. Lastly, there is good evidence that songbirds evolved in Australia before spreading across the globe. Despite all this, Kaplan points out, Australian birds are vastly underrepresented in scientific literature. For this reason, the author draws on examples from all over the world, including some from other taxa such as apes and humans, as well as drawing upon her own extensive experiences observing wild and rescued birds. Although these stories and anecdotes provide a lot of depth and interest to the book, many of them would be difficult to verify or replicate, a fact that should be taken into consideration when reading them. The author also selectively chooses references that promote her point and is often generous in the importance she gives to some studies or parts of studies that support her argument.

Behaviours are described very vividly, so that even without the drawings you can picture the birds acting them out. I am sure all of us can relate to many of the analogies drawn, such as cockatoos filling the role that monkeys occupy on other continents. Occasionally I found myself a little lost in the flow of the book, as there is a fair bit of 'jumping around', and I frequently found myself re-reading paragraphs or sentences. However, this happens less and less throughout the book as more concepts are explained. The final chapter provides a good summary of the rest of the book and goes some way towards answering the question we all want to ask – who is the 'smartest' bird of all?

This book is written for those with an interest in birds and bird behaviour, but without the means or knowhow to trawl through the huge body of pertinent scientific literature. If you enjoyed any of Kaplan's numerous earlier works (such as *Australian Magpie: Biology and Behaviour of an unusual Australian Songbird*; CSIRO Publishing 2004), you will certainly also enjoy this book.

Catherine Young