

SPINIFEX BIODIVERSITY PROJECT

Milestone 3 report

May 2024



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1. Executive Summary

The Spinifex Biodiversity Project, started in May 2023, has been set up to improve the understanding of biodiversity in the Great Victoria Desert by integrating Anangu traditional knowledge and scientific techniques. In its first year, the project collected ecological data through field surveys and camera deployments, utilising helicopters and vehicles to access remote areas of Spinifex, with a focus on habitats of species like the Sandhill Dunnart, Malleefowl (Nganamarra), and Black-footed Rock Wallaby (Waru). Evidence of two species of conservation significance was recorded (Brush-tailed Mulgara, Striated Grasswren, Nganamarra). Despite the absence of sightings of Nganamarra, Waru, or Sandhill Dunnart, continued monitoring is planned. Spinifex Rangers received training, equipping them with skills in ecological surveys, the use of data collection applications, and the use of motion sensing cameras.

In addition to the focus on field ecology, data collected over the past decade by Spinifex Land Management has been consolidated into a single, accessible database, with the aim of improving data integrity and usability.

The project has faced challenges, primarily with the rescheduling of planned helicopter trips, but also in the learning required by staff to familiarize themselves with the technology and techniques utilised. Recommendations for the next phase include continuing ecological work in tandem with cultural projects using helicopters to access remote areas, finalizing and implementing a data management strategy, and providing ongoing training for staff.

2. Introduction

The Spinifex Biodiversity project aims to enhance the understanding of biodiversity across the Great Victoria Desert by combining Anangu knowledge and cultural tracking, with scientific survey techniques. The traditional and historical knowledge of a range of species will be documented and surveying will be conducted for Malleefowl (Nganamarra), Sandhill Dunnart, and other threatened fauna. Data collected by Spinifex Land Management, including from the preceding 10 years, will be collated and managed in an appropriate database.

The project commenced in May 2023, and during the first 12 months a range of information was collected and recorded, including records of several threatened fauna species. The training of Spinifex Rangers was completed, and several cultural field trips were conducted on country. It is proposed that the next stage of the project builds on the information collected to date, by conducting similar methodology across a wider area. This report summarises the activities undertaken and results to date.

3. Methodology

Works methodology included both a field ecology component and a spatial ecology component.

3.1. Field Ecology

Field ecology methodology focused on field surveys and use of motion cameras. For field surveys, this included:

- using a helicopter and several vehicles, a community field survey across a large part of Spinifex country;
- showing Anangu the habitats for Sandhill Dunnart and Long-tailed Dunnart;
- Nganamarra walks, inspecting known Nganamarra habitat, and recording data into Fulcrum;
- trialling a search for Nganamarra nests via drone;
- searches for other threatened fauna including Waru (Black-footed Rock Wallaby), Brush-tailed Mulgara, and Striated Grasswren;
- collection of opportunistic fauna records; and
- fire training.

The use of motion cameras included:

- training in the use and deployment of motion sensing cameras, including how to set up and check cameras;
- Fulcrum (GIS mobile data collection software) training for recording locations and status of cameras;
- deployment and collection of cameras across the Spinifex IPA; and
- camera images to identify species reviewed by Anangu or by the field ecologist and loaded back into the data management system.

3.2. Spatial Ecology

Spatial ecology data has been collected in the Great Victoria Desert by Spinifex Land Management for over 13 years. A range of people have collected the data using a varied methodologies. In the first phase of the Spinifex Biodiversity Project, we have been working towards the following goals:

- data familiarisation with historical data, and liaison with ex-personnel that were familiar with the historical ecological data collected;
- data collation and data cleaning/tidying – historical data has been, and continues to be, collated, validated and standardised with the aim of compiling all data in a single location/software system.
- database and/or data storage construction and development – some preliminary investigations have been made into a range of data management systems. A chosen system will need to, at least:
 - o be compatible with all spatial data types collected (primarily point records and photographs in this instance, but may also include information in the form of track or polygon data, or oral histories);

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- ensure that users enter base data for each record (e.g. date, location, data type etc.) or, ideally, apply these fields automatically;
 - allow easy integration between field personnel (both trained and untrained) and the backend database. The team is mindful of the balance between the need for scientific rigour and standards and a system that can be embraced easily by on-ground personnel;
 - be functional in the field for periods without data connection (i.e. away from WiFi or internet networks);
 - enable multiple users to be on the system at any one time;
 - be adjustable and mouldable to changing field needs;
 - enable the export of data to be done in the simplest manner possible;
 - allow the export of all data in a form that could be readily transferable to an alternative system, should the need arise (i.e. to ensure future-proofing); and
 - if possible, allow field users to view simple summaries of data collected and interrogate the database with a minimum of technical expertise.

Once the system is selected and adapted to Spinifex Land Management activities, Spinifex Land Management's spatial ecology data (including all historical data) to be reviewed, cleansed, and loaded to the system.

4. Results

4.1. Field Ecology

On-Country Trips

Several on country field trips were conducted with the Spinifex Rangers in the first twelve months of the project. These comprised:

1. **June/July 2023:** A community field survey across a large part of Spinifex country, with the use of a helicopter and several vehicles. 12 cameras deployed and 16 cameras were collected from a previous deployment.
2. **August 2023:** Deployment of 2 cameras.
3. **September 2023:** Two weeks spent deploying 21 cameras within Sandhill Dunnart and Long-tailed Dunnart habitat, and collecting cameras previously deployed. Spinifex Rangers surveyed for Ngan̄amara, inspected known Ngan̄amara habitat and trialled a search using a drone. Searches for other threatened fauna, including Waru (Black-footed Rock Wallaby), Brush-tailed Mulgara, and Striated Grasswren were conducted.
4. **March 2024:** Collection of deployed camera.
5. **May 2024:** Collection of deployed camera
6. Ongoing smaller trips by Spinifex Rangers conducting traditional burns, removing feral cats and camels, deploying cameras, and recording other fauna opportunistically sighted.



Figures 1 & 2: Camera establishment with Spinifex Rangers



Figures 3 & 4: Camera establishment with Spinifex Rangers (continued)



Figures 5 & 6: Sandhill Dunnart habitat; Old, inactive Malleefowl mound



Figures 7 & 8: Example of a Lesser Stick-nest Rat (Tjualpi) Nest found by the rangers; the floor of a cave covered with Macropod scats including Waru.

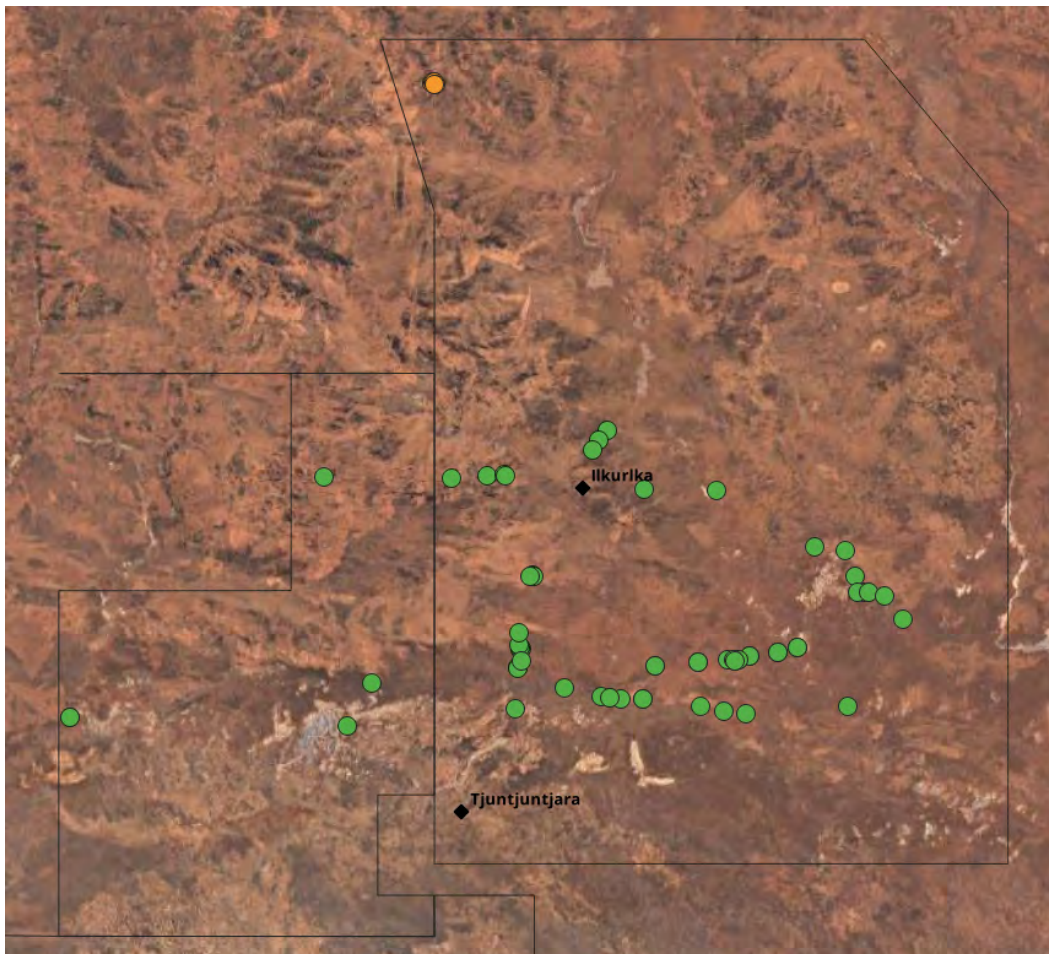


Figure 9: Map of deployed camera locations current at end of May 2024. Green locations indicate that the camera has been collected, while orange locations indicate the camera is still in the field.

Observed Fauna

A wide range of fauna was recorded throughout the region, including several threatened species and feral animals noted.

Table 1 indicates the three species of conservation significance which were recorded. A full list of fauna species recorded on motion sensor cameras is provided in Appendix 5.

Table 1: Summary of Species of Conservation Significance Recorded

Common Name	Species Name	Biodiversity Conservation (WA) Status	Act	EPBC Act (Cwlth) Status	Certainty	Notes
Malleefowl (Ngaṇamara)	<i>Leipoa ocellata</i>	Vulnerable		Vulnerable	Known or Likely to occur	Tracks recorded in one location, old mound (no activity) recorded.
Brush-tailed Mulgara (Murtja)	<i>Dasycercus blythi</i>	Priority 4: Rare, Near Threatened & other species in need of monitoring		Not Listed	May Occur	Three active burrows recorded, and the species recorded on camera at one of these burrows
Striated Grasswren	<i>Amytornis striatus</i>	Priority 4: Rare, Near Threatened & other species in need of monitoring		Not Listed	Known or Likely to occur	One breeding pair and one chick observed within long-unburnt spinifex grassland on the Lost Sands track

Spinifex Rangers are very familiar with Ngaṇamara and its distinctive tracks and mounds. Two known areas were visited, and while old mounds and excavations were observed, no recent evidence of Ngaṇamara was recorded. At a separate location, Ngaṇamara tracks were recorded (see Figure 20). The Sandhill Dunnart was not recorded, however a number of cameras have only recently been collected and are yet to be reviewed, with review of images to be done by Aṇangu, or the field ecologist.

Opportunistic records were taken of a range of fauna, including birds, reptiles, and mammals. Spinifex rangers located several old nests constructed by the Lesser Stick-nest Rat (Tjualpi) and old scats attributable to the Waru (Black-footed Rock Wallaby). Several feral cat scats were collected from a remote part of the Northern Spinifex area and since this area has not been surveyed before, the scats were sent to a specialist to identify the prey remains within the scats (likely to detect a range of locally occurring fauna).



Figures 10 & 11: Examples of species recorded on camera: Feral Cat, Camel



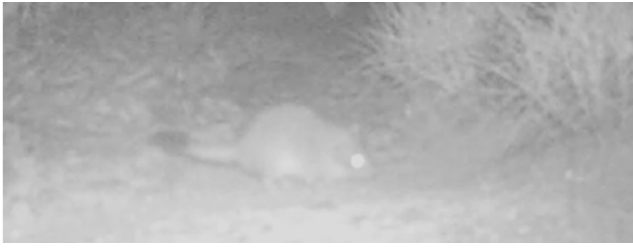
Figures 12 & 13: Examples of species recorded on camera: Sand Goanna; Red Fox



Figures 14 & 15: Examples of species recorded on camera: Western Grey Kangaroo, Spinifex Hopping Mouse



Figures 16 & 17: Examples of species recorded on camera: Grey Butcherbird; Thorny Devil



Figures 18 & 19: Examples of species recorded on camera: Brush-tailed Mulgara.

Figures 20: Recorded Nganmara tracks

Scat Analysis

Several predator scats were collected and sent to specialists to identify the prey remains within the scats. Analysis from Scats About detected remains of Brush-tailed Mulgara, Spinifex Hopping-mouse, Sandy Inland Mouse, Desert Mouse, Rabbit, Blue-tongue (*Tiliqua* sp), and a range of other reptiles and invertebrates. Genetic analysis by Curtin University detected remains of Brush-tailed Mulgara, Fat-tailed Pseudantechinus, Hairy-footed Dunnart, Ooldea Dunnart, House Mouse, Rabbit, Chestnut-rumped Thornbill, Splendid Fairy Wren, and Little Button-quail.

Other Outcomes

A_{ng}u gained experience in the use of field equipment (firearms, 4WD, cameras, Fulcrum) and familiarity identifying the habitats supporting threatened fauna. During the 12 months, A_{ng}u also conducted feral animal control, with a focus on Camels. 20 Motion Sensor Cameras and 19 SD cards were purchased.

4.2. Spatial Ecology Results

A summary of works completed to date includes:

Data Collection and Management Platform

After a review of Pila Nguru's data requirements, the mobile data collection platform Fulcrum developed by Spatial Networks, Inc., was identified as the candidate most likely to meet these requirements. Fulcrum had been used by Pila Nguru staff and reportedly is also used for the collection of ecological information and geospatial mapping by other similar organisations. The platform allows users to create applications to guide users through standardised data collection forms.

With this in mind, Pila Nguru conducted a review of the existing data-collection applications on Fulcrum to determine which were redundant, which could be reused, and which could be adapted. Over the last 12 months, many old applications have been decommissioned, several have been revitalised, and some have been created from scratch. Throughout this process, the organisation sought to strike the right balance between the accessibility requirements of all the users, and the need to capture data of sufficient quantity and quality. There are now 13 apps that are actively used. These include applications designed to record and monitor Ngan̄amara and other threatened species, track the removal of feral animals, conduct cool burns and conduct vehicle checks. These applications have become essential to the day-to-day work of the Ranger teams, as well as to their ability to monitor and protect threatened species. Review of the applications remains ongoing.

Pila Nguru also conducted a wider review into the data management strategy at the organisation. A draft data management strategy has been developed to meet the data requirements outlined above. The strategy broadly involves data collection using Fulcrum, storage and analysis using Esri's ArcGIS products, then access and use in the field via Fulcrum. Below is a visual representation of the draft data architecture:

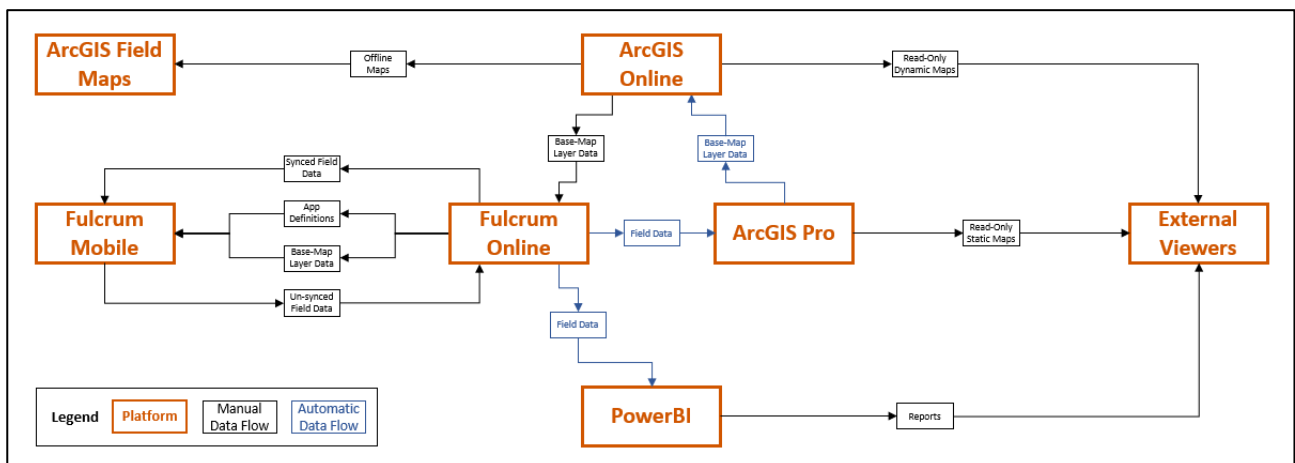


Figure 21: Draft plan of Data Architecture

This draft strategy has partially been implemented. It will be further developed and implemented in subsequent phases of the project in consultation with the spatial data ecologist.

Historical Spatial Data Review and Cleanse

Over the first 12 months of this project, Pila Nguru has amalgamated spatial data collected over the last 13 years from multiple different sources. These data had been collected by multiple people over the years, and with various data collection methods. They capture a wide variety of information types, including everything from cultural sites to animal sightings to road hazards to lunchbreak spots. The disparate nature of this historical data collection, along with the lack of any formalised or enduring data strategy, has led to a data ecosystem that requires significant cleansing and organisation.

After amalgamating what appears to be the bulk of the spatial data, Pila Nguru commenced the data cleansing process. This included removing duplicates and archiving data which cannot be interpreted or

utilised. The next step in the process, which is currently underway, is to 'ground-truth' each of the historical data points to ensure the data that has been captured reflects the cultural, geographical and ecological reality on the ground.

5. Discussion

The first 12 months of the Spinifex Biodiversity Project has been an insightful, constructive and impactful process for Pila Nguru. The positive outcomes delivered so far have been:

- the opportunity to visit culturally and ecologically important locations, often very remote, in the field;
- a better understanding of the depth and breadth of information held by the organisation;
- more clarity about the data and ecological challenges faced by the organisation;
- a clearer picture of where the organisation wants to move towards;
- improved ecological capabilities, driven by training, experience and consultation with experts;
- improved technological capabilities;
- a refreshed technology landscape that has improved the organisation's ability to store and process ecological information;
- a better understanding of the ecological landscape in the Spinifex lands; and
- an enhanced ability to protect this ecological landscape into the future.

Despite these strong positive outcomes however, there have also been challenges. These include:

- significant time and effort required to discover, collate and cleanse data from the various sources;
- significant time and effort required to design and begin implementing the draft data strategy;
- difficulty identifying and extracting enough ecological data to enable meaningful analysis given the current state of the data available;
- difficulty allocating enough time to derive maximal benefit from the project, given the capacity constraints facing Pila Nguru staff;
- a lack of direct staff experience with the utilised technologies, resources and methods;
- a lack of formal training opportunities; and
- difficulty accessing some of the targeted habitats given their extreme remoteness, especially for elderly staff.

There have been several key lessons learned through the process so far. These lessons offer key insight into how the rest of the project should be run.

1. Completing ecological work in tandem with other types of work is a great way to drive outcomes across multiple areas and appeal to a diverse pool of staff.
2. The absence of a comprehensive and well-designed data strategy at the organisation level lead to a data ecosystem that is disparate, unclean and very difficult to use.
3. A lack of expertise and capacity among staff leads to either excess time being spent on solutions, or practical workarounds being used that can create further difficulties down the track.

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4. Engaging experts in the design and implementation of a data strategy will be key to ensuring that a robust, fit for purpose system can be developed, implemented and maintained into the future.
 5. Ongoing training is required for staff to drive the outcomes of the project.
 6. Access to a helicopter will make many of the extremely remote habitats of interest significantly more accessible to a wider variety of stakeholders.
 7. Streamlining and improving the data management system will greatly improve the organisation's ability to derive meaningful ecological data insights.

6. Recommendations

Based on the lessons learned outlined above, a set of four recommendations have been developed for Stage 2 of the project:

1. Ecological work should continue to be conducted in tandem with other Spinifex land management work to ensure that wide ranging positive outcomes can be delivered and a diverse set of stakeholders can remain engaged.
2. A robust and fit for purpose data management strategy should be developed and implemented through consultation with relevant experts and stakeholders.
3. Guidelines should be put in place and training delivered to ensure that Pila Nguru staff are empowered to adhere to the data management system, regardless of staffing changes in the future.
4. Helicopter trips should continue to be funded to ensure extremely remote locations are accessible to all the relevant stakeholders and with all necessary equipment.

It is believed that implementing these recommendations will best enable the desired outcomes to be delivered.

6.1. *Field Ecology*

The following activities are proposed for the next six months:

- data from cameras collected in March and May 2024 will be reviewed;
 - helicopter trip to access remote areas of Spinifex lands
- cameras installed in remote parts of the northern Spinifex area during September 2023 are to be collected and reviewed via helicopter in June 2024;
- additional cameras to be deployed within habitat potentially supporting conservation significant fauna, particularly the Sandhill Dunnart in June 2024; and
 - Further searches for Nganamarra and other threatened fauna will be undertaken.

6.2. *Spatial Ecology*

- continuing the data organisation of historic geospatial data;
- developing and building a data management system for Spinifex Land Management species data;
and
- ensuring animal data captured on cameras is stored appropriately according to the data management strategy.

Appendix 1 Expenditure Report Against Budget

The timing of the first payment (received in May 2023) did not align with planned field activities and availability of ecologists to enable expenditure in the 2022-23FY. As such, Pila Nguru proposed to carry these funds forward into the 2023-24 FY and allocate according to budget figures in Table 2.

Table 2: Project expenditure against budget 2023-2024

2023-2024	Budget	YTD 1 June 2024
Income		
Unexpended grants carried forward	\$80,000	\$80,000
Grant income	\$160,000	
Total income	\$240,000	
Expenses		
Wages		
Spatial ecologist	\$43,900	
Field ecologist	\$6,000	
Oncosts	\$18,900	
Operations		
Consultants spatial and field ecologists		\$30,253.64
Administration	\$11,200	\$25,083.30
Operations	\$100,000	\$3,883.87
Total expense	\$240,00	\$59,220.81
Net profit		(\$20,779.19)

Appendix 2. Proposed Plan for Year 2 Including Budget

Proposed plan for 1 May 2024 to 30 June 2024.

The following activities are planned for the next year. As surveys supported by a helicopter were delayed are requesting an extra 6 months to be complete the project.

1. Helicopter assisted ecological field trip 1 – June 2024
2. Helicopter assisted ecological field trip 2 – May 2025
3. Cameras deployed and collected; data analysed.
4. Spatial ecologist employed to design database system for Pila Nguru staff to manage ecological data.
5. Field ecologist employed for field work, and analysis of results.
6. Pila Nguru and ecologist map Stage 2 of the project.

Budget

Table 3: Project expenditure against budget 2024-2025

Income 2024-2025	
Carry forward	\$20,779.19
Milestone 2 payment	\$80,000
Milestone 3 payment	\$80,000
Milestone 4 payment	\$80,000
Total	\$260,779.19
Expenses	
Ecologists	\$60,000
Helicopter	\$120,000
Operations	\$50,000
Administration	\$11,000
Total	\$241,000

Appendix 3. All fauna species recorded on motion-sensor cameras

Table 4: All Fauna species recorded on motion-sensor cameras

Common Name	Species Name
Spinifex Hopping Mouse	Notomys alexis
Sandy Inland Mouse	Pseudomys hermannsburgensis
Desert Mouse	Pseudomys desertor
House Mouse	Mus musculus
Little Long-tailed Dunnart	Sminthopsis dolichura
Hairy-footed Dunnart	Sminthopsis hirtipes
Dunnart Species	Sminthopsis sp.
Brush-tailed Mulgara*	Dasycercus blythii
Ningau	Ningau sp.
Western Grey Kangaroo	Macropus fuliginosus
Camel	Camelus dromedarius
Fox	Vulpes vulpes
Cat	Felis catus
Dingo	Canis familiaris
Rabbit	Oryctolagus cuniculus
Thorny Devil	Moloch horridus
Sand Goanna	Varanus gouldii
Knob-tailed Gecko	Nephurus laevis
Crested Bellbird	Oreoica gutturalis
Yellow-throated Miner	Manorina flavigula
Little Button-quail	Turnix velox
Grey Butcherbird	Cracticus torquatus
Australian Owlet Nightjar	Aegotheles cristatus
Crow	Corvus sp.
Pied Butcherbird	Cracticus nigrogularis
Black-faced Woodswallow	Artamus leucorhynchus
Willie Wagtail	Rhipidura leucophrys
Echidna	Tachyglossidae sp.
Grey-fronted Honeyeater	Ptilinopus plumula
Singing Honeyeater	Gavicalis virescens
Jacky Winter	Microeca fascians

Chestnut Quail-thrush	<i>Cinclosoma castanotum</i>
Grey Shrike-thrush	<i>Colluricincla harmonica</i>
White-browed Babbler	<i>Pomatostomus superciliosus</i>
Splendid Fairy Wren	<i>Malurus splendens</i>
Pygmy Desert Monitor	<i>Varanus eremius</i>
Black-headed Monitor	<i>Varanus tristis</i>
Dwarf Bearded Dragon	<i>Pogona minor</i>
Desert Skink	<i>Liopholis inornata</i>
Western Blue-tongue	<i>Tiliqua occipitalis</i>