

Further dietary samples of the Eastern Barn Owl *Tyto javanica delicatula* from the eastern Australian arid zone

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Abstract. The diet of the Eastern Barn Owl *Tyto javanica delicatula* was quantified by pellet analysis from two sites in the eastern Australian arid zone: Mulyungarie Station pastoral property in north-eastern South Australia in June 2011 ($n = 47$ pellets and fragments), and Naree Reserve (a private conservation reserve) in north-western New South Wales in September 2022 ($n = 15$ pellets and fragments). The Owl's diet at Mulyungarie consisted, by number, of 98% mammals, 1% bird, 1% reptile and <1% insect, of which the introduced House Mouse *Mus musculus* formed 88% and native mammals 10% (4% dasyurids, 6% rodents) or, overall, 94% rodents. By biomass, mammals contributed 99% (House Mice 85%, native mammals 14%). The Owl's diet at Naree consisted, by number, of 99% House Mice and 1% insect (100% mice by biomass).

Introduction

The diet of the Eastern Barn Owl *Tyto javanica delicatula* (hereafter Barn Owl) is well known in Australia, particularly in the arid zone, with analyses continuing to be presented (Rees *et al.* 2019; Kutt *et al.* 2021; Kearney *et al.* 2022; Schoenefuss *et al.* 2024; Charley *et al.* 2025), though less so in the agricultural zone (Debus & Tsang 2023; McLaughlin & Debus 2025). Here we present the results from collections of Barn Owl pellets from two locations in the south-eastern arid zone: a pastoral property in north-eastern South Australia (Mulyungarie Station), and a conservation reserve in north-western New South Wales (Naree Reserve). A previous Barn Owl pellet sample from Mulyungarie in 1993 yielded only the invasive pest House Mouse *Mus musculus* (Palmer 2001). Correct nomenclature for the Owl here follows recent genetic data (see e.g. Debus & Tsang 2023 and McLaughlin & Debus 2025 for discussion and references).

Naree was a grazing property, since protected as a reserve for over a decade and embedded in a patchy network of other conservation reserves, some new or recent, e.g. Cuttaburra (Comeroo) and Brindigabba (Fitzsimons 2025), westwards to the South Australian border via the decades-old Sturt National Park, which has an active reintroduction program for small native mammals. Mulyungarie, adjoining the New South Wales (NSW) border, is located between conservation reserves (Boolcoomatta Reserve, Bimbowrie Conservation Park) to the south and several reserves to the north (Strzelecki Desert National Park, Innamincka Regional Reserve). This context suggests the possibility of owl pellets revealing small native mammals that might be recovering their regional populations as arid land is transferred from grazing to conservation (e.g. Debus *et al.* 2010). Rangeland grazing management (sheep and cattle) at Mulyungarie has enabled the endangered Plains-wanderer *Pedionomus torquatus* to persist and breed there (Debus *et al.* 2006) and on neighbouring Boolcoomatta Reserve (Gerhardy *et al.* 2025), an indicator of the health of the ground layer and its potential ability to support small native mammals.

Study area and methods

Mulyungarie Station (homestead at 31°33'S, 140°47'E), located ~100 km north-west of Broken Hill (NSW) in arid woodland and shrubland in the Broken Hill Complex bioregion, has been described elsewhere (Palmer 2001; Debus *et al.* 2006). A sample of Barn Owl pellets was collected by S. Cairns (Zoology, University of New England) from a roost in the north Mulyungarie huts in June 2011 (~20 km north-north-west of the homestead, approximately 31°21'S, 140°42'E). When collected, many of the pellets were starting to lose their dark mucus coating, so probably dated from the preceding months, though their age is uncertain because of the dry indoor roost situation. The pellets ($n = 47$ whole and some fragmented) were conveyed to the Ornithology Department at the Australian Museum, and pellet curation and dissection commenced by staff there. However, because of various interruptions in the process (COVID-19, staff leave and departure), analysis was suspended until completed by MCM late in 2025.

Naree Reserve is located ~150 km north-west of Bourke, NSW, in the Mulga Lands bioregion (homestead at 29°12'S, 145°03'E). The habitat is a mosaic of non-eucalypt arid woodland, eucalypt woodland on ephemeral watercourses and elsewhere, and shrubland, with ground cover of grasses and forbs especially after rain. During a 10-day bird survey in September 2022 (a wet year), SJSJ found a Barn Owl roost in a dead old-growth Bimble Box *Eucalyptus populnea* in the homestead paddock, confirmed as a Barn Owl when other members of the survey team accidentally flushed the Owl from its roost hollow in that tree in daylight. The pellets had spilled onto the ground at the hollow base of the trunk, and appeared fresh when collected. The pellets were stored at the University of New England during the aforementioned issues (COVID, Australian Museum staff movements), the intact pellets were measured and weighed, and eventually conveyed to the Australian Museum in early January 2026. Meanwhile, many of the pellets had become fragmented, as the fur therein had been partly eaten by tineid moth larvae. The

sample consisted of 15 whole pellets plus 47 g of fragments representing a further ~15 pellets.

The pellet contents from both sites were analysed, identified and collated by MCM, and the minimum number of prey individuals (MNI) quantified by body parts (e.g. skull and jaw count) as in previous papers on the Barn Owl (e.g. Debus *et al.* 2010). Mean or median body weights of prey were obtained from Menkhorst & Knight (2020) (mammals) or estimated. The surprising record of the Little Long-tailed Dunnart *Sminthopsis dolichura* (see Results) was identified by its dentition (number of cusps on dP³, i.e. stylar cusp D: see Kemper *et al.* 2011).

Results

Mulyungarie

The Barn Owl's diet at Mulyungarie consisted, by number, of 98% mammals: 88% House Mice, 10% native mammals (or 94% rodents, 4% dasyurids) with 1% bird, 1% reptile and <1% insect (Table 1). Overall, there were 1–11 prey items per pellet (mean 5.2 items/pellet): 0–11 House Mice per pellet (mean 4.6), and 0–3 native mammals per pellet (mean 0.4 per pellet, or 1.1 per pellet for only those containing native mammal). House Mice occurred in 95% of pellets, native mammals in 34%. By biomass, mammals contributed 99%, with House Mice contributing 85% and native mammals 14%. Also of note, among the native mammals, is the preponderance of the Dusky Hopping Mouse *Notomys fuscus*, which at 35 g, is a more rewarding prey item than the other native mammals (<20 g) except for one Plains Mouse *Pseudomys australis* (58 g). However, we have no data on the relative abundance

of the mammal species to elucidate any prey selection by the Owls. The number of House Mice per pellet suggests that those mice were abundant and many eaten may have been juvenile or immature.

Most of the native mammals are noteworthy for minor to significant range extensions (assuming that the Owl caught them on north Mulyungarie), and/or being threatened and declining: Little Long-tailed Dunnart well east of its known range at Port Augusta; dunnart *Sminthopsis cf. murina* marginal to its known range; Dusky Hopping Mouse known range south to the Strzelecki Desert and listed as Vulnerable; Sandy Inland Mouse *Pseudomys hermannsburgensis* irruptive though rare east of the Stuart Highway; and Plains Mouse known range west of Lake Torrens though recently rediscovered in far western NSW, and listed as Vulnerable (cf. Leggett *et al.* 2018; Menkhorst & Knight 2020).

Naree

The Naree pellet sample measured 25–38 × 21–29 mm (mean 28.7 × 25.0 mm) and weighed 2.1–3.8 g (mean 2.9 g). All pellets and loose material consisted entirely of the remains (skulls and jaws) of House Mice (MNI 44 in the pellets and 61 in the pellet debris, total 105 mice in the sample), except for an insect (probably grasshopper, Orthoptera) in one pellet. There were 1–4 mice per pellet (mean 2.9); the larger and heavier pellets tended to contain the remains of 3–4 mice and the smaller and lighter pellets 1–2 mice. No native mammals were found in the sample. Barn Owl diet at Naree was thus 99% House Mice by number, and 100% by biomass.

Table 1. Prey items from pellets of the Eastern Barn Owl collected at Mulyungarie Station (north-eastern South Australia) in June 2011 ($n = 47$ pellets and fragments) and Naree Reserve (north-western New South Wales) in September 2022 ($n = 15$ pellets and fragments). * = Introduced. Prey weights from Menkhorst & Knight (2020) for mammals, or estimated.

Prey species	Weight (g)	Mulyungarie	Naree
Fat-tailed Dunnart <i>Sminthopsis crassicaudata</i>	15	7	
Little Long-tailed Dunnart <i>Sminthopsis dolichura</i>	15	1	
Dunnart <i>Sminthopsis</i> sp. (<i>murina</i> group) ¹	20	4	
Subtotal dasyurids		12	
*House Mouse <i>Mus musculus</i>	18	246	105
Dusky Hopping Mouse <i>Notomys fuscus</i>	35	12	
Plains Mouse <i>Pseudomys australis</i>	58	1	
Sandy Inland Mouse <i>Pseudomys hermannsburgensis</i>	13	2	
Subtotal rodents		261	105
Total mammals		273	105
Small bird (Aves)	20	2	
Gecko (Gekkonidae)	5	2	
Cockroach (Blattodea) ²	1	1	
Insect (grasshopper Orthoptera?)	1		1
Total		278	106

¹Taxonomy of the Common Dunnart *S. murina* complex is unsettled

²Probably Australian Cockroach *Validiblatta australasiae*

Discussion

Overall, the predominance of small terrestrial mammals in the Barn Owl's diet at both sites is consistent with data from elsewhere in continental Australia, and with the dominance of House Mice in dietary samples from the eastern Australian agricultural zone (e.g. see Debus *et al.* 2004; Debus & Tsang 2023, McLaughlin & Debus 2025 for reviews). The data are also consistent with the view that the Barn Owl specialises on rodents, where and when relative prey availability permits, although showing dietary flexibility when rodents or small mammals are scarce (e.g. Debus *et al.* 2004, 2010; McDowell & Medlin 2009).

Mulyungarie

The Owl's diet at north Mulyungarie was more diverse than in a previous smaller sample of pellets ($n = 14$) from the main homestead area, at a more southerly and human-affected site (Palmer 2001), though similarly dominated by House Mice. No native mammals were recorded in the Owl's diet in the Palmer (2001) study, although he recorded that feral House Cats *Felis catus* there had eaten native mammals (dunnart sp., Bolam's Mouse *Pseudomys bolami*) as well as House Mice. The native mammals recorded in the present study may reflect the larger sample size, more remote northern locality, proximity to recently declared conservation reserves, and/or seasonal conditions.

Other studies of Barn Owl diet from the wider region (vicinity of Lake Frome) recorded a diet broadly similar to that in the present study, especially in terms of the dominance of House Mice and the minor presence of native mammals (dunnarts: Morton & Martin 1979; Debus *et al.* 2004). Barn Owl dietary samples from farther north in South Australia and adjoining NSW tend to record a greater diversity of native mammals, including various rodents, especially when drought suppresses the highly irruptive House Mouse (Morton & Martin 1979; McDowell & Medlin 2009). Notably, where Dingoes *Canis dingo* are not suppressed and thus able to control introduced predators (Cat, Red Fox *Vulpes vulpes*) of small native mammals, Barn Owls took mostly native rodents (>35 g) that were larger than the few House Mice captured. Smaller native mammals (<35 g) were also taken (Rees *et al.* 2019).

Historical collections of *Tyto* pellets from sites between the North Flinders Ranges and Lake Frome, up to the 1800s when House Mice were present, reveal a formerly much more diverse assemblage of 'critical weight range' (<5 kg) native terrestrial mammals in the region (Smith 1977), many of which are now wholly extinct or regionally extirpated (Menkhorst & Knight 2020). As well as highlighting the parlous state of the small terrestrial mammal fauna in the arid zone (~30% of those species now extinct), this situation raises implications for the prey base of the Barn Owl and other Australian raptors and owls in the Australian arid and semi-arid zones.

Naree

The pellets were one of the few far-western samples for NSW to date, in an area where native mammals may be expected, given the de-stocked reserve status of Naree

and Barn Owl dietary samples from adjoining states that did contain a variety of native mammals (Morton *et al.* 1977; Morton & Martin 1979; McDowell & Medlin 2009; Rees *et al.* 2019; Mulyungarie, this study). The dominance of House Mice in the Naree sample may reflect the proximity of the Owl's roost to human habitation, and the severe mouse plague that occurred in northern inland NSW in 2021, following above-average rainfall in 2021 that continued well above average in 2022 (Bureau of Meteorology data for Bourke; www.bom.gov.au). It may also reflect the state of habitat recovery at Naree from past sheep grazing, and Dingo suppression in the NSW rangelands (see above).

The absence of native mammals in the Naree sample is surprising, given that for instance the Long-haired Rat *Rattus villosissimus* can occur in some years within ~50 km south-east of Bourke (SJSJ pers. obs.). However, many native mammals in the Barn Owl's prey size range are extinct or declining in the NSW arid and semi-arid agricultural and pastoral zones, or their current ranges are marginal in the far north-west of the state (e.g. Menkhorst & Knight 2020). Future samples of Barn Owl pellets from Naree, especially in areas remote from the homestead, are desirable as the habitat continues to recover and thus potentially enable recovery of mammal populations, in tandem with fox and cat control.

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