



**Baseline Environmental  
Investigations**  
Atacama Project

# Baseline Environmental Investigations Atacama Project

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Prepared by EBS Ecology for Iluka Resources Limited

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## GLOSSARY AND ABBREVIATION OF TERMS

AW NRM	Alinytjara Wilurara Natural Resource Management
BDBSA	Biological Database of South Australia (maintained by DEW)
BOM	Bureau of Meteorology
CP	Conservation Park
DEW	Department for Environment and Water (formerly known as DEWNR)
DotEE	Department of the Environment and Energy (formerly DSEWPC)
EBS	EBS Ecology
EIS	Environmental Impact Statement
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
GDE	Groundwater Dependent Ecosystem
GPS	Global Positioning System
Ha	Hectares
IBRA	Interim Biogeographic Regionalisation for Australia
Iluka	Iluka Resources Pty Ltd
JA	Jacynth-Ambrosia
ML	Mineral Lease
MNES	Matters of National Environmental Significance
NPW Act	<i>National Parks and Wildlife Act 1972</i>
NRM	Natural Resources Management
NVIS	Native Vegetation Information System
<i>Pers. Comm</i>	Personal Communication
PFS	Pre-feasibility Study
PMST	Protected Matters Search Tool
Project Area	The area defined by purple line on all maps in this report
The Project	Development of a high grade zircon deposit in the Eucla Basin, South Australia
PUA	Pastoral Unincorporated Area
Regional Study Area	Area External to the Study Area
RR	Regional Reserve
SA	South Australia/South Australian

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SEB	Significant Environmental Benefit
SKM	Sinclair Knight Merz (now known as Jacobs)
Study Area	50 Km buffer from the Project Area
TEC	Threatened Ecological Community
VA	Vegetation Association



## EXECUTIVE SUMMARY

Iluka Resources Pty Ltd (Iluka) are undertaking a Pre-Feasibility Study (PFS) into the development of a high grade zircon deposit located in the Eucla Basin, South Australia (the Project). This satellite deposit is named Atacama and is located adjacent to Iluka's operating mine Jacinth-Ambrosia. Atacama is located approximately 800 kilometres north-west of Adelaide and 270 kilometres from the Port of Thevenard.

EBS Ecology were engaged by Iluka to conduct a review and update of previous baseline ecological desktop studies conducted within the Atacama Project Area and its surrounds. The specific aims of the review are to:

- Provide a review of the existing database records for State and National flora and fauna species and communities within 50km of the Project Area;
- Identify, describe and map National and State flora and fauna species and ecological communities of conservation significance relevant to the Project Area to enable ecological evaluation by State (*National Parks and Wildlife (NPW) Act 1972*) and Commonwealth regulators (*Environment Protection and Biodiversity Conservation (EPBC) Act 1999*);
- Provide an overview of the vegetation communities, flora and fauna species habitat types recorded in previous baseline activities; and
- Identify key ecological knowledge gaps for the Project Area.

This desktop assessment has reviewed all existing reports and databases detailing the ecology of the Atacama Project Area and surrounding areas. The primary conclusions from this report with respect to the EPBC Act and NPW Act are:

- The vegetation communities in the Project Area are dominated by mallee associations, especially in the north, however, *Acacia*, *Alectryon* and *Casuarina* Woodlands and *Senna* and chenopod Shrublands are present in the south. The quality of vegetation within the Project Area was excellent;
- None of the vegetation communities are listed as Threatened Ecological Communities (TECs) under the EPBC Act or under the Provisional list of threatened ecosystems of South Australia;
- One Nationally threatened flora species; *Hibbertia crispula* (Ooldea Guinea Flower) may occur within the Project Area despite its failed detection during the 2014 assessment. This species was however observed during the 2014 assessment within 1.5 km of the Project Area's northern boundary;
- Two Nationally threatened fauna species are known to have occurred in the Project Area. The Sandhill Dunnart (*Smithopsis psammophila*) was captured within the Project Area in 2014, while in-active Malleefowl (*Leipoa ocellata*) mounds were also recorded. All other Nationally threatened fauna species have a very low likelihood of occurring within the Project Area, however, the potential presence of Princess Parrots (*Polytelis alexandrae*) and Night Parrots (*Pezoporus occidentalis*) cannot be ruled out;

- One migratory fauna species; the Fork-tailed Swift (*Apus pacificus*) could occur within the Project Area;
- Three State threatened flora species were recorded in the Project Area in 2014: *Calotis lappulacea* (Yellow Burr-daisy), *Gratwickia monochaeta* and *Melaleuca leiocarpa* (Pungent Honey-myrtle). An additional three State threatened flora species may occur within the Project Area based upon the presence of suitable habitat;
- Five State threatened fauna species (that are not also Nationally threatened) were recorded in the Project Area in 2014: Australian Bustard (*Ardeotis australis*), Peregrine Falcon (*Falco peregrinus*), Restless Flycatcher (*Myiagra inquieta*), Scarlet-chested Parrot (*Neophema splendida*) and Southern Marsupial Mole (*Notoryctes typhlops*), while the Scarlet-chested Parrot was also observed within the Project Area in 2017. A further four State threatened fauna species could occur within the Project Area based upon the availability of habitat;
- Four exotic flora species: *Acetosa vesicaria* (Rosy Dock), *Brassica tourneforti* (Wild Turnip), *Sonchus oleraceus* (Common Sow-thistle) and *Carrichtera annua* (Ward's Weed) were recorded in the Project Area. However, none of the weed species recorded were widespread; and
- Five introduced fauna species were recorded over the Project Area: House Mouse (*Mus musculus*), Rabbit (*Oryctolagus cuniculus*), Red Fox (*Vulpes vulpes*), Cat (*Felis catus*), and One-humped Camel (*Camelus dromedarius*).

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# 1 INTRODUCTION

## 1.1 The Project

Iluka Resources Pty Ltd are undertaking a Pre-Feasibility Study (PFS) into the development of a high grade zircon deposit, named Atacama (the Project), situated in the Eucla Basin, South Australia. Atacama is located adjacent to Iluka's operating mine Jacinth-Ambrosia, approximately 800 kilometres north-west of Adelaide and 270 kilometres from the Port of Thevenard (Figure 1).

## 1.2 Project Area

The Project Area is defined by the polygon bounded in purple (Figure 1; Figure 2) below. It is located adjacent to Iluka Mineral Lease 6315 and falls within exploration lease 5198. The Sonoran Project Area is located to the south east of the Project Area.

The Study Area (yellow polygon) for the desktop component of the baseline investigation (i.e. database searches, review of existing biological surveys, data and mapping) included a 50 km buffer from the boundary of the Project Area (Figure 2).

## 1.3 Objectives

EBS Ecology were engaged by Iluka to conduct a review and update of previous baseline ecological desktop studies conducted within the Atacama Project Area and its surrounds. The primary objectives of the baseline investigation are to:

- Provide a review of the existing database records for State and National flora and fauna species and communities within 50km of the Project Area;
- Identify, describe and map National and State flora and fauna species and ecological communities of conservation significance relevant to the Project Area to enable ecological evaluation by State (*National Parks and Wildlife (NPW) Act 1972*) and Commonwealth regulators (*Environment Protection and Biodiversity Conservation (EPBC) Act 1999*);
- Provide an overview of the vegetation communities, flora and fauna species habitat types recorded in previous baseline activities; and
- Identify key ecological knowledge gaps for the Project Area.

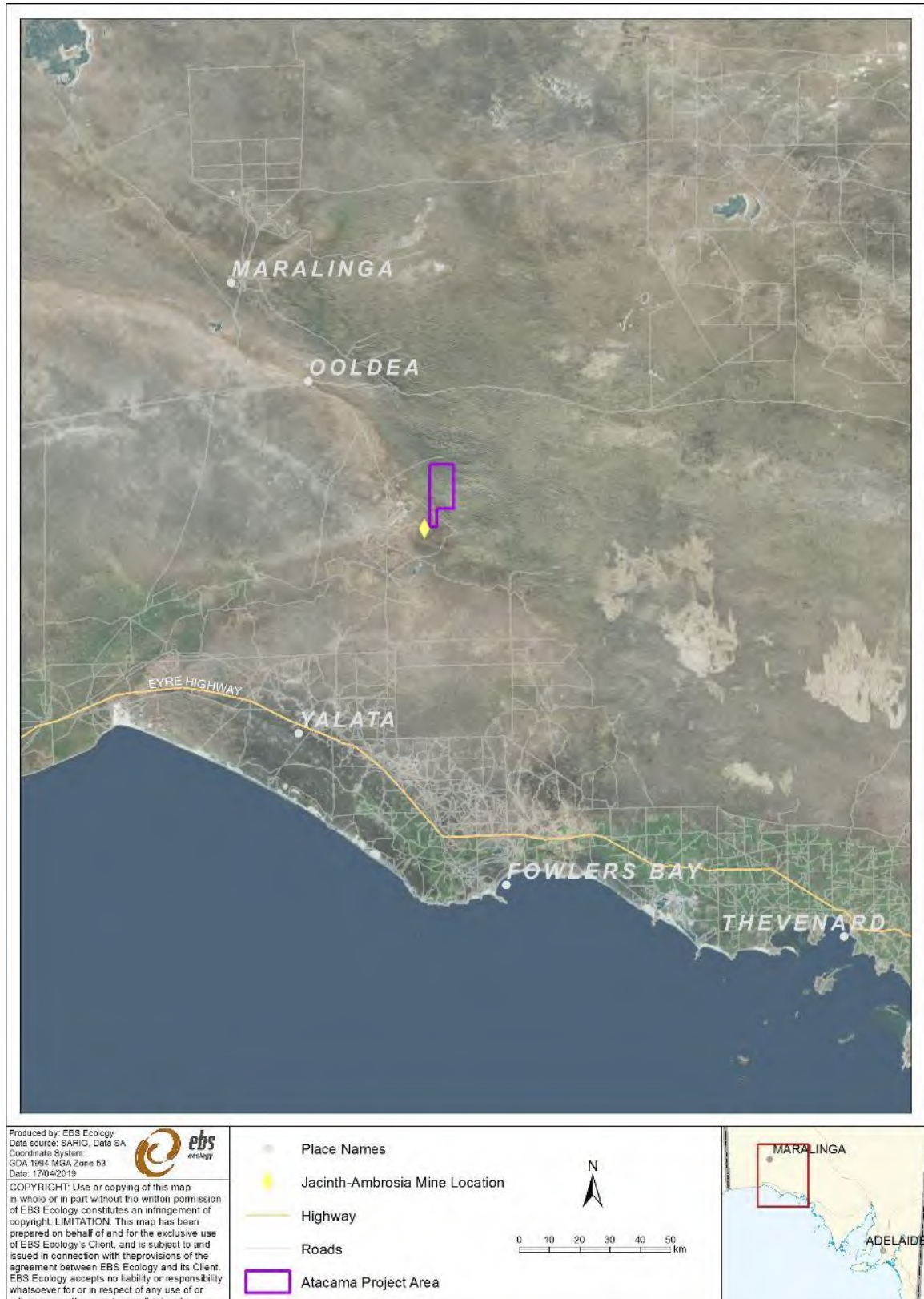


Figure 1. Location of the Atacama Project Area.



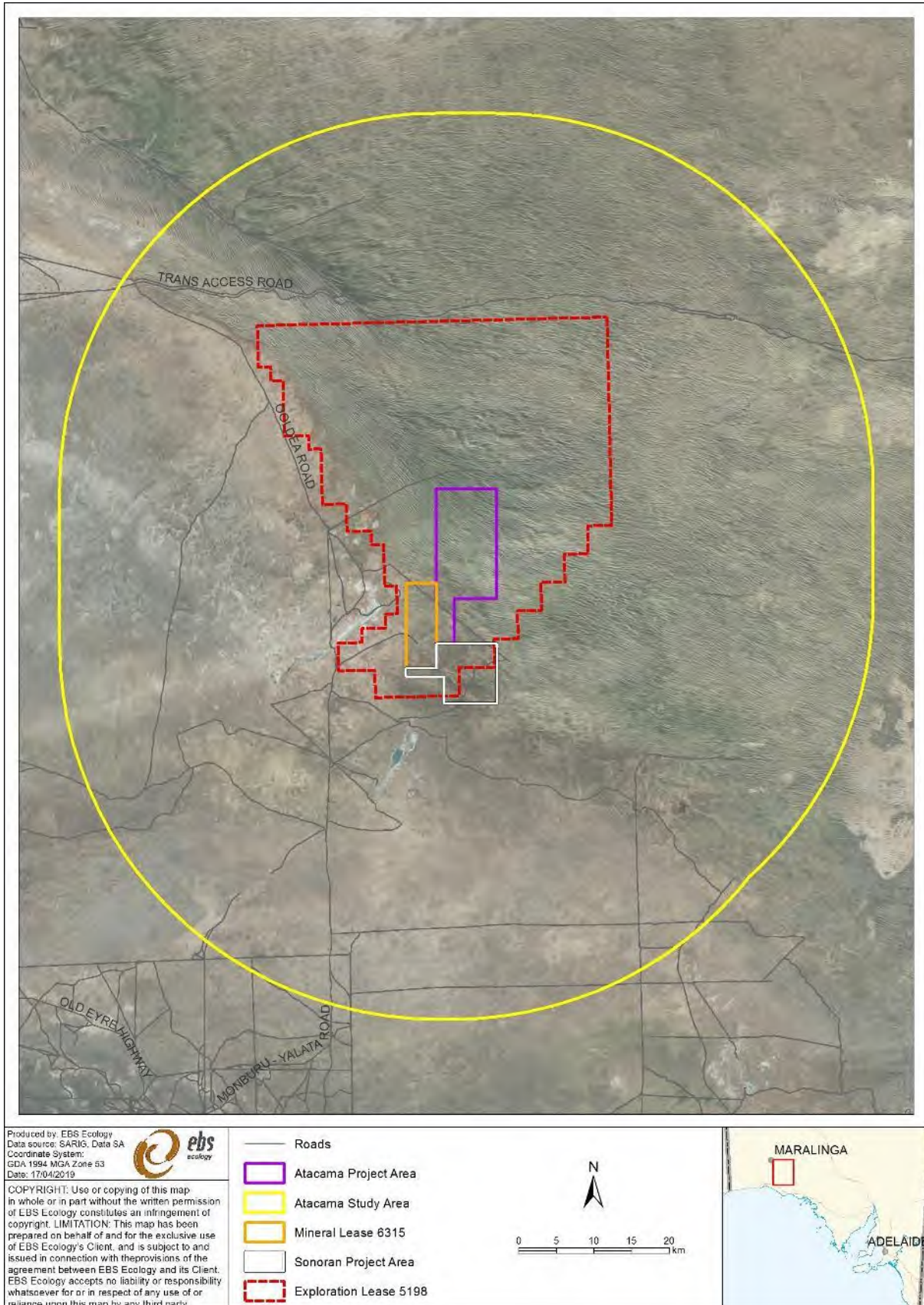


Figure 2. Atacama Project Area and Study Area in relation to other Iluka projects and tenements.

## 2 BACKGROUND

### 2.1 IBRA

The Interim Biogeographical Regionalisation for Australia (IBRA) identifies geographically distinct bioregions based on common climate, geology, landform, native vegetation and species information, which is used to assess and plan for the protection of biodiversity (DotE 2012). The bioregions are further refined into subregions and environmental associations. Native vegetation remnancy figures for IBRA subregions and environmental associations are useful for setting regional landscape targets.

The Project Area is located within the Great Victoria Desert IBRA bioregion and falls within the Yellabinna IBRA subregion (Table 1). Native vegetation remnancy within the Yellabinna IBRA subregion is very high (99%); and of that, 55% is formerly conserved. The Nullarbor and Yalata subregions fall within close proximity to the Project Area and are found within the Study Area (Figure 3).

**Table 1. IBRA bioregion, subregion, and environmental association environmental landscape summary (DotE 2012).**

<b>Great Victoria Desert IBRA bioregion</b>	
Arid active sand-ridge desert of deep Quaternary Aeolian sands overlying Permian and Mesozoic strata of the Officer Basin. Tree steppe of <i>Eucalyptus gongylocarpa</i> , Mulga and <i>E. youngiana</i> over hummock grassland dominated by <i>Triodia basedowii</i> . Arid, with summer and winter rain.	
<b>Yellabinna IBRA subregion</b>	
This subregion comprises essentially the field of regular parallel dunes of the Great Victoria Desert and tracts of salt lakes. The dune field mantles an erosional plain, and low outcrop of granite or volcanics form inselbergs or tors within the dune field. The dunes consist mainly of sand derived from the Western Australian Shield, with a gradual colour change southward to where white sands derived from the coast predominate. Inter-dunal areas support <i>Eucalyptus socialis</i> / <i>E. gracilis</i> open scrub on red calcareous earths, while dunes support <i>E. socialis</i> / <i>Triodia irritans</i> open scrub on reddish siliceous sands. A chenopod shrubland of <i>Halosarcia</i> spp. and <i>Tecticornia tenuis</i> occurs on the black calcareous loams of the depressions.	
Remnant vegetation	Approximately 99% (4,756,215 ha) of the subregion is mapped as remnant native vegetation, of which 55% (2,629,542 ha) is formally conserved.
Landform	Stable NW-SE longitudinal dunes, locally broken by granite hills and ridges of metamorphic rocks. Dunes closely spaced.
Geology	Vast dune sand & inter-dune corridors of clay, silt & very fine sand; evaporate deposits in numerous salt lakes (gypsum, halite); kopi ridges & dunes; some silcrete & calcrete (rare).
Soil	Sandy soils with weak pedologic development, Red calcareous earths; Red siliceous sands.
Vegetation	Mallee with hummock grass.
Conservation significance	43 species of threatened fauna, 46 species of threatened flora. 0 wetlands of National significance.



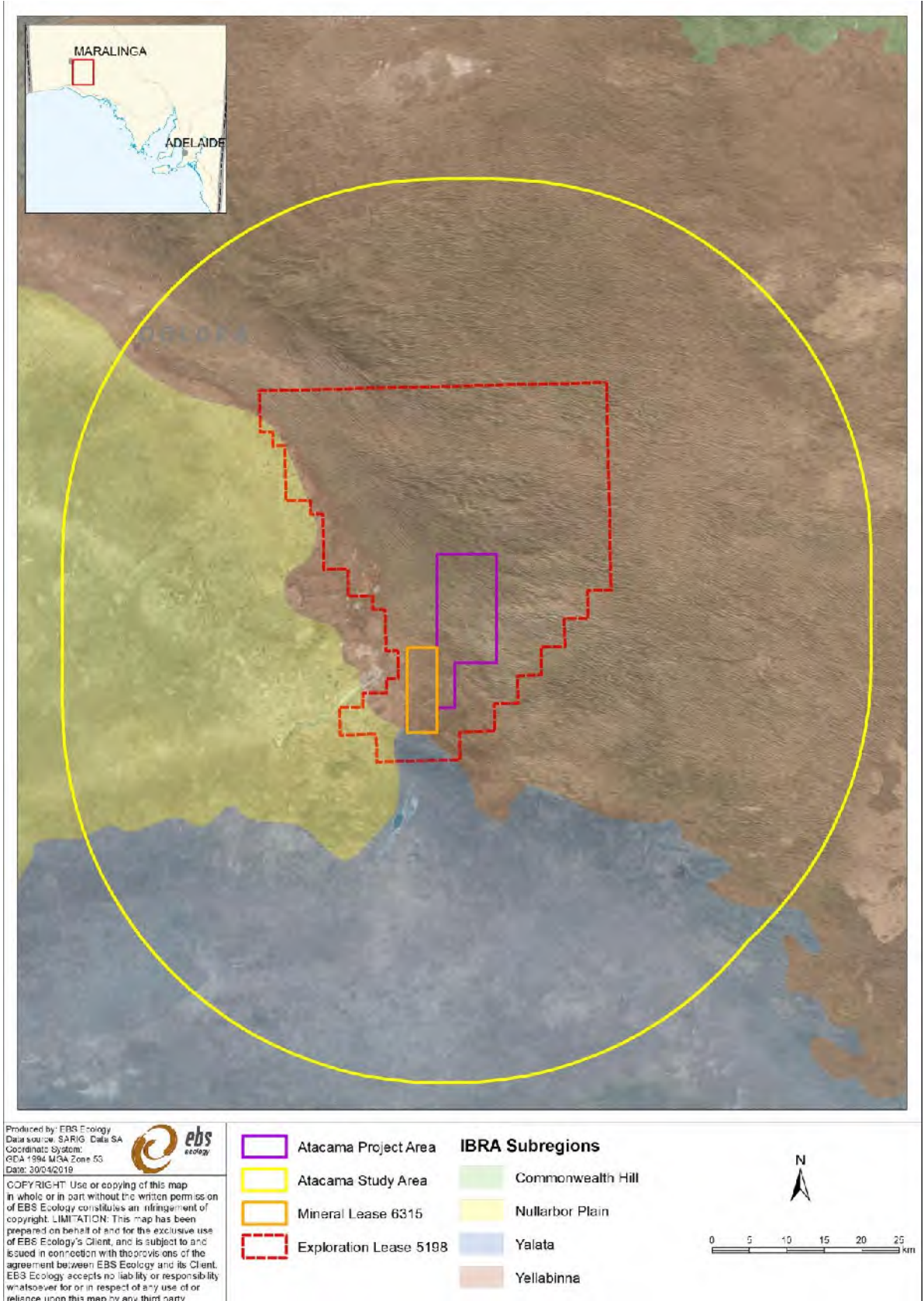


Figure 3. IBRA mapping over the Study Area and Project Area.



## 2.2 Administrative boundaries

The Project Area is located within the Pastoral Unincorporated Area (PUA) (outside of any Local Government Area) and is under the Stewardship of the Alinytjara Wilurara Natural Resources Management Board (AW NRM).

## 2.3 Land use

The Project Area falls within Yellabinna Regional Reserve (RR). Yellabinna RR borders Nullarbor RR on its western boundary and Yumbarra Conservation Park (CP) and Pureba CP on its southern boundary. The combined area of these RRs and CPs cover 3 million hectares (ha) of predominantly mallee vegetation that is largely undisturbed from human activity and its secondary effects (DEWNR 2013).

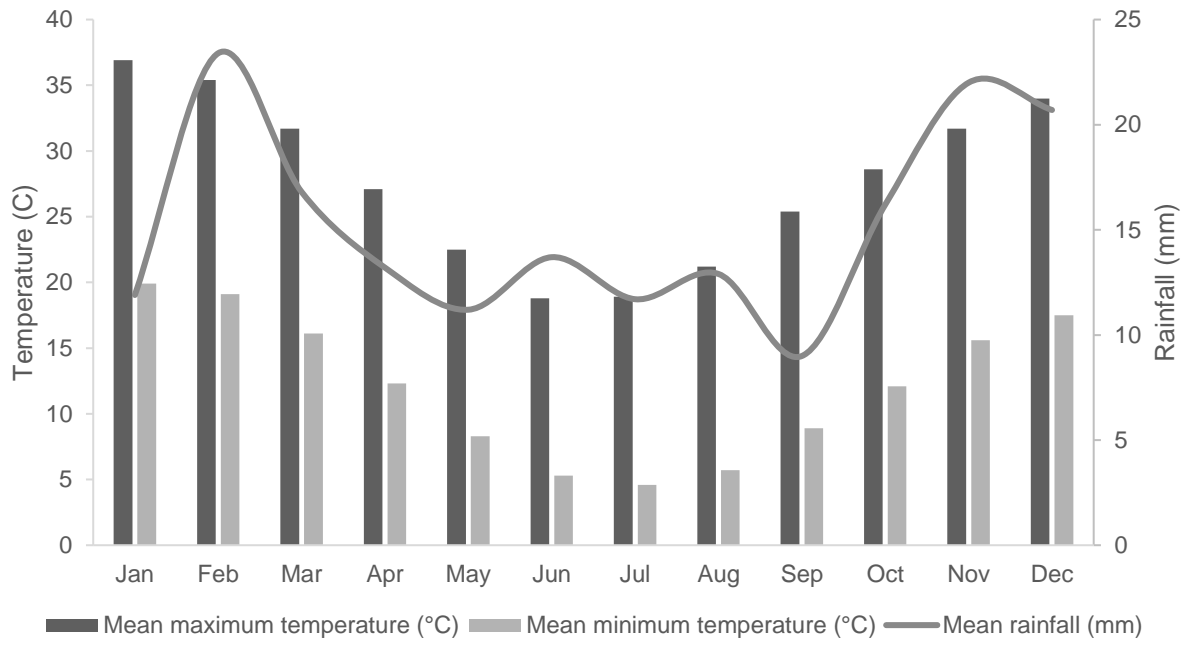
Heavy mineral sands within the Yellabinna RR are a State resource and currently mined at Iluka's Jacinth-Ambrosia (JA) mine. There are a number of heavy mineral sand deposits in the Yellabinna Region that are under evaluation for future mining.

The western boundary of Yellabinna RR (adjoining Nullarbor RR) was previously used as a travelling stock route, originally crossing Lake Ifould and then passing Poondinga Rockhole. The reserves have always been unsuitable for pastoral activities due to the lack of permanent water supplies and the presence of dingoes (*Canis lupus dingo*) (DEWNR 2013).

## 2.4 Climate

Tarcoola Aero (no. 160969) is the closest Bureau of Meteorology (BOM) weather station to the Project Area. The Tarcoola Aero weather station is located 218 km to the east of the Project Area, and therefore, due to this distance of separation in conjunction with dissimilarities in the physical and environmental environments, the data presented in Figure 4 should be used as an indication only of the climate likely to be experienced within the Project Area.

The Yellabinna RR region experiences an arid climate, consisting of mild winters and very hot summers (Figure 4). The mean minimum temperature ranges from 4.6°C (July) to 19.9°C (January) and the mean maximum temperature ranges from 18.8°C (June) to 36.9°C (January) (BOM 2019). Major rainfall events in the region are typically derived from synoptic situations, including cyclones and fronts which predominantly originate in the tropics (ABS 2012). As such, while the mean annual rainfall is 185.2 mm, annual rainfall is highly variable.



**Figure 4. Mean maximum and minimum temperatures and mean rainfall for each month at Tarcoola Aero (BOM 2019).**

## 3 METHOD

### 3.1 Desktop Assessment

A desktop assessment was conducted to determine the potential for any threatened and protected species (both Commonwealth and State listed) to occur within the Project Area. This was achieved by undertaking database searches using a 50 km buffer from the boundary of the Atacama Project Area (Study Area) along with review of historic reports relevant to the Yellabinna region.

#### 3.1.1 *Review of field assessments*

A review of previously conducted flora and fauna assessments within the Yellabinna region was undertaken to identify any potential ecological constraints that have been previously identified.

#### 3.1.2 *Protected Matters Search Tool (PMST) EPBC Act*

A Protected Matters Search Tool (PMST) report was generated on 11 April 2019 to identify Matters of National Environmental Significance (MNES) under the EPBC Act relevant to the Project Area (DotEE 2019). A 50 km buffer from the Project Area was applied to the PMST report. The PMST is maintained by the Department of the Environment and Energy (DotEE) and was used to identify flora and fauna species or Threatened Ecological Communities (TECs) of National environmental significance that may occur or have suitable habitat within the Project Area.

#### 3.1.3 *Biological Database of South Australia (BDBSA) NPW Act*

An extraction from the BDBSA was obtained to identify flora and fauna species that have been recorded within 50 km of the Project Area (DEW 2019, accessed 11/04/2019, *Record set number DEWNRBDBSA190121-1*). The BDBSA is comprised of an integrated collection of species records from the South Australian (SA) Museum, conservation organisations, private consultancy companies, Birds SA, Birdlife Australia and the Australasian Wader Study Group, which meet DEW standards for data quality, integrity and maintenance.

Threatened species (both Commonwealth and State listed) highlighted within 50 km of the Project Area are included in tabular form within each section of the results relating to flora (Section 7) and fauna (Section 8). The complete BDBSA search results are given within Appendix 1 (flora) and Appendix 2 (fauna) and include all species recorded within the Study Area.

#### 3.1.4 *Assessment of the likelihood of occurrence*

An assessment to determine the likelihood of occurrence for national and state threatened species and ecosystems within the Project Area was conducted (see Section 10 and Section 11). Each of the threatened species and ecosystems identified by the PMST and the BDBSA data extract were assigned a rating (highly likely, likely, possible and unlikely), which described their likelihood of occurrence with the Project Area. The following criteria were considered when assigned a likelihood rating:

- date of the most recent record (taking into consideration the date of the last surveys conducted in the area);
- proximity of the records (distance to the Project Area);
- landscape location of the records, vegetation remnancy and vegetation type of the record location (taking into consideration the landscape, remnancy and vegetation type of the Project Area, with higher likelihood assigned to species that were found in similar locations/condition/vegetation associations); and
- knowledge of the species: habitat preferences, causes of its decline, the conspicuousness of the species and local population trends.

A summary of the likelihood rating and criteria is shown below in Table 2.

**Table 2. Likelihood rating and criteria for the presence of threatened species.**

Likelihood	Criteria
Highly Likely/Known	<ul style="list-style-type: none"> <li>• Records in the last 10 years, the species does not have highly specific niche requirements, the habitat is largely intact and falls within the known range of the species distribution;</li> <li>• The species was recorded as part of project surveys.</li> </ul>
Likely	<ul style="list-style-type: none"> <li>• Records within the previous 20 years, the area falls within the known distribution of the species and the area provides species habitat which is largely intact.</li> </ul>
Possible	<ul style="list-style-type: none"> <li>• Records within the previous 20 years, the area falls inside the known distribution of the species but the area does not provide species habitat which is largely intact.</li> <li>• Records within 20 -40 years, survey effort is considered adequate, habitat is present and intact and species of similar habitat needs have been recorded in the area.</li> </ul>
Unlikely	<ul style="list-style-type: none"> <li>• Records within 20 -40 years, however suitable habitat does not occur and species of similar habitat requirements have not been recorded in the area.</li> <li>• No records within the previous 40 years despite suitable habitat being known to occur in the area or,</li> <li>• No records despite adequate survey effort.</li> </ul>

## 4 LITERATURE REVIEW OF FIELD ASSESSMENTS

The following field assessments within the Study Area and surrounds have been reviewed and the data incorporated into the overviews of vegetation, flora, fauna and groundwater dependent ecosystems where applicable.

### 4.1 Jacinth-Ambrosia, Sonoran and surrounds

Numerous biological surveys have been conducted at Jacinth-Ambrosia ML, Sonoran ML and surrounds.

Flora studies include:

- Sonoran Baseline Flora and Fauna Assessment (EBS 2013a);
- Jacinth-Ambrosia Vegetation Monitoring (EBS 2010b, 2010c, 2011, 2012a, 2014a, 2015a);
- Sonoran Pest Plant Survey (EBS 2013b);
- Eucla Basin Baseline Vegetation Survey Jacinth and Ambrosia Deposits (Badman 2006);
- Jacinth-Ambrosia Project: A Vegetation Survey of the Jacinth – Ambrosia Wellfield and Pipeline Corridor (Badman 2007);
- Vegetation Mapping and Data Recording for the Jacinth-Ambrosia Mine (EBS 2008a); and
- A Biological Survey of the Yellabinna Region of South Australia (Copley and Kemper 1992).

The locations of flora sites surveyed by Copley and Kemper (1992) and Badman (2006) are shown in Figure 5, and the flora sites surveyed by EBS Ecology are shown in Figure 8.

Fauna studies include:

- Sonoran Baseline Flora and Fauna Assessment (EBS 2013a);
- Jacinth-Ambrosia Fauna Monitoring (EBS 2008b, 2009a, 2010e, 2012b, 2014b, 2015b, 2017);
- Marsupial Mole Survey of Yellabinna and Yumbarra Conservation Reserves, Lower Great Victoria Desert, SA (Benshemesh 2005);
- Report on Fauna Survey 2005: Part I - Iluka Resources Ltd Mineral Deposit Area, Yellabinna Regional Reserve, South Australia (SKM 2006) conducted in 2005;
- A Biological Survey of the Yellabinna Region of South Australia (Copley and Kemper 1992);
- Sandhill Dunnart Survey, Barton Regional Exploration Program (EBS Ecology 2009c); and
- Predator Activity Monitoring, Barton Mineral Sands Drilling Program (EBS Ecology 2010a, 2010b).

The locations of fauna sites surveyed by Copley and Kemper (1992) are shown in Figure 6, SKM (2006) are shown in Figure 7 and those surveyed by EBS Ecology are shown in Figure 8.

## **4.2 Atacama Project Area**

The most comprehensive ecological assessment in the Project Area was conducted by EBS (2015c). The methodology used by EBS (2015c) is detailed in Section 5. In addition to this, sites within broader studies have also fallen within the Project Area, these include:

- Three vegetation/flora sites (Badman 2006) (Figure 5);
- One fauna site (SKM 2006) (Figure 7); and
- One bird and one flora site for annual Jacinth-Ambrosia monitoring (Figure 8).

## **5 ATACAMA BASELINE ASSESSMENT (EBS 2015C)**

The baseline flora and fauna assessment within the Atacama Project Area was conducted from 23 September to 1 October 2014. A targeted Southern Marsupial Mole (Itjaritjara) (*Notorcytes typhlops*) survey was subsequently conducted from 26 November to 4 December 2014.

The methods used to survey vegetation, flora and fauna are summarised below in Sections 5.1 (vegetation), 5.2 (flora) and 5.3 (fauna). For an in-depth methodology used during the baseline assessment refer to EBS (2015c).

### **5.1 Vegetation Associations**

The vegetation associations present within the Project Area were mapped using satellite imagery and on-ground field observations. Where changes in vegetation were recorded along the main access tracks a waypoint to mark this transition was taken on a Global Positioning System (GPS).

The recorded condition of the vegetation associations was based on the ratio assessment method as adapted from Stokes *et al.* (1998) and DWLBC (2005) and was used to calculate a Significant Environmental Benefit (SEB) Offset under the *Native Vegetation Regulations 2003*.

A complete species list was compiled for each separate vegetation association and a representative photo was taken.

### **5.2 Flora**

A ramble survey was conducted to record as many flora species as possible within the Project Area. Searches focused on areas of suitable habitat for threatened species to increase the likelihood of their detection.

Weeds were surveyed using the 'weed arc' method, whereby the number of individuals or the percentage (%) ground cover of weeds were recorded within a 50 m radius of a point centered on access tracks. The weed arc sites are shown in Figure 8.

### **5.3 Fauna**

The methods used to survey fauna within the Project Area, particularly threatened species, are summarised in Table 3.



**Table 3. Summary of methods used to survey fauna within the Project Area (EBS 2015c).**

Targeted fauna	Sites	Method	Description
All species	8	Active searching	A minimum of two hours of active searching was undertaken at each of the eight fauna trapping sites. This involved at least two surveyors scanning the site for signs of animals (e.g. tracks, nests, scats, diggings and burrows).
All species	N/A	Opportune	A GPS coordinate was taken for each opportunistic observation.
Bats	8	Anabat	A passive bat survey was conducted using AnaBat units to record bat echolocation calls.
	4	Harp trapping	A three bank harp trap was set for one night at each site.
Birds	14	Point count	Sites were surveyed for 30 minutes per site in the morning and 30 minutes per site in the afternoon.
Diurnal and nocturnal species	6	Camera trapping	Cameras were installed on star pickets or tree trunks at a height between 0.3 m and 1.2 m for two nights at each site.
Malleefowl	N/A	Aerial mound survey	Aerial surveys for existence of Malleefowl or their breeding mounds over the entire Project Area where suitable habitat occurred.
Nocturnal species	2	Spotlighting	Five observers walked the areas using hand-held spotlights and head torches. Each survey began approximately one hour after sunset and generally lasted two hours.
Small mammals and reptiles	8	Trapping lines	Eight fauna trapping sites were established to record small mammal, reptile and frog diversity. Each individual site was open for five nights and consisted of two lines of six pitfall traps, four funnel traps per line, 15 Elliott traps per line and two cage traps per line. The two individual lines were separated by approximately 100 m but were located within the same vegetation association and landscape.
Southern Marsupial Mole	20	Trench survey technique	Trenches were dug to expose a vertical wall of sand, allowing the wall to thoroughly dry, and then inspecting the wall for old tunnels of the moles. These tunnels or 'moleholes' are backfilled with sand and appear as circular or oval shaped outlines.

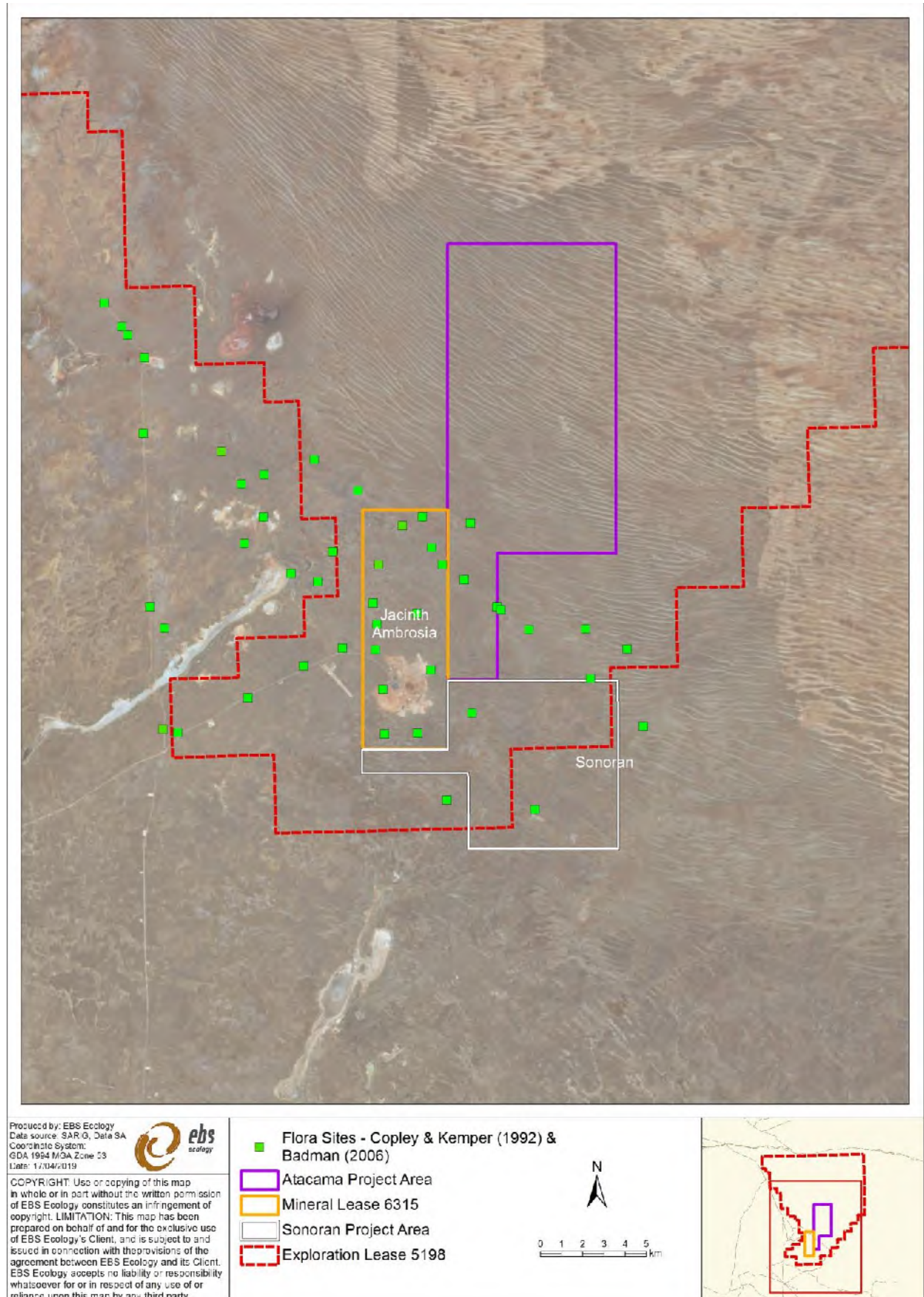


Figure 5. Flora sites as surveyed in Copley and Kemper (1992) and Badman (2006).



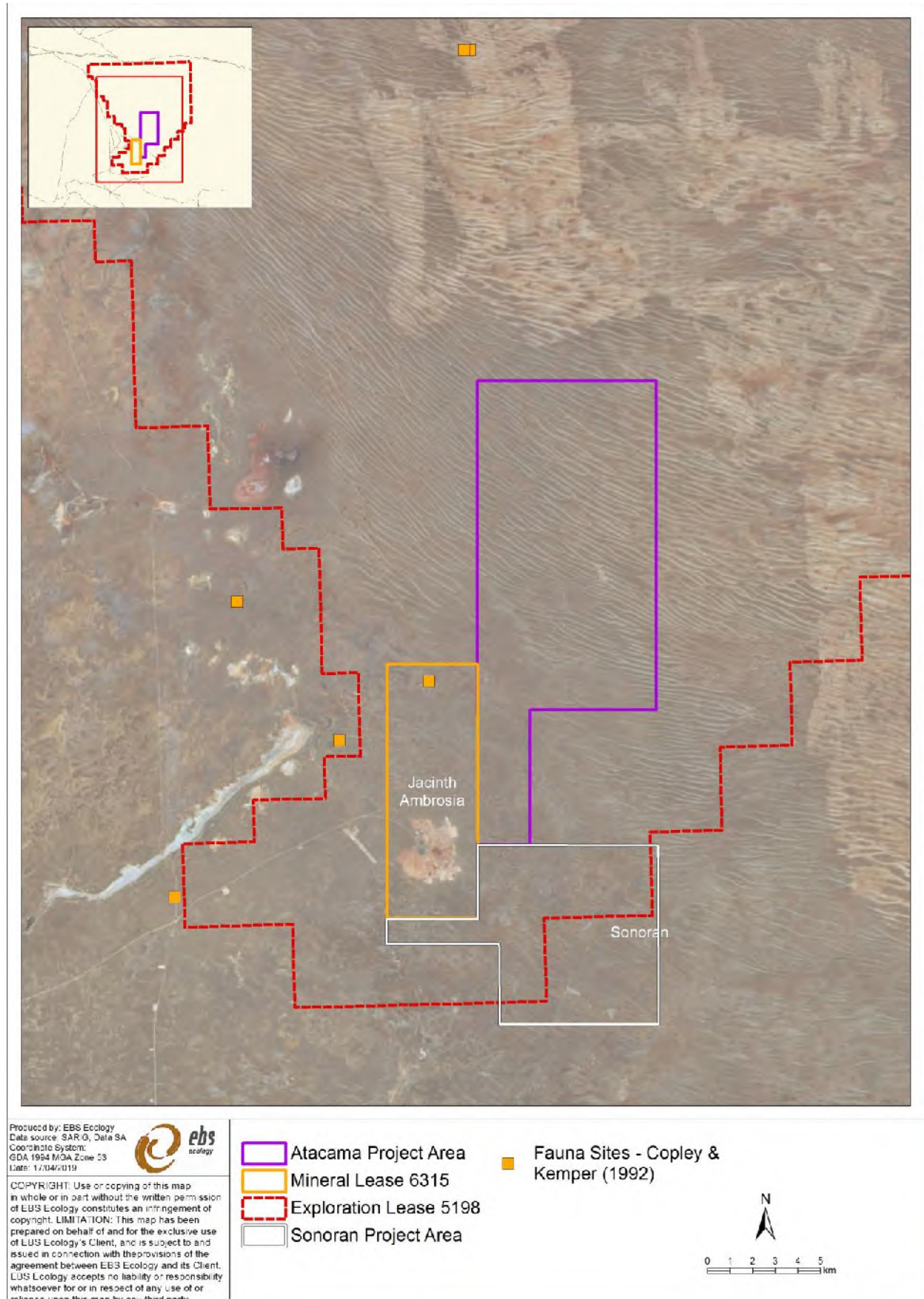


Figure 6. Fauna sites as surveyed in Copley and Kemper (1992).

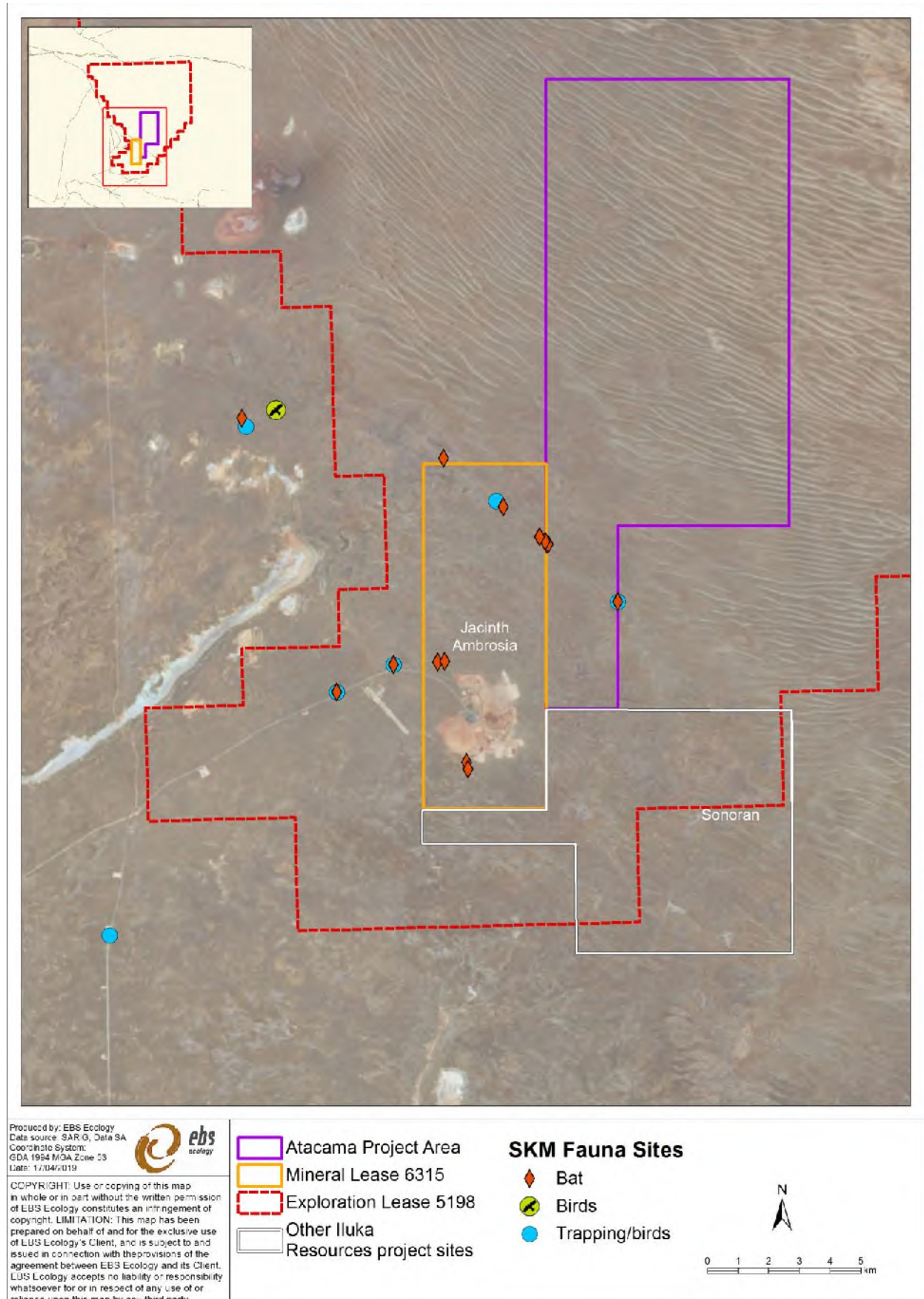


Figure 7. Fauna sites surveyed within and adjacent to Jacinth-Ambrosia Mine by SKM (2006).



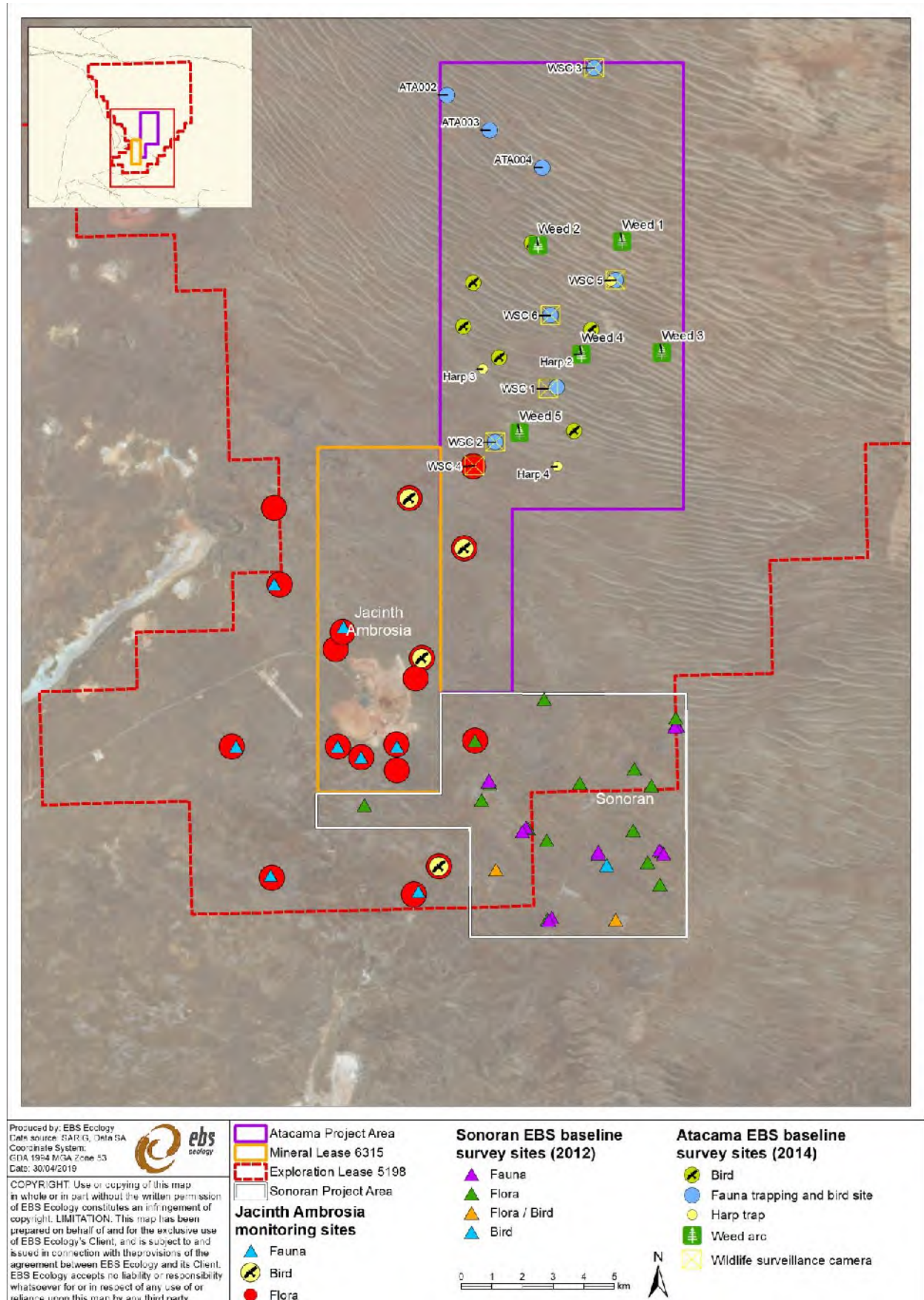


Figure 8. EBS survey sites at the Jacinth-Ambrosia, Sonoran and Atacama Project Areas (EBS 2015c).

## 6 VEGETATION OVERVIEW

### 6.1 Study Area

The National Vegetation Information System (NVIS), which is managed by DotE, maps the broad vegetation communities that are present within the Study Area (DotEE 2018). The 10 broad vegetation communities recorded in the Study Area are presented in Table 4 and mapped in Figure 9. Each of the broad vegetation communities are further refined into 20 vegetation associations based upon the dominant overstorey species (Table 4).

**Table 4. NVIS Version 5.1 extant vegetation within Study Area.**

Broad vegetation communities	Vegetation associations
1. <i>Acacia</i> Shrubland	1. <i>Acacia ligulata</i> Shrubland >1m
2. <i>Acacia</i> Woodland	2. <i>Acacia aneura</i> Woodland 3. <i>Acacia papyrocarpa</i> Woodland 4. <i>Acacia ramulosa</i> var. Woodland
3. <i>Alectryon</i> Woodland and Shrubland	5. <i>Alectryon oleifolius</i> ssp. <i>canescens</i> (mixed) Woodland
4. <i>Casuarina</i> Woodland	6. <i>Casuarina pauper</i> Woodland 7. <i>Casuarina pauper</i> , <i>Acacia papyrocarpa</i> Woodland
5. Chenopod Shrubland	8. <i>Atriplex vesicaria</i> ssp. Shrubland <1m 9. <i>Eriochiton sclerolaenoides</i> Shrubland <1m 10. <i>Maireana sedifolia</i> Shrubland <1m 11. <i>Salsola tragus</i> (mixed) Shrubland <1m
6. <i>Eucalyptus</i> Mallee Forest and Mallee Woodland	12. <i>Eucalyptus brachycalyx</i> Mallee Woodland 13. <i>Eucalyptus concinna</i> Mallee Woodland 14. <i>Eucalyptus oleosa</i> ssp. <i>ampliata</i> Mallee Woodland 15. <i>Eucalyptus oleosa</i> ssp. <i>oleosa</i> Mallee Woodland 16. <i>Eucalyptus yumbarrana</i> ssp. <i>yumbarrana</i> Mallee Woodland
7. <i>Melaleuca</i> Shrubland >1m	17. <i>Melaleuca lanceolata</i> Shrubland >1m
8. Shrubland <1m	18. <i>Nitraria billardiarei</i> , <i>Atriplex vesicaria</i> ssp. Shrubland <1m
9. Tussock Grassland	19. <i>Austrostipa nitida</i> (mixed) Grassland
10. Woodland	20. <i>Acacia tetragonophylla</i> (mixed) Woodland



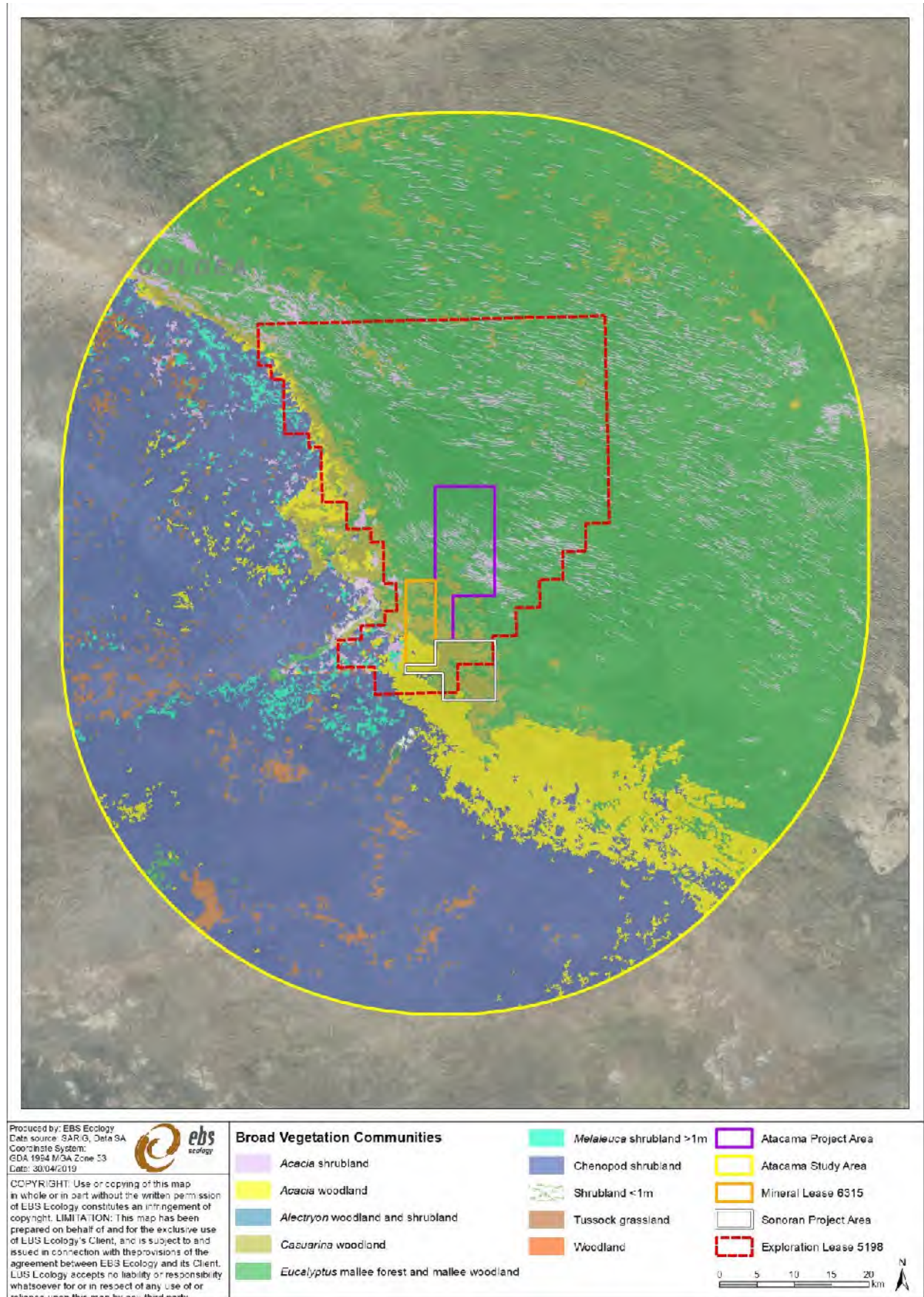


Figure 9. Broad vegetation communities mapped within the Study Area.



## 6.2 Project Area

### 6.2.1 Badman (2006)

The southern sector of the Project Area was surveyed by Badman (2006). Within the Project Area, Badman (2006) established three vegetation survey sites (Figure 5). The vegetation within these sites comprised of low woodland on sandplain, open Mallee on dune and low woodland on swale. The dominant species for each of these vegetation associations is detailed in Table 5.

**Table 5. Vegetation association and landform and description of three vegetation survey sites established in the south of the Project Area by Badman (2006).**

Vegetation and landform	Dominant species
Low Woodland on sandplain	<i>Acacia papyrocarpa</i> (Western Myall) over <i>Atriplex vesicaria</i> (Bladder Saltbush), <i>Maireana appressa</i> (Bluebush), <i>Maireana</i> sp., <i>Rhagodia spinescens</i> (Spiny Saltbush), <i>Zygophyllum (Roepera) aurantiaca</i> (Shrubby Twinleaf)
Open Mallee on dune	<i>Eucalyptus oleosa</i> ssp. <i>ampliata</i> over <i>Maireana erioclada</i> (Rosy Bluebush), <i>Atriplex vesicaria</i> (Bladder Saltbush), <i>Rhagodia spinescens</i> (Spiny Saltbush), <i>Zygophyllum (Roepera) aurantiaca</i> (Shrubby Twinleaf)
Low Woodland on swale	<i>Acacia papyrocarpa</i> (Western Myall) over <i>Maireana sedifolia</i> (Pearl Bluebush), <i>Atriplex vesicaria</i> (Bladder Saltbush), <i>Rhagodia spinescens</i> (spiny Saltbush), <i>Enchylaena tomentosa</i> (Ruby Saltbush)

### 6.2.2 EBS (2015c)

Vegetation mapping was conducted by EBS in 2014 (EBS 2015c). Overall, nine broad vegetation associations were present within the Project Area (Figure 10; Table 6). The vegetation mapping provided in detail, the extent and range of the vegetation structures present within the Project Area. These were described as intact native vegetation largely in pre-European condition, due to the presence of intact vegetation with little to no weed infestation. The Project Area was given an in principal SEB condition rating of 10:1 (Table 6). A representative photo of each vegetation association is presented in Appendix 4 in EBS (2015c). It should be noted that the *Native Vegetation Regulations* for South Australia were updated in 2017, and therefore the SEB ratio method is no longer valid and has been succeeded by the Rangelands Assessment Method (DEW 2017a, DEW 2017b).

**Table 6. Vegetation associations, area and SEB ratio recorded over the Project Area (EBS 2015c).**

#	Vegetation association	Area (ha)	Condition (SEB ratio)
1	<i>Eucalyptus</i> spp. / <i>Hakea francisiana</i> (Bottlebrush Hakea) / <i>Grevillea stenobotrya</i> (Rattle-pod Grevillea) Tall Open Shrubland	882.61	10:1
2	<i>Acacia papyrocarpa</i> (Western Myall) Open Woodland +/- <i>Cratystylis conocephala</i> (Daisy Bluebush) and <i>Maireana sedifolia</i> (Bluebush)	2952.41	10:1
3	<i>Eucalyptus oleosa</i> ssp. Mixed Mallee over <i>Triodia</i> spp.	2669.45	10:1
4	<i>Eucalyptus yumbarrana</i> (Yumbarra Mallee) Mixed Mallee	4511.5	10:1
5	<i>Alectryon oleifolius</i> (Bullock Bush) Shrubland	3.31	10:1
6	<i>Atriplex vesicaria</i> (Bladder Saltbush) Low Open Shrubland	54.30	10:1
7	<i>Casuarina pauper</i> (Black Oak) +/- <i>Acacia papyrocarpa</i> (Western Myall) Woodland	128.16	10:1
8	<i>Eucalyptus oleosa</i> ssp. (Red Mallee) / <i>Acacia papyrocarpa</i> (Western Myall) +/- <i>Myoporum platycarpum</i> (False Sandalwood) Open Woodland	1692.53	10:1
9	<i>Senna</i> spp. Open Shrubland	88.45	10:1

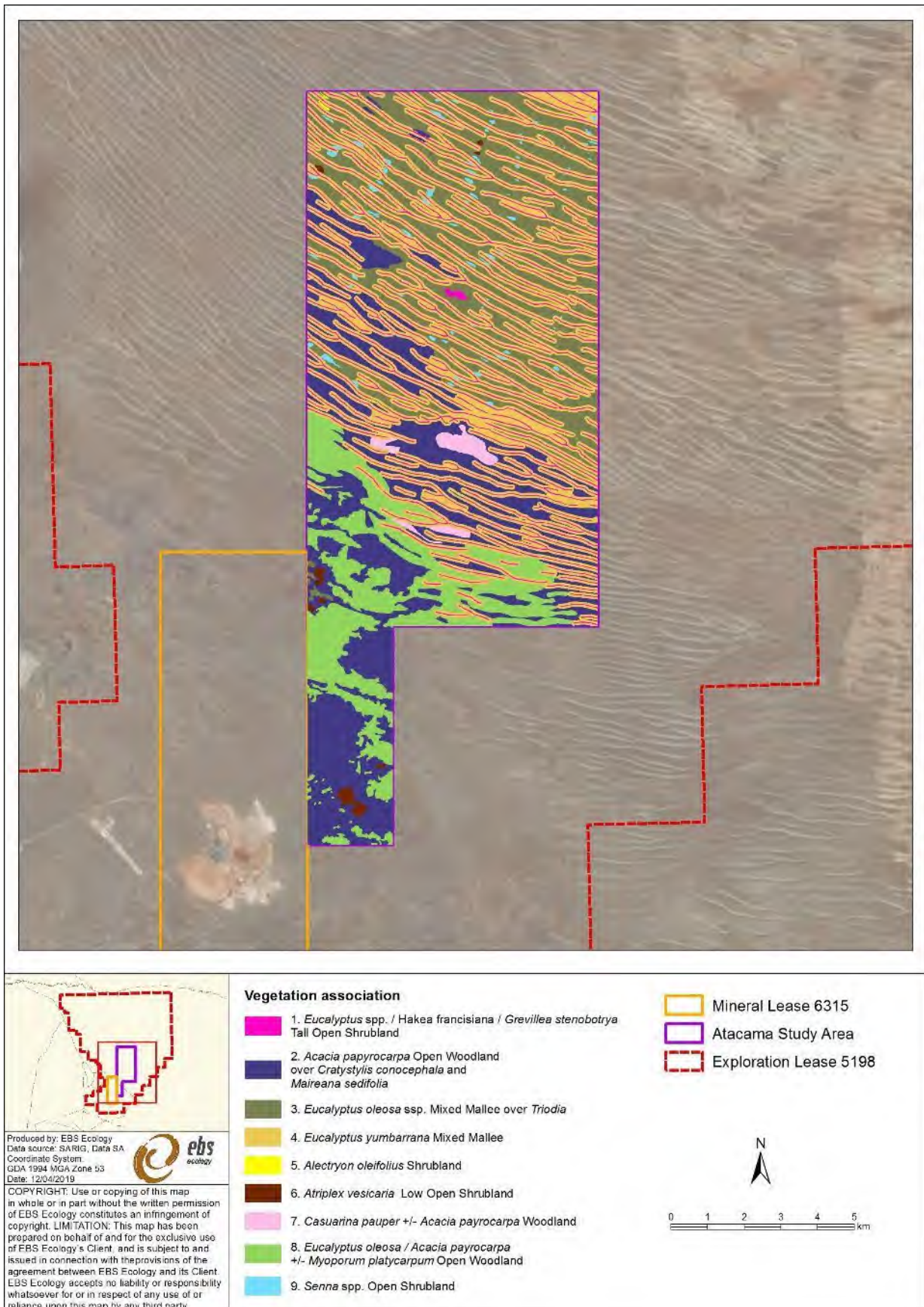


Figure 10. Vegetation associations mapped over the Project Area (EBS 2015c).

## 7 FLORA OVERVIEW

### 7.1 Study Area and Regional Assessments

The BDBSA search for the Study Area observed 360 flora species represented by 45 families (Appendix 1). The data sources ranged from individual surveyors through to extensive region wide assessments. The year of records varied from 1917 to 2015. Most flora records within the Study Area were collected from five large-scale surveys, which are listed below:

- Nullarbor Biological Survey, (DEW 1984);
- Yellabinna Biological Survey, (DEW, 1987 – 1989);
- Gawler Craton Vegetation Survey, (DEW 2005, unpublished data);
- Yellabinna Regional Reserve Assessment, Iluka Resources (Badman 2006); and
- Nullarbor Monitoring survey, (DEW 2012).

These surveys within the Study Area predominantly focused on the Nullarbor shrublands to the west and the Yellabinna dunes to the east. The Nullarbor and Yellabinna biological regions cover significant landmass within the western region of South Australia and are relatively homogenous in nature being either largely chenopod shrublands on the Nullarbor and Mallee on the Yellabinna dune fields. The Project Area lies on the transition zone from the shrublands to the Mallee dunes, and therefore, species richness is high within the Study Area due to the presence of multiple habitat types (B. Backhouse, *Pers. Comm.*, 2019).

### 7.2 Project Area

#### 7.2.1 *Jacinth-Ambrosia monitoring sites*

Two flora sites (MALCON2 and MALCON3) fall within the Project Area (Figure 8). These sites were monitored between 2009 and 2015 during which 69 flora species were recorded (EBS 2019, unpublished data). The full flora species list for these two sites is presented in Appendix 3.

Two introduced flora species were recorded: *Carrichtera annua* (Ward's Weed) and *Sonchus oleraceus* (Common Sow-thistle). These weeds were most recently recorded at MALCON3 in 2015.

#### 7.2.2 *EBS (2015c)*

A total of 136 flora species from 32 families have been observed within the Project Area, including 133 native species and three weed species (Appendix 4; EBS 2015c). Some species were recorded as individual occurrences, while others were widespread and common. Few additional species were observed after the first three days of the survey, which suggested that survey effort was sufficient to detect the vast majority of species present in the Project Area.

The most widespread flora species were Buckbush (*Salsola australis*), Silver Mulla Mulla (*Ptilotus obovatus*), Bladder Saltbush (*Atriplex vesicaria*), Wild Turnip (*Brassica tournefortii*), Desert Senna (*Senna artemisioides* ssp. *artemisioides* x ssp. *coriacea*) and Native Apricot (*Pittosporum angustifolium*), which were recorded in a minimum seven of the nine recorded vegetation associations.

No Nationally threatened flora species were recorded in the Project Area, however, three State threatened flora species were recorded:

- *Calotis lappulacea* (Yellow Burr-daisy) – State Rare;
- *Gratwickia monochaeta* – State Rare; and
- *Melaleuca leiocarpa* (Pungent Honey-myrtle) – State Rare.

A BDBSA database record for an individual *Santalum spicatum* (Sandalwood) shrub, listed as State Vulnerable, exists on the boundary of the Project Area, however no *Santalum spicatum* were recorded during the assessment.

Three introduced flora species were recorded in the Project Area. A summary of their extent of occurrence in the Project Area is provided in Table 7.

**Table 7. Details of exotic flora species recorded in the Project Area.**

Scientific name	Common name	Recorded presence
<i>Acetosa vesicaria</i>	Rosy Dock	Recorded in very low densities over the Project Area. <i>Acetosa vesicaria</i> occurred as individual plants or in very small groups that were typically located in areas that would collect runoff following rainfall events, such as ephemeral drainage lines, swales and the edges of some vehicle tracks.
<i>Brassica tournefortii</i>	Wild Turnip	Recorded in very low densities over the Project Area. <i>Brassica tournefortii</i> typically occurred fringing or on the crests and sides of dune rises, either as individual plants or small sparse groups. The species was recorded in a range of landforms, however, was most frequently observed on sandy sites.
<i>Carrichtera annua</i>	Ward's Weed	An uncommon species within the Project Area. <i>Carrichtera annua</i> was typically recorded growing in small dense patches, especially around dead trees in areas subject to runoff.



## 8 FAUNA OVERVIEW

The BDBSA search for the Study Area recorded 163 fauna species, which was comprised of 79 bird, 62 reptile and 22 mammal species (Appendix 2). The data sources ranged from individual surveyors to extensive regional assessments, which were conducted from pre-1900 to 2014. Most fauna records were obtained in five surveys and monitoring programs:

- Jacinth-Ambrosia fauna monitoring program (2008-2014) (EBS 2008b, 2009a, 2010e, 2012b, 2014b);
- Yellabinna Sandhill Dunnart Project (2008-2014) (Read *et al.* 2015; Moseby *et al.* 2016);
- Bird Atlas Data 1996-2006 (Birdlife Australia, unpublished data; Birds Australia 2002);
- Nullarbor Monitoring survey (DEW 2012); and
- Maralinga tjarutja animal track survey (2007-2012) (DEW, unpublished data).

### 8.1 Study Area and surrounds

#### 8.1.1 Birds

The assemblage of birds within the Yellabinna Environmental Association is diverse. A total of 121 bird species have been recorded within the Yellabinna Environmental Association, of which, 88 species were recorded during the three week long Yellabinna Biological Survey (Copley and Kemper 1992).

The birds recorded during the Biological Survey of the Yellabinna Region were split into four groups based upon habitat use and distribution (Copley and Kemper 1992). Group 1 occurred in the north of the region and covered mallee-spinifex and mulga communities. The six indicator species for Group 1 were the Grey-fronted Honeyeater (*Lichenostomus plumulus*), Rufous Whistler (*Pachycephala rufiventris*), Chestnut-rumped Thornbill (*Acanthiza uropygialis*), Southern Whiteface (*Aphelocephala leucopsis*), Little Crow (*Corvus bennetti*) and Red-capped Robin (*Petroica goodenovii*). Group 2 was comprised of a bridging group between Group 1 and Group 3, and therefore does not have a distinct bird community. The habitat where the Group 2 assemblage occurred was open low shrubland, which had low species diversity. The species most indicative of Group 2 were the Emu (*Dromaius novaehollandiae*) and Singing Honeyeater (*Lichenostomus virescens*). Group 3 occurred in the south of the region and covered mallee communities. The two indicator species for Group 3 were the Yellow-plumed Honeyeater (*Lichenostomus ornatus*) and Red Wattlebird (*Anthochaera carunculata*).

Within the Study Area, a total of 79 bird species had been recorded in the BDBSA (Appendix 2). However, 94 bird species have been recorded since 2008 as part of the fauna monitoring program at JA Mine (EBS 2018), an additional two species were recorded during baseline studies at JA Mine in 2005 (SKM 2006), and a further three bird species were recorded in 2012 during the Sonoran survey (EBS 2013).

One Nationally threatened bird species and nine State threatened bird species have records within the Study Area. No Nationally threatened bird species have been recorded during the JA Mine and Sonoran field surveys, however, eight State threatened bird species have been recorded (EBS 2013; EBS 2018):

- (Western) Slender-billed Thornbill (*Acanthiza iredalei iredalei*) – State Rare;
- Little Egret (*Egretta garzetta*) – State Rare;
- Major Mitchell's Cockatoo (*Lophochroa leadbeateri mollis*) – State Vulnerable;
- Australian Bustard (*Ardeotis australis*) – State Vulnerable;
- Gilbert's Whistler (*Pachycephala inornata*) – State Rare;
- Wood Sandpiper (*Tringa glaerola*) – State Rare
- Scarlet-chested Parrot (*Neophema splendida*) – State Rare; and
- Restless Flycatcher (*Myiagra inquieta*) – State Rare.

No introduced bird species have been recorded in the BDBSA within the Study Area nor as part of the JA Mine and Sonoran surveys.

### 8.1.2 Mammals

The mammal assemblage within the Yellabinna Environmental Association is comprised of 43 species, of which six are introduced, eight are extinct and four may be extinct (Copley and Kemper 1992). The mammals recorded during the Biological Survey of the Yellabinna Region were split into five groups based upon habitat use and distribution (Copley and Kemper 1992).

The Little Long-tailed Dunnart (*Sminthopsis dolichura*) was the indicator for Group 1, which occurred in sand dunes, where mallee woodland was dominant and at some sites Belah (*Casuarina cristata*) and Western Myall (*Acacia papyrocarpa*) woodlands, chenopod shrublands and *Triodia* cover were also present. The indicator species for Group 2 was the Southern Ningauai (*Ningauai yvonneae*), which occurred in sand dunes with mallee woodland with *Triodia* and a diverse shrub layer comprised of species of *Dodonaea*, *Bossiaea*, *Cassia*, *Eremophila* and *Acacia*. Unlike Group 1 and 2, Group 3 occurred on sand plains and floodplains amongst other landforms, where habitats were comprised of open mallee and mulga woodland and shrublands of *Acacia* sp., *Eremophila* sp., *Cassia* sp. and *Dodonaea* sp.. Tussock grasses were abundant at some sites, however, *Triodia* were uncommon. The indicator species for Group 3 were Sandy Inland Mouse (*Pseudomys hermannsburgensis*), Ooldea Dunnart (*Sminthopsis ooldea*) and Wongai Ningauai (*Ningauai ridei*). Group 4 occurred on all landforms, where mallee woodland dominated, however, a wide range of other vegetation types were also present. *Triodia* was rarely present at sites. The indicator species for Group 4 were House Mouse (*Mus musculus*) and Western Pygmy Possum (*Cercartetus concinnus*). The Sandhill Dunnart (*Sminthopsis psammophila*) was the sole indicator species from Group 5, which occurred in sandy interdune patches where low open woodland of mallee, Bullock Bush (*Alectryon oleifolius*) and Black Oak (*Casuarina pauper*), a sparse shrubland and dense *Triodia* occurred.

Twenty-two (22) mammal species were recorded in the BDBSA within the Study Area (Appendix 2), however, 24 mammal species have been recorded during monitoring and surveys at JA Mine and Sonoran. One Nationally threatened species, the Sandhill Dunnart (*Smithopsis psammophila*) was recorded in the surveys. There were no mammals solely listed as State threatened within the Study Area.

Five introduced mammal species have been recorded within the Study Area:

- One-humped Camel (*Camelus dromedarius*);
- Fox (*Vulpes vulpes*);
- Feral Cat (*Felis catus*);
- Rabbit (*Oryctolagus cuniculus*); and
- House Mouse (*Mus musculus*).

### **8.1.3 Reptiles**

The reptile assemblage within the Yellabinna Environmental Association is comprised of 78 species, of which, 65 species were recorded during the Biological Survey of the Yellabinna Region (Copley and Kemper 1992). The reptile assemblage was split into three groups based upon location, landform and habitat type.

Group 1 was distributed in the southern proportion of Yellabinna, where mesic mallee habitats were located. The indicator species for Group 1 were Southern Robust Slider (*Lerista picturata*), Southern Knob-tailed Gecko (*Nephurus stellatus*) and Western Stone Gecko (*Diplodactylus granariensis*). Group 2 was present within the northern half of Yellabinna, where the vegetation was comprised of arid species that were reflective of those present in the Great Victoria Desert. The indicator species for Group 2 were those that were adapted to sandy arid zone environments and included Three-lined Knob-tailed Gecko (*Nephurus levis*), Central Military Dragon (*Ctenophorus isolepis*), Central Deserts Robust Slider (*Lerista desertorum*), Royal Ctenotus (*Ctenotus regius*), Thorny Devil (*Moloch horridus*) and Variable Fat-tailed Gecko (*Diplodactylus conspicillatus*). Group 3 occurred on sand dune crests and slopes, where there was a high proportion of *Triodia* cover. The indicator species for Group 3 were Mallee Military Dragon (*Ctenophorus fordii*), Smooth Knob-tailed Gecko (*Nephurus laevissimus*), Wedgesnout Ctenotus (*Ctenotus brooksi*), Southern Mallee Ctenotus (*Ctenotus atlas*), Broad-banded Sand-swimmer (*Eremiascincus richardsonii*) and Orange-tailed Finesnout Ctenotus (*Ctenotus leae*).

Sixty-three (63) reptile species have been recorded in the BDBSA within the Study Area (Appendix 2), of which 47 have been recorded during monitoring and surveys at JA Mine and Sonoran. No Nationally threatened reptiles have been recorded within the Study Area, however, the State Rare Western Black-naped Snake (*Neelaps bimaculatus*) was recorded at Sonoran (EBS 2013a). No introduced reptiles have been recorded within the Study Area.

### **8.1.4 Amphibians**

There are no amphibians in the BDBSA recorded within the Study Area. Tadpoles belonging to the Trilling Frog (*Neobatrachus centralis*) were found in a dam at Maralinga in 1992 (Copley and Kemper 1992). However, this dam occurred outside the Study Area.



## 8.2 Project Area

### 8.2.1 Birds

#### *Jacinth-Ambrosia monitoring sites*

One bird point count site (MALCON2) falls within the Project Area (Figure 8). This site has been monitored on seven occasions since 2010 and has recorded 35 species (EBS 2019, unpublished data) (Table 8). The most abundant species recorded at this site are the Masked Woodswallow (*Artamus personatus*) (81 individuals), Chestnut-rumped Thornbill (*Acanthiza uropygialis*) (38 individuals), Yellow-plumed Honeyeater (*Ptilotula ornata*) (33 individuals) and Tree Martin (*Petrochelidon nigricans*) (32 individuals). The most commonly observed birds at this site were the Yellow-plumed Honeyeater and Yellow-throated Miner (*Manorina flavigula*), observed on six monitoring periods, while the Chestnut-rumped Thornbill, Red-capped Robin (*Petroica goodenovii*), Tree Martin (*Petrochelidon nigricans*) and Weebill (*Smicromis brevirostris*) were each observed on five monitoring periods.

No National or State threatened species have been observed at MALCON2. However, the State Rare Scarlet-chested Parrot (*Neophema splendida*) was opportunely observed near this site and within the Project Area in 2017 (EBS 2018).

**Table 8. The number of individuals of each bird species observed at site MALCON2 during fauna monitoring at Jacinth-Ambrosia Mine 2010-2017.**

Scientific name	Common name	2010	2011	2012	2013	2014	2015	2017	Total
<i>Barnardius zonarius</i>	Australian Ringneck							2	2
<i>Falco longipennis</i>	Australian Hobby						1		1
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	1			1			1	3
<i>Artamus cinereus</i>	Black-faced Woodswallow		2				5		7
<i>Accipter fasiatus</i>	Brown Goshawk	1							1
<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill	3	9			19	2	5	38
<i>Oreoica gutturalis</i>	Crested Bellbird	1	2					2	5
<i>Epthianura tricolor</i>	Crimson Chat					17			17
<i>Artamus cyanopterus</i>	Dusky Woodswallow			6		7			13
<i>Cracticus torquatus</i>	Grey Butcherbird		2	1	1				4
<i>Colluricincla harmonica</i>	Grey Shrike-thrush			1					1
<i>Melanodryas cucullata</i>	Hooded Robin		2			1			3
<i>Acanthiza apicalis</i>	Inland Thornbill		2			18			20
<i>Microeca fascinans</i>	Jacky Winter			1		4		4	9
<i>Corvus bennetti</i>	Little Crow		1						1
<i>Artamus personatus</i>	Masked Woodswallow		1		44	30	6		81
<i>Dicaeum hirundinaceum</i>	Mistletoebird					3		1	4
<i>Psephotus varius</i>	Mulga Parrot		2		2	2			6
<i>Merops ornatus</i>	Rainbow Bee-eater			5		4	4		13
<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher							1	1

Scientific name	Common name	2010	2011	2012	2013	2014	2015	2017	Total
<i>Petroica goodenovii</i>	Red-capped Robin	1	1		2	5		2	11
<i>Pachycephala rufiventris</i>	Rufous Whistler	1	1				1		3
<i>Lichenostomus virescens</i>	Singing Honeyeater		1						1
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater	1			6	2		3	12
<i>Pardalotus striatus</i>	Striated Pardalote	4				4	3		11
<i>Petrochelidon nigricans</i>	Tree Martin	4	10	4	10			4	32
<i>Malurus lamberti</i>	Variegated Fairy Wren			6					6
<i>Smicromis brevirostris</i>	Weebill		4		11	6	3	1	25
<i>Pomatostomus superciliosus</i>	White-browed Babbler		7			7		4	18
<i>Purnella albifrons</i>	White-fronted Honeyeater			3	4		3		10
<i>Lalage tricolor</i>	White-winged Triller				2				2
<i>Ptilotula ornata</i>	Yellow-plumed Honeyeater		4	6	7	10	5	1	33
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill		5						5
<i>Manorina flavigula</i>	Yellow-throated Miner	1	2	3	5	4		1	16
<i>Taeniopygia guttata</i>	Zebra Finch		6						6

### **EBS (2015c)**

A total of 52 bird species were recorded in the Project Area from 28 different families during the 2014 survey through point location observations, opportune observations, and spotlighting (Table 9). The Meliphagidae family (Honeyeaters) recorded the highest number of species with six representatives detected within the Project Area.

The most abundant birds recorded at point count sites were Budgerigar (*Melopsittacus undulatus*) (74 individuals), Weebill (*Smicromis brevirostris*) (48 individuals), White-fronted Honeyeater (*Phylidonyris albifrons*) (44 individuals) and Yellow-plumed Honeyeater (*Lichenostomus ornatus*) (43 individuals). The bird species that were most widespread over the point count sites were Weebill (10 sites), White-fronted Honeyeater (8 sites) and Striated Pardalote (*Pardalotus striatus*) (8 sites). The number of individuals of each bird species observed at the point counts are presented in Appendix 5.

One Nationally threatened and four State threatened bird species were recorded in the Project Area:

- Malleefowl (*Leipoa ocellata*) – National Vulnerable, State Vulnerable;
- Peregrine Falcon (*Falco peregrinus*) – State Rare;
- Restless Flycatcher (*Myiagra inquieta*) – State Rare;
- Australian Bustard (*Ardeotis australis*) – State Vulnerable; and
- Scarlet-chested Parrot (*Neophema splendida*) – State Rare.

Records of Malleefowl comprised of two old mounds rather than direct observations of individuals. All remaining threatened bird species were directly observed.

No introduced birds were recorded within the Project Area.

Table 9. Bird species recorded opportunistically and at point count sites within the Project Area (EBS 2015c).

Family	Species name	Common name	Conservation status	
			Aus	SA
ACANTHIZIDAE	<i>Acanthiza apicalis</i>	Inland Thornbill		
	<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill		
	<i>Smicromis brevirostris</i>	Weebill		
ACCIPITRIDAE	<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk		
	<i>Circus assimilis</i>	Spotted Harrier		
	<i>Hieraaetus morphnoides</i>	Little Eagle		
AEGOTHELIDAE	<i>Aegotheles cristatus</i>	Australian Owlet-nightjar		
ALCEDINIDAE	<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher		
ARTAMIDAE	<i>Artamus cinereus</i>	Black-faced Woodswallow		
	<i>Artamus leucorhynchus</i>	White-breasted Woodswallow		
	<i>Artamus personatus</i>	Masked Woodswallow		
	<i>Cracticus torquatus</i>	Grey Butcherbird		
	<i>Gymnorhina tibicen</i>	Australian Magpie		
CACATUIDAE	<i>Nymphicus hollandicus</i>	Cockatiel		
CAMPEPHAGIDAE	<i>Coracina maxima</i>	Ground Cuckooshrike		
	<i>Coracina novaehollandiae</i>	Black-faced Cuckooshrike		
	<i>Lalage tricolor</i>	White-winged Triller		
COLUMBIDAE	<i>Phaps chalcoptera</i>	Common Bronzewing		
CUCULIDAE	<i>Cacomantis pallidus</i>	Pallid Cuckoo		
	<i>Chalcites basalis</i>	Horsfield's Bronze Cuckoo		
	<i>Chalcites osculans</i>	Black-eared Cuckoo		
DICAEIDAE	<i>Dicaeum hirundinaceum</i>	Mistletoebird		
FALCONIDAE	<i>Falco berigora</i>	Brown Falcon		
	<i>Falco peregrinus</i>	Peregrine Falcon		R
HIRUNDINIDAE	<i>Petrochelidon nigricans</i>	Tree Martin		
MALURIDAE	<i>Malurus splendens</i>	Splendid Fairywren		
MEGAPODIIDAE	<i>Leipoa ocellata</i>	Malleefowl	VU	V
MELIPHAGIDAE	<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater		
	<i>Certhionyx variegatus</i>	Pied Honeyeater		
	<i>Epthianura tricolor</i>	Crimson Chat		
	<i>Manorina flavigula</i>	Yellow-throated Miner		
	<i>Ptilotula ornata</i>	Yellow-plumed Honeyeater		
	<i>Purnella albifrons</i>	White-fronted Honeyeater		
MEROPIDAE	<i>Merops ornatus</i>	Rainbow Bee-eater		
MONARCHIDAE	<i>Myiagra inquieta</i>	Restless Flycatcher		R
NEOSITTIDAE	<i>Daphoenositta chrysoptera</i>	Varied Sittella		
OREOICIDAE	<i>Oreoica gutturalis</i>	Crested Bellbird		
OTIDIDAE	<i>Ardeotis australis</i>	Australian Bustard		V
PACHYCEPHALIDAE	<i>Colluricincla harmonica</i>	Grey Shrikethrush		
	<i>Pachycephala rufiventris</i>	Rufous Whistler		
PARDALOTIDAE	<i>Pardalotus striatus</i>	Striated Pardalote		
PETROICIDAE	<i>Melanodryas cucullata</i>	Hooded Robin		
	<i>Microeca fascinans</i>	Jacky Winter		
	<i>Petroica goodenovii</i>	Red-capped Robin		
PODARGIDAE	<i>Podargus strigoides</i>	Tawny Frogmouth		
POMATOSTOMIDAE	<i>Pomatostomus superciliosus</i>	White-browed Babbler		
PSITTACIDAE	<i>Barnardius zonarius</i>	Australian Ringneck		
	<i>Melopsittacus undulatus</i>	Budgerigar		
	<i>Neophema splendida</i>	Scarlet-chested Parrot		R
	<i>Psephotus varius</i>	Mulga Parrot		

## Baseline Environmental Investigations Atacama Project

Family	Species name	Common name	Conservation status	
			Aus	SA
RHIPIDURIDAE	<i>Rhipidura leucophrys</i>	Willie Wagtail		
TURNICIDAE	<i>Turnix velox</i>	Little Buttonquail		

**Aus:** Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **SA:** South Australia (*National Parks and Wildlife Act 1972*). **Conservation Codes:** **CE:** Critically Endangered. **ENE:** Endangered. **VU/V:** Vulnerable. **R:** Rare.

# = Disused mound only.

### 8.2.2 Mammals

A total of 20 mammal species from 11 families were recorded in the Project Area during surveys in 2014 (Table 10). The 20 mammal species included 15 terrestrial mammals and five microbat species. Eleven (11) of the 20 species were recorded from direct observations, however, the remaining nine species were recorded from fresh tracks, echolocation call analysis and signature diggings.

Seven small mammal species were captured over the eight trapping sites (Table 10). The most abundant species were the introduced House Mouse (*Mus musculus*) (23 individuals), Little Long-tailed Dunnart (*Sminthopsis dolichura*) (10 individuals) and Sandy Inland Mouse (*Pseudomys hermannsburgensis*) (nine individuals). The most widespread small mammal species over the eight trapping sites were the House Mouse (seven sites), Sandy Inland Mouse (five sites) and Western Pygmy Possum (*Cercartetus concinnus*) (five sites). The number of small mammals captured from each species at each trapping site is presented in Appendix 6.

Large native mammal species were restricted to the Western Grey Kangaroo (*Macropus fuliginosus*), Red Kangaroo (*Macropus rufus*) and Dingo (*Canis lupus*) (Table 10). Only one Western Grey Kangaroo and two Red Kangaroos were observed in the Project Area, while the Dingo was only recorded through the presence of fresh tracks.

Five bat species were recorded over eight fauna sites using Anabat Detectors (Table 10). Only one bat, a Lesser Long-eared Bat (*Nyctophilus geoffroyi*) was trapped using harp traps. The most widespread bat species, as inferred from Anabat recordings, were the Lesser Long-eared Bat (eight sites), Gould's Wattled Bat (*Chalinolobus gouldii*) (six sites) and Inland Free-tailed Bat (*Ozimops petersi*) (three sites). The number of call recordings from each bat species at each fauna site is presented in Appendix 7.

A targeted search for the burrows of the Southern Marsupial Mole (*Notoryctes typhlops*) identified their burrows at nine of 20 trenching sites. No direct observations of Southern Marsupial Moles were recorded.

One Nationally threatened and one State threatened mammal species were recorded within the Project Area:

- Sandhill Dunnart (*Sminthopsis psammophila*) – National Vulnerable, State Vulnerable; and
- Southern Marsupial Mole – State Vulnerable.

Detail on the records of Sandhill Dunnarts in the Project Area is provided in Section 10.3.5.

Five introduced species were recorded over the Project Area:

- House Mouse;
- Rabbit (*Oryctolagus cuniculus*);
- Red Fox (*Vulpes vulpes*);
- Cat (*Felis catus*); and
- One-humped Camel (*Camelus dromedarius*).

A summary of the presence of introduced mammals in the Project Area is provided in Table 11.

Table 10. Mammal species recorded within the Project Area (EBS 2015c).

Family	Species name	Common name	Conservation status	
			Aus	SA
BURRAMYIDAE	<i>Cercartetus concinnus</i>	Western Pygmy-possum		
CAMELIDAE	* <i>Camelus dromedarius</i>	One-humped Camel		
CANIDAE	<i>Canis lupus</i>	Dingo, Feral Dog		
	* <i>Vulpes vulpes</i>	Fox (Red Fox)		
DASYURIDAE	<i>Ningauai yvonneae</i>	Southern Ningauai		
	<i>Sminthopsis dolichura</i>	Little Long-tailed Dunnart		
	<i>Sminthopsis psammophila</i>	Sandhill Dunnart	EN	V
FELIDAE	* <i>Felis catus</i>	Domestic Cat (Feral Cat)		
LEPORIDAE	* <i>Oryctolagus cuniculus</i>	Rabbit (European Rabbit)		
MACROPODIDAE	<i>Macropus fuliginosus</i>	Western Grey Kangaroo		
	<i>Macropus rufus</i>	Red Kangaroo		
MOLOSSIDAE	<i>Austronomus australis</i>	White-striped Free-tailed Bat		
	<i>Ozimops petersi</i>	Inland Free-tailed Bat		
MURIDAE	* <i>Mus musculus</i>	House Mouse		
	<i>Notomys mitchellii</i>	Mitchell's Hopping-mouse		
	<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse		
NOTORYCTIDAE	<i>Notoryctes typhlops</i>	Southern Marsupial Mole (Itjaritjari)		V
VESPRTLIONIDAE	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat		
	<i>Vespadelus regulus</i>	Southern Forest Bat		
	<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat		

**Aus:** Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **SA:** South Australia (*National Parks and Wildlife Act 1972*). **Conservation Codes:** **CE:** Critically Endangered. **ENE:** Endangered. **VU/V:** Vulnerable. **R:** Rare.

\* Denotes introduced species.

Table 11. The recorded presence of introduced mammals in the Project Area (EBS 2015c).

Scientific name	Common name	Recorded presence
<i>Mus musculus</i>	House Mouse	Twenty-three (23) individuals were captured over all eight fauna trapping sites.
<i>Oryctolagus cuniculus</i>	Rabbit	Buckheaps, tracks and diggings were observed at low densities but were quite widespread throughout the Project Area.
<i>Vulpes vulpes</i>	Red Fox	Footprints were commonly recorded on vehicle exploration tracks.
<i>Felis catus</i>	Cat	Footprints were recorded in the Project Area.
<i>Camelus dromedarius</i>	One-humped Camel	A herd of 10 individuals was observed browsing in a swale area near fauna site ATA004. Fresh and old Camel tracks were also commonly sighted throughout the Project Area.

### **8.2.3 Reptiles**

A total of 38 reptile species from nine families were recorded within the Project Area (Table 12). The Scincidae family (skinks) recorded the greatest number of species with 12 representatives.

Thirty-five (35) of the 38 species were captured at trapping sites, however, three species were only recorded through opportune observations and capture by hand. The three species opportunistically recorded were Sand Goanna (*Varanus gouldii*), Pygmy Mulga Goanna (*Varanus gilleni*) and Broad-banded Sandswimmer (*Eremiascincus richardsonii*).

The most abundant reptiles captured at trapping sites were Southern Spinifex Ctenotus (*Ctenotus atlas*) (28 individuals), Starred Knob-tailed Gecko (*Nephrurus stellatus*) (17 individuals) and Sandplain Ctenotus (*Ctenotus schomburgkii*). The reptile species most widespread at trapping sites were Desert Wood Gecko (*Diplodactylus wiru*) (seven sites), Southern Spinifex Ctenotus (seven sites) and Starred Knob-tailed Gecko (six sites). The number of individuals of each reptile species captured at trapping sites are presented in Appendix 8.

Four reptiles were observed during the two spotlighting events; Thorny Devil (*Moloch horridus*), Dwarf Bearded Dragon (*Pogona minor*), Starred Knob-tailed Gecko (*Nephrurus stellatus*), and Southern Sandplain Gecko (*Lucasium bungabinna*).

No reptile species with a National or State conservation rating were recorded in the Project Area.

No introduced reptiles were recorded within the Project Area.

### **8.2.4 Amphibians**

No amphibians were recorded within the Project Area.

Table 12. Reptiles recorded within the Project Area (EBS 2015c).

Family	Species name	Common name	Conservation status	
			Aus	SA
AGAMIDAE	<i>Ctenophorus cristatus</i>	Crested Dragon		
	<i>Ctenophorus fordi</i>	Mallee Dragon		
	<i>Ctenophorus isolepis</i>	Military Dragon		
	<i>Diporiphora lingua</i>	Linga Dragon		
	<i>Moloch horridus</i>	Thorny Devil		
	<i>Pogona minor</i>	Dwarf Bearded Dragon		
CARPHODACTYLIDAE	<i>Nephrurus laevisimus</i>	Pale Knob-tailed Gecko		
	<i>Nephrurus stellatus</i>	Starred Knob-tailed Gecko		
DIPLODACTYLIDAE	<i>Diplodactylus wiru</i>	Desert Wood Gecko		
	<i>Lucasium bungabinna</i>	Southern Sandplain Gecko		
	<i>Lucasium damaeum</i>	Beaded Gecko		
	<i>Strophurus assimilis</i>	Thorn-tailed Gecko		
	<i>Strophurus elderi</i>	Jewelled Gecko		
ELAPIDAE	<i>Brachyuropsis fasciolatus</i>	Narrow-banded Snake		
	<i>Brachyuropsis semifasciatus</i>	Half-girdled Snake		
	<i>Demansia reticulata</i>	Desert Whipsnake		
	<i>Pseudonaja modesta</i>	Five-ringed Snake		
GEKKONIDAE	<i>Gehyra purpurascens</i>	Purple Dtella		
	<i>Gehyra variegata</i>	Tree Dtella		
PYGOPODIDAE	<i>Delma butleri</i>	Spinifex Snake-lizard		
	<i>Delma petersoni</i>	Painted Snake-lizard		
	<i>Lialis burtonis</i>	Burton's Legless Lizard		
SCINCIDAE	<i>Ctenotus atlas</i>	Southern Spinifex Ctenotus		
	<i>Ctenotus schomburgkii</i>	Sandplain Ctenotus		
	<i>Ctenotus taeniatus</i>	Eyrean Ctenotus		
	<i>Cyclodomorphus melanops</i>	Spinifex Slender Bluetongue		
	<i>Eremiascincus richardsonii</i>	Broad-banded Sandswimmer		
	<i>Lerista desertorum</i>	Great Desert Slider		
	<i>Lerista labialis</i>	Eastern Two-toed Slider		
	<i>Lerista taeniata</i>	Ribbon Slider		
	<i>Lerista terdigitata</i>	Southern Three-toed Slider		
	<i>Lerista timida</i>	Dwarf Three-toed Slider		
	<i>Liopholis inornata</i>	Desert Skink		
	<i>Morethia butleri</i>	Butler's Snake-eye		
TYPHLOPIDAE	<i>Ramphotyphlops bicolor</i>	Southern Blind Snake		
VARANIDAE	<i>Varanus eremius</i>	Desert Pygmy Goanna		
	<i>Varanus gilleni</i>	Pygmy Mulga Goanna		
	<i>Varanus gouldii</i>	Sand Goanna		



## 9 GROUNDWATER DEPENDENT ECOSYSTEMS

Groundwater Dependent Ecosystems (GDEs) refer to vegetation, vertebrate and macroinvertebrate communities that rely on the uptake of groundwater in order to persist through dry periods (Clifton *et al.* 2007 in Richardson *et al.* 2011; Tomlinson 2011 in Richardson *et al.* 2011). GDEs include (DPI 2016):

- Terrestrial ecosystems that show seasonal or episodic reliance on groundwater;
- River base flow systems, which are aquatic and riparian ecosystems in or adjacent to streams/rivers dependent on the input of groundwater base flows, especially during dry seasons in seasonally dry climates or perennially in arid zones;
- Aquifer and cave ecosystems, often containing diverse and unique fauna;
- Wetlands dependent on groundwater influx for all or part of the year; and
- Estuarine and near-shore marine ecosystems that use groundwater discharge.

Observations of the ecosystems present within the Project Area do not suggest a direct link between their occurrence and the role of groundwater discharge due to;

- A lack of any continual flow or highly persistent pools or wet areas;
- No increased flow or presence of any water pools within the Project Area other than ephemeral claypans;
- No wetland vegetation species such as sedges, rushes or other water dependent larger trees, such as *Melaleuca glomerata* (Desert Honey-myrtle), within the Project Area;
- The absence of areas that do not receive overland flow that appear to have increased access to water, i.e. vegetation with lush canopies or turgid leaves, than the surrounding landscape due to groundwater expression; and
- No vegetation communities present consistent with species recognised as GDE indicators.

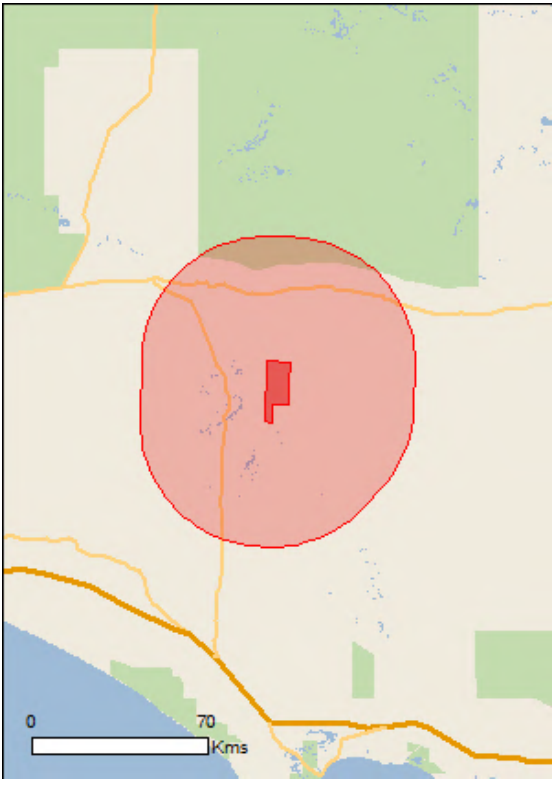
The preferred method of quantifying whether groundwater plays a role in vegetation communities is undertaking water balance modelling using pre-dawn leaf water potential measurements and use of stable isotopes of water analysis to determine whether a groundwater 'signature' exists within the plant xylem (Richardson 2011). Such an assessment is not required within the Project Area based on existing information.

In addition to the absence of groundwater dependent ecosystems, EBS (2014c) determined that no surface water dependent ecosystems occurred within the Project Area. This study determined that no vegetation associations present within the Project Area were reliant upon flows or flooding due to the infrequency of these events. Rather vegetation associations in the Project Area were driven by soil depth and type (EBS 2014c).

## 10 MATTERS OF NATIONAL SIGNIFICANCE

The results of the PMST report are summarised in (DotEE 2019). The relevant Matters of National Environmental Significance, other matters protected under the *EPBC Act 1999*, and threatened species listed under the *NPW Act 1972* are discussed in detail below. Observations from previous field surveys regarding species and habitat presence have been integrated into the discussion.

**Table 13. Summary of EPBC Act Protected Matters Search Tool results (DotEE 2019).**

Study Area (50km buffer)	Matters of National environmental significance under the EPBC Act	Identified within the search area
	World heritage properties	None
	National heritage properties	None
	Wetlands of international importance	None
	Great Barrier Reef marine park	None
	Commonwealth marine area	None
	Threatened ecological communities	None
	Threatened species	6
	Migratory species	9
	Commonwealth land	3
	Commonwealth heritage places	None
	Listed marine species	14
	Whales and other cetaceans	None
	Critical habitats	None
	Commonwealth reserves terrestrial	None
	Commonwealth reserves marine	None
	State and Territory reserves	3
	Regional forest agreements	None
	Invasive species	10
Nationally important Wetlands	None	
Key ecological features (marine)	None	

### 10.1 Threatened Ecological Communities

No vegetation communities listed as EPBC Act Threatened Ecological Communities (TECs) were identified in the PMST or in any previous background information (Table 13).

## 10.2 Nationally threatened flora

One Nationally threatened flora species; *Hibbertia crispula* (Ooldea Guinea-flower) was highlighted within the EPBC Protected matters search. This species has been recorded within the Study Area (Figure 11).

**Table 14. Nationally threatened flora identified within the Study Area.**

Scientific name	Common name	Conservation status		Source	Last Record (50 km Buffer)	Likelihood of occurrence within Project Area
		Aus	SA			
<i>Hibbertia crispula</i>	Ooldea Guinea-flower	VU	V	1, 2, 3	2014	Possible

**Conservation status:** Aus.: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). SA: South Australia (*National Parks and Wildlife Act 1972*).

**Conservation codes:** CE: Critically Endangered. ENE: Endangered. VU/V: Vulnerable. R: Rare.

**Source:** 1: EPBC Protected Matters Search, 2: Biological Database of South Australia, 3: EBS (2015c).

### 10.2.1 *Hibbertia crispula* (Ooldea Guinea-flower)

#### **Conservation Status**

*Hibbertia crispula* (Ooldea Guinea Flower) is listed as Vulnerable under the EPBC Act and the NPW Act.

#### **Ecology**

*Hibbertia crispula* is a small wiry, glabrous shrub growing up to 50 cm high. It is characterised by yellow flowers (8-15 mm in diameter), which are found in the axils of the leaves. The flowers typically lack a stalk, however, on occasion, a very short stalk may be present. The leaves are alternate, cylindrical and up to 45 mm long and 1 mm wide (DotE 2008). Current records suggest that the species is known only from two disjunct locations; the Lake Everard region and the Ooldea region of South Australia (DotE 2008).

Three patches of mature *H. crispula* (totalling 51 shrubs) were recorded in March 2010 approximately 18 km north-west of the Project Area (Personal Obs., Matt Launer 2010). The shrubs were recorded on dune crests that supported mallee associations (Personal Obs., Matt Launer 2010).

The distribution of *H. crispula* is likely to be more widespread within the Yellabinna Environmental Association than current records indicate. This is likely to be due to the lack of survey effort in the area because of remoteness, lack of vehicular access and large sand dune terrain.

The primary threats to *H. crispula* are grazing from introduced species, including rabbits, goats and camels and weed invasion (DotE 2008).

#### **Search effort**

The Project Area was searched on-ground by foot and vehicle in 2014 by EBS (EBS 2015c). The Project Area was traversed for nine days by five observers during which observations of threatened flora were recorded (EBS 2015c). Search effort was greatest in areas with easy access, such as tracks, however, was low or nil within dune areas at significant distances from tracks.

The species was recorded outside the Project Area during the field assessment in 2014 (Figure 11). Five patches were observed, which totalled 283 individual shrubs. The *H. crispula* patches were recorded outside the northern and eastern boundaries of the Project Area, with the closest record 1.5 km from the

northern boundary. The habitat within which *H. crispula* were recorded was comprised of dune crests in *Eucalyptus* spp. / *Hakea francisiana* (Bottlebrush Hakea) / *Grevillea stenobotrya* (Rattle-pod Grevillea) Tall Open Shrubland (VA 1). Fire had impacted areas where *H. crispula* were recorded, with mature individuals recorded in the 2002 fire scar and juveniles within the 2012 fire scar.

***Likelihood of occurrence***

*Hibbertia crispula* may potentially occur within the Project Area despite the failed detection of the species in 2014 (EBS 2015c). It is considered possible that *H.crispula* may occur within the Project Area due to the occurrence of local records and the presence of suitable habitat (VA 1 and 4), particularly within the northern section of the Project Area.

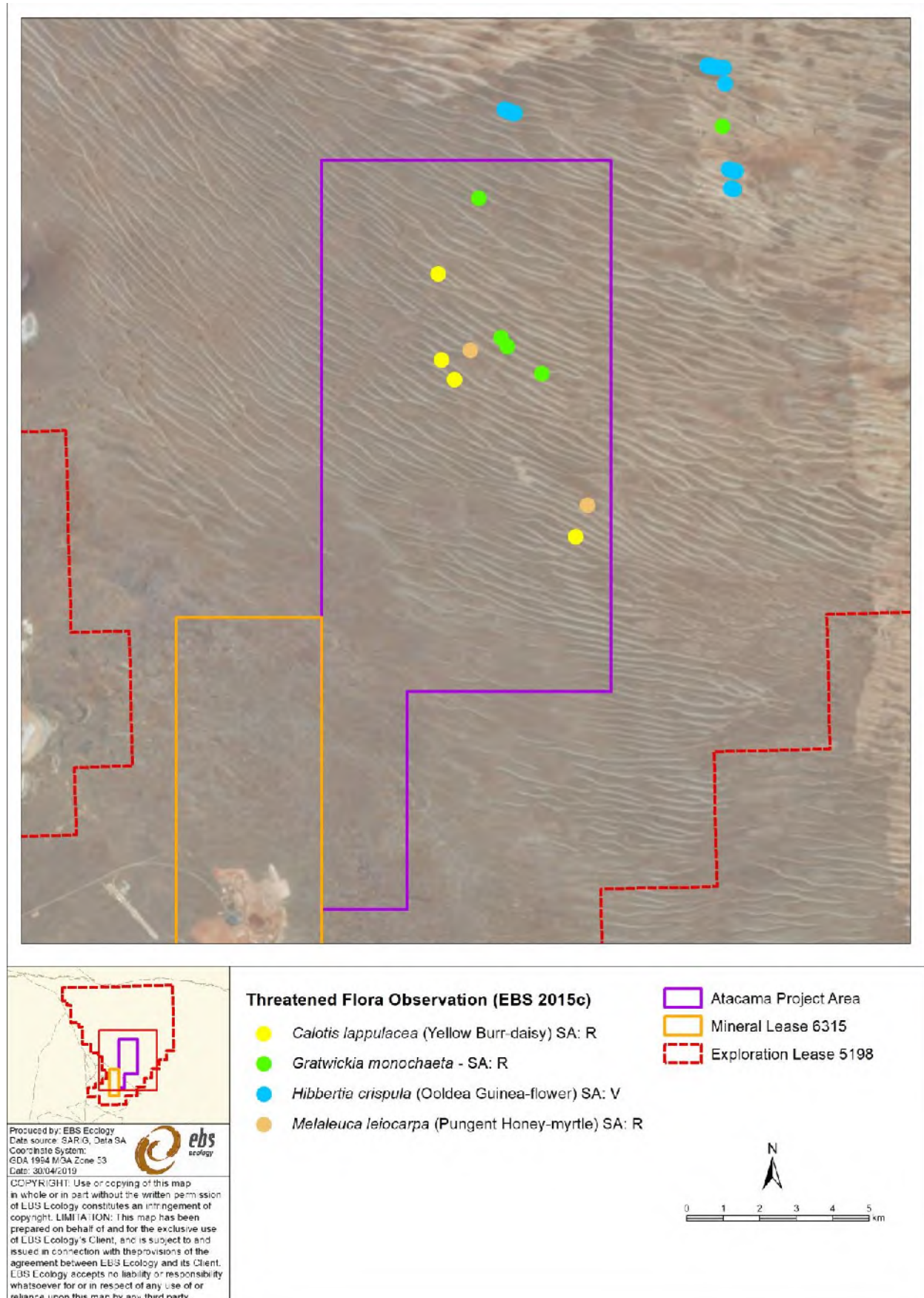


Figure 11. Location of threatened flora species observations (EBS 2015c).

### 10.3 Nationally threatened fauna

Five Nationally threatened fauna species were identified in the PMST as having potential to occur within the Study Area. The potential for each of the five Nationally threatened fauna species to occur within the Project Area is presented in Table 15 and discussed below. The locations of recorded Nationally threatened fauna species are shown in Figure 12.

**Table 15. Threatened and migratory fauna species listed under the EPBC Act that were identified in the PMST, BDBSA and EBS (2015c).**

Scientific name	Common name	Conservation status		Source	Last Record (50 km Buffer)	Likelihood of occurrence within Project Area
		Aus	SA			
<i>Calidris ferruginea</i>	Curlew Sandpiper	CE, Mi		1		Unlikely
<i>Leipoa ocellata</i>	Malleefowl	VU	V	1, 2, 3	2014	Known
<i>Pezoporus occidentalis</i>	Night Parrot	EN	E	1		Unlikely
<i>Polytelis alexandrae</i>	Princess Parrot	VU	V	1		Unlikely
<i>Sminthopsis psammophila</i>	Sandhill Dunnart	VU	V	1, 2, 3	2014	Known

**Conservation status:** **Aus.:** Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **SA:** South Australia (*National Parks and Wildlife Act 1972*).

**Conservation codes:** **CE:** Critically Endangered. **ENE:** Endangered. **VU/V:** Vulnerable. **R:** Rare.

**Source:** **1:** EPBC Protected Matters Search, **2:** Biological Database of South Australia, **3:** EBS (2015c).



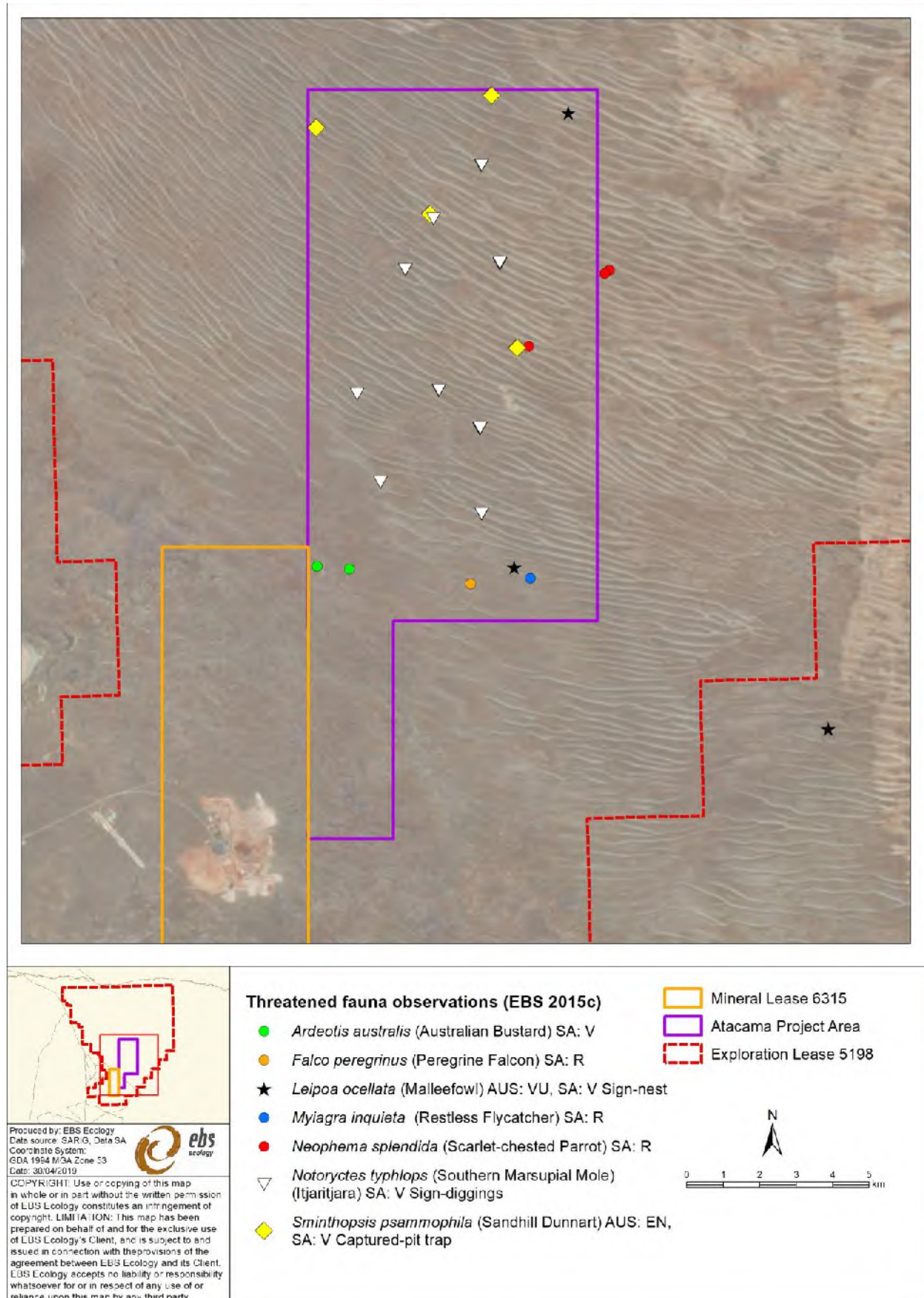


Figure 12. Threatened fauna recorded in the Atacama Project Area by EBS (2015c).

### **10.3.1 Curlew Sandpiper (*Calidris ferruginea*)**

#### ***Conservation Status***

The Curlew Sandpiper (*Calidris ferruginea*) is listed as Critically Endangered under the EPBC Act.

#### ***Ecology***

The Curlew Sandpiper is a species of migratory shorebird, which spend their non-breeding season (September – April) in Australia and their breeding season in the arctic tundra of Siberia (Hollands and Minton 2012). The species inhabits coastal and inland wetland environments, which include tidal mudflats, saltmarsh, wetlands from fresh to saline and artificial wetlands including dams and sewage ponds (Pizzey and Knight 2014). Within suitable habitat, Curlew Sandpipers forage in very shallow water probing the sediment for invertebrates to feed upon (Dann 2000).

#### ***Search effort***

The Project Area was searched on-ground by foot and vehicle and aerially by helicopter in 2014 by EBS (EBS 2015c). The Project Area was traversed for nine days by five observers during which signs or direct observations of threatened fauna and/or their habitat were recorded (EBS 2015c).

#### ***Likelihood of occurrence in the Project Area***

It is unlikely that the Curlew Sandpiper would occur within the Project Area as there is no suitable habitat for the species. No areas of the Project Area could support large expanses of shallow water cover.

The closest potential habitat for the Curlew Sandpiper to the Project Area occurs within the large salt lakes, including Lake Ifould, that occur >3 km to the west of the Project Area.

### 10.3.2 Malleefowl (*Leipoa ocellata*)

#### **Conservation Status**

The Malleefowl (*Leipoa ocellata*) is listed as Vulnerable under the EPBC Act and the NPW Act.

#### **Ecology**

The Malleefowl is a large, heavy-bodied, ground-dwelling bird, which constructs a mound within which it incubates its eggs (Pizzey and Knight 2014). The species habitats semi-arid to arid South Australia, where it occurs primarily within mallee associations, however, has been recorded within other eucalypt dominated habitats as well as scrubs featuring *Melaleuca*, *Calitris* and *Acacia* species (Benshemesh 2007).

The suitability of habitat is largely driven by the time since last fire as the vegetation structure, floristic composition and quantity of leaf litter are key parameters of habitat quality (Parsons and Gosper 2011). Mallee habitats most valuable to Malleefowl are those which have not been burnt for over 40 years, and therefore, support the highest breeding densities for the species (Benshemesh 2007). Habitat that has not been burnt for over 40 years provides greater food resources, including seed, herbage and invertebrates, as seed-bearing shrubs and leaf litter require many years to re-colonise and accumulate following fire (Benshemesh 2007; Parsons and Gosper 2011). Accumulated leaf litter is important to Malleefowl, which they use to line the nest chamber within their mound, as the breakdown of the organic matter generates heat that incubates their eggs (Parsons and Gosper 2011).

#### **Search effort**

Malleefowl were targeted aerially and on-ground (EBS 2015c). The aerial search was conducted by helicopter over a two-day period, during which all suitable habitat for the species within the Project Area was traversed in transects that followed the bearing of dune swales (EBS 2015c).

Malleefowl were also searched for on-ground. The Project Area was traversed for nine days by five observers whom searched for signs of Malleefowl presence, while 14-point count sites were also established over the Project Area, where birds were systematically surveyed (EBS 2015c) (see Methods; Table 3).

#### **Likelihood of occurrence in the Project Area**

Two old Malleefowl mounds which had not been used for many years were found within the Project Area (EBS 2015c). An additional four mounds within 30 km to the east of the Project Area were also investigated, however, all appeared to have been in-active in recent years (EBS 2015c). One nest recorded 30 km to the east of the Project Area by the Iluka exploration team during their work within Yellabinna RR was not located during the helicopter flight (EBS 2015c). Two Malleefowl were observed to flee this nest in November 2014 (G. Hoffrichter, Pers. Comm. 2014).

Malleefowl were not directly observed within the Project Area in 2014 despite evidence of their previous occurrence (old mounds) (EBS 2015c). The reason for this may have been in part caused by a bushfire in 2002 that burnt 3,253 ha (25.1%) of the Project Area. Furthermore, in 2012 a fire burnt 130,327 ha occur within 2 km of the northern and eastern extent of the Project Area (NatureMaps 2019). The 2002 fire is expected to have reduced the suitability of mallee associations in the Project Area for Malleefowl, while

the 2012 fire may have caused the mortality of Malleefowl populations to the east of the Project Area and rendered large areas temporarily unsuitable for the species.

The 3,253 ha of mallee that burnt in 2002 within the Project Area is expected to be more suitable to support Malleefowl breeding activity in 2019 than 2014 due to the greater time since the last fire. While habitat that has not suffered a burn in the past 40 years is preferable breeding habitat, Malleefowl have been recorded to return to 80% of their original breeding densities within 12 years following a fire (Benshemesh 2007) Furthermore, there is an additional 6,503 ha of mallee within the Project Area for which there is no recorded fire history, and therefore, may provide suitable habitat. As the species has previously occurred within the Project Area and suitable habitat may be available, it is considered possible that Malleefowl may occur in 2019 despite their absence in 2014.

### 10.3.3 Night Parrot (*Pezoporus occidentalis*)

#### Conservation Status

The Night Parrot (*Pezoporus occidentalis*) is listed as Endangered under the EPBC Act and NPW Act.

#### Ecology

The Night Parrot is a medium sized (22 – 24 cm) dumpy olive-green parrot that is nocturnal (Pizzey and Knight 2014). The Night Parrot is one of the world's most cryptic birds, with no accepted records from 1935 to 1979 (Garnett *et al.* 2011). During the day, the Night Parrot roosts within cavities in spinifex or low shrubs. When disturbed from a roosting location, Night Parrots fly a short distance (20 – 30 m) before dropping to ground level and running in a squatted manner to cover (Pizzey and Knight 2014).

Night Parrots were widespread across arid, inland Australia until 1900. The distribution of the Night Parrot is considered to have contracted due to pastoral settlement and introduced grazers and predators. The current distribution of the species is unknown, however populations within the Pilbara and Sandy Desert, Western Australia, southern Northern Territory and south-western Queensland are known (Night Parrot Recovery Team 2019). Prior to the recent (post 2016) discovery of these known populations, an expert committee estimated that there may be 50 to 250 birds at less than five locations (Garnett *et al.* 2011).

The last confirmed record of the Night Parrot in South Australia was in 1979, in the north of the State near Coopers Creek (ALA 2019). Records within South Australia have been concentrated around the Gawler Ranges (pre-1894), Lake Eyre (pre-1875) and the north-west of the State (last record 1979) (ALA 2019). The closest records of Night Parrots to the Project Area are from an area south of Lake Gairdner, where 16 of the 23 known Night Parrot specimens were collected between the 1870s and 80s (Olsen 2018). The Night Parrot is believed to be scarce (if present) south of the dingo fence, based on the quality of habitat in this region, which has been degraded as a result of stock grazing (Reid *in litt* in Garnett *et al.* 2011). The habitat within the vicinity of Night Parrot records is typically *Triodia* grasslands, however records have also occurred in chenopod associations, shrubby samphire, mulga woodlands and bare gibber (Garnett *et al.* 1993; Cupitt and Cupitt 2008; Murphy 2015; TSSC 2016).

A Night Parrot which was tracked with a satellite transmitter at Pullen Pullen Reserve, south-western Queensland, was recorded at six broad land types:

- Floodplain dominated by ephemeral and *Astrebla* grassland;
- Alluvial depression;
- Stony rises;
- Pebbly herbfields;
- Iron-stone plains with vegetation patches; and
- Quaternary sand drifts and ridges.

The vegetation within these land types were “either dominated by *Triodia longiceps* on slopes and margins of duricrust plateaus or with *Sclerolaena* spp., *Maireana* spp. (*Saltbush* spp.), *Ptilotus* spp. (*Mulla Mulla* spp.), and small areas of *T. longiceps*; with occasional watercourses with *Acacia cambagei* (stinking gidgee)” (Murphy 2015).



Photographs of habitats within which Night Parrots have been recorded since 2017 in the Pilbara, Western Australia and southern Northern Territory are within *Triodia* grasslands on alluvial plains and sheet wash plains (Night Parrot Recovery Team 2019).

Garnett *et al.* (1993) surveyed the vegetation within the immediate surrounds of seven Night Parrot sightings in western Queensland. This study found that *Triodia* grasslands were nearby at the point of observation for six of the seven sightings, with the remaining sighting of a foraging pair occurring within open woodland vegetation with perennial grasses where chenopods and *Triodia* were absent.

The carcass of an individual found within a fence near Boulia, south-western Queensland, in 2006, was also outside of *Triodia* grassland, with the surrounding habitat comprised of bare gibber with patches of sparse, low shrubs and grasses, which were close to an *Acacia* drainage line (Cupitt and Cupitt 2008). It is hypothesised that this individual may have been flying to a water source when it struck the fence.

The most recent South Australian observations of Night Parrots at Partacoona in 1979 were within an area covered with annual and perennial saltbush (*Atriplex* spp.), some bindii (*Bassia* sp.) and Blackbush (*Maireana pyramidata*), with no *Triodia* for over 3 km (Powell 1970).

### ***Search effort***

As the Night Parrot is nocturnal, regular daylight monitoring methods for birds such as point counts and opportune observations are ineffective to record the species. Nocturnal monitoring activities, such as spotlighting and camera trapping, have been conducted in the Project Area. However, since 2014, methods to detect the presence of Night Parrots have been refined following the re-discovery and surveys of populations in Western Australia and Queensland. As such, search effort for Night Parrots could be improved with the use of songmeters at locations with the most suitable habitat for the species within the Project Area and more broadly the Study Area.

### ***Likelihood of occurrence in the Project Area***

It is unlikely that the Night Parrot would occur within the Project Area as the species is presumed extinct within southern South Australia and the Project Area falls outside the extent of historic records (Reid *in litt* in Garnett *et al.* 2011; ALA 2019). Furthermore, the landforms within the Project Area do not feature alluvial or sheet-wash plains where recent Night Parrot records have occurred elsewhere in central Australia (Night Parrot Recovery Team 2019). Despite this, vegetation communities (VA 3 and 4) present within the Project Area offer potential habitat for Night Parrots due to the presence of a *Triodia* dominated understorey and excellent vegetation condition, which is almost reflective of that which would have occurred prior to European settlement (EBS 2015c). In addition to this, the landforms in the Project Area are broadly similar to the Murray Mallee in Victoria, where Night Parrots were recorded between 1870 and the early 1900s, due to the presence of sand dunes, mallee associations and *Triodia* (Menkhorst and Ryan 2015). Therefore, while the likelihood of Night Parrot occurrence in the Project Area is low it cannot be discounted.

### 10.3.4 Princess Parrot (*Polytelis alexandrae*)

#### **Conservation Status**

The Princess Parrot (*Polytelis alexandrae*) is listed as Vulnerable under the EPBC Act and Endangered under the NPW Act.

#### **Ecology**

The Princess Parrot is a moderate to large parrot (34 – 46 cm) with a slender build. The species is colourful, having an olive-green breast and back, a pale blue crown, pink throat, lime-green shoulders, sky blue rump and a long, slim blue-green tail (Pizzey and Knight 2014). Males are larger in size and have brighter colouration than females (Pizzey and Knight 2014).

Princess Parrots inhabit arid central Australia, with their range extending from the Great Victoria Desert in the south, SA and WA, to the Tanami Desert, NT, in the north; and from the Gibson Desert, WA, in the west to the MacDonnell Ranges, NT, in the east (Pavey *et al.* 2014). The core range of the species includes the Great Victoria Desert and Great Sandy Desert (Pavey *et al.* 2014). The Project Area falls outside the known range of the Princess Parrot.

Princess Parrots have irruptive population dynamics, meaning that large numbers of birds can occur within an area for a short period of time and then be absent for long periods (Pavey *et al.* 2014). The species makes large-scale movements as inferred by their sporadic appearance in areas outside their core range (DotE 2018). The number of records of Princess Parrots have reduced from the periphery of its distribution since the 1950s, which may indicate that the extent of the species distribution has retreated (DotE 2018).

The Princess Parrot inhabits sandy dunes and flats that support shrublands and savanna woodlands (Garnett *et al.* 2011). Common over-storey species include eucalypts (especially *Eucalyptus gongylocarpa*, *E. chippendalei* and mallee species), casuarinas, allocasuarinas and acacias (especially *Acacia anerua*). Midstorey vegetation consists of large shrubs, including *Cassia*, *Eremophila*, *Grevillea*, *Hakea* and *Senna*. Areas of preferred habitat regularly have an understorey comprised of spinifex (DotE 2018).

The diet of the Princess Parrot is diverse and consists of a range of flowers, nectar, seeds and foliage (Pavey *et al.* 2014). As such, the species forages both on the ground and within shrubs and trees offering food items. The foraging ecology of a breeding population of Princess Parrot was studied by Pavey *et al.* (2014) whom determined that many of the plant species consumed are widespread within arid central Australia.

#### **Search effort**

The Project Area was traversed for nine days by five observers whom searched for opportune observations of Princess Parrots, while 14-point count sites were also established over the Project Area, where birds were systematically surveyed (see Methods; Table 3).

#### **Likelihood of occurrence in the Project Area**

The Princess Parrot is considered unlikely to occur within the Project Area as it occurs outside their known range, however their temporal presence within the Project Area cannot be discounted due to:

(1) The presence of potential habitat;

The habitat preferences of the Princess Parrot broadly overlap with the vegetation associations present. For example, vegetation associations 1, 3 and 4 have a eucalypt canopy and have either a *Triodia* understorey or mid-storey species that include *Grevillea* and *Hakea* species, which are reflective of habitats where Princess Parrots have been recorded.

(2) Relative proximity to core distribution;

The core range for the Princess Parrot occurs in the Great Victoria Desert, the edge of which is 170 km to the north-west of the Project Area. Such a distance is an achievable distance of flight for a parrot that can move hundreds of kilometres.

(3) Irruptive populations; and

The Princess Parrot has an irruptive population, whereby it will retract to small, discrete portions of its core range during extended dry periods, then breed rapidly in response to pulses in resource availability, and subsequently dispersing to other parts of its range (Pavey *et al.* 2014). As such, areas where Princess Parrots are recorded during dispersal events may not be revisited for many years if conditions do not facilitate breeding.

(4) The relative lack of search effort within the dune systems of Yellabinna RR.

The dune systems of Yellabinna RR have limited access and due to their isolation and very rarely are visited. Due to the isolation and difficulty of access, the area has been studied on few occasions.

### 10.3.5 Sandhill Dunnart (*Sminthopsis psammophila*)

#### Conservation Status

The Sandhill Dunnart (*Sminthopsis psammophila*) is listed as Vulnerable under the EPBC Act and the NPW Act.

#### Ecology

The Sandhill Dunnart is a small carnivorous marsupial. Sandhill Dunnarts are a large species of dunnart, weighing between 30 and 50 g (Churchill 2001a). Its relatively large size and crest of stiff black hairs on its ventral surface of the distal portion of its tail are features that distinguish the species from other dunnart species (Archer 1981).

Sandhill Dunnarts have been recorded within disjointed populations across South Australia and Western Australia. Within South Australia, current populations occur on Eyre Peninsula, Great Victorian Desert and Yellabinna Regional Reserve (Ward *et al.* 2008; Churchill 2001b).

The majority of Sandhill Dunnarts have been recorded in or near sand dunes that range in height between 5 and 30 m (Churchill 2001a). The vegetation on the sand dunes is typically comprised of mallee and an understorey comprised of a diverse array of shrubs and *Triodia* (Churchill 2001a). The most consistent features of habitat at sites where Sandhill Dunnarts occur are sand dunes and *Triodia* hummocks, which represent 10-70% of the groundcover (Churchill 2001a).

The size and structure of *Triodia* that provides preferable habitat for Sandhill Dunnarts is not clear, as Moseby *et al.* (2016) found *Triodia* height to be positively correlated with Sandhill Dunnart capture rates, whereas McLean (2015) identified a negative correlation with this habitat parameter and capture rates. Despite this, the overall ground cover, structure and size of *Triodia* hummocks are likely to influence the suitability of habitat for Sandhill Dunnarts as they are used for nesting and protection (Churchill 2001b; Phillip 2011). It has been suggested that the preferred stage of *Triodia* growth is Stage 3 (Figure 13), where hummocks were large and had begun to senesce at their centre. However, Sandhill Dunnarts have also been recorded to nest in burrows underneath old *Triodia* hummocks (Stage 5) rather than within the *Triodia* hummocks themselves (Churchill 2011b).

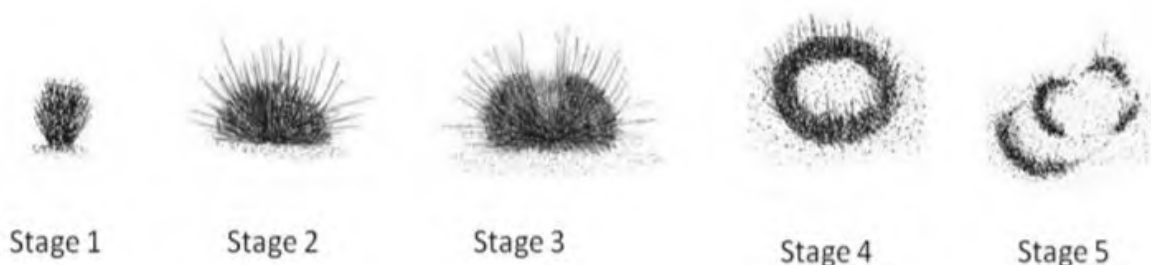


Figure 13. Life stages of *Triodia* (Churchill 2011b).

*Triodia* is susceptible to fire, which causes the complete or near-complete destruction of hummocks. Following fire, *Triodia*, dependent on the species, will either re-sprout or germinate from seed (Rice and Westoby 1999). As such, the time since last fire significantly influences the structure of *Triodia* hummocks.

The most favourable fire ages for Sandhill Dunnarts has been suggested to be between 10 and 20 years, when the *Triodia* hummocks have reached maximum size but have not become shaded out by the dense growth of shrubs (Churchill 2001a). However, McLean (2015) recorded Sandhill Dunnarts in the Middleback Ranges, South Australia, within habitats of 7 years post fire and >60 years post fire and found no differences in their use.

### ***Search effort***

Eight trapping sites were established over the Project Area in 2014 and were open for five nights each (EBS 2015c). Seven of the eight sites were positioned within sand dunes with mallee vegetation communities and featured a *Triodia* sp. understorey, and therefore, suitable habitat for the presence of Sandhill Dunnarts.

The trapping program implemented in 2014 optimised detection of Sandhill Dunnarts by using wide deep (225 mm wide x 600 mm deep) pit-falls (EBS 2015c), which capture more Sandhill Dunnarts than shorter or narrower pitfalls (150 mm wide x 500 mm deep) or Elliott traps (Read *et al.* 2015).

### ***Likelihood of occurrence in the Project Area***

Sandhill Dunnarts were captured at four sites over the Project Area (Figure 12) (EBS 2015c). One individual was captured at sites ATA001, ATA002, ATA004 and ATA005. The four sites at which Sandhill Dunnarts were captured all contained an overstorey of Mallee species and mixed shrubs and an understorey of *Triodia* sp. (EBS 2015c). The fire age for three sites where Sandhill Dunnarts captured were unknown, except for Site ATA005 which was burnt in 2002.

Sandhill Dunnarts are expected to be widespread in the areas containing *Triodia* within the Project Area. Vegetation associations 1, 3 and 4 all support *Triodia* and therefore may support Sandhill Dunnarts. These vegetation associations total an area of 8,064 ha (62% of the Project Area).



## 10.4 Migratory Fauna

Ten (10) migratory fauna species were identified in the desktop assessment as potentially occurring within the Study Area (Table 16). One species, the Fork-tailed Swift (*Apus pacificus*) could potentially occur within the Project Area, while all other identified species are considered unlikely to occur. The rationale for the likelihood of occurrence for each migratory fauna species within the Project Area is provided in Table 17.

**Table 16. Migratory fauna species listed under the EPBC Act that were identified in the PMST, BDBSA and EBS (2015b).**

Scientific name	Common name	Conservation status		Source	Last Record (50 km Buffer)	Likelihood of occurrence within Project Area
		Aus	SA			
<i>Actitis hypoleucos</i>	Common Sandpiper	Mi	R	1		Unlikely
<i>Apus pacificus</i>	Fork-tailed Swift	Mi		1		Possible
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Mi		1		Unlikely
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR, Mi		1		Unlikely
<i>Calidris melanotos</i>	Pectoral Sandpiper	Mi	R	1		Unlikely
<i>Charadrius veredus</i>	Oriental Plover	Mi		1		Unlikely
<i>Motacilla cinerea</i>	Grey Wagtail	Mi		1		Unlikely
<i>Motacilla flava</i>	Yellow Wagtail	Mi		1		Unlikely
<i>Pandion haliaetus</i>	Osprey	Mi	E	1		Unlikely
<i>Tringa glaurola</i>	Wood Sandpiper	Mi	R	3	2014	Unlikely

**Conservation status:** **Aus.:** Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **SA:** South Australia (*National Parks and Wildlife Act 1972*).

**Conservation codes:** **CR:** Critically Endangered. **ENE:** Endangered. **VU/V:** Vulnerable. **R:** Rare. **Mi:** Migratory

**Source:** **1:** EPBC Protected Matters Search, **2:** Biological Database of South Australia, **3:** EBS (2015b).

Table 17. Likelihood of occurrence rationale for migratory fauna species that may occur within the Project Area.

Scientific name	Common name	Likelihood of occurrence rationale
<i>Actitis hypoleucos</i>	Common Sandpiper	<b>Unlikely.</b> The Common Sandpiper is a species of migratory shorebird that in the arid region will inhabit dams, sewage ponds and inland lakes (Pizzey and Knight 2014). There are no permanent, semi-permanent or ephemeral wetlands present within the Project Area and therefore the species is unlikely to occur.
<i>Apus pacificus</i>	Fork-tailed Swift	<b>Possible.</b> The Fork-tailed Swift is an aerial insectivore that is almost exclusively aerial within Australia (Pizzey and Knight 2014). The species has been recorded to fly-over a wide variety of habitats from cities to forests to treeless plains (Pizzey and Knight 2014), and therefore, the Fork-tailed Swift may fly-over any sector of the Project Area.
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	<b>Unlikely.</b> The Sharp-tailed Sandpiper is a species of migratory shorebird that in the arid region will inhabit dams, sewage ponds and inland lakes (Pizzey and Knight 2014). There are no permanent, semi-permanent or ephemeral wetlands present within the Project Area and therefore the species is unlikely to occur.
<i>Calidris ferruginea</i>	Curlew Sandpiper	<b>Unlikely.</b> The Curlew Sandpiper is a species of migratory shorebird that in the arid region will inhabit dams, sewage ponds and inland lakes (Pizzey and Knight 2014). There are no permanent, semi-permanent or ephemeral wetlands present within the Project Area and therefore the species is unlikely to occur.
<i>Calidris melanotos</i>	Pectoral Sandpiper	<b>Unlikely.</b> The Pectoral Sandpiper is a species of migratory shorebird that in the arid region will inhabit dams, sewage ponds and inland lakes (Pizzey and Knight 2014). There are no permanent, semi-permanent or ephemeral wetlands present within the Project Area and therefore the species is unlikely to occur.
<i>Charadrius veredus</i>	Oriental Plover	<b>Unlikely.</b> The Oriental Plover is a species of migratory shorebird. The ecology of the Oriental Plover differs to other shorebird species identified in the desktop assessment as it may occur at great distances from water. The species may occur on plains, including gibber, as well as wetlands, including dams and inland lakes (Pizzey and Knight 2014). As no open plains nor permanent, semi-permanent or ephemeral wetlands are present within the Project Area, the Oriental Plover is unlikely to occur.
<i>Motacilla cinerea</i>	Grey Wagtail	<b>Unlikely.</b> The Grey Wagtail is a vagrant to South Australia with very few records in the State. The species inhabits wetlands and/or boggy vegetated areas, including irrigated lawns (Pizzey and Knight 2014), as such suitable habitat is absent from the Project Area.
<i>Motacilla flava</i>	Yellow Wagtail	<b>Unlikely.</b> The Yellow Wagtail is a vagrant to South Australia with very few records in the State. The species inhabits wetlands and/or boggy vegetated areas, including irrigated lawns (Pizzey and Knight 2014), as such suitable habitat is absent from the Project Area.
<i>Pandion haliaetus</i>	Osprey	<b>Unlikely.</b> The Osprey is a marine raptor species that inhabits coastal environments and major rivers (Pizzey and Knight 2014). Due to the absence of these landscapes, the species is unlikely to occur.
<i>Tringa glaerola</i>	Wood Sandpiper	<b>Unlikely.</b> The Wood Sandpiper is a species of migratory shorebird that in the arid region will inhabit dams, sewage ponds and inland lakes (Pizzey and Knight 2014). The species was recorded at Jacinth-Ambrosia water treatment pond in 2014. There are no permanent, semi-permanent or ephemeral wetlands present within the Project Area and therefore the species is unlikely to occur.

## 11 MATTERS OF STATE SIGNIFICANCE

The BDBSA search highlighted 12 flora and 12 fauna species of State conservation significance with previous records within the Study Area. The complete flora and fauna species lists, including non-threatened species are presented in Appendix 1 (flora) and Appendix 2 (fauna).

### 11.1.1 Threatened Ecological Communities

No threatened ecological communities were recorded during the field assessment by EBS (2015c).

Whilst *Alectryon oleofolius* (Bullock Bush) Shrubland is recorded within the Project Area, it does not qualify as a State threatened ecological community as it was not growing on alluvial soils of plains (Neagle 2009).

### 11.1.2 Threatened Flora

Twelve (12) State conservation listed flora species were highlighted from the BDBSA search (Table 18). Three of the 12 species are known to occur in the Project Area (EBS 2015c), while a further three species could potentially occur within the Project Area based upon available habitat and the level of search effort to detect these species.

**Table 18. State threatened flora recorded within the Study Area.**

Scientific name	Common name	Conservation status		Source	Last Record (50 km Buffer)	Likelihood of occurrence within Project Area
		Aus	SA			
<i>Austrostipa nullanulla</i>	Club Spear-grass		V	1	2006	Unlikely
<i>Corynotheca licrota</i>	Sand Lily		R	1	1987	Possible
<i>Dampiera lanceolata</i> var. <i>intermedia</i>	Aldinga Dampiera		E	1	1923	Unlikely
<i>Eremophila hillii</i>	Hill's Emubush		R	1	2009	Unlikely
<i>Frankenia cinerea</i>			R	1	2014	Unlikely
<i>Gratwickia monochaeta</i>			R	2	2014	Known
<i>Maireana suaedifolia</i>	Lax Bluebush		R	1	2010	Possible
<i>Melaleuca leiocarpa</i>	Pungent Honey-myrtle		R	1	1987	Known
<i>Santalum spicatum</i>	Sandalwood		V	1, 2	2014	Possible
<i>Sarcozona bicarinata</i>	Ridged Noon-flower		V	1	2006	Unlikely
<i>Teucrium grandiusculum</i> ssp. <i>pilosum</i>			E	1	2010	Unlikely
<i>Calotis lappulacea</i>	Yellow Bur-daisy		R	2	2014	Known

**Conservation status:** Aus.: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). SA: South Australia (*National Parks and Wildlife Act 1972*).

**Conservation codes:** CE: Critically Endangered. ENE: Endangered. VU/V: Vulnerable. R: Rare.

**Source:** 1: Biological Database of South Australia, 2: EBS (2015c).

Table 19. Likelihood of occurrence rationale for State threatened flora species that may occur within the Project Area.

Scientific name	Common name	Likelihood of occurrence rationale
<i>Austrostipa nullanulla</i>	Club Spear-grass	<b>Unlikely:</b> Very closely aligned with <i>Austrostipa vickeryana</i> for which one record exists at Lake Ifould. Historical records suggest that this species is closely associated with saline areas and gypseous breakaways (Jessop <i>et al.</i> 2006).
<i>Corynotheca licrota</i>	Sand Lily	<b>Possible:</b> Found from Lake Gairdner west to the border and in the Murray region in South Australia, growing in low rainfall areas on sandy plains. Also found in Northern Territory, New South Wales and Victoria. Rare in South Australia. Rare in the other States (Seeds SA 2019). Existing records near the Ooldea siding (ALA 2019).
<i>Dampiera lanceolata</i> var. <i>intermedia</i>	Aldinga Dampiera	<b>Unlikely:</b> Single record from the Ooldea area in 1977. Most likely miss-identification as several records for <i>Dampiera lanceolata</i> var. <i>lanceolata</i> exist in area (not threatened). Flora SA list species as being confined to Southern Lofty area (Flora SA 2019).
<i>Eremophila hillii</i>	Hill's Emubush	<b>Unlikely:</b> Records exist around Ooldea soak area and Limestone sinkholes. Appears to be largely associated with water and calcareous loams over limestone (ALA 2019).
<i>Frankenia cinerea</i>		<b>Unlikely:</b> Probably restricted to Lake Ifould where local records occur. Associated with highly saline areas such as Salt lakes (Flora SA 2019).
<i>Gratwickia monochaeta</i>		<b>Known:</b> Several patches of <i>Gratwickia monochaeta</i> , often consisting of 30-100 individuals were recorded. Interestingly these small herb species were commonly recorded growing in areas of minor soil disturbance such as the rolled pads for the helicopter and track rehabilitation (EBS 2015c). Responds to suitable seasonal conditions especially good winter rainfall.
<i>Maireana suaedifolia</i>	Lax Bluebush	<b>Possible:</b> Found on raised areas around salt lakes. One Record north of site describes a clay pan adjacent to <i>Casuarina pauper</i> woodland (Flora SA). May occur within claypans in north western section of Project Area.
<i>Melaleuca leiocarpa</i>	Pungent Honey-myrtle	<b>Known:</b> <i>Melaleuca leiocarpa</i> was recorded in areas adjacent to low dune crests and was generally recorded as single to few individuals (EBS 2015c).
<i>Santalum spicatum</i>	Sandalwood	<b>Possible:</b> Occurs around the area fringing the Nullarbor plain and often associated with transitional Myall mixed Mallee communities within the Jacinth area. Most likely to be present in the south western corner of the Project Area (A. Sinel, pers. comm.).
<i>Sarcozona bicarinata</i>	Ridged Noon-flower	<b>Unlikely:</b> Probably restricted to shallow soil areas of mixed Mallee and associated with limestone and calcareous loams. Previous records all occur around Lake Ifould (ALA 2019).
<i>Teucrium grandiusculum</i> ssp. <i>pilosum</i>		<b>Unlikely:</b> Associated with calcrete outcropping on red loam soils (ALA 2019). No habitat present in area.
<i>Calotis lappulacea</i>	Yellow Bur-daisy	<b>Known:</b> <i>Calotis lappulacea</i> was very common and widespread on dune crests within the northern section of the Project Area (EBS 2015c).

### 11.1.3 Threatened Fauna

Eleven (11) State threatened fauna were recorded within the Study Area (Table 20) (EBS 2015c). Five of these species were known to the Project Area, however, the Southern Marsupial Mole was indirectly recorded from their diggings. A further four State threatened fauna species may occur within the Project Area, while the remaining three species are unlikely to occur. The rationale for the likelihood of occurrence for each State threatened fauna species within the Project Area is provided in Table 21.

**Table 20. State threatened fauna species recorded within the Study Area.**

Scientific name	Common name	Conservation status		Source	Last Record (50 km Buffer)	Likelihood of occurrence within Project Area
		Aus	SA			
<b>AVES</b>						
<i>Acanthiza iredalei iredalei</i>	(Western) Slender-billed Thornbill		R	1, 3	2017	Likely
<i>Ardeotis australis</i>	Australian Bustard		V	1, 2, 3	2017	Known
<i>Climacteris affinis</i>	White-browed Treecreeper		R	1	1922	Unlikely
<i>Falco peregrinus</i>	Peregrine Falcon		R	2	2014	Known
<i>Lophochroa leadbeateri mollis</i>	Major Mitchell's Cockatoo		R	1	2009	Likely
<i>Myiagra inquieta</i>	Restless Flycatcher		R	2	2014	Known
<i>Neophema splendida</i>	Scarlet-chested Parrot		R	1, 2, 3	2017	Known
<i>Northiella narethae</i>	Naretha Bluebonnet		R	1	1999	Possible
<i>Pachycephala inornata</i>	Gilbert's Whistler		R	1	2003	Possible
<b>MAMMALIA</b>						
<i>Notoryctes typhlops</i>	Southern Marsupial Mole		V	1, 2	2014	Known
<b>REPTILIA</b>						
<i>Neelaps bimaculatus</i>	Western Black-naped Snake		R	1	2012	Possible

**Conservation status:** **Aus.:** Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **SA:** South Australia (*National Parks and Wildlife Act 1972*).

**Conservation codes:** **CE:** Critically Endangered. **ENE:** Endangered. **VUV:** Vulnerable. **R:** Rare.

**Source:** **1:** Biological Database of South Australia, **2:** EBS (2015c), **3:** EBS (2018).

*Note:* The State Rare Striated Grasswren (*Amytornis striatus*) was previously recorded as a desktop record as part of the desktop assessment (see EBS 2015c), but this species was not recorded in the current 2019 BDBSA search ((DEW 2019, accessed 11/04/2019, *Record set number DEWNRBDBSA190121-1*), and is therefore not assessed further in this report.



**Table 21. Likelihood of occurrence rationale for State threatened fauna species that may occur within the Project Area.**

Scientific name	Common name	Likelihood of occurrence rationale
<i>Acanthiza iredalei iredalei</i>	(Western) Slender-billed Thornbill	<b>Likely.</b> The (Western) Slender-billed Thornbill inhabits chenopod shrublands within the Jacinth-Ambrosia Project Area (EBS 2017). The species is therefore likely to occur within the south of the Project Area, where VA 2 and 6 are present. Slender-billed Thornbills would be most likely to inhabit Vegetation Association (VA) 2, however, could occur within VA 6, where the density of overstorey vegetation is sparser.
<i>Ardeotis australis</i>	Australian Bustard	<b>Known.</b> The Australian Bustard was recorded on three occasions within the southern section of the Project Area in 2014 (EBS 2015). The species was present within more open habitats, and therefore, was observed within VA 2 and VA 6. The locations of Australian Bustard observations are shown in Figure 12.
<i>Climacteris affinis</i>	White-browed Treecreeper	<b>Unlikely.</b> The White-browed Treecreeper has not been recorded within the Study Area since 1922. Given this and the relative and numerous ecological surveys and monitoring programs conducted within the vicinity of the Project Area, it is considered that this species is unlikely to occur. However, the species has been recorded within semi-arid and arid inland scrubs and woodlands, where tree species with rough bark, such as Western Myall ( <i>Acacia papyrocarpa</i> ) and Black Oak ( <i>Casuarina pauper</i> ) are present (Pizzey and Knight 2014). As such, if the species were to occur, VA 2 and 7 may offer suitable habitat.
<i>Falco peregrinus</i>	Peregrine Falcon	<b>Known.</b> The Peregrine Falcon was observed within the Project Area in 2014 (EBS 2015). The lone individual was recorded in a transition area between VA 2 and VA 8 (Figure 12). Peregrine Falcons can inhabit a wide array of habitats, and therefore, the entire Project Area supports suitable habitat for the species.
<i>Lophochroa leadbeateri mollis</i>	Major Mitchell's Cockatoo	<b>Likely.</b> The Major Mitchell's Cockatoo has been recorded within the Jacinth-Ambrosia Project Area (Figure 12) and is therefore considered likely to occur within the Project Area due to the presence of suitable habitat in conjunction with a local record. Major Mitchell Cockatoos could occur in all vegetation associations within the Project Area, however, the mallee associations over sand, i.e. VA 1, 3, 4 and 8 may be the most preferred habitat for the species (Pizzey and Knight 2014).
<i>Myiagra inquieta</i>	Restless Flycatcher	<b>Known.</b> The Restless Flycatcher was recorded within the Project Area in 2014 (EBS 2015). The species inhabits and was recorded within mallee associations, and therefore, vegetation associations 1, 3, 4 and 8 would be suitable habitat.
<i>Neophema splendida</i>	Scarlet-chested Parrot	<b>Known.</b> The Scarlet-chested Parrot was recorded within the Project Area in 2014 (see Figure 12) and 2017 (EBS 2015; EBS 2018). The species inhabits and was recorded within mallee associations over sand (Pizzey and Knight 2014), and therefore, vegetation associations 1, 3, 4 and 8 would be suitable habitat.
<i>Northiella narethae</i>	Naretha Bluebonnet	<b>Possible.</b> The Naretha Bluebonnet was last recorded in the Study Area in 1999 (Table 20). The species inhabits chenopod shrublands that are very lightly timbered (Pizzey and Knight 2014). As such, only the southern sector of the Project Area could potentially support Naretha Bluebonnets, which would be most likely to occur in VA 6 and areas of VA 2, 7 and 8 where tree densities are low.
<i>Notoryctes typhlops</i>	Southern Marsupial Mole	<b>Known.</b> The Southern Marsupial Mole was indirectly recorded within the Project Area due to the presence of their backfilled tunnels or 'mole holes' (EBS 2015). Moleholes were detected at nine of the 20 trenching sites. The age of the tunnels are not known. However, Southern Marsupial Moles are expected to be within the sand dunes of the Project Area, and therefore may occur in VA 1, 3 and 4 (Benshemesh 2005).
<i>Pachycephala inornata</i>	Gilbert's Whistler	<b>Possible.</b> The Gilbert's Whistler inhabits semi-arid woodlands, mallee and shrublands, with understorey vegetation that often includes species of <i>Acacia</i> , <i>Eremophila</i> or <i>Cassia</i> (Pizzey and Knight 2014). All vegetation associations within the Project Area except for VA 6 could provide habitat for the Gilbert's Whistler, however, it may be most likely to occur within VA 1, which has a diverse array of shrubs in the understorey.
<i>Neelaps bimaculatus</i>	Western Black-naped Snake	<b>Possible.</b> The Western Black-naped Snake inhabits mallee and mallee/myall sand dune associations, especially where leaf litter is present. Three individuals were captured during the SKM JA baseline survey in 2005 (SKM 2006) and one was captured at Sonoran in 2012 (EBS 2013). The presence of suitable habitat in VA 1, 3, 4, 5, 7 and 8 matched with local, recent records of the Western Black-naped Snake suggests that it could occur within the Project Area.

## 12 KEY ECOLOGICAL KNOWLEDGE GAPS

With respect to the ecological studies that have occurred within the Study Area and Project Area, the key ecological knowledge gaps which concern Matters of National Environmental Significance for the Atacama Project are:

1. Whether *Hibbertia crispula* individuals occur within the Project Area.
2. Whether the habitat present within the Project Area is now suitable for Malleefowl to breed.
3. Whether Night Parrots occur within the Project Area or Study Area.
4. Whether Princess Parrots occur within the Project Area or Study Area.

The methodology proposed for a field assessment to help address each of the four key ecological knowledge gaps is detailed in EBS (2019b).

With respect to the ecological studies that have occurred within the Study Area and Project Area, there are no knowledge gaps which concern Matters of State Environmental Significance for the Atacama Project. The State matters identified in the current report have all been previously identified by EBS in preceding survey works (see EBS 2015c). As a result of this review there are no other key ecological knowledge gaps at the state level.

## 13 CONCLUSION

This desktop assessment has reviewed all existing reports detailing the ecology of the Atacama Project Area and more broadly the Atacama Study Area. The primary conclusions from this report with respect to the EPBC Act and NPW Act are:

- The vegetation communities in the Project Area are dominated by mallee associations, especially in the north, however, *Acacia*, *Alectryon* and *Casuarina* Woodlands and *Senna* and chenopod Shrublands are present in the south. The quality of vegetation within the Project Area was excellent;
- None of the vegetation communities are listed as TECs under the EPBC Act or State threatened ecological communities under the Provisional list of threatened ecosystems of South Australia;
- One Nationally threatened flora species; *Hibbertia crispula* (Ooldea Guinea Flower) may occur within the Project Area despite its failed detection during the 2014 assessment. This species was however observed during the 2014 assessment within 1.5 km of the Project Area northern boundary;
- Two Nationally threatened fauna species are known to have occurred in the Project Area. The Sandhill Dunnart (*Smithopsis psammophila*) was captured within the Project Area in 2014, while in-active Malleefowl (*Leipoa ocellata*) mounds were also recorded. All other Nationally threatened fauna species have a very low likelihood of occurring within the Project Area, however, the potential presence of Princess Parrots (*Polytelis alexandrae*) and Night Parrots (*Pezoporus occidentalis*) cannot be ruled out.
  - Note: the Southern Marsupial Mole (*Notoryctes typhlops*) was nationally listed during the previous 2014 assessment (EBS 2015c), however this species is currently (2019) listed as State Vulnerable and is addressed below in the bullet point on State threatened fauna species.
  - Note: Nationally listed Princess Parrots (*Polytelis alexandrae*) (Aus: EN) and Night Parrots (*Pezoporus occidentalis*) (Aus: VU) were Nationally listed at the time of the previous 2014 assessment, but these two species were not recorded in the 2014 EPBC assessment (likely due to their known distribution at the time of the 2014 works). It is likely that recent changes in distribution maps of these two species have resulted in the records of Princess Parrots and Night Parrots in the 2019 Protected Matters Search database search.
- One migratory fauna species; the Fork-tailed Swift (*Apus pacificus*) could occur within the Project Area;
- Three State threatened flora species were recorded in the Project Area in 2014: *Calotis lappulacea* (Yellow Burr-daisy), *Gratwickia monochaeta* and *Melaleuca leiocarpa* (Pungent Honey-myrtle). An additional three State threatened flora species may occur within the Project Area based upon the presence of suitable habitat;

- Five State threatened fauna species (that are not also Nationally threatened) were recorded in the Project Area in 2014: Australian Bustard (*Ardeotis australis*), Peregrine Falcon (*Falco peregrinus*), Restless Flycatcher (*Myiagra inquieta*), Scarlet-chested Parrot (*Neophema splendida*) and Southern Marsupial Mole (*Notoryctes typhlops*), while the Scarlet-chested Parrot was also observed within the Project Area in 2017. A further four State threatened fauna species could occur within the Project Area based upon the availability of habitat;
- Four exotic flora species: *Acetosa vesicaria* (Rosy Dock), *Brassica tourneforti* (Wild Turnip), *Sonchus oleraceus* (Common Sow-thistle) and *Carrichtera annua* (Ward's Weed) were recorded in the Project Area. However, none of the weed species recorded were widespread; and
- Five introduced fauna species were recorded over the Project Area: House Mouse (*Mus musculus*); Rabbit (*Oryctolagus cuniculus*); Red Fox (*Vulpes vulpes*); Cat (*Felis catus*); and One-humped Camel (*Camelus dromedarius*).

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## 15 APPENDICES

Appendix 1. Flora species recorded in the BDBSA within 50 km of the Project Area (DEW 2019).

Family	Species name	Common name	Conservation Status		Last record (Year)
			Aus	SA	
AIZOACEAE	<i>Gunnipopsis septifraga</i>	Green Pigface			1998
	<i>Mesembryanthemum aitonis</i>	Angled Iceplant			2014
	<i>Mesembryanthemum crystallinum</i>	Common Iceplant			1955
	<i>Sarcozona bicarinata</i>	Ridged Noon-flower		V	2006
	<i>Sarcozona praecox</i>	Sarcozona			1980
	<i>Tetragonia eremaea</i>	Desert Spinach			1989
AMARANTHACEAE	<i>Hemichroa diandra</i>	Mallee Hemichroa			2005
	<i>Ptilotus exaltatus</i>	Pink Mulla Mulla			2005
	<i>Ptilotus exaltatus</i> var. (NC)	Pink Mulla Mulla			2006
	<i>Ptilotus incanus/obovatus</i>	Silver Mulla Mulla			2006
	<i>Ptilotus nobilis</i> ssp. <i>nobilis</i> (NC)	Yellow-tails			1989
	<i>Ptilotus obovatus</i>	Silver Mulla Mulla			2012
	<i>Ptilotus obovatus</i> (NC)				1984
		Silver Mulla Mulla			2005
	<i>Ptilotus polystachyus</i>	Long-tails			1989
APOCYNACEAE	<i>Alyxia buxifolia</i>	Sea Box			1987
ASCLEPIADACEAE	<i>Marsdenia australis</i>	Native Pear			1987
	<i>Rhyncharrhena linearis</i>	Bush Bean			1989
BORAGINACEAE	<i>Halgania cyanea</i>	Rough Blue-flower			2010
	<i>Omphalolappula concava</i>	Burr Stickseed			1984
CACTACEAE	<i>Opuntia robusta</i>	Wheel Pear			2010
CASUARINACEAE	<i>Casuarina pauper</i>	Black Oak			2005
CHENOPODIACEAE	<i>Atriplex acutibractea</i> ssp. <i>acutibractea</i>	Pointed Saltbush			1987
	<i>Atriplex cryptocarpa</i>				2001
	<i>Atriplex stipitata</i>	Bitter Saltbush			2006
	<i>Atriplex vesicaria</i>	Bladder Saltbush			2012
	<i>Chenopodium curvispicatum</i>	Cottony Goosefoot			2006
	<i>Chenopodium desertorum</i> ssp. <i>anidiophyllum</i>	Mallee Goosefoot			1987
	<i>Chenopodium desertorum</i> ssp. <i>desertorum</i>	Frosted Goosefoot			2006
	<i>Chenopodium gaudichaudianum</i>	Scrambling Goosefoot			2001
	<i>Dissocarpus paradoxus</i>	Ball Bindyi			2001
	<i>Enchylaena tomentosa</i> var.	Ruby Saltbush			2006
	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	Ruby Saltbush			2012
	<i>Eriochiton sclerolaenoides</i>	Woolly-fruit Bluebush			2013
	<i>Maireana appressa</i>	Pale-fruit Bluebush			2005
	<i>Maireana astrotricha</i>	Low Bluebush			2015
	<i>Maireana brevifolia</i>	Short-leaf Bluebush			1987
	<i>Maireana erioclada</i>	Rosy Bluebush			2012
	<i>Maireana erioclada/pentatropis</i>				2012
	<i>Maireana georgei</i>	Satiny Bluebush			2006
	<i>Maireana georgei/turbinata</i>	Satiny Bluebush			2012
	<i>Maireana integra</i>	Entire-wing Bluebush			2012
<i>Maireana oppositifolia</i>	Salt Bluebush			1989	

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Family	Species name	Common name	Conservation Status		Last record (Year)
			Aus	SA	
	<i>Maireana pentatropis</i>	Erect Mallee Bluebush			2012
	<i>Maireana planifolia</i>	Flat-leaf Bluebush			2006
	<i>Maireana radiata</i>	Radiate Bluebush			2012
	<i>Maireana sedifolia</i>	Bluebush			2015
	<i>Maireana sp.</i>	Bluebush/Fissure-plant			2006
	<i>Maireana suaedifolia</i>	Lax Bluebush		R	2010
	<i>Maireana trichoptera</i>	Hairy-fruit Bluebush			2012
	<i>Maireana turbinata</i>	Top-fruit Bluebush			1984
	<i>Rhagodia candolleana</i> ssp. <i>argentea</i>	Silver Sea-berry Saltbush			2006
	<i>Rhagodia preissii</i> ssp. <i>preissii</i>	Mallee Saltbush			2005
	<i>Rhagodia spinescens</i>	Spiny Saltbush			2012
	<i>Rhagodia ulicina</i>	Intricate Saltbush			2006
	<i>Salsola australis</i>	Buckbush			2012
	<i>Sclerolaena brevifolia</i>	Small-leaf Bindyi			1985
	<i>Sclerolaena diacantha</i>	Grey Bindyi			2012
	<i>Sclerolaena holtiana</i>	Holt's Bindyi			2015
	<i>Sclerolaena obliquicuspis</i>	Oblique-spined Bindyi			2012
	<i>Sclerolaena parviflora</i>	Small-flower Bindyi			2005
	<i>Sclerolaena patenticuspis</i>	Spear-fruit Bindyi			2012
	<i>Sclerolaena uniflora</i>	Small-spine Bindyi			2012
	<i>Tecticornia disarticulata</i>				2005
	<i>Tecticornia halocnemoides</i> ssp.	Grey Samphire			2005
	<i>Tecticornia pergranulata</i> ssp. <i>pergranulata</i>	Black-seed Samphire			1922
	<i>Tecticornia pruinosa</i>	Bluish Samphire			2005
<b>COMPOSITAE</b>	<i>Actinobole uliginosum</i>	Flannel Cudweed			2005
	<i>Angianthus conocephalus</i>				1984
	<i>Brachyscome ciliaris</i> var. <i>ciliaris</i>	Variable Daisy			2005
	<i>Brachyscome lineariloba</i>	Hard-head Daisy			1939
	<i>Brachyscome trachycarpa</i>	Smooth Daisy			2006
	<i>Calotis erinacea</i>	Tangled Burr-daisy			2005
	<i>Calotis hispidula</i>	Hairy Burr-daisy			1984
	<i>Calotis multicaulis</i>	Woolly-headed Burr-daisy			1920
	<i>Centaurea melitensis</i>	Malta Thistle			1989
	<i>Cephalipterum drummondii</i>	Pompom Head			2007
	<i>Chrysocephalum apiculatum</i>	Common Everlasting			1987
	<i>Chrysocephalum apiculatum</i> (NC)	Common Everlasting			1987
	<i>Chrysocephalum eremaeum</i>	Sand Button-bush			1987
	<i>Chrysocephalum pterochaetum</i>	Shrub Everlasting			1987
	<i>Compositae sp.</i>	Daisy Family			2012
	<i>Cratystylis conocephala</i>	Bluebush Daisy			2006
	<i>Gnephosis tenuissima</i>	Dwarf Golden-tip			1987
	<i>Gratwickia monochaeta</i>			R	2006
	<i>Isoetopsis graminifolia</i>	Grass Cushion			1922
	<i>Kippistia suaedifolia</i>	Fleshy Kippistia			1939
	<i>Lawrencella davenportii</i>	Davenport Daisy			1989
	<i>Millotia greevesii</i> ssp. <i>helmsii</i>				1922
	<i>Millotia myosotidifolia</i>	Broad-leaf Millotia			1980
	<i>Minuria cunninghamii</i>	Bush Minuria			2007

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			Aus	SA	
	<i>Minuria leptophylla</i>	Minnie Daisy			2001
	<i>Olearia calcarea</i>	Crinkle-leaf Daisy-bush			2005
	<i>Olearia exiguifolia</i>	Lobed-leaf Daisy-bush			2006
	<i>Olearia muelleri</i>	Mueller's Daisy-bush			2006
	<i>Olearia subspicata</i>	Spiked Daisy-bush			1980
	<i>Podolepis capillaris</i>	Wiry Podolepis			2006
	<i>Podolepis rugata</i> ssp. <i>rugata</i>	Pleated Podolepis			2004
	<i>Podotheca angustifolia</i>	Sticky Long-heads			1920
	<i>Polycalymma stuartii</i>	Poached-egg Daisy			1939
	<i>Pycnosorus pleiocephalus</i>	Soft Billy-buttons			2005
	<i>Reichardia tingitana</i>	False Sowthistle			2006
	<i>Rhodanthe chlorocephala</i> ssp. <i>rosea</i>	Western Sunray			1921
	<i>Rhodanthe floribunda</i>	White Everlasting			2013
	<i>Rhodanthe haigii</i>	Haig's Everlasting			1954
	<i>Rhodanthe moschata</i>	Musk Daisy			1987
	<i>Rhodanthe pygmaea</i>	Pigmy Daisy			1987
	<i>Rhodanthe tietkensii</i>	Tietken's Daisy			1983
	<i>Senecio glossanthus</i>	Annual Groundsel			2006
	<i>Senecio gregorii</i>	Fleshy Groundsel			1955
	<i>Senecio pinnatifolius</i> (NC)	Variable Groundsel			1984
	<i>Sonchus oleraceus</i>	Common Sow-thistle			2005
	<i>Trichanthodium skirrophorum</i>	Woolly Yellow-heads			2005
	<i>Vittadinia cervicalis</i> var. <i>circularis</i>	Waisted New Holland Daisy			2012
	<i>Vittadinia eremaea</i>	Desert New Holland Daisy			1987
	<i>Waitzia acuminata</i> var. <i>acuminata</i>	Orange Immortelle			1980
	<i>Waitzia fitzgibbonii</i>	Fitzgibbon's Daisy			1984
<b>CRASSULACEAE</b>	<i>Crassula colorata</i> var. <i>colorata</i>	Dense Crassula			2006
	<i>Crassula sieberiana</i> ssp. <i>tetramera</i> (NC)	Australian Stonecrop			1984
<b>CRUCIFERAE</b>	<i>Arabidella filifolia</i>	Thread-leaf Cress			1984
	<i>Arabidella trisecta</i>	Shrubby Cress			2006
	<i>Brassica tournefortii</i>	Wild Turnip			2006
	<i>Carrichtera annua</i>	Ward's Weed			2012
	<i>Cruciferae</i> sp.	Cress Family			2006
	<i>Lepidium draba</i>	Hoary Cress			1917
	<i>Lepidium oxytrichum</i>	Green Peppercress			1989
	<i>Lepidium phlebopetalum</i>	Veined Peppercress			2012
	<i>Lepidium</i> sp.	Peppercress			2012
	<i>Menkea australis</i>	Fairy Spectacles			1935
	<i>Phlegmatospermum cochlearinum</i>	Downy Cress			1969
	<i>Stenopetalum lineare</i>	Narrow Thread-petal			1984
	<i>Stenopetalum lineare</i> (NC)	Narrow Thread-petal			2006

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			Aus	SA	
	<i>Stenopetalum nutans</i>	Nodding Thread-petal			1922
	<i>Stenopetalum sphaerocarpum</i>	Round-fruit Thread-petal			1955
	<i>Stenopetalum velutinum</i>	Velvet Thread-petal			1920
<b>CUPRESSACEAE</b>	<i>Callitris verrucosa</i>	Scrub Cypress Pine			1987
<b>DILLENIACEAE</b>	<i>Hibbertia crispula</i>	Ooldea Guinea-flower	<b>VU</b>	V	2014
<b>EUPHORBIACEAE</b>	<i>Beyeria opaca</i>	Dark Turpentine Bush			1987
	<i>Chamaesyce drummondii</i> (NC)	Caustic Weed			1987
	<i>Euphorbia drummondii</i> (NC)				2012
	<i>Euphorbia multifaria</i>				2006
	<i>Euphorbia tannensis</i> ssp. <i>eremophila</i>	Desert Spurge			2012
	<i>Poranthera leiosperma</i>	Small Poranthera			1920
<b>FRANKENIACEAE</b>	<i>Frankenia cinerea</i>			R	2014
	<i>Frankenia serpyllifolia</i>	Thyme Sea-heath			2006
	<i>Frankenia</i> sp.	Sea-heath			1984
<b>GERANIACEAE</b>	<i>Erodium aureum</i>				2006
	<i>Erodium cicutarium</i>	Cut-leaf Heron's-bill			1960
	<i>Erodium cygnorum</i>	Blue Heron's-bill			2006
	<i>Erodium cygnorum</i> ssp. <i>cygnorum</i> (NC)	Blue Heron's-bill			1987
	<i>Erodium moschatum</i>	Musky Herons-bill			1984
	<i>Erodium</i> sp.	Heron's-bill/Crowfoot			2006
<b>GOODENIACEAE</b>	<i>Cooperookia strophiolata</i>	Sticky Cooperookia			1987
	<i>Dampiera lanceolata</i> var. <i>intermedia</i>	Aldinga Dampiera		E	1923
	<i>Dampiera lanceolata</i> var. <i>lanceolata</i>	Grooved Dampiera			1976
	<i>Goodenia pinnatifida</i>	Cut-leaf Goodenia			2006
	<i>Scaevola depauperata</i>	Skeleton Fanflower			2010
	<i>Scaevola spinescens</i>	Spiny Fanflower			2012
	<i>Velleia arguta</i>	Toothed Velleia			1920
	<i>Velleia</i> sp.	Velleia			1984
<b>GRAMINEAE</b>	<i>Aristida contorta</i>	Curly Wire-grass			2005
	<i>Aristida holathera</i> var. <i>holathera</i>	Tall Kerosene Grass			2006
	<i>Aristida</i> sp.	Three-awn/Wire-grass			2005
	<i>Austrostipa drummondii</i>	Cottony Spear-grass			2004
	<i>Austrostipa elegantissima</i>	Feather Spear-grass			2005
	<i>Austrostipa eremophila</i>	Rusty Spear-grass			2006
	<i>Austrostipa nitida</i>	Balcarra Spear-grass			2012
	<i>Austrostipa nullanulla</i>	Club Spear-grass		V	2006
	<i>Austrostipa platychaeta</i>	Flat-awn Spear-grass			2005
	<i>Austrostipa</i> sp.	Spear-grass			2006

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			Aus	SA	
	<i>Cenchrus ciliaris</i>	Buffel Grass			2013
	<i>Enneapogon avenaceus</i>	Common Bottle-washers			2013
	<i>Enneapogon caeruleus</i>	Blue Bottle-washers			2006
	<i>Enneapogon cylindricus</i>	Jointed Bottle-washers			2006
	<i>Enneapogon polyphyllus</i>	Leafy Bottle-washers			1989
	<i>Eragrostis eriopoda</i>	Woollybutt			1955
	<i>Eragrostis lanipes</i>	Woollybutt			1920
	<i>Eragrostis setifolia</i>	Bristly Love-grass			2005
	<i>Gramineae sp.</i>	Grass Family			1984
	<i>Monachather paradoxus</i>	Bandicoot Grass			1989
	<i>Rostraria pumila</i>	Tiny Bristle-grass			1984
	<i>Rytidosperma caespitosum</i>	Common Wallaby-grass			2012
	<i>Rytidosperma sp.</i>	Wallaby-grass			2012
	<i>Schismus arabicus</i>	Arabian Grass			1984
	<i>Schismus barbatus</i>	Arabian Grass			2005
	<i>Setaria basiclada</i>				1917
	<i>Setaria clementii</i>	Clement's Paspalidium			1917
	<i>Triodia lanata</i>	Woolly Spinifex			1987
	<i>Triodia scariosa</i>	Spinifex			2006
	<i>Triodia sp.</i>	Spinifex			2005
	<i>Triraphis mollis</i>	Purple Plume Grass			1983
<b>GYROSTEMONACEAE</b>	<i>Codonocarpus cotinifolius</i>	Desert Poplar			1926
	<i>Gyrostemon ramulosus</i>	Bushy Wheel-fruit			2005
<b>LABIATAE</b>	<i>Prostanthera althoferi</i> ssp. <i>longifolia</i>				2006
	<i>Teucrium grandiusculum</i> ssp. <i>pilosum</i>			E	2010
	<i>Westringia rigida</i>	Stiff Westringia			2005
<b>LAURACEAE</b>	<i>Cassytha melantha</i>	Coarse Dodder-laurel			2005
<b>LEGUMINOSAE</b>	<i>Acacia acanthoclada</i> ssp. <i>acanthoclada</i>	Harrow Wattle			2006
	<i>Acacia aneura</i> (NC)	Mulga			1987
	<i>Acacia aneura</i> var. <i>aneura</i>	Mulga			1926
	<i>Acacia aneura</i> var. <i>intermedia</i>	Broad-leaf Mulga			2005
	<i>Acacia brachystachya</i>	Turpentine Mulga			1928
	<i>Acacia burkittii</i>	Pin-bush Wattle			2013
	<i>Acacia colletioides</i>	Veined Wait-a-while			1987
	<i>Acacia gilesiana</i>	Giles' Wattle			1987
	<i>Acacia kempeana</i>	Witchetty Bush			2005
	<i>Acacia ligulata</i>	Umbrella Bush			2006
	<i>Acacia nyssophylla</i>	Spine Bush			2006



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			Aus	SA	
	<i>Acacia oswaldii</i>	Umbrella Wattle			2006
	<i>Acacia papyrocarpa</i>	Western Myall			2012
	<i>Acacia prainii</i>	Prain's Wattle			2005
	<i>Acacia ramulosa (NC)</i>	Horse Mulga			1989
	<i>Acacia ramulosa var. linophylla</i>	Horse Mulga			2013
	<i>Acacia ramulosa var. ramulosa</i>	Horse Mulga			1985
	<i>Acacia rigens</i>	Nealie			2005
	<i>Acacia sibirica</i>	Bastard Mulga			1980
	<i>Acacia sp.</i>	Wattle			2005
	<i>Acacia tetragonophylla</i>	Dead Finish			2005
	<i>Bossiaea walkeri</i>	Cactus Pea			2006
	<i>Cassia sturtii (NC)</i>	Grey Cassia			1984
	<i>Daviesia aphylla</i>	Dryland Bitter-pea			1987
	<i>Daviesia ulicifolia (NC)</i>	Gorse Bitter-pea			1987
	<i>Daviesia ulicifolia ssp. aridicola</i>	Gorse Bitter-pea			1987
	<i>Glycine canescens</i>	Silky Glycine			1900
	<i>Lotus cruentus</i>	Red-flower Lotus			2013
	<i>Senna artemisioides ssp. petiolaris</i>				2006
	<i>Senna artemisioides ssp. petiolaris (NC)</i>	Flat-stalk Senna			1989
	<i>Senna artemisioides ssp. X artemisioides</i>	Silver Senna			2005
	<i>Senna artemisioides ssp. X coriacea</i>	Broad-leaf Desert Senna			2012
	<i>Senna cardiosperma ssp. gawlerensis</i>	Gawler Ranges Senna			2012
	<i>Senna cardiosperma ssp. microphylla</i>	Curved-leaf Senna			1972
	<i>Senna pleurocarpa var. pleurocarpa</i>	Stripe-pod Senna			1980
	<i>Swainsona flavicarinata</i>	Yellow-keel Swainson-pea			1900
	<i>Swainsona oliveri</i>				1984
	<i>Swainsona reticulata</i>				1900
	<i>Swainsona villosa</i>	Villous Swainson-pea			1983
	<i>Templetonia incrassata</i>	Thick-stemmed Broombush Templetonia			1983
<b>LILIACEAE</b>	<i>Corynotheca licrota</i>	Sand Lily		R	1987
	<i>Dianella brevicaulis/revoluta var.</i>	Black-anther Flax-lily			1987
	<i>Dianella revoluta var. divaricata</i>	Broad-leaf Flax-lily			2006
	<i>Lomandra leucocephala ssp. robusta</i>	Woolly Mat-rush			1987
	<i>Thysanotus baueri</i>	Mallee Fringe-lily			1983

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<b>LOGANIACEAE</b>	<i>Orianthera nuda</i>	Leafless Logania			1987
<b>LORANTHACEAE</b>	<i>Amyema maidenii</i> ssp. <i>maidenii</i>	Pale-leaf Mistletoe			2005
	<i>Amyema miquelii</i>	Box Mistletoe			1987
	<i>Amyema preissii</i>	Wire-leaf Mistletoe			2005
	<i>Amyema quandang</i> var. <i>quandang</i>	Grey Mistletoe			2012
	<i>Amyema</i> sp.	Mistletoe			1987
	<i>Lysiana exocarpi</i> ssp. <i>exocarpi</i>	Harlequin Mistletoe			1989
<b>Major Group only - Lichens</b>	<i>Lichen</i> sp.				2006
<b>MALVACEAE</b>	<i>Abutilon otocarpum</i>	Desert Lantern-bush			1989
	<i>Hibiscus krichauffianus</i>	Velvet-leaf Hibiscus			1960
	<i>Lawrenzia squamata</i>	Thorny Lawrenzia			2006
	<i>Malva preissiana</i>	Australian Hollyhock			1922
	<i>Malva preissiana</i> (NC)	Australian Hollyhock			2001
	<i>Malvastrum americanum</i> var. <i>americanum</i>	Malvastrum			2006
	<i>Sida ammophila</i>	Sand Sida			1989
	<i>Sida calyxhymenia</i>	Tall Sida			1983
	<i>Sida corrugata</i> var. <i>corrugata</i>	Corrugated Sida			1922
	<i>Sida intricata</i>	Twiggy Sida			2006
	<i>Sida</i> sp.	Sida			2005
	<i>Sida spodochroma</i>				2014
<b>MYOPORACEAE</b>	<i>Eremophila alternifolia</i>	Narrow-leaf Emubush			1989
	<i>Eremophila battii</i>				1969
	<i>Eremophila decipiens</i> ssp. <i>decipiens</i>	Long-stalk Tar-bush			1980
	<i>Eremophila decussata</i>				2005
	<i>Eremophila delisseri</i>	Nullarbor Emubush			1917
	<i>Eremophila fallax</i>				1987
	<i>Eremophila gibsonii</i>	Gibson's Emubush			2013
	<i>Eremophila glabra</i> ssp.	Tar Bush			2006
	<i>Eremophila glabra</i> ssp. <i>glabra</i>	Tar Bush			2005
	<i>Eremophila hillii</i>	Hill's Emubush		R	2009
	<i>Eremophila latrobei</i> ssp.	Crimson Emubush			2005
	<i>Eremophila latrobei</i> ssp. <i>glabra</i>	Crimson Emubush			2001
	<i>Eremophila paisleyi</i> (NC)	Paisley's Emubush			1989
	<i>Eremophila paisleyi</i> ssp. <i>paisleyi</i>				1983
	<i>Eremophila platythamnos</i> ssp.	Munyun#pa			2006

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			Aus	SA	
	<i>Eremophila platythamnos</i> ssp. <i>platythamnos</i>				1987
	<i>Eremophila scoparia</i>	Broom Emubush			2012
	<i>Eremophila</i> sp.	Emubush/Turkey-bush			2005
	<i>Eremophila verrucosa</i> ssp. <i>brevistellata</i>	Warty Emubush			1987
	<i>Eremophila willsii</i> ssp. <i>integrifolia</i>	Will's Emubush			1987
	<i>Myoporum montanum</i>	Native Myrtle			1900
	<i>Myoporum platycarpum</i> (NC)	False Sandalwood			1984
	<i>Myoporum platycarpum</i> ssp.	False Sandalwood			2006
	<i>Myoporum platycarpum</i> ssp. <i>platycarpum</i>	False Sandalwood			2012
<b>MYRTACEAE</b>	<i>Darwinia salina</i>	Salt Darwinia			2001
	<i>Eucalyptus brachycalyx</i>	Gilja			2006
	<i>Eucalyptus concinna</i>	Victoria Desert Mallee			2012
	<i>Eucalyptus dumosa</i> complex	White Mallee			2005
	<i>Eucalyptus eremicola</i> ssp. <i>peeneri</i>	Peeneri Mallee			1920
	<i>Eucalyptus foecunda</i> (NC)	Narrow-leaved Mallee			1987
	<i>Eucalyptus gracilis</i>	Yorrell			2006
	<i>Eucalyptus leptophylla</i>	Narrow-leaf Red Mallee			1924
	<i>Eucalyptus leptophylla</i> (NC)	Narrow-leaf Red Mallee			2005
	<i>Eucalyptus oleosa</i> (NC)	Red Mallee			1987
	<i>Eucalyptus oleosa</i> ssp. <i>ampliata</i>	Red Mallee			2012
	<i>Eucalyptus oleosa</i> ssp. <i>oleosa</i>	Red Mallee			2005
	<i>Eucalyptus pimpiniana</i>	Pimpin Mallee			1987
	<i>Eucalyptus socialis</i> (NC)	Beaked Red Mallee			1989
	<i>Eucalyptus socialis</i> ssp.	Beaked Red Mallee			2005
	<i>Eucalyptus socialis</i> ssp. <i>victoriensis</i>				2005
	<i>Eucalyptus</i> sp.				2005
	<i>Eucalyptus striatocalyx</i> (NC)	Kopi Mallee			1987
	<i>Eucalyptus youngiana</i>	Ooldea Mallee			1900
	<i>Eucalyptus yumbarrana</i>	Yumbarra Mallee			2005
	<i>Leptospermum coriaceum</i>	Dune Tea-tree			1987
	<i>Melaleuca eleuterostachya</i>	Hummock Honey-myrtle			2012
	<i>Melaleuca interioris</i>	Broombush			2012
	<i>Melaleuca lanceolata</i>	Dryland Tea-tree			2006

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Family	Species name	Common name	Conservation Status		Last record (Year)
			Aus	SA	
	<i>Melaleuca leiocarpa</i>	Pungent Honey-myrtle		R	1987
	<i>Melaleuca uncinata</i> (NC)	Broombush			1987
	<i>Melaleuca xerophila</i>	Boree			2006
	<i>Thryptomene elliotii</i>				1989
<b>PAPAVERACEAE</b>	<i>Papaver hybridum</i>	Rough Poppy			1900
<b>PITTIOSPORACEAE</b>	<i>Pittosporum angustifolium</i>	Native Apricot			2006
<b>PLANTAGINACEAE</b>	<i>Plantago drummondii</i>	Dark Plantain			1984
<b>PORTULACACEAE</b>	<i>Calandrinia eremaea</i>	Dryland Purslane			2006
	<i>Calandrinia</i> sp.	Purslane/Parakeelya			1989
<b>PROTEACEAE</b>	<i>Grevillea huegelii</i>	Comb Grevillea			2006
	<i>Grevillea pterosperma</i>	Dune Grevillea			1987
	<i>Grevillea stenobotrya</i>	Rattle-pod Grevillea			1997
	<i>Hakea francisiana</i>	Bottlebrush Hakea			1983
	<i>Hakea leucoptera</i> ssp. <i>leucoptera</i>	Silver Needlewood			2005
<b>RHAMNACEAE</b>	<i>Cryptandra propinqua</i>	Silky Cryptandra			1975
<b>RUBIACEAE</b>	<i>Pomax umbellata</i>	Pomax			1987
<b>RUTACEAE</b>	<i>Boronia coerulescens</i> ssp. <i>coerulescens</i>	Blue Boronia			1987
	<i>Geijera linearifolia</i>	Sheep Bush			2006
<b>SANTALACEAE</b>	<i>Exocarpos aphyllus</i>	Leafless Cherry			2006
	<i>Santalum acuminatum</i>	Quandong			2012
	<i>Santalum spicatum</i>	Sandalwood		V	2006
<b>SAPINDACEAE</b>	<i>Alectryon oleifolius</i> ssp. <i>canescens</i>	Bullock Bush			2006
	<i>Dodonaea microzyga</i> var. <i>microzyga</i>	Brilliant Hop-bush			1980
	<i>Dodonaea</i> sp.	Hop-bush			2005
	<i>Dodonaea stenozyga</i>	Desert Hop-bush			1987
	<i>Dodonaea viscosa</i> ssp. <i>angustissima</i>	Narrow-leaf Hop-bush			2006
<b>SOLANACEAE</b>	<i>Duboisia hopwoodii</i>	Pituri			1919
	<i>Grammosolen truncatus</i>	Shrubby Ray-flower			2013
	<i>Lycium australe</i>	Australian Boxthorn			2006
	<i>Nicotiana goodspeedii</i>	Small-flower Tobacco			1939
	<i>Nicotiana velutina</i>	Velvet Tobacco			2005
	<i>Solanum coactiliferum</i>	Tomato-bush			1987
	<i>Solanum ellipticum</i>	Velvet Potato-bush			1960
	<i>Solanum hystrix</i>	Afghan Thistle			1966
	<i>Solanum nigrum</i>	Black Nightshade			1972
<b>STACKHOUSIACEAE</b>	<i>Stackhousia megaloptera</i>	Dune Candles			1987
<b>THYMELAEACEAE</b>	<i>Pimelea microcephala</i> ssp.	Shrubby Riceflower			1989
	<i>Pimelea microcephala</i> ssp. <i>microcephala</i>	Shrubby Riceflower			1987

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Family	Species name	Common name	Conservation Status		Last record (Year)
			Aus	SA	
	<i>Pimelea simplex ssp. simplex</i>	Desert Riceflower			1955
<b>UMBELLIFERAE</b>	<i>Trachymene ceratocarpa</i>	Creeping Carrot			1920
<b>URTICACEAE</b>	<i>Parietaria debilis</i>	Smooth-nettle			1939
<b>VISCACEAE</b>	<i>Korthalsella leucothrix</i>	Jointed Mistletoe			1922
<b>ZYGOPHYLLACEAE</b>	<i>Nitraria billardiarei</i>	Nitre-bush			2005
	<i>Roepera apiculata</i>	Pointed Twinleaf			2006
	<i>Roepera aurantiaca</i>	Shrubby Twinleaf			2006
	<i>Roepera aurantiaca ssp. aurantiaca</i>	Shrubby Twinleaf			2012
	<i>Roepera eremaea</i>				2006
	<i>Roepera iodocarpa</i>	Violet Twinleaf			2013
	<i>Roepera ovata</i>	Dwarf Twinleaf			2006
	<i>Roepera sp.</i>	Twinleaf			2013
	<i>Zygophyllum eremaeum (NC)</i>	Pale-flower Twinleaf			1989

**Aus:** Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **SA:** South Australia (*National Parks and Wildlife Act 1972*). **Conservation Codes:** **CE:** Critically Endangered. **ENE:** Endangered. **VU/V:** Vulnerable. **R:** Rare.



## Appendix 2. Fauna species recorded in the BDBSA within 50 km of the Study Area (DEW 2019).

*	Class	Scientific name	Common name	Conservation Status		Last record (Year)
				Aus	SA	
	<b>AVES</b>	<i>Acanthiza apicalis</i>	Inland Thornbill			2014
		<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill			2000
		<i>Acanthiza iredalei iredalei</i>	Slender-billed Thornbill (western)		R	2012
		<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill			2014
		<i>Aphelocephala leucopsis</i>	Southern Whiteface			2012
		<i>Calamanthus (Calamanthus) campestris</i>	Rufous Fieldwren			2014
		<i>Pyrrholaemus brunneus</i>	Redthroat			1987
		<i>Smicromnis brevirostris</i>	Weebill			2014
		<i>Accipiter cirrocephalus cirrocephalus</i>	Collared Sparrowhawk			2014
		<i>Aquila audax</i>	Wedge-tailed Eagle			2009
		<i>Circus assimilis</i>	Spotted Harrier			2013
		<i>Hieraaetus morphnoides</i>	Little Eagle			2014
		<i>Milvus migrans</i>	Black Kite			2009
		<i>Aegotheles cristatus</i>	Australian Owlet-nightjar			2009
		<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher			2013
		<i>Todiramphus sanctus</i>	Sacred Kingfisher			2010
		<i>Artamus cinereus</i>	Black-faced Woodswallow			2014
		<i>Artamus cyanopterus</i>	Dusky Woodswallow			2012
		<i>Artamus personatus</i>	Masked Woodswallow			2014
		<i>Cracticus torquatus</i>	Grey Butcherbird			2014
		<i>Gymnorhina tibicen</i>	Australian Magpie			2012
		<i>Lophochroa leadbeateri mollis</i>	Major Mitchell's Cockatoo (EP, GR, NW)		SP	2009
		<i>Nymphicus hollandicus</i>	Cockatiel			2014
		<i>Coracina maxima</i>	Ground Cuckooshrike			2012
		<i>Coracina novaehollandiae</i>	Black-faced Cuckooshrike			2012
		<i>Lalage tricolor</i>	White-winged Triller			2009
		<i>Peltohyas australis</i>	Inland Dotterel			1900
		<i>Cinlosoma alisteri</i>	Nullarbor Quailthrush			2006
		<i>Climacteris affinis</i>	White-browed Treecreeper		R	1922
		<i>Climacteris picumnus</i>	Brown Treecreeper			2009
		<i>Corvus bennetti</i>	Little Crow			2009
		<i>Corvus coronoides</i>	Australian Raven			2012
		<i>Cacomantis pallidus</i>	Pallid Cuckoo			2014
		<i>Chalcites basalis</i>	Horsfield's Bronze Cuckoo			2014
		<i>Chalcites osculans</i>	Black-eared Cuckoo			2008
		<i>Dicaeum hirundinaceum</i>	Mistletoebird			2012
		<i>Taeniopygia guttata</i>	Zebra Finch			2012
		<i>Falco berigora</i>	Brown Falcon			2014
		<i>Falco cenchroides</i>	Nankeen Kestrel			2012
		<i>Cheramoeca leucosterna</i>	White-backed Swallow			2000
		<i>Hirundo neoxena</i>	Welcome Swallow			2012
		<i>Petrochelidon nigricans</i>	Tree Martin			2013
		<i>Megalurus cruralis</i>	Brown Songlark			2011
		<i>Megalurus mathewsi</i>	Rufous Songlark			2011
		<i>Malurus lamberti</i>	Variiegated Fairywren			2012
		<i>Malurus leucopterus</i>	White-winged Fairywren			2012
		<i>Malurus splendens callainus</i>	Splendid (Turquoise) Fairywren			1987

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*	Class	Scientific name	Common name	Conservation Status		Last record (Year)
				Aus	SA	
		<i>Leipoa ocellata</i>	Malleefowl	VU	V	2014
		<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater			2014
		<i>Epthianura aurifrons</i>	Orange Chat			2009
		<i>Epthianura tricolor</i>	Crimson Chat			2014
		<i>Gavicalis virescens</i>	Singing Honeyeater			2013
		<i>Manorina flavigula</i>	Yellow-throated Miner			2014
		<i>Ptilotula ornata</i>	Yellow-plumed Honeyeater			2014
		<i>Ptilotula plumula plumula</i>	Grey-fronted Honeyeater (GR, NW)			2012
		<i>Purnella albifrons</i>	White-fronted Honeyeater			2014
		<i>Merops ornatus</i>	Rainbow Bee-eater			2014
		<i>Anthus australis</i>	Australian Pipit			2011
		<i>Daphoenositta chrysoptera</i>	Varied Sittella			2014
		<i>Oreoica gutturalis</i>	Crested Bellbird			2014
		<i>Ardeotis australis</i>	Australian Bustard		V	2011
		<i>Colluricincla harmonica</i>	Grey Shrikethrush			2014
		<i>Pachycephala inornata</i>	Gilbert's Whistler		R	2003
		<i>Pachycephala rufiventris</i>	Rufous Whistler			2003
		<i>Pardalotus punctatus</i>	Spotted Pardalote			1999
		<i>Pardalotus striatus</i>	Striated Pardalote			2014
		<i>Drymodes brunneopygia</i>	Southern Scrub Robin			1909
		<i>Melanodryas cucullata</i>	Hooded Robin (EP, GR, NW)			2014
		<i>Microeca fascinans</i>	Jacky Winter			2014
		<i>Petroica goodenovii</i>	Red-capped Robin			2012
		<i>Podargus strigoides</i>	Tawny Frogmouth			2013
		<i>Pomatostomus superciliosus</i>	White-browed Babbler			2012
		<i>Barnardius zonarius</i>	Australian Ringneck			2010
		<i>Neophema splendida</i>	Scarlet-chested Parrot		R	2014
		<i>Northiella narethae</i>	Naretha Bluebonnet		R	1999
		<i>Psephotellus varius</i>	Mulga Parrot			2014
		<i>Rhipidura leucophrys</i>	Willie Wagtail			2012
		<i>Calidris acuminata</i>	Sharp-tailed Sandpiper			1900
		<i>Turnix velox</i>	Little Buttonquail			2011
	<b>MAMMALIA</b>	<i>Cercartetus concinnus</i>	Western Pygmy-possum			2012
*		<i>Camelus dromedarius</i>	One-humped Camel (Dromedary, Arabian Camel)			2012
		<i>Canis lupus dingo</i>	Dingo			2014
*		<i>Vulpes vulpes</i>	Fox (Red Fox)			2011
		<i>Ningauai yvonneae</i>	Southern Ningauai			2012
		<i>Sminthopsis crassicaudata</i>	Fat-tailed Dunnart			2014
		<i>Sminthopsis dolichura</i>	Little Long-tailed Dunnart			2014
		<i>Sminthopsis ooldea</i>	Ooldea Dunnart			1987
		<i>Sminthopsis psammophila</i>	Sandhill Dunnart	EN	V	2012
*		<i>Felis catus</i>	Domestic Cat (Feral Cat)			2011
*		<i>Oryctolagus cuniculus</i>	Rabbit (European Rabbit)			2012
		<i>Macropus fuliginosus</i>	Western Grey Kangaroo			2011
		<i>Austronomus australis</i>	White-striped Free-tailed Bat			2009
		<i>Mus musculus</i>	House Mouse			2014
		<i>Notomys mitchellii</i>	Mitchell's Hopping-mouse			2014

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*	Class	Scientific name	Common name	Conservation Status		Last record (Year)
				Aus	SA	
		<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse			2014
		<i>Notoryctes typhlops</i>	Southern Marsupial Mole (Itjaritjara)		V	2014
		<i>Chalinolobus gouldii</i>	Gould's Wattled Bat			2011
		<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat			2014
		<i>Nyctophilus major</i>	Central Long-eared Bat			1987
		<i>Vespadelus baverstocki</i>	Inland Forest Bat			2009
		<i>Lasiorhinus latifrons</i>	Southern Hairy-nosed Wombat			2009
	<b>REPTILIA</b>	<i>Ctenophorus cristatus</i>	Crested Dragon			2012
		<i>Ctenophorus fordi</i>	Mallee Dragon			2014
		<i>Ctenophorus isolepis</i>	Military Dragon			2014
		<i>Ctenophorus nuchalis</i>	Central Netted Dragon			2009
		<i>Ctenophorus pictus</i>	Painted Dragon			2012
		<i>Diporiphora linga</i>	Linga Dragon			2014
		<i>Moloch horridus</i>	Thorny Devil			2014
		<i>Pogona minor</i>	Western Bearded Dragon			2014
		<i>Tympanocryptis houstoni</i>	Nullarbor Earless Dragon			2013
		<i>Nephrurus laevis</i>	Pale Knob-tailed Gecko			2014
		<i>Nephrurus levis</i>	Common Knob-tailed Gecko			2012
		<i>Nephrurus stellatus</i>	Starred Knob-tailed Gecko			2014
		<i>Underwoodisaurus milii</i>	Common Barking Gecko			2013
		<i>Diplodactylus vittatus (revised)</i>	Eastern Stone Gecko			2008
		<i>Diplodactylus wiru</i>	Desert Wood Gecko			2012
		<i>Lucasium bungabinna</i>	Southern Sandplain Gecko			2013
		<i>Lucasium damaeum</i>	Beaded Gecko			2014
		<i>Lucasium stenodactylum (revised)</i>	Sandplain Gecko			2014
		<i>Rhynchoedura ornata (revised)</i>	Western Beaked Gecko			2008
		<i>Strophurus intermedius</i>	Southern Spiny-tailed Gecko			2010
		<i>Brachyuropis fasciolatus</i>	Narrow-banded Snake			2014
		<i>Brachyuropis semifasciatus</i>	Half-girdled Snake			2014
		<i>Parasuta spectabilis</i>	Mallee Black-headed Snake			2010
		<i>Pseudechis australis</i>	Mulga Snake			2009
		<i>Pseudonaja aspidorhyncha</i>	Patch-nosed Brown Snake			2009
		<i>Pseudonaja mengdeni</i>	Gwardar			1950
		<i>Pseudonaja modesta</i>	Five-ringed Snake			2014
		<i>Simoselaps bertholdi</i>	Desert Banded Snake			2012
		<i>Gehyra purpurascens</i>	Robust Tree Dtella			2014
		<i>Gehyra variegata (revised)</i>	Western Tree Dtella			2009
		<i>Heteronotia binoei</i>	Bynoe's Gecko			2012
		<i>Delma butleri</i>	Unbanded Delma			2011
		<i>Delma petersoni</i>	Painted Delma			2014
		<i>Pygopus nigriceps</i>	Western Hooded Scaly-foot			2012
		<i>Cryptoblepharus australis</i>	Desert Wall Skink			2008
		<i>Ctenotus atlas</i>	Southern Spinifex Ctenotus			2014
		<i>Ctenotus brooksi</i>	Sandhill Ctenotus			1987
		<i>Ctenotus euclae</i>	Bight Coast Ctenotus			2013
		<i>Ctenotus orientalis</i>	Spotted Ctenotus			2012
		<i>Ctenotus pantherinus</i>	Leopard Skink			2009
		<i>Ctenotus regius</i>	Eastern Desert Ctenotus			2013
		<i>Ctenotus schomburgkii</i>	Sandplain Ctenotus			2014

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*	Class	Scientific name	Common name	Conservation Status		Last record (Year)
				Aus	SA	
		<i>Ctenotus sp.</i>				2014
		<i>Cyclodomorphus melanops</i>	Spinifex Slender Bluetongue			2009
		<i>Eremiascincus richardsonii</i>	Broad-banded Sandswimmer			2014
		<i>Lerista bipes</i>	Western Two-toed Slider			2012
		<i>Lerista desertorum</i>	Great Desert Slider			2014
		<i>Lerista dorsalis</i>	Southern Four-toed Slider			2014
		<i>Lerista edwardsae</i>	Myall Slider			2014
		<i>Lerista labialis</i>	Eastern Two-toed Slider			2014
		<i>Lerista taeniata</i>	Ribbon Slider			2009
		<i>Lerista terdigitata</i>	Southern Three-toed Slider			2012
		<i>Lerista timida</i>	Dwarf Three-toed Slider			2014
		<i>Liopholis inornata</i>	Desert Skink			2014
		<i>Menetia greyii</i>	Dwarf Skink			2014
		<i>Morethia adelaidensis</i>	Adelaide Snake-eye			2014
		<i>Morethia butleri</i>	Butler's Snake-eye			2014
		<i>Anilius bicolor</i>	Southern Blind Snake			2014
		<i>Anilius endoterus</i>	Centralian Blind Snake			2014
		<i>Varanus eremius</i>	Desert Pygmy Goanna			2013
		<i>Varanus gilleni</i>	Pygmy Mulga Goanna			2014
		<i>Varanus gouldii</i>	Sand Goanna			2012

**Aus:** Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **SA:** South Australia (*National Parks and Wildlife Act 1972*). **Conservation Codes:** **CE:** Critically Endangered. **ENE:** Endangered. **VU/V:** Vulnerable. **R:** Rare.

## Appendix 3. Flora species recorded at flora sites MALCON2 and MALCON3 within the Project Area.

*	Scientific name	Common name	Conservation Status	
			Aus	SA
	<i>Acacia oswaldii</i>	Umbrella Wattle		
	<i>Acacia papyrocarpa</i>	Western Myall		
	<i>Alectryon oleifolius ssp. canescens</i>	Bullock Bush		
	<i>Amyema quandang var. quandang</i>	Grey Mistletoe		
	<i>Atriplex vesicaria</i>	Bladder Saltbush		
	<i>Austrostipa acrocliata</i>	Graceful Spear-grass		
	<i>Austrostipa elegantissima</i>	Feather Spear-grass		
	<i>Austrostipa nitida</i>	Balcarra Spear-grass		
	<i>Austrostipa platychaeta</i>	Flat-awn Spear-grass		
	<i>Austrostipa sp.</i>	Spear-grass		
	<i>Calandrinia sp.</i>	Purslane/Parakeelya		
	<i>Calotis hispidula</i>	Hairy Burr-daisy		
	<i>Calotis sp.</i>	Burr-daisy		
	<i>Chenopodium curvispicatum</i>	Cottony Goosefoot		
	<i>Crassula sp.</i>	Crassula/Stonecrop		
	<i>Cratystylis conocephala</i>	Bluebush Daisy		
	<i>Enchylaena tomentosa var.</i>	Ruby Saltbush		
	<i>Eremophila latrobei ssp.</i>	Crimson Emubush		
	<i>Eremophila scoparia</i>	Broom Emubush		
	<i>Eriochiton sclerolaenoides</i>	Woolly-fruit Bluebush		
	<i>Eucalyptus oleosa ssp.</i>	0		
	<i>Euphorbia drummondii</i>	0		
	<i>Euphorbia tannensis ssp. eremophila</i>	Desert Spurge		
	<i>Gramineae sp.</i>	Grass Family		
	<i>Lepidium phlebopetalum</i>	Veined Peppercross		
	<i>Lepidium sp.</i>	Peppercross		
	<i>Maireana erioclada</i>	Rosy Bluebush		
	<i>Maireana georgei</i>	Satiny Bluebush		
	<i>Maireana pentatropis</i>	Erect Mallee Bluebush		
	<i>Maireana radiata</i>	Radiate Bluebush		
	<i>Maireana sedifolia</i>	Bluebush		
	<i>Maireana trichoptera</i>	Hairy-fruit Bluebush		
	<i>Maireana turbinata</i>	Top-fruit Bluebush		
	<i>Minuria cunninghamii</i>	Bush Minuria		
	<i>Myoporum montanum</i>	Native Myrtle		
	<i>Myoporum platycarpum ssp.</i>	False Sandalwood		
	<i>Olearia calcarea</i>	Crinkle-leaf Daisy-bush		
	<i>Olearia muelleri</i>	Mueller's Daisy-bush		
	<i>Ptilotus incanus/obovatus</i>	Silver Mulla Mulla		
	<i>Rhagodia candolleana ssp.</i>	Sea-berry Saltbush		
	<i>Rhagodia candolleana ssp. argentea</i>	Silver Sea-berry Saltbush		
	<i>Rhagodia spinescens</i>	Spiny Saltbush		
	<i>Rhodanthe floribunda</i>	White Everlasting		
	<i>Salsola australis</i>	Buckbush		
	<i>Santalum acuminatum</i>	Quandong		
	<i>Scaevola spinescens</i>	Spiny Fanflower		

*	Scientific name	Common name	Conservation Status	
			Aus	SA
	<i>Sclerolaena diacantha</i>	Grey Bindyi		
	<i>Sclerolaena obliquicuspis</i>	Oblique-spined Bindyi		
	<i>Sclerolaena sp.</i>	Bindyi		
	<i>Senna artemisioides ssp. artemisioides x ssp. coriacea</i>	Desert Senna		
	<i>Senna artemisioides ssp. petiolaris</i>	0		
	<i>Senna artemisioides ssp. X coriacea</i>	Broad-leaf Desert Senna		
	<i>Senna cardiosperma ssp. gawlerensis</i>	Gawler Ranges Senna		
	<i>Senna phyllodinea</i>	0		
	<i>Sida fibulifera</i>	Pin Sida		
	<i>Sida petrophila</i>	Rock Sida		
	<i>Sida sp.</i>	Sida		
	<i>Sida trichopoda</i>	High Sida		
	<i>Stenopetalum lineare</i>	Narrow Thread-petal		
	<i>Tetragonia eremaea</i>	Desert Spinach		
	<i>Tetragonia moorei</i>	New Zealand Spinach		
	<i>Vittadinia cuneata var.</i>	Fuzzy New Holland Daisy		
	<i>Vittadinia sp.</i>	New Holland Daisy		
	<i>Zygophyllum apiculatum</i>	Pointed Twinleaf		
	<i>Zygophyllum aurantiacum ssp.</i>			
	<i>Zygophyllum eremaeum</i>			
*	<i>Carrichtera annua</i>	Ward's Weed		
*	<i>Sonchus oleraceus</i>	Common Sow-thistle		



Appendix 4. Flora species recorded in the Project Area (EBS 2015c).

Family	Species name	Common name	Conservation status		Vegetation association									
			Aus	SA	1	2	3	4	5	6	7	8	9	
AIZOACEAE	<i>Sarcosoma praecox</i>	Sarcosoma				✓	✓						✓	
AMARANTHACEAE	<i>Ptilotus incanus/obovatus</i>	Silver Mulla Mulla				✓	✓	✓	✓			✓	✓	✓
	<i>Ptilotus nobilis ssp. nobilis</i>	Yellow-tails					✓	✓						
	<i>Ptilotus polystachyus</i>	Long-tails										✓	✓	
ASCLEPIADACEAE	<i>Cynanchum floribundum</i>	Desert Cynanchum						✓					✓	
BORAGINACEAE	<i>Halgania andromedifolia</i>	Scented Blue-flower			✓		✓							
CHENOPODIACEAE	<i>Atriplex vesicaria</i>	Bladder Saltbush				✓	✓		✓	✓	✓	✓	✓	✓
	<i>Enchylaena tomentosa var.</i>	Ruby Saltbush				✓	✓		✓		✓	✓	✓	
	<i>Eriochiton sclerolaenoides</i>	Woolly-fruit Bluebush				✓				✓	✓	✓	✓	✓
	<i>Maireana pentatropis</i>	Erect Mallee Bluebush				✓	✓		✓		✓	✓	✓	
	<i>Maireana radiata</i>	Radiate Bluebush				✓	✓		✓		✓	✓	✓	
	<i>Maireana sedifolia</i>	Bluebush				✓							✓	
	<i>Maireana trichoptera</i>	Hairy-fruit Bluebush				✓			✓	✓		✓	✓	
	<i>Maireana villosa</i>	Silky Bluebush											✓	
	<i>Rhagodia candolleana ssp. argentea</i>	Silver Sea-berry Saltbush				✓							✓	
	<i>Rhagodia crassifolia</i>	Fleshy Saltbush				✓							✓	
	<i>Rhagodia preissii ssp. preissii</i>	Mallee Saltbush				✓							✓	
	<i>Rhagodia spinescens</i>	Spiny Saltbush				✓	✓		✓		✓	✓	✓	
	<i>Rhagodia ulicina</i>	Intricate Saltbush								✓				
	<i>Salsola australis</i>	Buckbush			✓	✓	✓		✓	✓	✓	✓	✓	✓
	<i>Sclerolaena diacantha</i>	Grey Bindyi				✓				✓		✓	✓	✓
	<i>Sclerolaena parviflora</i>	Small-flower Bindyi					✓	✓						
	<i>Sclerolaena patentiuspis</i>	Spear-fruit Bindyi				✓				✓				
CHLOANTHACEAE	<i>Dicrastylis beveridgei var. lanata</i>	Woolly Sand-sage			✓		✓	✓						
	<i>Dicrastylis lewellinii</i>	Purple Sand-sage			✓		✓	✓						
	<i>Dicrastylis verticillata</i>	Whorled Sand-sage			✓		✓	✓						
	<i>Newcastelia bracteosa</i>				✓		✓	✓						
COMPOSITAE	<i>Brachyscome sp.</i>	Native Daisy					✓							

Family	Species name	Common name	Conservation status		Vegetation association									
			Aus	SA	1	2	3	4	5	6	7	8	9	
	<i>Calotis lappulacea</i>	Yellow Burr-daisy		R	✓		✓	✓						
	<i>Cephalopterum drummondii</i>	Pompom Head				✓				✓				
	<i>Chrysocephalum apiculatum</i>	Common Everlasting			✓	✓	✓	✓					✓	
	<i>Cratystylis conocephala</i>	Bluebush Daisy				✓							✓	
	<i>Eriochlamys behrii</i>	Woolly Mantle								✓				
	<i>Gnephosis tenuissima</i>	Dwarf Golden-tip								✓				
	<i>Gratwickia monochaeta</i>			R			✓							
	<i>Minuria leptophylla</i>	Minnie Daisy					✓							
	<i>Olearia exiguifolia</i>	Lobed-leaf Daisy-bush							✓					
	<i>Olearia lepidophylla</i>	Clubmoss Daisy-bush			✓		✓	✓						
	<i>Olearia muelleri</i>	Mueller's Daisy-bush				✓	✓	✓						
	<i>Olearia pimeleoides</i>	Pimelea Daisy-bush					✓	✓						
	<i>Podolepis capillaris</i>	Wiry Podolepis				✓	✓	✓					✓	
	<i>Rhodanthe floribunda</i>	White Everlasting				✓				✓	✓			
	<i>Senecio gregorii</i>	Fleshy Groundsel				✓								
	<i>Vittadinia dissecta var. hirta</i>	Dissected New Holland Daisy					✓	✓						
	<i>Xerochrysum bracteatum</i>	Golden Everlasting					✓	✓						
CRUCIFERAE	* <i>Brassica tournefortii</i>	Wild Turnip			✓	✓	✓	✓	✓			✓	✓	
	* <i>Carrichtera annua</i>	Ward's Weed				✓	✓						✓	
CUPRESSACEAE	<i>Callitris verrucosa</i>	Scrub Cypress Pine			✓			✓						
CYPERACEAE	<i>Schoenus subaphyllus</i>	Desert Bog-rush					✓							
EUPHORBIACEAE	<i>Adriana tomentosa var. hookeri</i>	Mallee Bitter-bush			✓		✓	✓						
	<i>Beyeria opaca</i>	Dark Turpentine Bush					✓	✓					✓	
FRANKENIACEAE	<i>Frankenia serpyllifolia</i>	Thyme Sea-heath				✓								
GOODENIACEAE	<i>Coopernookia strophiolata</i>	Sticky Coopernookia			✓		✓	✓						
	<i>Dampiera dysantha</i>	Shrubby Dampiera			✓		✓	✓						
	<i>Dampiera lanceolata var. lanceolata</i>	Grooved Dampiera			✓		✓	✓						
	<i>Goodenia glauca</i>	Pale Goodenia					✓							
	<i>Goodenia havilandii</i>	Hill Goodenia					✓	✓						

Family	Species name	Common name	Conservation status		Vegetation association									
			Aus	SA	1	2	3	4	5	6	7	8	9	
	<i>Goodenia varia</i>	Sticky Goodenia					✓							
	<i>Scaevola depauperata</i>	Skeleton Fanflower			✓				✓					
	<i>Scaevola humilis</i>	Inland Fanflower					✓							
	<i>Scaevola spinescens</i>	Spiny Fanflower				✓	✓	✓				✓		
	<i>Velleia connata</i>	Cup Velleia					✓							
GRAMINEAE	<i>Amphipogon caricinus var. caricinus</i>	Long Grey-beard Grass					✓	✓						
	<i>Aristida contorta</i>	Curly Wire-grass				✓						✓	✓	✓
	<i>Austrostipa nitida</i>	Balcarra Spear-grass				✓						✓	✓	
	<i>Austrostipa platychaeta</i>	Flat-awn Spear-grass						✓	✓					
	<i>Triodia basedowii</i>	Hard Spinifex			✓		✓	✓						
	<i>Triodia lanata</i>	Woolly Spinifex			✓		✓	✓						
GYROSTEMONACEAE	<i>Codonocarpus cotinifolius</i>	Desert Poplar			✓		✓	✓						
	<i>Gyrostemon thesioides</i>	Broom Wheel-fruit			✓			✓						
HALORAGACEAE	<i>Glischrocaryon behrii</i>	Golden Pennants					✓	✓						
	<i>Haloragis gossei</i>	Gosse's Raspwort			✓		✓	✓						
LABIATAE	<i>Prostanthera striatiflora</i>	Striated Mintbush					✓	✓					✓	
	<i>Westringia rigida</i>	Stiff Westringia					✓	✓					✓	
LEGUMINOSAE	<i>Acacia acanthoclada ssp. acanthoclada</i>	Harrow Wattle					✓							
	<i>Acacia ligulata</i>	Umbrella Bush			✓			✓						
	<i>Acacia nyssophylla</i>	Spine Bush				✓	✓	✓	✓			✓	✓	
	<i>Acacia oswaldii</i>	Umbrella Wattle				✓	✓		✓			✓	✓	✓
	<i>Acacia papyrocarpa</i>	Western Myall				✓	✓		✓			✓	✓	✓
	<i>Acacia rigens</i>	Nealie					✓		✓					✓
	<i>Bossiaea walkeri</i>	Cactus Pea			✓				✓					
	<i>Daviesia ulicifolia ssp.</i>				✓				✓					
	<i>Dillwynia uncinata</i>	Silky Parrot-pea			✓									
	<i>Senna artemisioides ssp. artemisioides x ssp. coriacea</i>	Desert Senna				✓	✓	✓			✓	✓	✓	✓
	<i>Senna artemisioides ssp. petiolaris</i>					✓	✓				✓	✓	✓	✓

Family	Species name	Common name	Conservation status		Vegetation association									
			Aus	SA	1	2	3	4	5	6	7	8	9	
	<i>Senna cardiosperma ssp. gawlerensis</i>	Gawler Ranges Senna										✓		✓
	<i>Senna pleurocarpa var. pleurocarpa</i>	Stripe-pod Senna						✓						
	<i>Swainsona sp.</i>	Swainson-pea						✓						
	<i>Templetonia egena</i>	Broombush Templetonia						✓					✓	
LILIACEAE	<i>Dianella revoluta var. divaricata</i>	Broad-leaf Flax-lily						✓	✓				✓	
	<i>Lomandra collina</i>	Sand Mat-rush						✓						
	<i>Lomandra leucocephala ssp. robusta</i>	Woolly Mat-rush			✓			✓	✓					
	<i>Thysanotus exiliflorus</i>	Inland Fringe-lily			✓			✓	✓					
LOGANIACEAE	<i>Logania nuda</i>	Leafless Logania			✓				✓					
MALVACEAE	<i>Alyogyne pinoniana var. pinoniana</i>	Sand Hibiscus						✓					✓	
MYOPORACEAE	<i>Eremophila alternifolia</i>	Narrow-leaf Emubush						✓					✓	
	<i>Eremophila crassifolia</i>	Thick-leaf Emubush			✓			✓					✓	
	<i>Eremophila gibsonii</i>	Gibson's Emubush						✓	✓					
	<i>Eremophila glabra ssp.</i>	Tar Bush						✓					✓	
	<i>Eremophila macdonnellii</i>	Macdonnell's Emubush			✓			✓	✓					
	<i>Eremophila maculata ssp.</i>	Spotted Emubush												
	<i>Eremophila paisleyi ssp. paisleyi</i>								✓					
	<i>Eremophila scoparia</i>	Coccid Emu-bush					✓	✓	✓			✓	✓	✓
	<i>Myoporum platycarpum ssp. platycarpum</i>	False Sandalwood					✓					✓	✓	
MYRTACEAE	<i>Calytrix sp.</i>	Fringe-myrtle			✓			✓	✓					
	<i>Eucalyptus brachycalyx</i>	Gilja					✓						✓	
	<i>Eucalyptus capitanea</i>	Desert Ridge-fruited Mallee			✓									
	<i>Eucalyptus oleosa ssp. oleosa</i>	Red Mallee					✓	✓					✓	
	<i>Eucalyptus pimpiniana</i>	Pimpin Mallee						✓	✓					
	<i>Eucalyptus yumbarrana</i>	Yumbarra Mallee			✓			✓	✓					
	<i>Leptospermum coriaceum</i>	Dune Tea-tree			✓				✓					
	<i>Melaleuca eleuterostachya</i>	Hummock Honey-myrtle			✓			✓	✓					
	<i>Melaleuca leiocarpa</i>	Pungent Honey-myrtle		R	✓				✓					
	<i>Thryptomene elliottii</i>							✓	✓					

Family	Species name	Common name	Conservation status		Vegetation association									
			Aus	SA	1	2	3	4	5	6	7	8	9	
PITTOSPORACEAE	<i>Billardiera cymosa</i> ssp.					✓	✓							
	<i>Pittosporum angustifolium</i>	Native Apricot			✓	✓			✓	✓	✓	✓	✓	✓
POLYGONACEAE	* <i>Acetosa vesicaria</i>	Rosy Dock								✓				
PROTEACEAE	<i>Grevillea huegelii</i>	Comb Grevillea					✓	✓						
	<i>Grevillea juncifolia</i> ssp. <i>juncifolia</i>	Honeysuckle Grevillea					✓	✓						
	<i>Grevillea stenobotrya</i>	Rattle-pod Grevillea			✓			✓						
	<i>Hakea francisiana</i>	Bottlebrush Hakea			✓			✓						
RUTACEAE	<i>Boronia coerulescens</i> ssp. <i>coerulescens</i>	Blue Boronia					✓	✓					✓	
	<i>Geijera linearifolia</i>	Sheep bush			✓	✓	✓							
SANTALACEAE	<i>Exocarpos sparteus</i>	Slender Cherry					✓						✓	
	<i>Santalum acuminatum</i>	Quandong				✓	✓				✓	✓		
	<i>Santalum spicatum</i>	Sandalwood		V		✓								
SAPINDACEAE	<i>Dodonaea stenozyga</i>	Desert Hop-bush					✓	✓						
	<i>Dodonaea viscosa</i> ssp. <i>angustissima</i>	Narrow-leaf Hop-bush				✓			✓					
SOLANACEAE	<i>Grammosolen truncatus</i>	Shrubby Ray-flower					✓	✓					✓	
	<i>Lycium australe</i>	Australian Boxthorn				✓			✓					
	<i>Nicotiana velutina</i>	Velvet Tobacco				✓								✓
	<i>Solanum coactiliferum</i>	Tomato-bush			✓		✓	✓						
THYMELAEACEAE	<i>Pimelea microcephala</i> ssp.	Shrubby Riceflower					✓						✓	
	<i>Pimelea trichostachya</i>	Spiked Riceflower					✓							
ZYGOPHYLLACEAE	<i>Zygophyllum apiculatum</i>	Pointed Twinleaf				✓	✓						✓	
	<i>Zygophyllum aurantiacum</i> ssp.					✓	✓		✓		✓	✓	✓	✓

**Aus:** Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **SA:** South Australia (*National Parks and Wildlife Act 1972*). **Conservation Codes:** **CE:** Critically Endangered. **EN/E:** Endangered. **VU/V:** Vulnerable. **R:** Rare.

\* Denotes introduced species.

#### Vegetation associations

1. *Eucalyptus* spp. / *Hakea francisiana* (Bottlebrush Hakea) / *Grevillea stenobotrya* (Rattle-pod Grevillea) Tall Open Shrubland.
2. *Acacia papyrocarpa* (Western Myall) Open Woodland +/- *Cratystylis conocephala* (Daisy Bluebush) and *Maireana sedifolia* (Bluebush).
3. *Eucalyptus oleosa* ssp. Mixed Mallee over *Triodia* sp.
4. *Eucalyptus yumbarrana* (Yumbarrana Mallee) Mixed Mallee

5. *Alectryon oleifolius* (Bullock Bush) Shrubland.
6. *Atriplex vesicaria* (Bladder Saltbush) Low Open Shrubland.
7. *Casuarina pauper* (Black Oak) +/- *Acacia papyrocarpa* (Western Myall) Woodland.
8. *Eucalyptus oleosa* ssp. (Red Mallee) / *Acacia papyrocarpa* (Western Myall) +/- *Myoporum platycarpum* (False Sandalwood) Open Woodland.
9. *Senna* spp. Open Shrubland.



## Appendix 5. Bird species recorded at point count sites in the Project Area (EBS 2015c).

Family	Species name	Common name	ATA001	ATA002	ATA003	ATA004	ATA005	ATA006	ATA007	ATA008	ATA009	ATA010	ATA011	ATA012	ATA013	ATA014	Total
ACANTHIZIDAE	<i>Acanthiza apicalis</i>	Inland Thornbill	4			4	10										18
	<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill				4			10								14
	<i>Smicronis brevirostris</i>	Weebill	2	7	11	6	2	7		3	4		2			4	48
ACCIPITRIDAE	<i>Hieraaetus morphnoides</i>	Little Eagle							1								1
AEGOTHELIDAE	<i>Aegotheles cristatus</i>	Australian Owlet-nightjar						1									1
ALCEDINIDAE	<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher										2					2
ARTAMIDAE	<i>Artamus cinereus</i>	Black-faced Woodswallow				2	2									2	6
	<i>Artamus leucorhynchus</i>	White-breasted Woodswallow							4								4
	<i>Artamus personatus</i>	Masked Woodswallow			17		4		2	7		6			2	2	40
	<i>Cracticus torquatus</i>	Grey Butcherbird				2	1										3
	<i>Gymnorhina tibicen</i>	Australian Magpie													2	2	4
CAMPEPHAGIDAE	<i>Coracina novaehollandiae</i>	Black-faced Cuckooshrike													2		2
	<i>Lalage tricolor</i>	White-winged Triller							2								2
COLUMBIDAE	<i>Phaps chalcoptera</i>	Common Bronzewing	1														1
CUCULIDAE	<i>Cacomantis pallidus</i>	Pallid Cuckoo				1	1	1				2					5
	<i>Chalcites basalis</i>	Horsfield's Bronze Cuckoo				1				1	1	1					4
FALCONIDAE	<i>Falco berigora</i>	Brown Falcon				1		1		1							3
HIRUNDINIDAE	<i>Petrochelidon nigricans</i>	Tree Martin										15			6		21
MALURIDAE	<i>Malurus splendens</i>	Splendid Fairywren											1				1
MELIPHAGIDAE	<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater		4		5						2					11
	<i>Certhionyx variegatus</i>	Pied Honeyeater				2											2
	<i>Epthianura tricolor</i>	Crimson Chat										7			2		9
	<i>Manorina flavigula</i>	Yellow-throated Miner		2	4	13						4		4			27

	<i>Ptilotula ornata</i>	Yellow-plumed Honeyeater	4	10	12	2	7	6				2					<b>43</b>
	<i>Purnella albifrons</i>	White-fronted Honeyeater	12	7	3	4	8	2	2					6			<b>44</b>
MEROPIIDAE	<i>Merops ornatus</i>	Rainbow Bee-eater			4												<b>4</b>
NEOSITTIDAE	<i>Daphoenositta chrysoptera</i>	Varied Sittella				7											<b>7</b>
OREOICIDAE	<i>Oreoica gutturalis</i>	Crested Bellbird		2	1		1		1				1	1	1		<b>8</b>
PACHYCEPHALIDAE	<i>Colluricincla harmonica</i>	Grey Shrikethrush	2		2	1		1									<b>6</b>
	<i>Pachycephala rufiventris</i>	Rufous Whistler	1	3	4		1										<b>9</b>
PARDALOTIDAE	<i>Pardalotus striatus</i>	Striated Pardalote	2	4	2	4		1		2			2		2		<b>19</b>
PETROICIDAE	<i>Microeca fascians</i>	Jacky Winter	6	2			6								4		<b>18</b>
	<i>Petroica goodenovii</i>	Red-capped Robin				2						2					<b>4</b>
POMATOSTOMIDAE	<i>Pomatostomus superciliosus</i>	White-browed Babbler	4				13		4								<b>21</b>
PSITTACIDAE	<i>Melopsittacus undulatus</i>	Budgerigar	6		6				17	12		21	12				<b>74</b>
	<i>Psephotus varius</i>	Mulga Parrot				2			2	2	2					2	<b>10</b>
TURNICIDAE	<i>Turnix velox</i>	Little Buttonquail					1										<b>1</b>
<b>Total abundance</b>			<b>44</b>	<b>41</b>	<b>66</b>	<b>63</b>	<b>57</b>	<b>20</b>	<b>45</b>	<b>28</b>	<b>7</b>	<b>64</b>	<b>18</b>	<b>11</b>	<b>21</b>	<b>12</b>	<b>497</b>
<b>Total diversity</b>			<b>11</b>	<b>9</b>	<b>11</b>	<b>18</b>	<b>13</b>	<b>8</b>	<b>10</b>	<b>7</b>	<b>3</b>	<b>11</b>	<b>5</b>	<b>3</b>	<b>8</b>	<b>5</b>	<b>37</b>

## Appendix 6. Small mammal captures at fauna trapping sites in the Project Area (EBS 2015c).

Family	Species name	Common name	Conservation status		ATA 001	ATA 002	ATA 003	ATA 004	ATA 005	ATA 006	ATA 007	ATA 008	Total
			Aus	SA									
BURRAMYIDAE	<i>Cercartetus concinnus</i>	Western Pygmy-possum			2	2	1	1				1	7
DASYURIDAE	<i>Ningai yvonneae</i>	Southern Ningai				2							2
	<i>Sminthopsis dolichura</i>	Little Long-tailed Dunnart				3		2	4		1		10
	<i>Sminthopsis psammophila</i>	Sandhill Dunnart	EN	V	1	1		1	1				4
MURIDAE	* <i>Mus musculus</i>	House Mouse			2	2	3	5	3	2	6		23
	<i>Notomys mitchellii</i>	Mitchell's Hopping-mouse				1					1	1	3
	<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse			5		1	1			1	1	9
<b>Total abundance</b>					<b>10</b>	<b>11</b>	<b>5</b>	<b>10</b>	<b>8</b>	<b>2</b>	<b>9</b>	<b>3</b>	<b>58</b>
<b>Total diversity</b>					<b>4</b>	<b>6</b>	<b>3</b>	<b>5</b>	<b>3</b>	<b>1</b>	<b>4</b>	<b>3</b>	<b>7</b>

**Aus:** Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **SA:** South Australia (*National Parks and Wildlife Act 1972*). **Conservation Codes:** **CE:** Critically Endangered. **EN/E:** Endangered. **VU/V:** Vulnerable. **R:** Rare.

\* Denotes introduced species.

## Appendix 7. Bat echolocation calls recorded at fauna sites in the Project Area (EBS 2015c).

Family	Species name	Common name	ATA 001	ATA 002	ATA 003	ATA 004	ATA 005	ATA 006	ATA 007	ATA 008
VESPERTILIONIDAE	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat		3	4	2		3	1	1
	<i>Vespadelus regulus</i>	Southern Forest Bat					1			
	# <i>Nyctophilus geoffroyi</i> / <i>Nyctophilus major</i>	Lesser Long-eared Bat / Central Long-eared Bat	6	23	23	43	4	19	20	2
MOLOSSIDAE	<i>Austronomus australis</i>	White-striped Free- tailed Bat					1	1		
	# <i>Mormopterus</i> species 3 or 4	Inland Free-tailed Bat			2	1		1		

# = Species not identified with certainty.

## Appendix 8. Reptiles captured at fauna trapping sites in the Project Area (EBS 2015c).

Family	Species name	Common name	ATA 001	ATA 002	ATA 003	ATA 004	ATA 005	ATA 006	ATA 007	ATA 008	Total
AGAMIDAE	<i>Ctenophorus cristatus</i>	Crested Dragon			2						2
	<i>Ctenophorus fordi</i>	Mallee Dragon			1	1		1		1	4
	<i>Ctenophorus isolepis</i>	Military Dragon	6 (1)			1		1			8
	<i>Diporiphora linga</i>	Linga Dragon		3	3	4		1	1		12
	<i>Moloch horridus</i>	Thorny Devil	1	1	1 (1)	1					4
	<i>Pogona minor</i>	Dwarf Bearded Dragon		1	1	3	3			1	9
CARPHODACTYLIDAE	<i>Nephrurus laevisissimus</i>	Pale Knob-tailed Gecko	1	2							3
	<i>Nephrurus stellatus</i>	Starred Knob-tailed Gecko	2 (1)	2	3	2	3	3	1	1 (8)	17
DIPOLODACTYLIDAE	<i>Diplodactylus wiru</i>	Desert Wood Gecko	2	1	1		1	1	1	1	8
	<i>Lucasium bungabinna</i>	Southern Sandplain Gecko				2	2		2		6
	<i>Lucasium damaeum</i>	Beaded Gecko						2		9	11
	<i>Strophurus assimilis</i>	Thorn-tailed Gecko					2				2
	<i>Strophurus elderi</i>	Jewelled Gecko			1	2					3
ELAPIDAE	<i>Brachyuropsis fasciolatus</i>	Narrow-banded Snake	1			1					2
	<i>Brachyuropsis semifasciatus</i>	Half-girdled Snake			1			1		3	5
	<i>Demansia reticulata</i>	Desert Whipsnake						1			1
	<i>Pseudonaja modesta</i>	Five-ringed Snake				1					1
GEKKONIDAE	<i>Gehyra purpurascens</i>	Purple Dtella		1	1	2	1			1	6
	<i>Gehyra variegata</i>	Tree Dtella	1	1						2	4
PYGOPODIDAE	<i>Delma butleri</i>	Spinifex Snake-lizard	2								2
	<i>Delma petersoni</i>	Painted Snake-lizard		2	1						3
	<i>Lialis burtonis</i>	Burton's Legless Lizard			2	1	1				4
SCINCIDAE	<i>Ctenotus atlas</i>	Southern Spinifex Ctenotus	7	5	2	5	2	5	2		28
	<i>Ctenotus schomburgkii</i>	Sandplain Ctenotus	2	3	7		2			1 (1)	15
	<i>Ctenotus taeniatus</i>	Eyrean Ctenotus						1			1
	<i>Cyclodomorphus melanops</i>	Spinifex Slender Bluetongue	1		1	2		5	2		10
	<i>Lerista desertorum</i>	Great Desert Slider			1						1
	<i>Lerista labialis</i>	Eastern Two-toed Slider	1			1	1		3	3	9
	<i>Lerista taeniata</i>	Ribbon Slider	1	1	1						3

Family	Species name	Common name	ATA 001	ATA 002	ATA 003	ATA 004	ATA 005	ATA 006	ATA 007	ATA 008	Total
	<i>Lerista terdigitata</i>	Southern Three-toed Slider		1							1
	<i>Lerista timida</i>	Dwarf Three-toed Slider		1				1	1		3
	<i>Liopholis inornata</i>	Desert Skink			3		3				6
	<i>Morethia butleri</i>	Butler's Snake-eye		3	1				3		7
TYPHLOPIDAE	<i>Ramphotyphlops bicolor</i>	Southern Blind Snake					2	2			4
VARANIDAE	<i>Varanus eremius</i>	Desert Pygmy Goanna		1		1	2				4
<b>Total abundance</b>			<b>28</b>	<b>29</b>	<b>34</b>	<b>30</b>	<b>25</b>	<b>25</b>	<b>16</b>	<b>23</b>	<b>209</b>
<b>Total diversity</b>			<b>13</b>	<b>16</b>	<b>19</b>	<b>16</b>	<b>13</b>	<b>13</b>	<b>9</b>	<b>10</b>	<b>35</b>

Note: Recaptured reptiles are highlighted in parenthesis and are not included in the totals





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