Fauna survey of the Gawler Ranges (2022)

Searching for the sandhill dunnart in Gawler Ranges National Park and Conservation Park

Cover image:

Hummock of spinifex (*Triodia scariosa*) in sandy, mallee habitat.

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Acknowledgements

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Introduction

This report follows the methodology and expands the effort of a previous survey (Moseby & Lynch, 2020), which includes a more detailed background on sandhill dunnarts in the Gawler Ranges region. Key parts of the report are repeated below.

The Sandhill Dunnart (*Sminthopsis psammophila*) is a carnivorous marsupial nationally listed under the Australian *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* as Endangered. The species is distinguished from other dunnarts by a crest of blackish-grey hairs on the underside of the tail. The sandhill dunnart is thought to have significantly declined in range and is threatened by inappropriate fire regimes, habitat clearance and predation from introduced predators. Sandhill dunnarts are restricted to sand dunes and interdunes densely vegetated by large, domed *Triodia* hummocks, which are used by the dunnarts for both cover and nesting shelters (Moseby *et al.* 2016; Churchill 2001).

Triodia is a long-lived grass species that typically progresses through a range of growth forms in a cycle largely initiated and controlled by fire. Current research suggests that *Triodia* hummocks become suitable for sandhill dunnarts when at least some *Triodia* clumps grow to over 40 cm in height (Moseby *et al.* 2016). Breeding reliably occurs when *Triodia* cover is greater than 25% (Moseby *et al.* 2016). The optimum *Triodia* age since fire varies but is typically more than 20 years. Although sandhill dunnarts are generally not recorded in *Triodia* less than 10 years postfire, they have been recorded in high density in very old, senescing *Triodia* more than 60 years post fire (Moseby *et al.* 2016).

The Gawler Ranges was declared a National Park in 2002 and covers approximately 1,600 km^2 in the northern Eyre Peninsula. Sandhill dunnarts have not been previously recorded from the Gawler Ranges National Park (GRNP) nor the Crown Lands to the west of the GRNP. The nearest records are in the adjacent Pinkawillinie Conservation Park, where a small number of individuals have been found in the north western (2005 & 2006) and north eastern sections of the park (2011 & 2020). Foxes are managed through regular aerial and ground-based poisoning within GRNP, but there is no Government coordinated poisoning effort within the Crown Lands or Conservation Park region to the north-west of the GRNP.

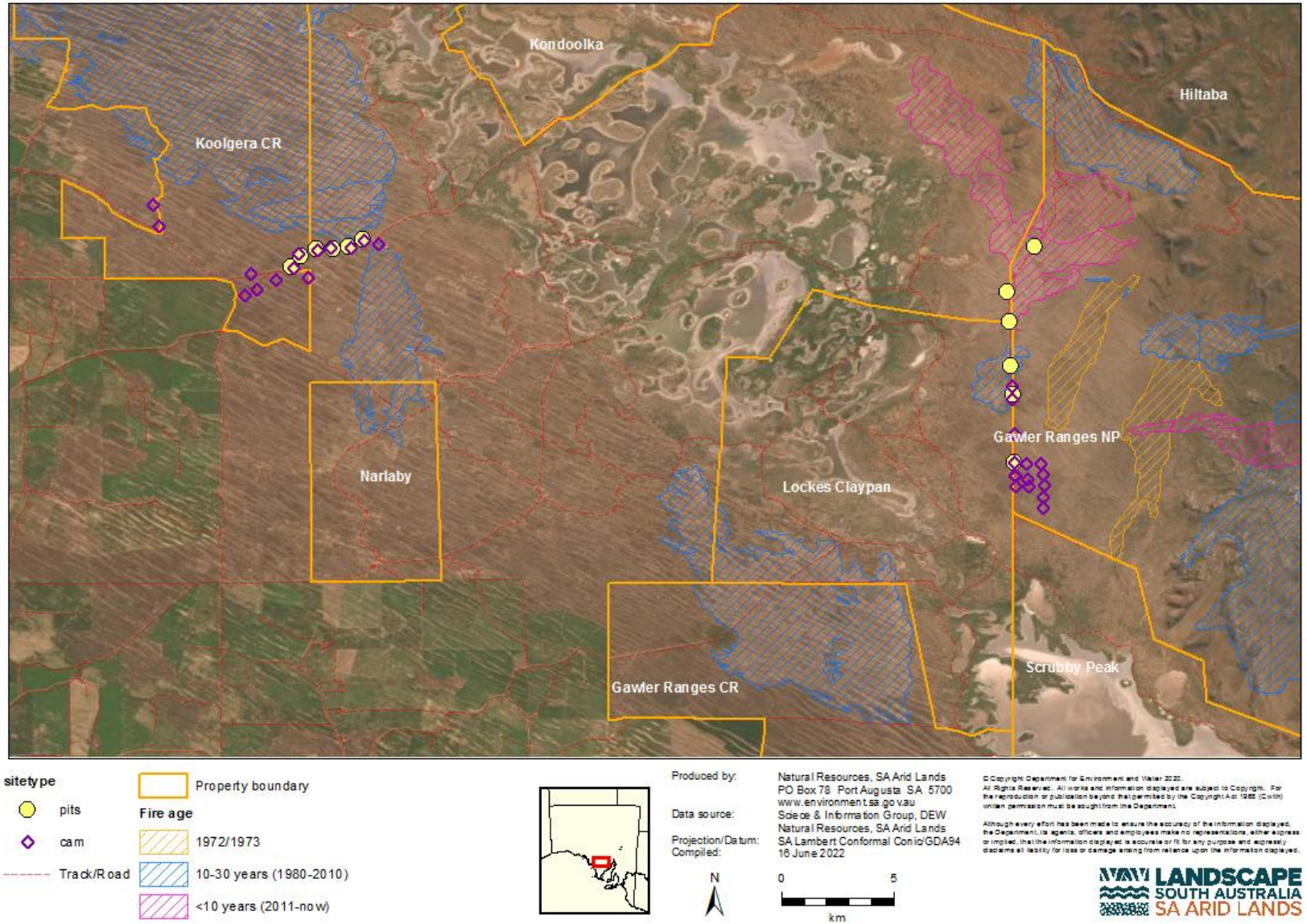


Figure 1. Locations of trap sites in 2022 in and adjacent to the Gawler Ranges National Park. Camera sites are indicated by purple diamonds and pitfall sites are indicated by yellow dots. Fire age is shown by the hatched colours.

Methods

Trapping

Two broad locations were established, with one in the north-west corner of the Gawler Ranges National Park (GRNP), where routine ground and aerial baiting for foxes occurs. Sites at this location were spread across a range of fire histories, from long unburnt to as recent as 2012. A further six sites were located to the north-west of the Gawler Ranges Conservation Park within crown lands (GRCL; Figure 2). This area is currently subject to a Crown license for primary production purposes. No systematic baiting programs occur in this area, which is long unburnt (>60 yrs).

Six sites were selected at each location (total sites = 12). Site selection involved searching for the largest, tallest *Triodia* hummocks on sand dunes. Trapping was conducted at each site for 4 nights (Figure 1). Each site comprised six pits, approximately 10 m apart, linked by flymesh fence. An alternating combination of deep (600 mm) and shallow (380 mm) pits (width = 225mm) were installed at each monitoring site. A toilet roll and small quantity of sand were placed in the pits to provide protection. Coopex insecticide powder was dusted around the top of the traps to deter ants.

Pits were installed and trapped between 23rd February to 3rd March 2022 by Alice Smith, Robert Brandle and Kristian Bell from the SA Arid Lands Landscape Board. Three Working on Country Rangers from the Gawler Ranges National Park and two volunteers also helped install sites. The moon phase was a waning crescent during the trapping period. Temperatures remained consistent throughout, with an average maximum of 32.5 °C and an average minimum 14.4 °C (Wudinna weather station) with no rain recorded across the survey period. All traps were checked within 3 hours of dawn each morning and all captures were released near their point of capture. Captures were identified to species level, sexed, checked for reproductive condition and weighed to the nearest gram.

Ten Elliott traps were also established for four nights at each of the six sites (total Elliott traps = 60) within the GRNP. These were set to trap any small mammals that might be present and was not targeted to sandhill dunnarts.

Triodia measurements

At each pitfall site, the height width (of live needles at widest part) and separation distance to the closest *Triodia* hummock (bushes with overlapping live needles were considered the same individual) were measured for the five *Triodia* hummocks closest to each pitfall trap. Five hummocks were measured either side of each pit along the pitfall line totalling 60 hummocks at each site. The average height and 90th percentile height was then calculated for each site and compared with sandhill dunnart captures.

Camera trapping

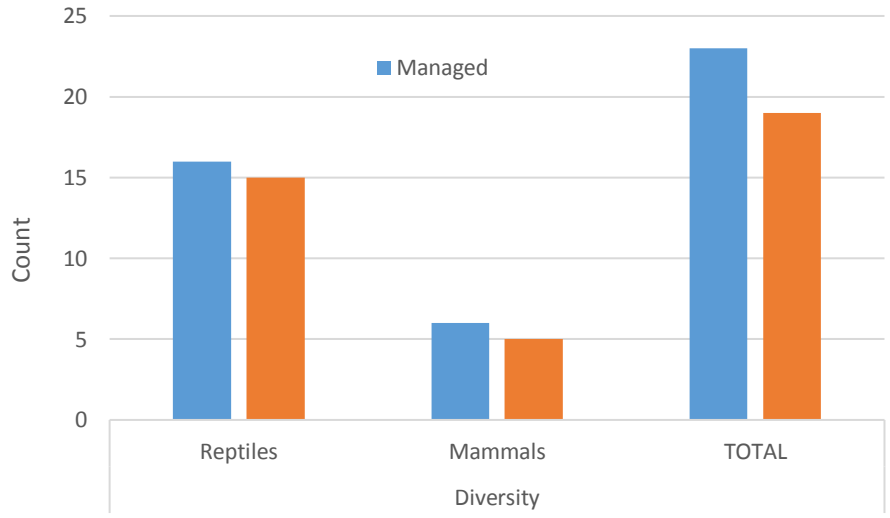
To identify critical core habitat for sandhill dunnarts, fifteen cameras were set within both the Gawler Ranges NP and the crown lands region and spaced a minimum of 500 m apart in areas of longitudinal dunes. Cameras were attached to steel star posts and faced directly towards the ground at a height of 1 m. A 30 cm length of 50 mm wide PVC pipe filled with peanut butter and oats was attached to the base of the dropper and fish oil was applied to adjacent substrate to act as a lure. Cameras were left in position for approximately 4 months.

Results

Trapping

One sandhill dunnart (M) was captured from a single site in the unmanaged GRCL (Figure 3). The individual was a sub-adult weighing 21g. The sandhill dunnart was captured at a long unburnt site more than 70 km from the next closest record (from Pinkawillanie CP in 2011). *Cercartetus concinnus*, *Notomys mitchelli and Sminthopsis dolichura* were the most common mammals captured (Table 1) and 24 species of reptile were also recorded. Both diversity and abundance of reptiles and mammals was greater within the feral predator-managed GRNP, with mammal abundance showing the largest divergence between the off-park Crown Lands sites (total number of mammals captured = 18) and the national park sites (total number of mammals captured = 48; Figure 2).

a)



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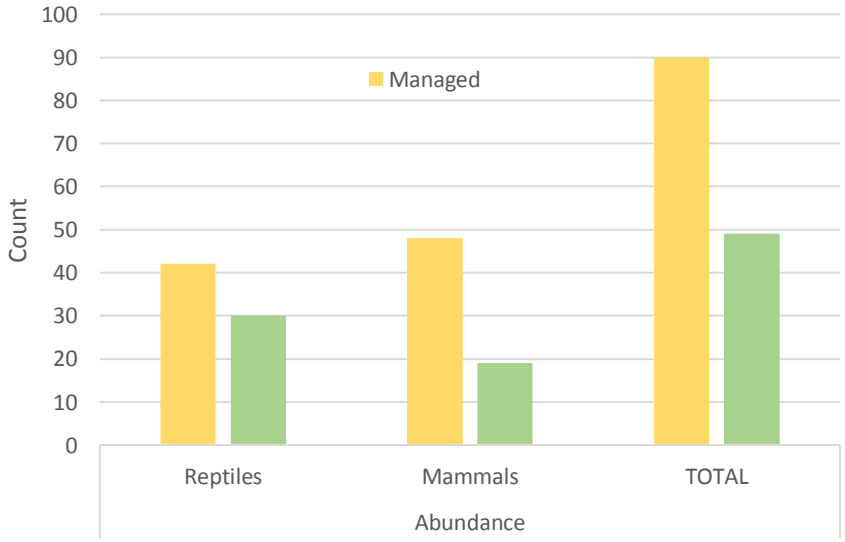

Figure 2. Reptile and mammal diversity (a) and abundance (b) between Gawler Ranges National Park (managed) sites and Gawler Ranges Crown Lands (unmanaged) sites.

Table 1. Mammal and reptile captures at pitfall and Elliott sites within the Gawler Ranges National Park (managed) and Gawler Ranges Crown Lands (unmanaged).

SPECIES LISTS	MANAGED	UNMANAGED	TOTAL
Aprasia inaurita	1	-	1
Beaded Gecko - Lucasium damaeum	1	-	1
Butler's Snake-eye - Morethia butleri	1	-	1
Crested Dragon - Ctenophorus cristatus	1	-	1
Desert Skink - Liopholis inornata	3	-	3
Desert Wood Gecko - Diplodactylus wiru	2	1	3
Diporiphora linga	-	1	1
Eremiascincus richardsonii	-	1	1
Goat (Feral Goat) - Capra hircus	1	-	1
House Mouse - Mus musculus	5	-	5
lialis burtonis	-	1	1
Little Long-tailed Dunnart - Sminthopsis dolichura	6	6	12
Lucasium stenodactylus	1	-	1
Mallee Dragon - Ctenophorus fordi	1	2	3
Mallee Snake-eye - Morethia obscura	-	1	1
Mitchell's Hopping-mouse - Notomys mitchellii	10	3	13
Myall Slider - Lerista edwardsae	1	1	2
Pseudomys hermannsburgensis	3	1	4
Pseudonaja modesta	1	-	1
Rhynchoedura eyrensis	2	5	7
Sandhill dunnart - Sminthopsis psammophila	-	1	1
Sandplain Ctenotus - Ctenotus schomburgkii	4	4	8
Southern Blind Snake - Anilios bicolor	1	-	1
Southern Ningaui - Ningaui yvonneae	8	-	8
Southern Spinifex Ctenotus - Ctenotus atlas	7	3	10
Southern Three-toed Slider - Lerista terdigitata	1	1	2
Spinifex Slender Bluetongue - Cyclodomorphus melanops	2	1	3
Starred Knob-tailed Gecko - Nephrurus stellatus	8	5	13
Stone Geckos - Diplodactylus vittatus complex (NC)	1	-	1
Thorny Devil - Moloch horridus	1	1	2
Western Bearded Dragon - Pogona minor	2	2	4
Western Pygmy-possum - Cercartetus concinnus	15	8	23
Grand Total	**90**	**49**	**139**

Figure 3. A single, male sandhill dunnart captured during the survey, with a characteristic black crest under tail.

Triodia measurements

Two species of *Triodia* (*T. scariosa* and *T. lanata)* occur within the study region and sandhill dunnarts have been recorded in association with either species. Sandhill dunnarts have been recorded in habitat supporting three species of *Triodia*; *Triodia lanata, T. bunicola* and *T. scariosa*. *Triodia* hummocks within the GRNP were taller and longer than those within the Crown Lands region, and were therefore considered more suitable for sandhill dunnart (Figure 5). However, while hummocks were smaller within the Crown Lands sites, the separation between hummocks was smaller and hummocks were more plentiful.

Figure 4. The survey team at a pitfall site in the Gawler Ranges NP. From left to right, Rob Brandle (DEW/SAAL), Lindsay Brown (DEW), Marcus Rohl (DEW), Alice Smith (SAAL), Sarah Butcher (DEW), Nadine Brown (volunteer) and Abbey Dean (volunteer).

Triodia height is considered an important predictor of suitable habitat for sandhill dunnarts (Moseby *et al.* 2015) with sites where the 90th percentile is over 40 cm being most suitable. The 90th percentile height of *Triodia* was over 40 cm, on average, at both sites (Table 2). As such, it is possible that all sites were broadly suitable based on hummock characteristics alone. However, no sandhill dunnarts were recorded in the areas with the highest/largest *Triodia*, and the single detection occurred at a site with the 2nd shortest *Triodia* (Figure 5).

Table 2. Average height, length, separation and 90th percentile height of *Triodia* hummocks at each trap site. Measurements are in cm.

SITES	HEIGHT	LENGTH	SEPARATION	90th	COUNT
Gawler Ranges NP	42	115	78	63	461
Gawler Ranges Crown Lands	30	78	70	45	472

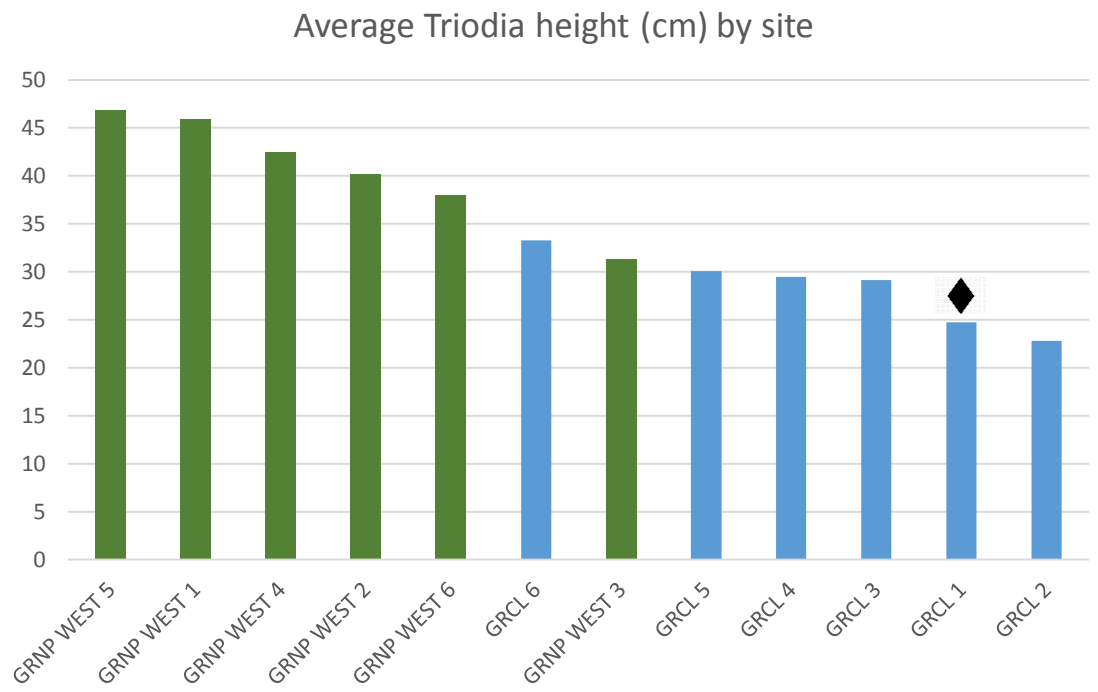

Figure 5. Average Triodia height at each pitfall site trapped over the survey. National Park sites are denoted green, off park sites are denoted with blue columns. The site of the sandhill dunnart capture is denoted by the black diamond.

Camera grids

The two camera sites comprising 15 cameras each (total cameras = 30) were left set in the field for 114 days. Detection rates of all animals was higher within the National Park (0.11 animals per trap night, total sightings = 297) compared to the Crown Lands (0.08, total sightings = 202). Regular fox control within the National Park appears to be effective, with considerably fewer observations of foxes compared to the Crown Lands (CL = 16, NP = 3). Conversely, more cats were observed within the National Park (CL= 3, NP = 8). Sandhill dunnart were observed at low levels in both the Crown Lands (3) and National Park (2).

Discussion and Management Implications

Overall, a total of 6 sandhill dunnarts were recorded, with 5 detections occurring through camera trapping, and one through pitfall trapping. This low catch rate (~0.001 per trap night) is characteristic of this elusive species, where trapping in apparently suitable habitat does not guarantee capture (Moseby and Lynch, 2020). The lack of target captures may therefore be due to the relatively low density/absence of sandhill dunnarts, greater trap avoidance of sandhill dunnarts compared to other mammals, or some other unmeasured habitat characteristic which rendered sites unsuitable.

No sandhill dunnarts were captured during pitfall trapping in the Gawler Ranges National Park despite some sites supporting patches of *Triodia* of suitable 90th percentile height. The National Park sites also covered a range of fire histories and there were numerous patches of healthy, high *Triodia* hummocks. Sandhill dunnarts prefer long-unburnt *Triodia* and high hummocks (Moseby and Lynch, 2020). However, a single sandhill dunnart was captured on unmanaged property, despite generally senescent, low *Triodia*. The low numbers of captures or observations of sandhill dunnarts make conclusions between preferred habitat types difficult. However, the locations of the few individuals that were recorded may represent a key link between populations >50 km to the NW and SE. We recommend further surveys in this area and genetic analysis of any future captures to ascertain the degree of connectivity, and consequently, potential population viability of sandhill dunnart in this region.

Data from pitfall and camera trapping also confirmed this species persistence outside fox managed zones, suggesting fox baiting may not benefit this species in this region. While we know little about the comparative predation pressure imposed by foxes and cats on sandhill dunnart, it is possible that the higher numbers of cat observations in areas where fox numbers are controlled, are offsetting any benefits in reduced fox abundance.

While not addressed in this survey, changes to historical fire regimes may have a negative impact on sandhill dunnart (Churchill, 2001). A section at the north east of Pinkawillinie Conservation Park, a reserve adjacent to Gawler Ranges National Park, is under consideration for implementation of a strip-protection burn in 2023 by DEW. Two sandhill dunnarts were recorded in this area during a 2018 survey, and also previously in 2011. We would recommend repeat surveys in this area to monitor the response of sandhill dunnarts and *Triodia* before and after a controlled burn.

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Appendices

Appendix 1. Photographic representation of species seen or trapped during the survey (Author provided). In order Pink-tailed worm lizard (*Aprasia inaurita*), mallee ctenotus (*Ctenotus atlas*), Southern shovel-nosed snake (*Brachyurophis semifasciatus*), broad-banded sandswimmer (*Eremiascincus richardsonii*), Burtons legless lizard (*Lialis burtonis*), central military dragon (*Ctenophorus isolepis*), mallee dragon (*Ctenophorus fordi*), southern ningaui (*Ningaui yvonneae*), dwarf bearded dragon (*Pogona minor*), ringed brown snake (*Pseudonaja modesta*), Goldfields spiny-tailed gecko (*Strophrurus assimilis*), thorny devil (*Moloch horridus*), western pygmy possum (*Cercartetus concinnus*), stone gecko (*Diplodactylus vittatus*).


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