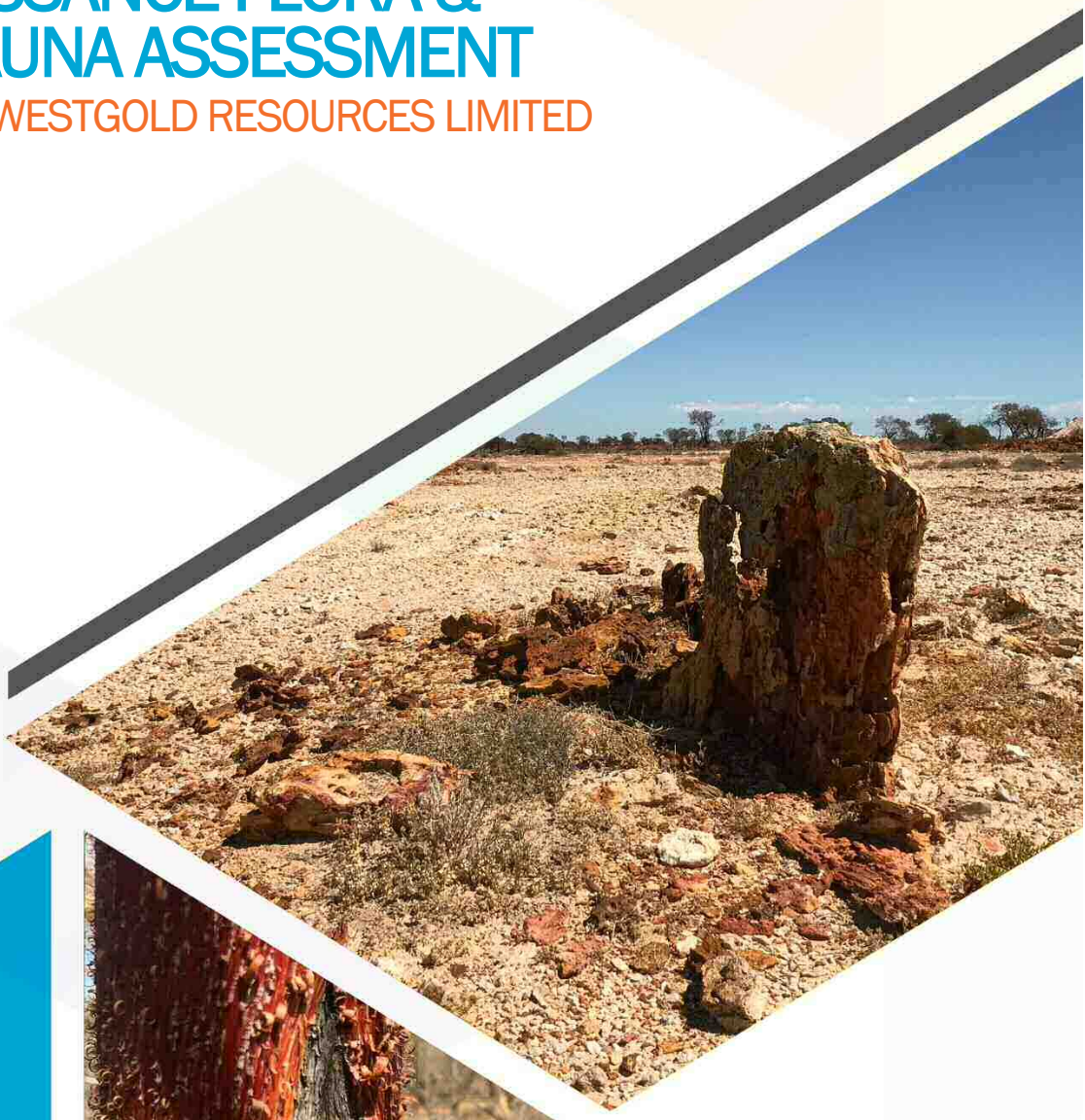
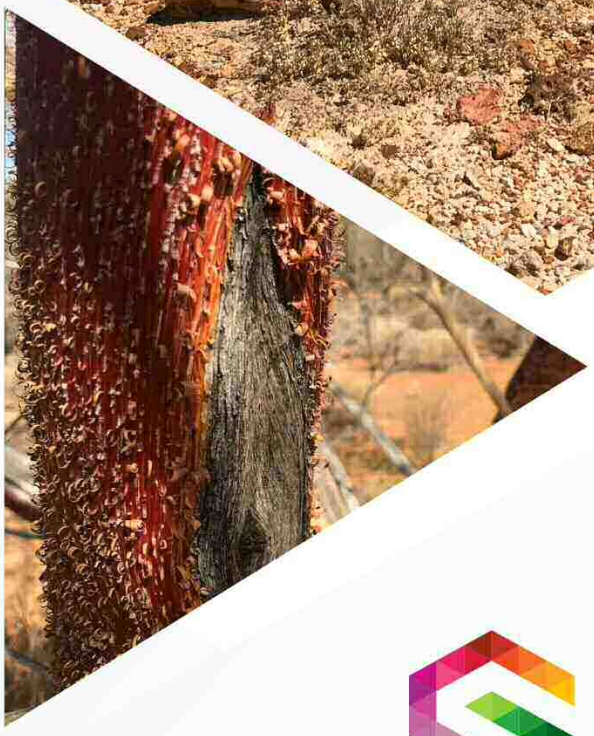
# NANNINE MINING AREA

## RECONNAISSANCE FLORA & LEVEL 1 FAUNA ASSESSMENT

PREPARED FOR: WESTGOLD RESOURCES LIMITED





Spectrum ECOLOGY

© Spectrum Ecology Pty Ltd
ABN 68 615 115 243
PO Box 314 Leederville
Western Australia 6902
Ph: (08) 9317 8233
Email: info@spectrumecology.com.au

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# EXECUTIVE SUMMARY

Westgold Resources Limited (Westgold) is the owner of the Nannine Mining Area (Nannine), approximately 30 km south of Meekatharra in the Murchison region of Western Australia. Westgold are looking to expand the disturbance envelope to include three additional areas that have previously been unsurveyed.

Westgold has requested a reconnaissance flora and level 1 terrestrial fauna assessment of a 555-ha area in the vicinity of the Nannine mining area (the Survey Area) to support the submission of a Native Vegetation Clearing Permit (NVCP) and Mining Proposal (MP) application. In addition to the Survey Area, a 5 km buffer around the Survey Area was included.

The flora and fauna survey was undertaken from the 19 to 21 of April 2020 by Botanist Carmel Forrester and Zoologist Jesse Forbes-Harper. The field survey timing was conducted in accordance with EPA recommended timing and adequate rainfall. Ten flora relevés and fauna sites were sampled over the Survey Area.

Thirty-five significant flora taxa were identified during the flora database searches. One species was previously recorded within the Survey Area, *Acacia sclerosperma* subsp. *glaucescens* (Priority 3) and two have been assigned a High likelihood of occurrence, *Calytrix verruculosa* and *Tecticornia cymbiformis* (both Priority 3).

No Threatened or Priority flora taxa were identified within the Survey Area. Three significant flora taxa were collected within the Survey Area. Two of these constitute range extensions; *Hakea leucoptera* subsp. *sericipes* and *Rhagodia drummondii*, and one specimen, *Tecticornia* sp. nov, was recorded as a potential new species and is associated with the restricted salt lake vegetation type: D2.

The flora species considered to have high significance at a local and regional scale at the Survey Area include: *Tecticornia* sp. nov (potential new taxon), recorded in Lake Annean; and *Calytrix verruculosa* (Priority 3), high likelihood of occurrence.

Three invasive weed species were recorded within the Survey Area; **Cenchrus ciliaris*, **Cenchrus setiger*, and **Citrullus colocynthis*.

No Threatened Ecological Communities (TECs) were recorded within the vicinity of the Survey Area. Eleven Priority Ecological Communities (PECs) were recorded during the database searches. Two of these were recorded within the Survey Area: Austin System (Priority 3); and Polelle Calcrete (Priority 1). No vegetation at the Study Area resembles any known PECs.

Five vegetation types were described across the Survey Area associated with drainage areas, flats, slopes and crests. The assessment identified one vegetation type as being significant: D2; *Tecticornia* dominated salt pan. This vegetation type is considered significant as it is restricted within the Study Area (only occurring in one location) and habitat for the *Tecticornia* genus and a potential new species; *Tecticornia* sp.nov.

Five fauna habitat types were mapped at the Study Area: open plain, Mulga woodland, salt lake, Samphire shrubland, and cleared. The desktop assessment identified the potential presence of 27 significant fauna species, including one mammal, 22 birds, one reptile and three invertebrates. The fauna habitats recorded within the Survey Area form suitable habitat for 17 conservation significant fauna species; Long-tailed Dunnart (Sminthopsis longicaudata), Migratory Waterbirds (12 species), Grey Falcon (*Falco hypoleucos*), Fork-tailed Swift (*Apus pacificus*), Peregrine Falcon (*Falco peregrinus*) and West Coast Mulga Slider/ Meekatharra Slider (*Lerista eupoda*).

The Salt Lake and Samphire Shrubland habitats across Australia form important areas of habitat for EPBC Act listed Migratory Waterbirds. Lake Annean forms one of these areas and is located adjacent to the Survey Area, however only a small section of this lake, along its northern shore, is included within the Survey Area.

Mulga Woodland habitat forms suitable habitat for *Lerista eupoda*, particularly when leaf litter accumulates on loamy soils. This habitat type is common in the surrounding region and occurs in small pockets within the Survey Area along drainage areas.

The remaining three conservation significant fauna species (Grey Falcon, Fork-tailed Swift, and Peregrine Falcon) are wide ranging bird species that are expected to only utilise the Survey Area occasionally to forage. No suitable nesting habitat was recorded within the Survey Area.

# 1. INTRODUCTION

## 1.1. Project Background

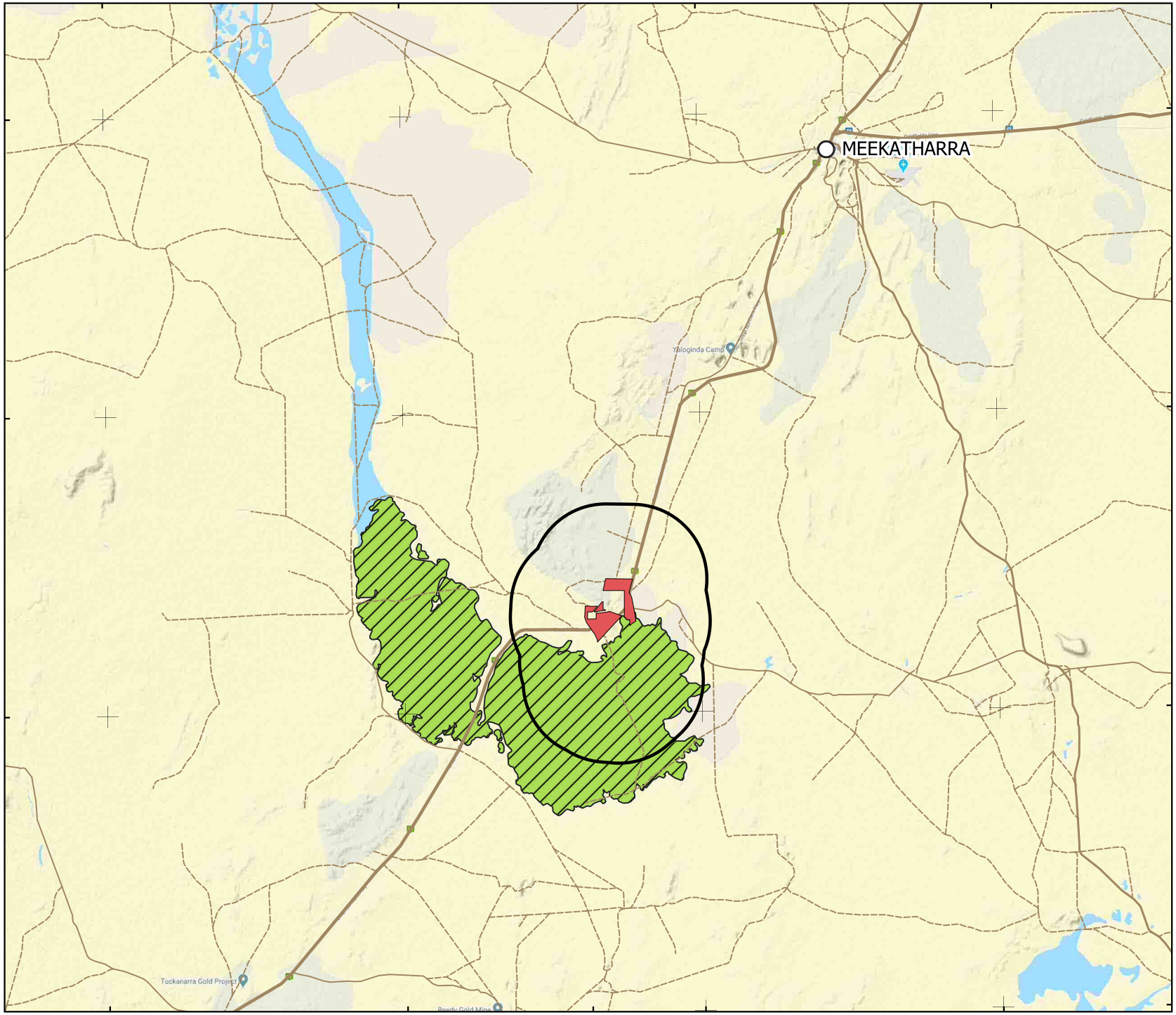
Westgold Resources Limited (Westgold) is the owner of the Nannine Mining Area (Nannine), approximately 30 km south of Meekatharra in the Murchison region of Western Australia. Westgold are looking to expand the disturbance envelope to include three additional areas that have previously been unsurveyed.

## 1.2. Scope of Works

Westgold has requested a reconnaissance flora and level 1 terrestrial fauna assessment of a 555-ha area in the vicinity of the Nannine mining area (the Survey Area) to support the submission of a Native Vegetation Clearing Permit and Mining Proposal application. In addition to the Survey Area, a 5 km buffer around the Survey Area was included (the Study Area; Figure 1.1).

The scope of work outlined in this report includes:

- Completion of desktop searches and literature review;
- Completion of a reconnaissance flora and vegetation survey (within the Survey Area); and
- Completion of a level 1 terrestrial fauna and fauna habitat assessment based on broad scale mapping or extrapolation of recorded vegetation types within a 5 km radius (within the Study Area) and discussion in the region.




## Legend

- Populated Place
- Study Area
- Survey Area

**Significant Lands**

- Directory of Important Wetlands
- Enivornmentally Sensitive Areas

**Roads**

- Minor Road
- Principal Road
- Secondary Road
- Track


N

0 5 10 km

Scale 1:400,000 @ A4

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: Tim Hammer Date: 08-06-2020

# Project Location

Nannine Flora and Fauna Assessment

Figure 1.1

Prepared for
Westgold Resources Ltd

## 1.3. Bioregion & Climate

The Interim Biogeographic Regionalisation for Australia (IBRA) classifies Australia into regions based on dominant landscape, climate, lithology, geology, landform, and vegetation (Thackway and Cresswell, 1995).

The Survey Area is situated in the Murchison IBRA region, which is characterised by low hills and mesas with vegetation consisting mainly of low Mulga woodlands. The Murchison is divided into the Eastern and Western Murchison subregions. The Survey Area is located within the Western Murchison subregion, although close to the border between the two subregions. This subregion features low Mulga woodlands, often rich in ephemerals, on outcrops and finely textured Quaternary alluvial and eluvial surfaces of extensive hardpan wash plains, that dominate and characterise the subregion with mantling granitic and greenstone strata within the northern part of the Yilgarn Craton (McKenzie, May and McKenna, 2003). Surfaces associated with the occluded drainage system occur throughout with hummock grasslands on Quaternary sandplains, saltbush shrublands on calcareous soils, and *Tecticornia* low shrublands on saline alluvia (McKenzie, May and McKenna, 2003). The subregion contains the headwaters of the Murchison and Wooramel Rivers, which drain westwards to the coast.

The Murchison region has an arid climate with bimodal rainfall that usually falls in winter. Spatially averaged median rainfall is 201 mm per year (McKenzie, May and McKenna, 2003).

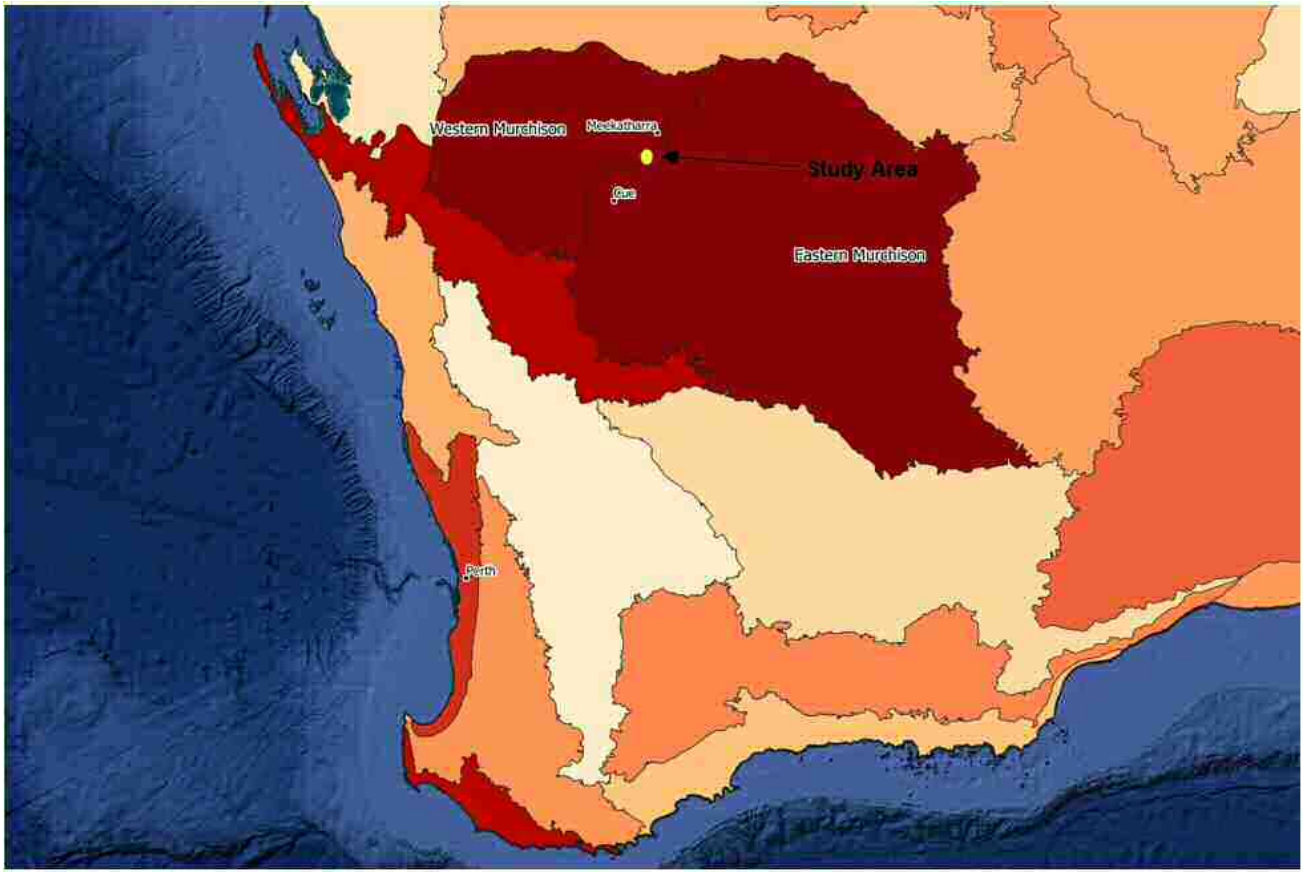



Figure 1.2: IBRA Classification

## 1.4. Disturbance History

The West Murchison subregion is mainly used for grazing native pastures (96.2%), with lesser areas of Unallocated Crown Land (UCL), and Crown reserves (2.8%). Conservation lands constitute <0.1% of the subregion, with a significant proportion of conservation estate in the subregion falls outside the International Union for Conservation of Nature (IUCN) I-IV categories. Mining interest in nickel and gold mining in particular are considerable, however most mining leases still come under the pastoral lands act and as such are still required to be stocked (McKenzie, May and McKenna, 2003).

## 1.5. Geology

The surface geology of Western Australia (WA) has been mapped at a scale of 1:500,000 (DMIR, 2019). Nine units in total were mapped within the Study Area, of which seven were mapped in the Survey Area (Table 1.1;

Figure 1.3). All nine geological units present are located within 250 km of the Survey Area, with three of these units (A-ANnn-mgta, A-AN-od, and A-ANrc-mg) only recorded within 20 km. One unit (A-AN-od) is particularly restricted in WA with only 620 ha in total mapped across the state. The next most restricted unit is A-NO-musr with 12,062 ha mapped across WA. None of the geological units have over 0.2% of their area within the Survey Area.

Table 1.1: Surface Geology (1:500,000)

| Code | Description | Area in Study Area (ha) | % of Study Area | Area in Survey Area (ha) | % of Survey Area | Area in WA (ha) | % of Survey Area/WA Geology |
|---|---|---|---|---|---|---|---|
| A-ANC-mg | Metatonalite, metagranodiorite, and metatrondhjemite; typically hornblende-bearing, and with common mafic clots. | 832.1 | 4.4 | 115.5 | 20.8 | 42,924 | 0.05 |
| A-ANnn-mgta | Hornblende metatonalite. | 4,761.1 | 25.1 | 114.3 | 20.6 | 16,821 | 0.12 |
| A-AN-od | Dolerite grading into metadolerite, locally schistose; metamorphosed. | 70.3 | 0.4 | - | - | 620 | - |
| A-ANrc-mg | Metagranite, undivided; metamorphosed; includes deeply weathered rock. | 5,887.6 | 31.0 | 12.3 | 2.2 | 20,641 | 0.01 |
| A-NOm-mb | Metabasalt and metakomatiitic basalt. | 1,064.2 | 5.6 | 103.2 | 18.6 | 35,947 | 0.05 |
| A-NO-musr | Tremolite-rich ultramafic schist; locally interlayered with meta-pyroxene spinifex-textured basalt, metadolerite, or mafic schist; typically sheared. | 1,414.8 | 7.5 | 133.6 | 24.1 | 12,062 | 0.20 |
| A-NOy-cx | Banded iron-formation, jaspilite, chert, and shale with associated mafic rock; metamorphosed. | 1,951.9 | 10.3 | 75.1 | 13.5 | 56,431 | 0.02 |
| A-POm-xb-f | Basalt and komatiitic basalt; minor felsic volcanic rocks; generally weakly metamorphosed. | 1,389.1 | 7.3 | 1.3 | 0.2 | 193,964 | >0.01 |
| A-TU-mgmu | K-feldspar megacrystic biotite metamonzogranite; strongly foliated. | 1,614.0 | 8.5 | - | - | 73,385 | - |


**Legend**

- Study Area
- Survey Area

**Geological Units**

- A-ANC-mg
- A-ANnn-mgta
- A-AN-od
- A-ANrc-mg
- A-NOm-mb
- A-NO-musr
- A-NOy-cx
- A-POm-xb-f
- A-TU-mgmu

N

0 1 2 3 km

Scale 1:100,000 @ A4

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: Tim Hammer

Date: 05-06-2020

Surface Geology (1:500,000)

Nannine Flora and Fauna Assessment

Prepared for Westgold Resources Limited

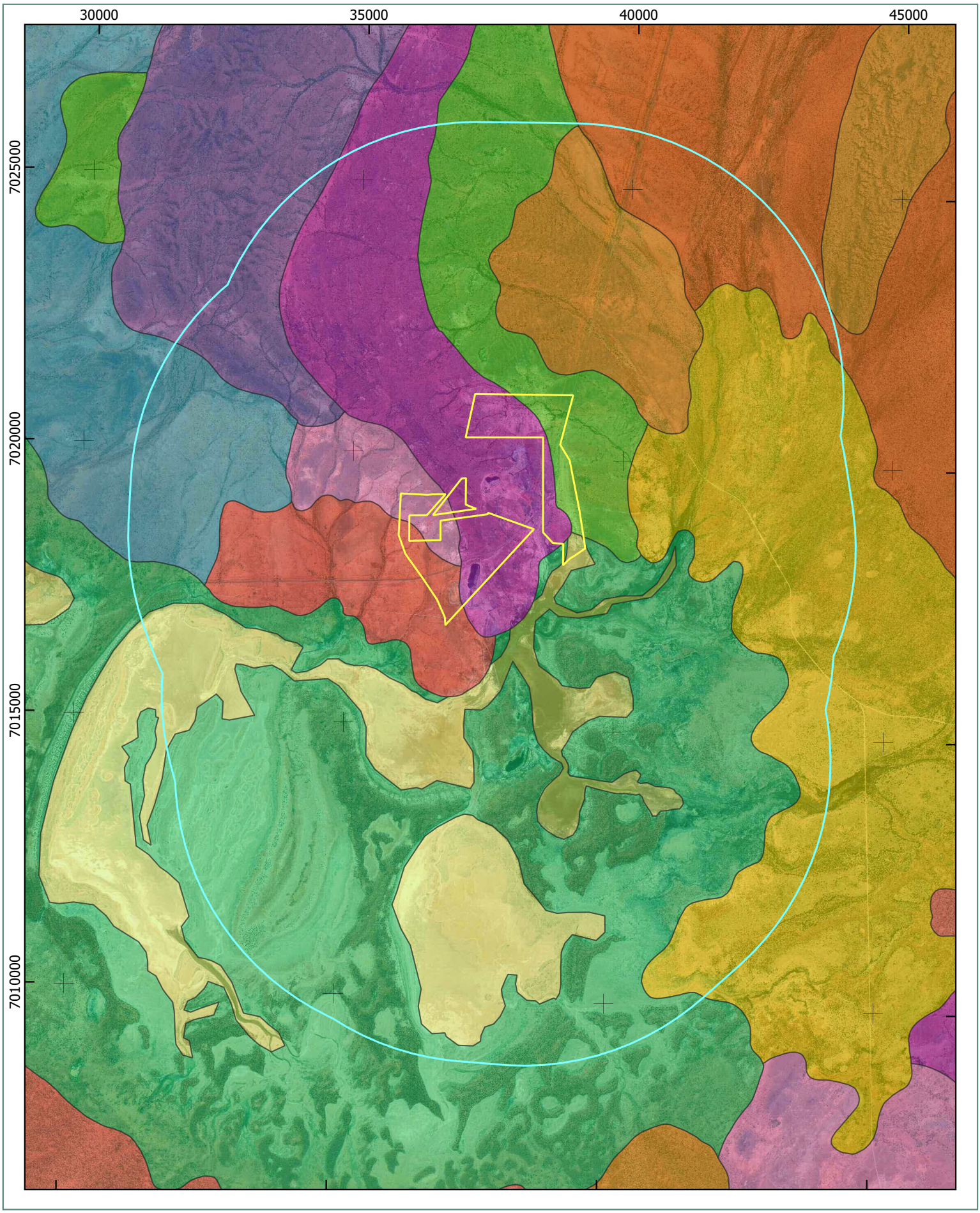
Figure 1.3

## 1.6. Land Systems

The Study Area is mapped as 11 land systems, and the Survey Area, six (Table 1.2; Figure 1.4). Most of the land systems that occur are well represented in the wider region. The Austin and Yagahog land systems covers the smallest areas and have the most restricted distributions across WA.

Table 1.2: Land Systems

| Land System | Description | Area in Study Area (ha) | Area in Survey Area (ha) | Total Extent (ha) | Location & Description of Occurrence |
|---|---|---|---|---|---|
| Austin | Saline stony plains with low rises and drainage foci supporting low halophytic shrublands with scattered Mulga and Snakewood. | 1,029 | 84 | 22,589 | Isolated and scattered over 180 km in the Murchison IBRA region. |
| Carnegie | Salt lakes with fringing saline alluvial plains, kopi dunes and sandy banks, supporting halophytic shrublands and Acacia tall shrublands. | 5,913 | 3 | 1,746,555 | Widespread over the Murchison and Yalgoo IBRA regions, and small occurrences in the Avon Wheatbelt, Coolgardie, Gascoyne, and Great Victoria Desert. |
| Gabanintha | Greenstone ridges, hills and footslopes supporting sparse Acacia and other mainly non-halophytic shrublands. | 2,076 | 287 | 251,429 | Widespread over the Murchison and Yalgoo IBRA regions, and small occurrences in the Avon Wheatbelt. |
| Jundee | Hardpan plains with variable gravelly mantles and minor sandy banks supporting weakly groved Mulga shrublands. | 1,221 | - | 664,968 | Widespread over the Murchison and Yalgoo IBRA regions, and small occurrences in the Gascoyne. |
| Koonmarra | Quartz-strewn stony plains and low rises with outcropping Granite, Gneiss, and Schist, supporting scattered Mulga shrublands and other mainly non-saline shrubs. | 865 | - | 563,294 | Common in the northern Murchison IBRA region and a few occurrences crossing into southern Gascoyne. |
| Lake Bed | Bare lake beds inundated for short periods after rain. | 2,186 | 12 | 973,458 | Widespread over the Murchison, Coolgardie, south-eastern Gascoyne, southern Yalgoo IBRA regions, and small occurrences in the Avon Wheatbelt and Great Victoria Desert. |
| Mileura | Saline and non-saline calcreted river plains with flood plains and calcrete platforms supporting variable tall shrublands, mixed halophytic shrublands and shrubby grasslands. | 2,655 | - | 261,213 | Small, isolated occurrences throughout much of the Murchison IBRA region, and small occurrences in the Yalgoo and Gascoyne. |
| Violet | Gently undulating gravelly plains on greenstone, laterite, and hardpan, with low stony rises and minor saline plains; supporting groved Mulga and bowgada shrublands and occasionally Chenopod shrublands. | 1,305 | 103 | 548,626 | Widespread over the Murchison IBRA region, and small occurrences in the south-eastern Yalgoo and western Great Victoria Desert. |
| Wiluna | Low greenstone hills with occasional lateritic breakaways and broad stony slopes, lower saline stony plains, and broad drainage tracts; supporting sparse Mulga and other Acacia shrublands with patches of halophytic shrubs. | 440 | 66 | 259,998 | Widespread over the Murchison IBRA region, and small occurrences in the Yalgoo region. |
| Yagahong | Hills, ranges and small plateaux on slate and basalt with cobble strewn footslopes supporting stunted Mulga shrublands. | 529 | - | 16,546 | Isolated and scattered over 160 km in the Murchison IBRA region. |
| Yandil | Flat hardpan wash plains with mantles of small pebbles and gravels; supporting groved Mulga shrublands and occasional Wanderrie grasses. | 767 | - | 495,874 | Common in the northern Murchison IBRA region and a few occurrences crossing into southern Gascoyne. |




**Legend**

- Study Area
- Survey Area

**Land Systems**

- Austin Land System
- Carnegie Land System
- Gabanintha Land System
- Jundee Land System
- Koonmarra Land System
- Lake Bed Land System
- Mileura Land System
- Violet Land System
- Wiluna Land System
- Yagahong Land System
- Yandil Land System

N

0 1 2 3 km

Scale 1:100,000 @ A4

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: Tim Hammer Date: 05-06-2020

Land Systems

Nannine Flora and Fauna Assessment

Prepared for Westgold Resources Limited

Figure 1.4

## 1.7. Vegetation

Pre-European vegetation mapping was originally undertaken by Beard at various scales across the state and has since been updated to be consistent with the National Vegetation Information System (NVIS) descriptions at a scale of 1:250,000 (DPIRD, 2019).

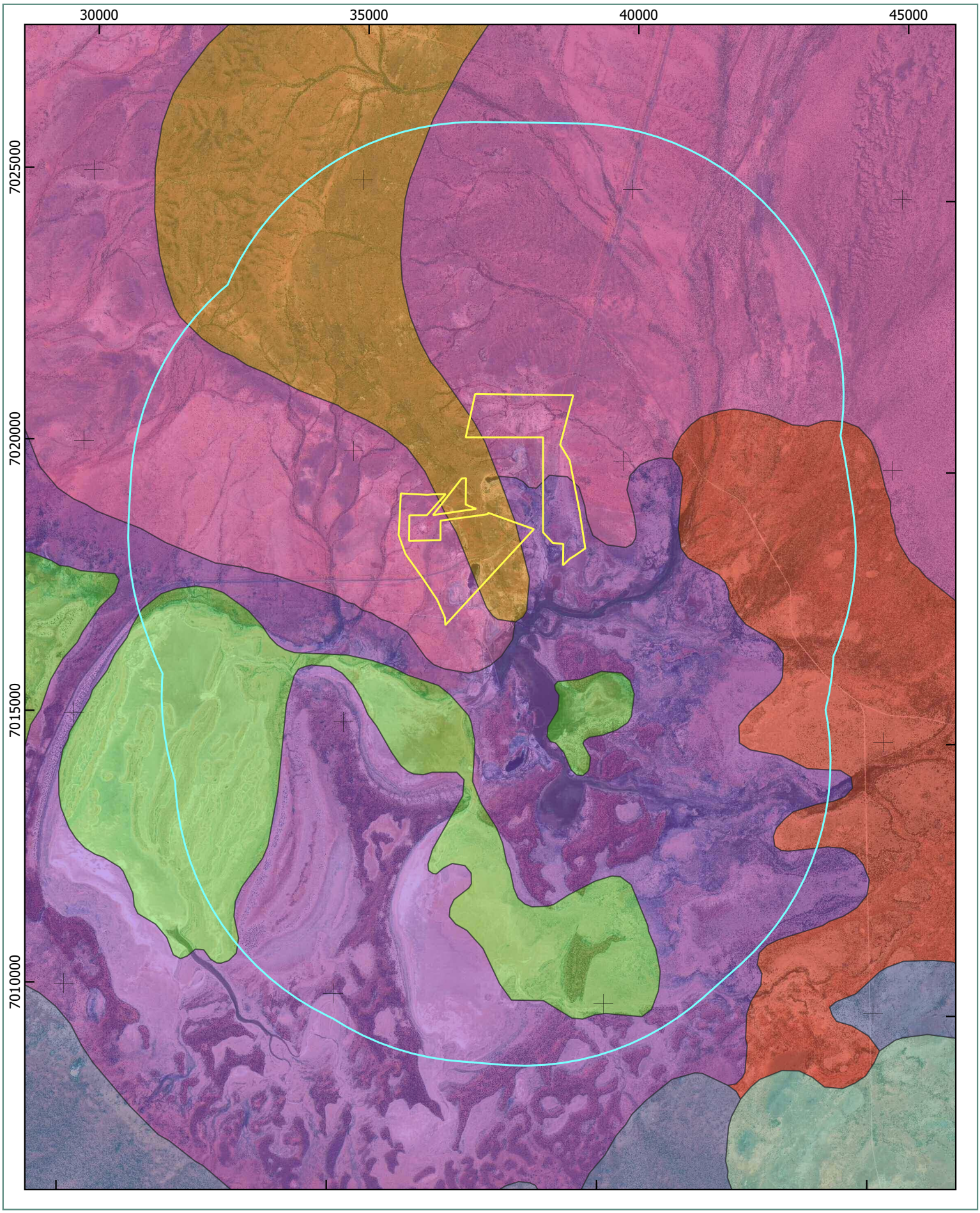
Five vegetation sub-associations have been mapped within the Study Area of which three are mapped within the Survey Area (Table 1.3; Figure 1.5).

State-wide vegetation statistics are available for these units which list pre-European extent, current extent, area in Department of Biodiversity, Conservation and Attractions (DBCA) managed lands etc., and is a useful tool to determine if a vegetation association is rare or otherwise significant (WA Gov, 2019).

All of the Beard sub-associations mapped within the Study Area have over 90% of their pre-European extent remaining. One sub-association (1128.0) is comprised of fringing salt lake vegetation from the *Tecticornia* genus (an under explored taxonomic group). This sub-association has a relatively small total extent in Western Australia and is distributed in small pockets throughout the state.

Table 1.3: Beard Vegetation Sub-Associations

| # | NVIS Level VI Vegetation Description | Area in Study Area (ha) | % of Study Area | Area in Survey Area (ha) | % of Survey Area | Pre-European WA (ha) | Current Extent WA (ha) | % Remaining | % of Current Extent in DBCA Land |
|---|---|---|---|---|---|---|---|---|---|
| 18.2 | *Acacia aneura* low woodland, over *Eremophila fraseri* and *Eremophila foliosissima* tall open shrubland | 6,411 | 33.8 | 331 | 59.6 | 1,901,789 | 1,897,253 | 99.8 | 3.5 |
| 39.1 | *Acacia grasbyi, Eremophila fraseri, Acacia aneura* tall open shrubland | 1,901 | 10.0 | 129 | 23.2 | 411,827 | 410,748 | 99.7 | 3.3 |
| 125.0 | Bare areas; salt lakes | 2,481 | 13.0 | - | - | 3,481,250 | 3,144,221 | 90.3 | 8.5 |
| 204.1 | *Acacia sclerosperma, Acacia victoriae* tall sparse shrubland, over *Atriplex vesicaria* and *Frankenia pauciflora* chenopod shrubland | 1,478 | 7.8 | - | - | 115,310 | 115,306 | 100.0 | 4.2 |
| 1128.0 | *Tecticornia* sp. low open samphire shrubland | 6,714 | 35.4 | 95 | 17.1 | 18,657 | 18,349 | 98.4 | <0.1 |




**Legend**

- Study Area
- Survey Area

**Beard Vegetation**

- 18.2
- 39.1
- 125.0
- 204.1
- 1128.0

N

0 1 2 3 km

Scale 1:100,000 @ A4

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: Tim Hammer

Date: 05-06-2020

Beard Vegetation Sub-Associations

Nannine Flora and Fauna Assessment

Prepared for Westgold Resources Limited

Figure 1.5

## 1.8. Significant Lands

### 1.8.1. Conservation Estate

The Western Australian conservation estate includes land and waters vested in the Conservation and Parks Commission under the Conservation and Land Management Act (1984). The conservation estate is generally managed by the Parks and Wildlife Service of DBCA to protect Western Australia's biodiversity, and includes National Parks, Nature Reserves, Conservation Reserves and other areas managed primarily for biodiversity conservation (DoEE, 2016).

No conservation estate occurs within or in the vicinity of the Survey Area. The closest known conservation estate to the Survey Area is ex-Lakeside (92 km south-west), and the ex-Moolgoolool Pastoral Leases (97 km north-east).

### 1.8.2. Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESA) that are associated with flora and vegetation are areas that are defined by the Department of Water and Environmental Regulation (2019) as:

- A defined wetland and the area within 50 m of a wetland;
- The area covered by vegetation within 50 m of Threatened flora, to the extent to which the vegetation is continuous with the vegetation in which the Threatened flora is located;
- The area covered by a TEC;
- A Bush Forever site;
- Areas covered by the Gnangara Mound Crown Land Policy and Western Swamp Tortoise Policy; and
- Areas covered by lakes, wetlands and fringing vegetation of the Swan Coastal Plain Lakes Policy, including South West Agricultural Zone Wetlands Policy and Swan and Canning Rivers Policy.

There is one ESA located within the Survey Area, Lake Annean (also known as Lake Nannine) which intersects the southern portion of the Survey Area (Figure 1.1).

### 1.8.3. Australian Wetlands Database

The Australian Wetlands Database includes nationally significant wetlands (as listed in the directory of important wetlands), wetlands listed under the Ramsar convention, wetlands that are representative, rare or unique, or wetlands that are considered of international importance (DoEE, 2019).

Lake Annean is also listed in the directory of important wetlands as a nationally significant wetland.

# 2. METHODS

## 2.1. Project Team & Licences

Spectrum Ecology staff involved with this assessment are listed in Table 2.1, along with their role, years of experience and relevant licences.

Table 2.1: Project Team & Licences

| Staff | Role & Project Tasks | Years of Experience | Licences |
|---|---|---|---|
| Melissa Hay | Principal Botanist – reporting | 12 | - |
| Damien Cancilla | Principal Zoologist – reporting | 15 | - |
| Dr Timothy Hammer | Botanist – reporting | 5 | - |
| Carmel Forrester | Botanist – field survey and reporting | 5 | FB62000134 |
| Jesse Forbes-Harper | Zoologist – field survey and reporting | 5 | BA27000222-2 |
| Udani Sirisena | Taxonomist – plant IDs | 10 | - |

## 2.2. Field Survey Timing

The flora and fauna survey was undertaken from the 19 to 21 of April 2020 by Botanist Carmel Forrester and Zoologist Jesse Forbes-Harper.

Figure 2.1 illustrates the climatic conditions leading up to the field survey as derived from the weather station at Meekatharra Airport (#007045), located 30 km north of the Survey Area (Bureau of Meteorology, 2020). High rainfall in January and February (over twice the median rainfall) resulted in adequate conditions during the field survey for flora, vegetation, and fauna taxa.

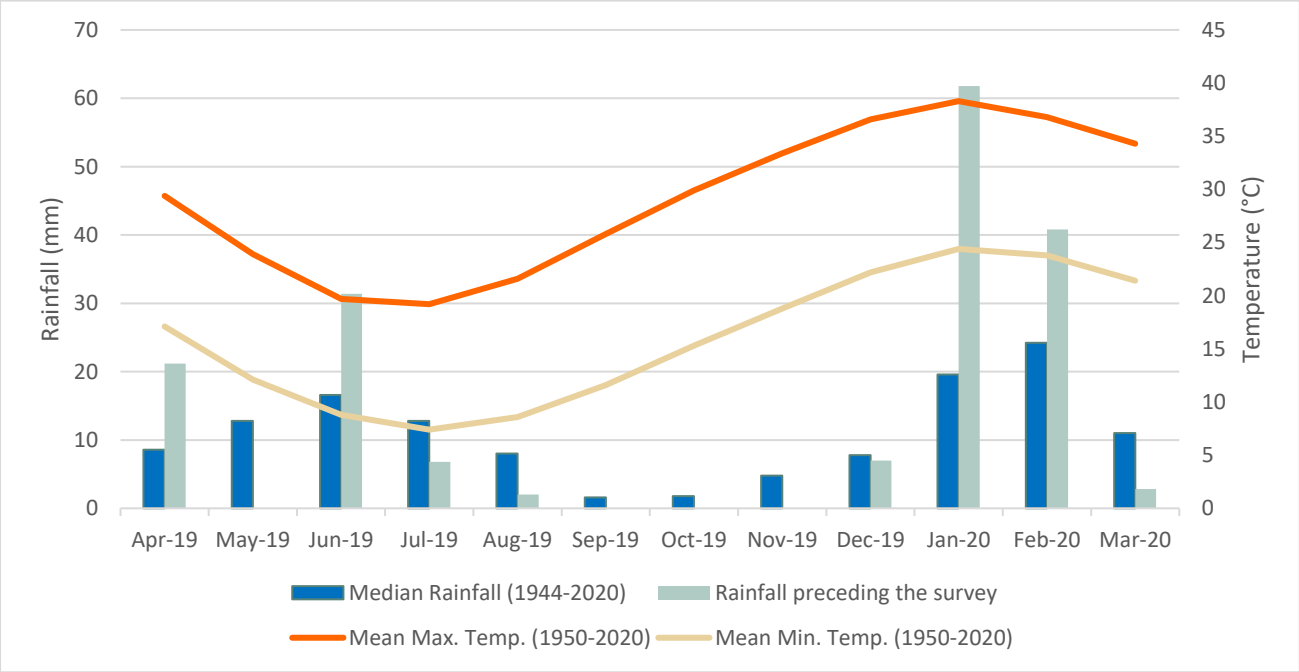



Figure 2.1: Monthly Rainfall Recorded at Meekatharra Airport

The following rainfall was recorded at the Meekatharra station:

- In the 12 months preceding the 2020 field survey (April 2019 to March 2020), 173.8 mm of rainfall was recorded, which is 44.2 mm more than the sum of the long-term median of 130 mm;

- The three-months prior to the survey (January 2020 - March 2020), made up more than 60% of rainfall recorded the 12 months prior to the field survey, recording 105.4 mm of rainfall. This is 50 mm higher than the sum of the long-term median for the same three months (54.8 mm)

The Murchison Bioregion is considered part of the Eremaean Botanical province and recommendations are to conduct biological surveys 6-8 weeks after the wet season from March to June (EPA, 2016c). The field survey timing was conducted in accordance with EPA recommended timing with sufficient rainfall activity prior to the survey.

## 2.3. Legislation & Guidelines

Flora and fauna in Western Australia are protected by various legislation, including:

- Biodiversity Conservation Act 2016 (BC Act);
- Environmental Protection Act 1986 (EP Act) (Western Australian Government, 1986); and
- Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) (Department of the Environment and Energy, 2016 [DotEE]).

The surveys are compliant with reconnaissance flora and vegetation guidelines and level 1 Fauna guidelines, as outlined in:

- EPA Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment (Environmental Protection Authority, 2016c);
- EPA Technical Guidance: Terrestrial Fauna Surveys (EPA, 2016d); and
- EPA Technical Guidance: Sampling Methods for Terrestrial Vertebrate Fauna (EPA and DEC, 2010).

This assessment is also consistent with the following guidelines:

- EPA Position Statement No. 3: Terrestrial Biological Surveys as an Element of Biodiversity Protection (EPA 2002);
- EPA Environmental Factor Guideline: Flora and Vegetation (EPA 2016b);
- National Vegetation Information System (NVIS) Australian Vegetation Attribute Manual (ESCAVI, 2003);
- EPA Guidance Statement No. 56: Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia (EPA 2004); and
- EPA & DEC Technical Guide: Terrestrial Vertebrate Fauna Surveys for EIA (EPA and DEC, 2010).

## 2.4. Significant Flora, Fauna & Vegetation Definitions

Significant flora can include (EPA, 2016b):

- Being identified as Threatened: Critically Endangered, Endangered or Vulnerable (state listed BC Act and/or nationally listed EPBC Act);
- Being identified as Priority flora species: Priority 1 to 4 (DBCA, 2019);
- Locally endemic or association with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems);
- New species or anomalous features that indicate a potential new species;
- Representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
- Unusual species, including restricted subspecies, varieties or naturally occurring hybrids; or
- Relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.

Significant vegetation can include (EPA, 2016b):

- Threatened Ecological Community (TEC): Critically Endangered, Endangered or Vulnerable (state listed BC Act and/or nationally listed EPBC Act);
- Priority Ecological Community (PEC): Priority 1 to 5 (DBCA, 2017);
- Restricted distribution;
- Degree of historical impact from threatening processes;
- A role as a refuge; or
- Providing an important function required to maintain ecological integrity of a significant ecosystem.

Significant fauna can include (EPA, 2016a):

- Being identified as a Threatened or priority species;
- Species with restricted distribution;
- Degree of historical impact from threatening processes; or
- Providing an important function required to maintain the ecological integrity of a significant ecosystem.

## 2.5. Introduced Flora & Declared Plant Categories

Introduced flora can pose a threat to native vegetation and biodiversity. The Department of Primary Industries and Regional Development (DPIRD) keeps a database of organisms that are declared pests in Western Australia. This database is regulated under the Biosecurity and Agricultural Management Act (WA Gov, 2007). The legal status and control requirements for these environmentally significant weeds are provided in Appendix A.

## 2.6. Nomenclature

### 2.6.1. Flora

Flora nomenclature used in this report is consistent with the DBCA Census of Western Australian Plants database, provided through FloraBase (WAH, 2020). All species are current at the time of report preparation.

### 2.6.2. Fauna

Nomenclature for mammals, birds, reptiles, and amphibians followed the Western Australian Museum Checklist of the Vertebrates of Western Australia (October 2019). Fauna species identifications were completed based on information provided in references listed in Table 2.2. Nomenclature for SRE invertebrates is based on data provided by WA Museum and relevant experts.

Table 2.2: References Used for Identification of Fauna Species

| Fauna | Survey Technique |
|---|---|
| Mammals | Churchill (2009), Menkhorst and Knight (2001), Van Dyck and Strahan (2008) |
| Birds | Menkhorst et. al. (2017) |
| Reptiles & Amphibians | Wilson and Swan (2017), Cogger (2014), Tyler and Doughty (2009) |

## 2.7. Desktop Assessment

### 2.7.1. Database Searches

A desktop review of all relevant and available fauna, flora, and vegetation data sources was undertaken prior to the field survey and incorporated into the desktop assessment (Table 2.3).

Table 2.3: Databases Searches

| Data Source | Custodian | Details |
|---|---|---|
| Commonwealth Protected Matters Search Tool (PMST) | Department of the Environment and Energy (DoEE) | Date: 04/03/19<br>Buffer: 40 km<br>Centre point: 118°20'49''E, 26°52'09''S |
| NatureMap | Department of Biodiversity Conservation and Attractions (DBCA)/ Western Australian Museum (WAM) | Date: 04/03/19<br>Buffer: 40 km around centre point |
| DBCA Threatened Fauna Database | DBCA | Date: 04/03/19<br>Buffer: 50 km around centre point |
| Threatened and Priority Flora database (TPFL/ WA Herbarium) | DBCA | Date: 04/03/19<br>Buffer: 60 km around centre point |
| Communities database (TEC/PEC) | DBCA | Date: 04/03/19<br>Buffer: 15 km around Study Area polygon |
| Invertebrate Fauna Databases | WAM | Arachnids & Myriapods: 30/03/19<br>Mollusca & Crustacea: 11/03/19<br>Buffer: 40km square around the Survey Area |
| Index of Biodiversity Surveys of Assessments (IBSA) database | Department of Water and Environmental Regulation (DWER) | Date: 9/03/19<br>Buffer: 50 km |

### 2.7.2. Previously Conducted Flora & Fauna Assessments

Previously conducted flora and fauna assessments conducted within 70 km of the assessment are listed in Table 2.4.

Table 2.4: Previously Conducted Surveys

| Source | Survey Type | Author |
|---|---|---|
| Weld Range Vertebrate Fauna Assessment | Level 2, 4 Phase | *ecologia* Environment (2009) for SMC Pty Ltd |
| Jack Hills Expansion Project Vertebrate Fauna Assessment | Level 2, 2 Phase | *ecologia* Environment (2009) for Crosslands Resources Ltd |
| A Vertebrate Fauna Survey of the Jack Hills Project Area | Level 2, 2 Phase | MBS Environmental (2005) for Murchison Metals Ltd |
| Weld Range Iron Ore Project SRE Assessment | Level 2 | *ecologia* Environment (2009) for SMC Pty Ltd |
| Jack Hills Mine Expansion – SRE Invertebrate Report | Level 2 | *ecologia* Environment (2009) for Crosslands Resources Ltd |
| Gabanintha Vanadium Project Reconnaissance Flora and Vegetation Survey | Reconnaissance | Biologic Environmental Survey (2018) for Technology Metals Australia Ltd. |
| Gabanintha Vanadium Project Targeted Vertebrate Fauna & SRE Assessment | Level 1 & Targeted | Biologic Environmental Survey (2018) for Technology Metals Australia Ltd. |

### 2.7.3. Likelihood of Occurrence Assessment

The following information was collated for each significant flora/fauna taxon or vegetation community identified during the desktop assessment:

- Conservation status (EPBC Act, WC Act, DBCA listing);
- Description of species and flowering period (flora only);
- Description of habitat requirements and presence within the Survey and Study Areas;
- Source of record (DBCA, previous report etc.); and
- Distance of record to the Project.

A likelihood of occurrence assessment was then conducted using the criteria listed in Table 2.5. This included assessing the distance of the record from the Project (historical database records considered not accurate were excluded if required), presence of appropriate habitats within the Project (using land systems, geology, vegetation mapping, and/or aerial imagery), and the age of the record (fauna only).

Table 2.5: Likelihood of Occurrence Assessment Criteria

| Likelihood | Flora & Vegetation | Fauna |
|---|---|---|
| Recorded | Species or vegetation community accurately recorded within the Survey Area during the literature review (includes TEC/PEC buffers that intersect). | Species recorded within the Study Area within the previous ten years. |
| High | Species or vegetation community recorded near the Survey Area, and suitable habitat does, or is likely, to occur. | Species recorded within or near the Study Area within the previous 20 years. Suitable habitat occurs in the Study Area. |
| Medium | Species or vegetation community recorded outside the Survey Area but within 20 km and suitable habitat may occur. | Species recorded within or in proximity to the Study Area more than 20 years ago. Species recorded outside the Study Area but within 40 km. Suitable habitat occurs in the Study Area. |
| Low | Species or vegetation community rarely or not recorded within 20 km of the Survey Area and suitable habitat does not likely occur within the Survey Area. | Species rarely or not recorded within 40 km of the Study Area. Suitable habitat does not occur within or in proximity to the Study Area. |
| Very Low | n/a | Species not recorded within 40 km despite multiple recent surveys. Suitable habitat does not occur within the Study Area. Species considered locally extinct. |

### 2.7.4. Data for the Index of Biodiversity Surveys for Assessment (IBSA)

The Environmental Protection Authority has given instruction that all biological surveys collecting data on biodiversity submit the report and associated raw data to IBSA as an IBSA data package.

All survey data collected at the Project will be provided electronically to comply with IBSA data standards.

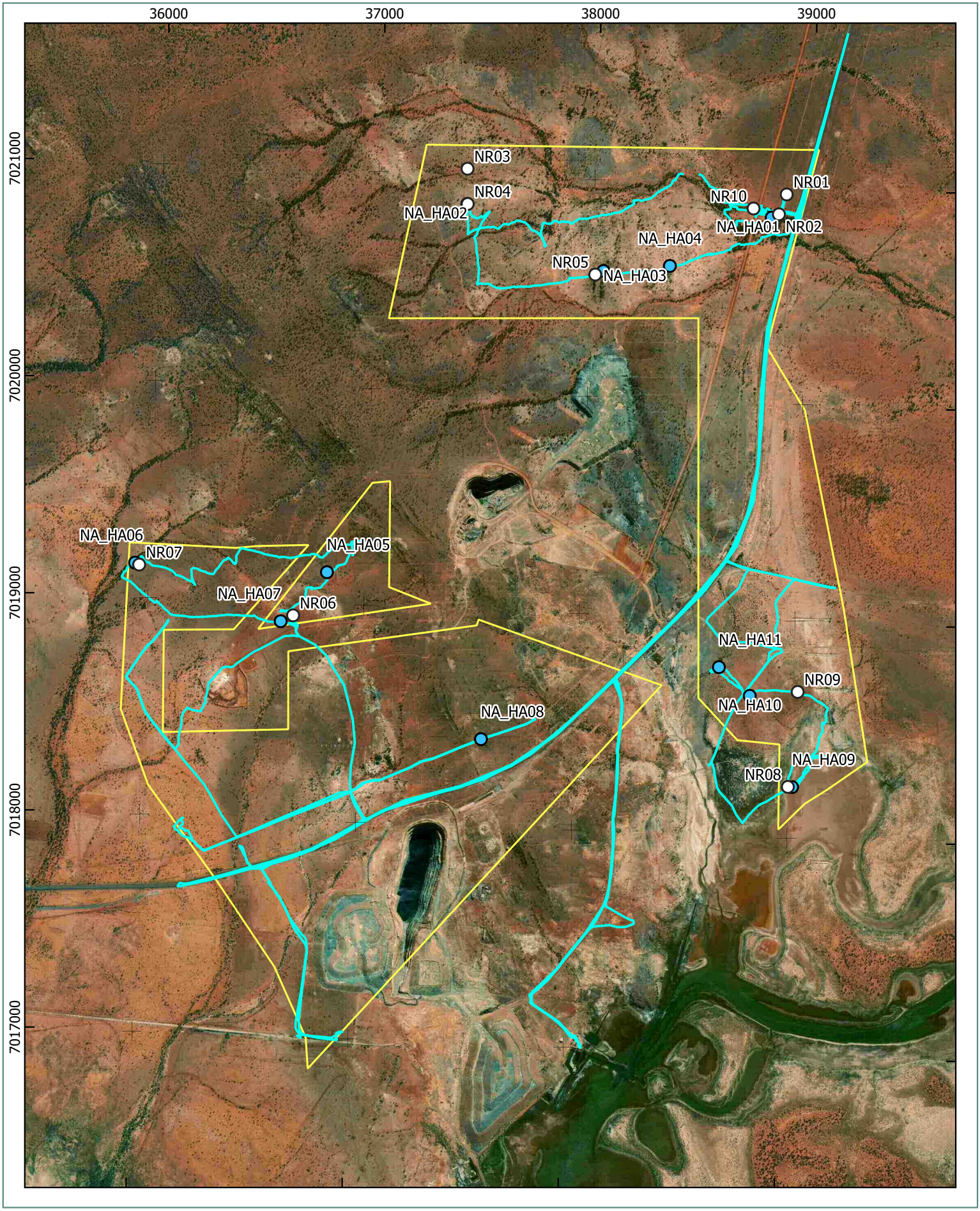
## 2.8. Reconnaissance Flora & Vegetation Assessment

### 2.8.1. Field Methodology & Sampling Effort

A reconnaissance flora and vegetation assessment was conducted at the Survey Area. A combination of relevés, traverses, and opportunistic sampling is appropriate for reconnaissance surveys as stipulated in the guidance statement. These survey techniques are described in Table 2.6. Information on vegetation mapping was collected at selected sites and opportunistically whilst traversing the Survey Area. Ten relevés were sampled over the Survey Area (site information is described in Appendix B. Relevés and sampling effort within the Survey Area is displayed in Figure 2.2.

Table 2.6: Reconnaissance Flora & Vegetation Assessment Survey Techniques

| Survey Technique | Description |
|---|---|
| Relevés | Relevés are a low intensity survey technique for gathering information for low-intensity flora and vegetation surveys. Information collected at each relevé includes:<br>• Site code, date, location, botanist;<br>• A photograph;<br>• Vegetation condition and disturbances (including fire);<br>• Landform including; slope, soil, rock type, aspect; and<br>• Flora and vegetation information; dominant cover, structure and species count where necessary. |
| Traverses | A traverse is an unmarked route along which data is collected. Traverses are useful for identifying the boundaries and characteristics of vegetation types, selecting sites for reconnaissance survey, and targeting significant flora or vegetation.<br>Information recorded along a traverse is as for the relevé, with the addition of noting vegetation changes and relationships between vegetation and substrate. |
| Opportunistic Sampling | Flora and vegetation not recorded through other sampling methods was opportunistically sampled as encountered in the Survey Area. Opportunistic sampling also included recording locations of significant, introduced (weed) and unknown species. |
| Targeted Sampling | Areas likely to support significant flora or vegetation were targeted during the survey. Including areas with existing records of significant flora (if present).<br>Areas were selected based on existing records from database searches, geology, vegetation mapping, and known Environmentally Sensitive Areas. Where possible, unusual, and restricted geological features within the Survey Area were sampled.<br>When potentially significant flora were encountered during the survey, sufficient information was recorded to complete a Threatened and Priority Flora Report Form (TPRF). |




## Legend

- Relevé Sites
- Fauna Habitat Assessment Sites
- Tracks

N

0 250 500 m

Scale 1:25,000 @ A4

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: Tim Hammer

Date: 08-06-2020

Sampling Effort at Survey Area

Nannine Flora and Fauna Assessment

Prepared for Westgold Resources Limited

Figure 2.2

### 2.8.2. Vegetation Mapping

The data collected from relevé sites and traverses, as well as general field notes, observations and aerial photography were used to map the vegetation across the Survey Area. Vegetation was classified structurally based on the dominant species present. The vegetation classification is consistent with NVIS Level V – association vegetation descriptions (referred to as a 'vegetation types' for the local scale in this report). This level of description provides information on the dominant growth form, height, and cover for up to three species for each of the upper, mid, and ground strata (ESCAVI, 2003).

### 2.8.3. Vegetation Condition

Vegetation condition was recorded at relevé sites and where areas of different vegetation condition were observed from both ground truthing and aerial imagery. The vegetation condition was mapped across the Survey Area at the same scale as the vegetation mapping. Vegetation condition ratings follow the scale recommended for the Eremaean botanical province (EPA 2016c), summarised in Table 2.7.

Table 2.7: Vegetation Condition Scale & Criteria – Eremaean

| Vegetation Condition | Disturbance Criteria |
|---|---|
| Excellent | Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement |
| Very Good | Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks |
| Good | More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds |
| Poor | Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds |
| Degraded | Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species |
| Completely Degraded | Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs |

### 2.8.4. Specimen Identification & Lodgement

Flora specimens were collected to confirm species recorded during the relevés or investigate suspected conservation significance. Specimens were identified using the appropriate taxonomic keys and, when required, relevant taxonomic experts at the Western Australian Herbarium utilised, including *Tecticornia* specimens which were identified by Senior Research Scientist Dr Kelly Shephard.

Specimens were vouchered with the Western Australian Herbarium as per guidance; when they represent new populations of Threatened or Priority Flora, new occurrences of TECs or PECs, individuals that have atypical characteristics, or bioregional range extensions.

## 2.9. Level 1 Fauna Assessment

### 2.9.1. Sampling Effort

The terrestrial vertebrate fauna survey was carried out in accordance with Technical Guidance: Terrestrial Fauna Surveys (EPA, 2016g). The guidance suggests selective low-intensity sampling of fauna and identification of fauna habitats to verify the accuracy of the desktop assessment. The approach of a level 1 fauna survey was used to describe and map the vertebrate fauna habitats across the survey area and complete active searches to describe the vertebrate fauna assemblages, particularly any significant fauna identified as likely to be present.

A total of 10 habitat assessment sites were completed within the Survey Area (Figure 2.2). A variety of survey techniques were used for fauna as outlined in Table 2.8. All survey data has been provided electronically with this report as an IBSA data package.

Table 2.8: Fauna Survey Techniques

| Fauna | Survey Technique |
|---|---|
| Mammals | Direct sightings and indirect evidence such as tracks, scats and diggings were recorded across the Project. |
| Birds | Direct sightings and calls, as well as indirect evidence such as feathers, pellets and nests were recorded across the Project. Search effort was focused to Malleefowl in areas of potential habitat. |
| Reptiles & Amphibians | Direct sightings and indirect evidence such as calls, tracks, diggings, skins, and latrines were recorded and targeted searches were undertaken in areas with suitable habitat. Raking of leaf litter, if present, in an effort to detect *Lerista eupoda*. |
| Invertebrate Fauna | Litter beds and areas between litter beds were surveyed for the leaf arrangement burrow lids characteristic of trapdoor spider (*Idiosoma* spp.) in the region. |

### 2.9.2. Fauna Habitat Mapping

Fauna habitat mapping identifies areas of vegetation and land features that are distinguishable from other areas. Typically, each fauna habitat supports a characteristic fauna assemblage that is adapted to the features of the fauna habitat. Fauna habitat types are identified and mapped based on the following information:

- General vegetation type (Shepherd, Beeston, and Hopkins, 2001);
- Vegetation types mapped within the Survey Area;
- Vegetation structure;
- Landforms;
- Geological units;
- Soil substrate;
- Aerial imagery;
- Fauna assemblage; and
- Field observations.

The fauna habitat was recorded at each survey site, opportunistically while traversing the Survey Area on foot, and when travelling between sites.

### 2.9.3. Conservation Significant Fauna

During the field survey, the preliminary assessment of the likelihood of conservation significant fauna species occurring within the Survey Area was reviewed and amended. The assessment included the following:

- Suitable fauna habitats recorded from the Survey Area;
- Distribution of previously recorded conservation significant species;
- Frequency of occurrence of conservation significant species in the region;
- Temporal distribution of conservation significant species; and
- Accuracy of record locations, date, and source of record (level of reliability).

The likelihood of occurrence of each conservation significant species listed by the database searches was determined based on the criteria outlined in Table 2.5.

# 3. RESULTS

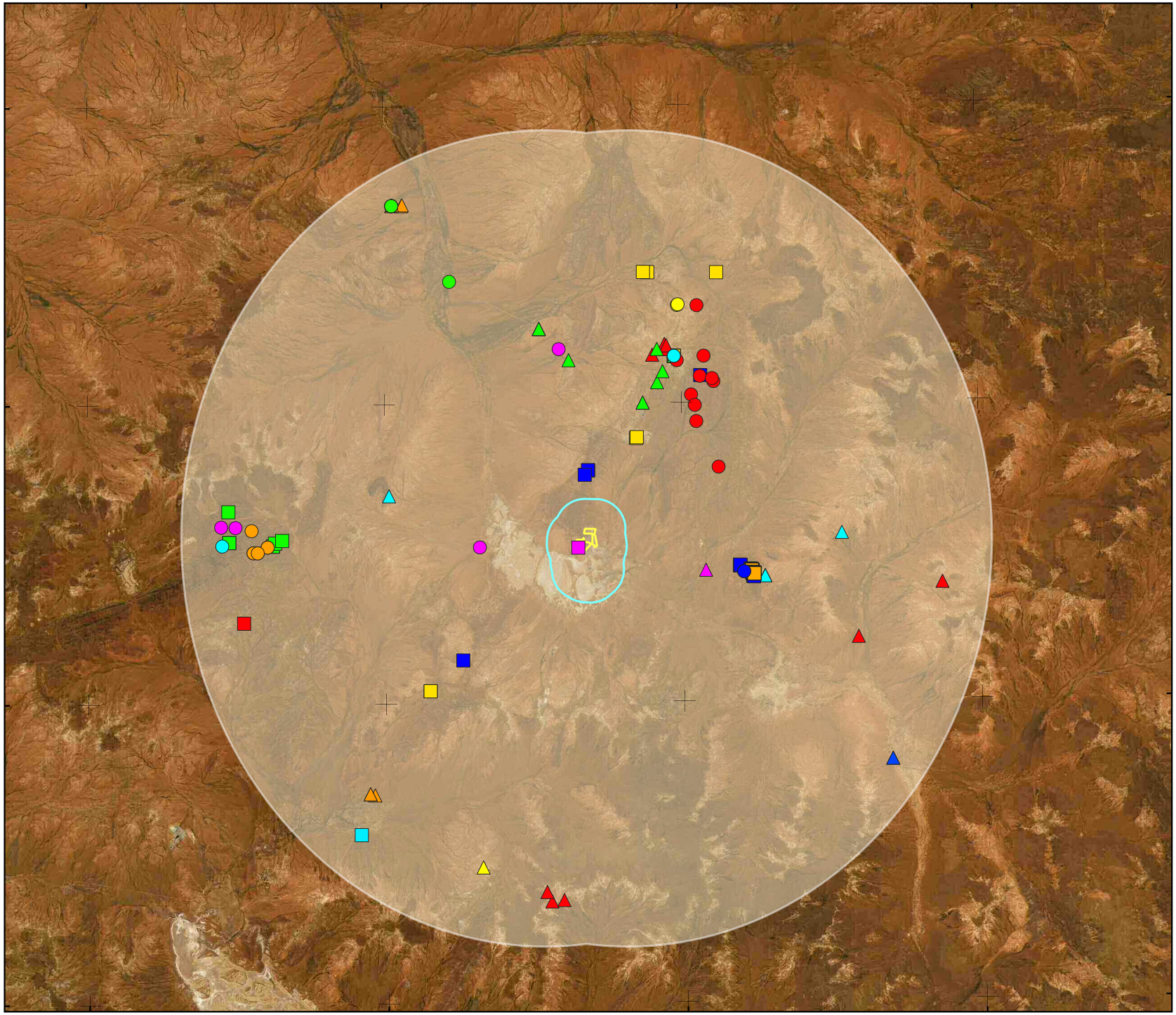
## 3.1. Flora

### 3.1.1. Desktop Assessment

Thirty-five significant flora taxa were identified during the flora database searches. One species was previously recorded within the Survey Area, *Acacia sclerosperma* subsp. *glaucescens* (Priority 3) and two have been assigned a High likelihood of occurrence, *Calytrix verruculosa* and *Tecticornia cymbiformis* (both Priority 3). The likelihood of occurrence for all significant flora within the Survey Area are listed in Table 3.1 and detailed in Appendix C. Records are mapped in Figure 3.1 and Figure 3.2.

Table 3.1: Significant Flora – Desktop Assessment

| Likelihood | Status | Species |
|---|---|---|
| Recorded | Priority 3 | *Acacia sclerosperma* subsp. *glaucescens* |
| High | Priority 3 | *Calytrix verruculosa, Tecticornia cymbiformis* |
| Medium | Priority 1 | *Eremophila retropila* |
| | Priority 3 | *Eremophila fasciata, Hemigenia virescens, Homalocalyx echinulatus, Ptilotus luteolus* |
| | Priority 4 | *Acacia speckii, Grevillea inconspicua* |
| Low | Threatened | *Eremophila rostrata* subsp. *rostrata* |
| | Priority 1 | *Beyeria lapidicola, Lepidium xylodes, Ptilotus actinocladus, Rhodanthe sphaerocephala, Stenanthemum mediale* |
| | Priority 2 | *Bergia auriculata* |
| | Priority 3 | *Acacia burrowsiana, Eragrostis* sp. Erect spikelets (P.K. Latz 2122), *Eremophila arachnoides* subsp. *arachnoides, Drummondita miniata, Menkea draboides, Micromyrtus placoides, Petrophile pauciflora, Prostanthera ferricola, Prostanthera petrophila, Ptilotus beardii, Ptilotus lazaridis, Sauropus* sp. Woolgorong (M. Officer s.n. 10/8/94), *Sida picklesiana, Tribulus adelacanthus, Verticordia jamiesonii, Hibiscus krichauffianus* |
| | Priority 4 | *Dodonaea amplisemina, Goodenia berringbinensis* |




## Legend

- Study Area
- Survey Area
- Search Buffer

Desktop Flora Search Results

- Acacia burrowsiana
- Acacia sclerosperma subsp. glaucescens
- Acacia speckii
- Bergia auriculata
- Beyeria lapidicola
- Calytrix verruculosa
- Dodonaea amplisemina
- Drummondita miniata
- Eragrostis sp. Erect spikelets (P.K. Latz 2122)
- Eremophila arachnoides subsp. arachnoides
- Eremophila fasciata
- Eremophila retropila
- Eremophila rostrata subsp. rostrata
- Goodenia berringbinensis
- Grevillea inconspicua
- Hemigenia virescens
- Hibiscus krichauffianus
- Homalocalyx echinulatus
- Lepidium xylodes
- Menkea draboides
- Micromyrtus placoides

N

0 10 20 km

Scale 1:1,000,000 @ A4

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

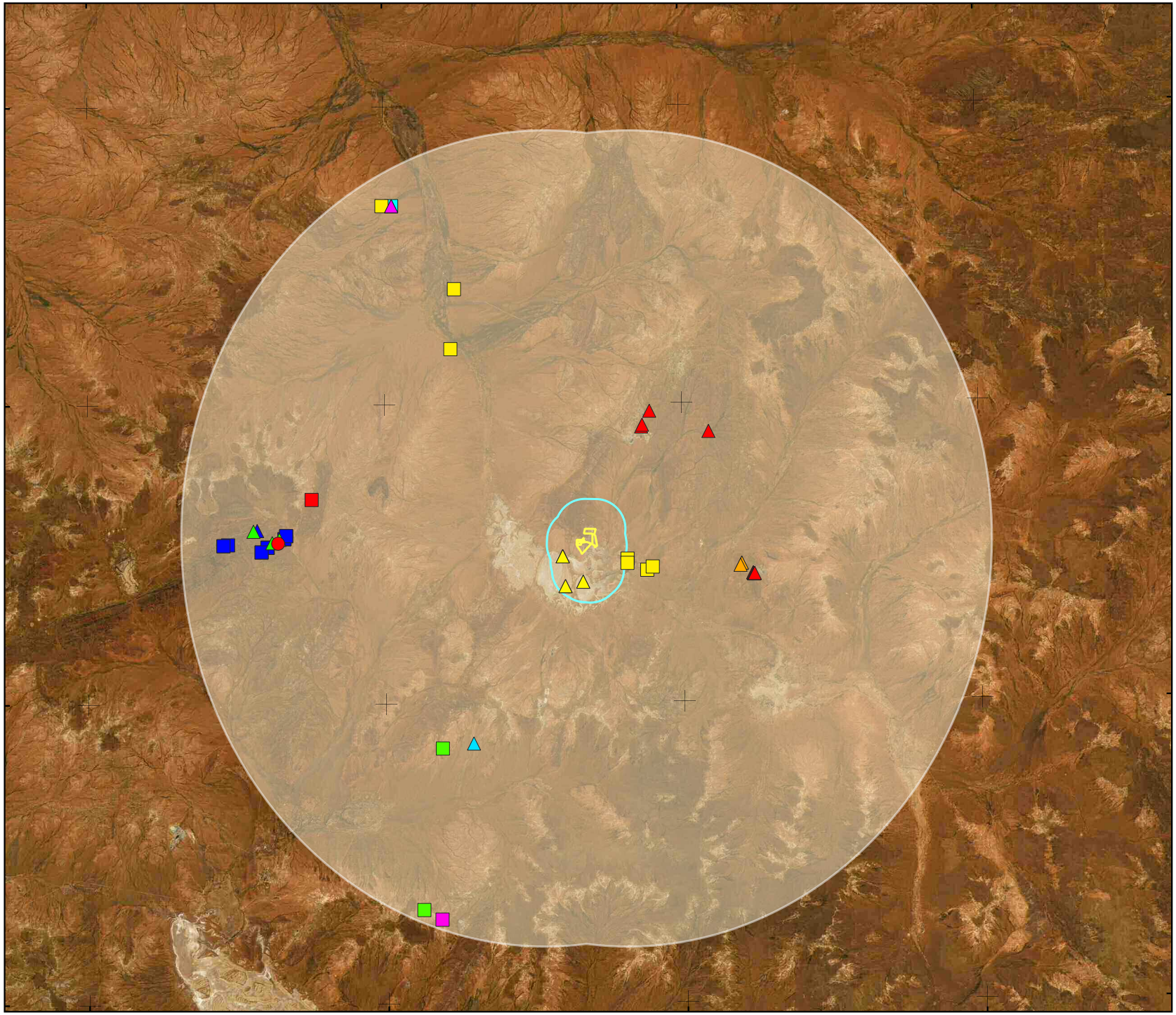
Author: Tim Hammer Date: 09-06-2020

# Significant Flora - Desktop Assessment (1/2)

Nannine Flora and Fauna Assessment

Prepared for
Westgold Resources Ltd

Figure
3.1




## Legend

- Study Area
- Survey Area
- Search Buffer

Desktop Flora Search Results

- Petrophile pauciflora
- Prostanthera ferricola
- Prostanthera petrophila
- Ptilotus actinocladus
- Ptilotus beardii
- Ptilotus lazaridis
- Ptilotus luteolus
- Rhodanthe sphaerocephala
- Sauropus sp. Woolgorong (M. Officer s.n. 10/8/94)
- Sida picklesiana
- Stenanthemum mediale
- Tecticornia cymbiformis
- Tribulus adelacanthus
- Verticordia jamiesonii

N

0 10 20 km

Scale 1:1,000,000 @ A4

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: Tim Hammer Date: 09-06-2020

# Significant Flora - Desktop Assessment (2/2)

Nannine Flora and Fauna Assessment

Prepared for
Westgold Resources Ltd

Figure
3.2

### 3.1.2. Flora

Sixty-eight taxa from 19 families and 34 genera were recorded during the survey and these are listed in Appendix D. Chenopodiaceae was the most species-rich family (17 species), followed by Fabaceae (12 species) and Poaceae (10 species). The most species-rich genera were *Acacia* (9 species), *Tecticornia* (9 species), and *Eremophila* (5 species).

### 3.1.3. Conservation Significant Flora

No Threatened or Priority flora taxa were identified within the Survey Area.

Three significant flora taxa were collected within the Survey Area. Two of these constitute range extensions and the remaining specimen, *Tecticornia* sp. nov, has anomalous features and constitutes a potential new species. This species is also associated with the restricted salt lake vegetation type: D2 (Table 3.2; Figure 3.3). Locations are provided with the final iteration of the report in IBSA data format.

During formal identification of all *Tecticornia* specimens collected during the survey, Western Australian Herbarium Senior Research Scientist Kelly Shepherd identified one specimen that had novel features that she considers to be a possible new species, having provided the identification *Tecticornia* sp. nov. She considers the new specimen to have an affinity with *Tecticornia undulata*, which has been recorded as close as Lake Austin, approximately 90 km south-west of the Survey Area.

No other flora that are considered to be locally endemic, associated with restricted habitat types, have anomalous features, are unusual, or have relictual status, were recorded in the Survey Area.

Table 3.2: Significant Flora Recorded at the Survey Area

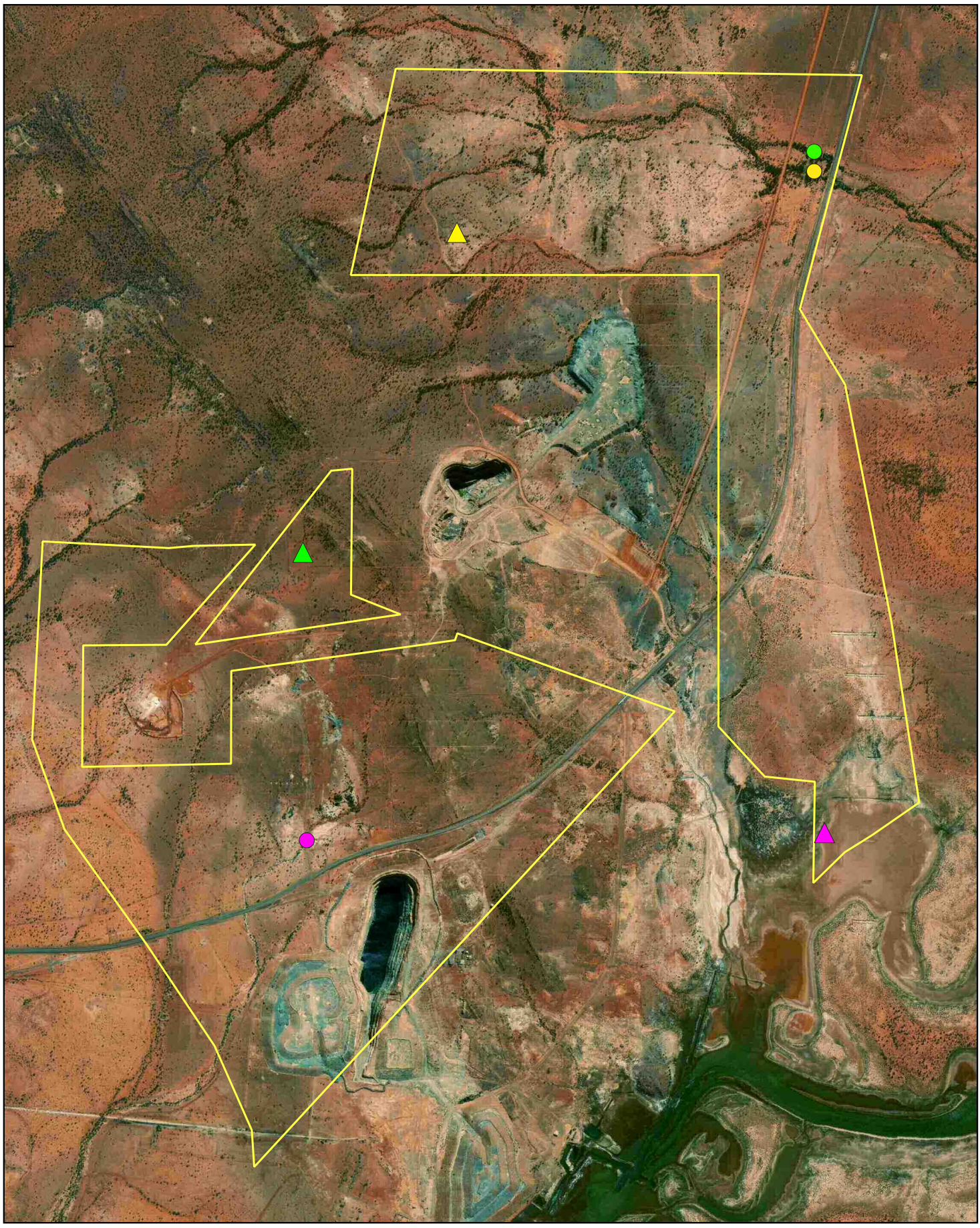
| Taxon | Significance | No. of Plants | No. of Locations | Vegetation & Landform | Collector & Collection No. |
|---|---|---|---|---|---|
| *Hakea leucoptera* subsp. *sericipes* | Range extension (100 km SW) | 10 | 1 | Vegetation: F1. Landform: Sandy-clay plains. | C. Forrester 2009.N-OC1 |
| *Rhagodia drummondii* | Range extension (75 km N) | 1 | 1 | Vegetation: F2. Landform: Sandy-clay plains. | C. Forrester 2009.NR06-9 |
| *Tecticornia* sp. nov. | Potential new species | 1 | 1 | Vegetation: D2. Landform: Salt pan. | C. Forrester 2009.NR08-6 |

### 3.1.4. Introduced Flora

Three weed species were recorded within the Survey Area (Table 3.3; Figure 3.3) and locations are provided electronically. The record of one weed species (**Citrullus colocynthis*) constitutes a new record for the Western Murchison.

Table 3.3: Introduced Flora Recorded at the Survey Area

| Taxon | No. of Plants | No. of Locations | Vegetation & Landform | Collector and Collection No. |
|---|---|---|---|---|
| **Cenchrus ciliaris* | 3 | 1 | Vegetation: D1. Landform: Drainage line on flat. | C. Forrester 2009.NR02-9 |
| **Cenchrus setiger* | 3 | 1 | Vegetation: D1. Landform: Drainage line on flat. | C. Forrester 2009.NR02-8 |
| **Citrullus colocynthis* | 5 | 1 | Vegetation: F2. Landform: Sandy-clay plains. | C. Forrester 2009.N-OC38 |




**Legend**

Survey Area

**Significant Flora**

Hakea leucoptera subsp. sericipes (RE)

Rhagodia drummondii (RE)

Tecticornia sp. nov. (novel)

**Introduced Flora**

*Cenchrus ciliaris

*Cenchrus setiger

*Citrullus colocynthis

N

0 250 500 m

Scale 1:22,000 @ A4

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: Tim Hammer

Date: 09-06-2020

# Significant and Introduced Flora Current Survey

Nannine Flora and Fauna Assessment

Prepared for Westgold Resources Limited

Figure 3.3

## 3.2. Vegetation

### 3.2.1. TECs & PECs

No Threatened Ecological Communities (TECs) were recorded within the vicinity of the Survey Area. Eleven Priority Ecological Communities (PECs) were recorded during the database searches. Two of these were recorded within the Survey Area: Austin System (Priority 3); and Polelle Calcrete (Priority 1). The likelihood of occurrence for all PECs within the Survey Area are listed in Table 3.4. Records are mapped in Figure 3.4.

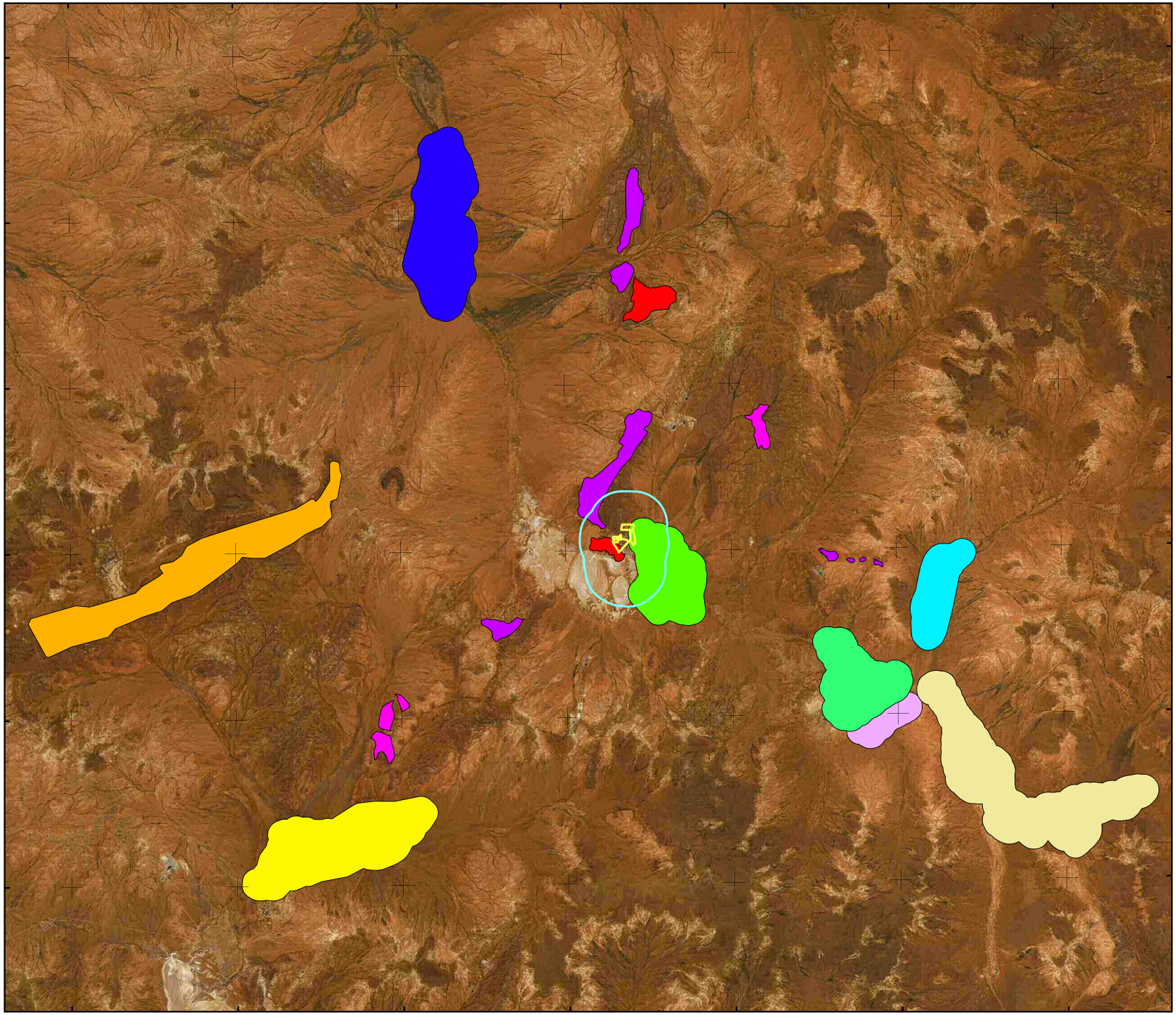
The Austin System PEC covers an area of 84 ha in the south-west of the Survey Area. This area is characterised by saline stony plains and drainage channels adjacent to Lake Annean and overlies the Nannine Tonalite geological unit.

The Polelle Calcrete PEC buffer covers an area of 171 ha in the eastern section of the Survey Area and has been identified as containing unique assemblages of invertebrates in groundwater calcretes on Murchison palaeodrainage on Polelle Station. This PEC is not associated with flora and vegetation.

Yagahong Land System was recorded within 2 km west of the Survey Area and within the Study Area. This Land System is characterized by gently sloping stony plains, low rises, and drainage foci with shrublands of Snakewood, Mulga, Bluebush, and Samphire with patches of tussock grassland.

Table 3.4: Priority Ecological Communities

| Likelihood | Status | Name | Description | Proximity to the Survey Area |
|---|---|---|---|---|
| Recorded | Priority 1 | Polelle Calcrete | Polelle calcrete groundwater assemblage type on Murchison palaeodrainage on Polelle Station. | Covering an area of 171 ha in the eastern part of the Survey Area |
| | Priority 3 | Austin Land System | Saline stony plains with low rises and drainage foci supporting low halophytic shrublands with scattered mulga and snakewood. | Covering an area of 84 ha within the south-western part of the Survey Area |
| High | Priority 3 | Yagahong Land System | Gently sloping stony plains with low rises of metamorphic rocks and gilgaied drainage foci; supporting shrublands of snakewood, mulga, bluebush, and samphire with patches of tussock grassland. | 2 km west |
| | | Trillbar Land System | Gently sloping stony plains with low rises of metamorphic rocks and gilgaied drainage foci; supporting shrublands of snakewood, mulga, bluebush, and samphire with patches of tussock grassland | 20 km north-east |
| Medium | Priority 1 | Nowthanna Calcrete | Nowthanna Hill calcrete groundwater assemblage type on Murchison palaeodrainage on Yarrabubba Station. | 25 km south-east |
| Low | Priority 1 | Hillview Calcrete | Hillview calcrete groundwater assemblage type on Murchison palaeodrainage on Hillview Station. | 35 km east |
| | | Taincrow Calcrete | Taincrow calcrete groundwater assemblage type on Murchison palaeodrainage on Taincrow Station. | 40 km south-west |
| | | Belele Calcrete | Belele calcrete groundwater assemblage type on Murchison palaeodrainage on Belele Station. | 35 km north-west |
| | | Yarrabubba West Calcrete | Yarrabubba west calcrete groundwater assemblage types on Murchison palaeodrainage on Yarrabubba Station. | 35 km south-east |
| | | Yarrabubba East Calcrete | Yarrabubba east calcrete groundwater assemblage types on Murchison palaeodrainage on Yarrabubba Station. | 40 km south-east |
| | | Weld Range BIF | Weld Range vegetation complexes (banded ironstone formation) | 35 km west |




## Legend

- Study Area
- Survey Area

TEC/PEC Search Results

- Belele Calcrete
- Hillview Calcrete
- Nowthanna Hill Calcrete
- Polelle Calcrete
- Taincrow Calcrete
- Weld Range Vegetation Complexes
- Yarrabubba East Calcrete
- Yarrabubba West Calcrete
- Austin Land System
- Trillbar Land System
- Yagahong Land System

N

0 10 20 km

Scale 1:900,000 @ A4

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: Tim Hammer Date: 08-06-2020

# Priority Ecological Communities Desktop Assessment

Nannine Flora and Fauna Assessment

Prepared for
Westgold Resources Ltd

Figure
3.4

### 3.2.2. Current Survey

Five vegetation types were described across the Survey Area associated with drainage areas, flats, slopes and crests (Table 3.5; Figure 3.5):

#### Drainage: drainage line

- D1: *Acacia aptaneura*, *Acacia caesaneura*, and *Acacia macraneura* tall open shrubland, over ±*Eremophila pantonii*, ±*Eremophila youngii* subsp. *youngii*, and *Acacia tetragonophylla* mid sparse shrubland, over ±*Aristida contorta* and ±*Setaria dielsii* low sparse tussock grassland.

#### Drainage: salt pan

- D2: *Tecticornia peltata*, *Tecticornia* sp. 1, and *Tecticornia pergranulata* subsp. *pergranulata* low sparse shrubland, over *Eragrostis pergracilis* low sparse tussock grassland, over *Heliotropium curassavicum* and *Dysphania plantaginella* low isolated clumps of forbs.

#### Flats: plain

- F1: *Acacia aptaneura*, ±*Hakea preissii* and ±*Acacia* ?*demissa* tall sparse shrubland, over ±*Eremophila fraseri* subsp. *fraseri*, *Acacia tetragonophylla*, and ±*Santalum lanceolatum* mid sparse shrubland, over ±*Enneapogon caerulescens* and ±*Aristida contorta* low sparse tussock grassland.
- F2: *Senna glutinosa*, *Acacia synchronicia*, and *Rhagodia drummondii* mid sparse shrubland, over *Ptilotus obovatus* and *Solanum lasiophyllum* low sparse shrubland, over *Aristida contorta* and *Enneapogon caerulescens* isolated tussock grasses.

#### Hill: ridge or crest

- S1: *Acacia aptaneura* tall sparse shrubland, over *Senna artemisioides* and *Eremophila macmillaniana* mid sparse shrubland, over *Ptilotus obovatus* low sparse shrubland.

#### 3.2.2.1. Significant Vegetation

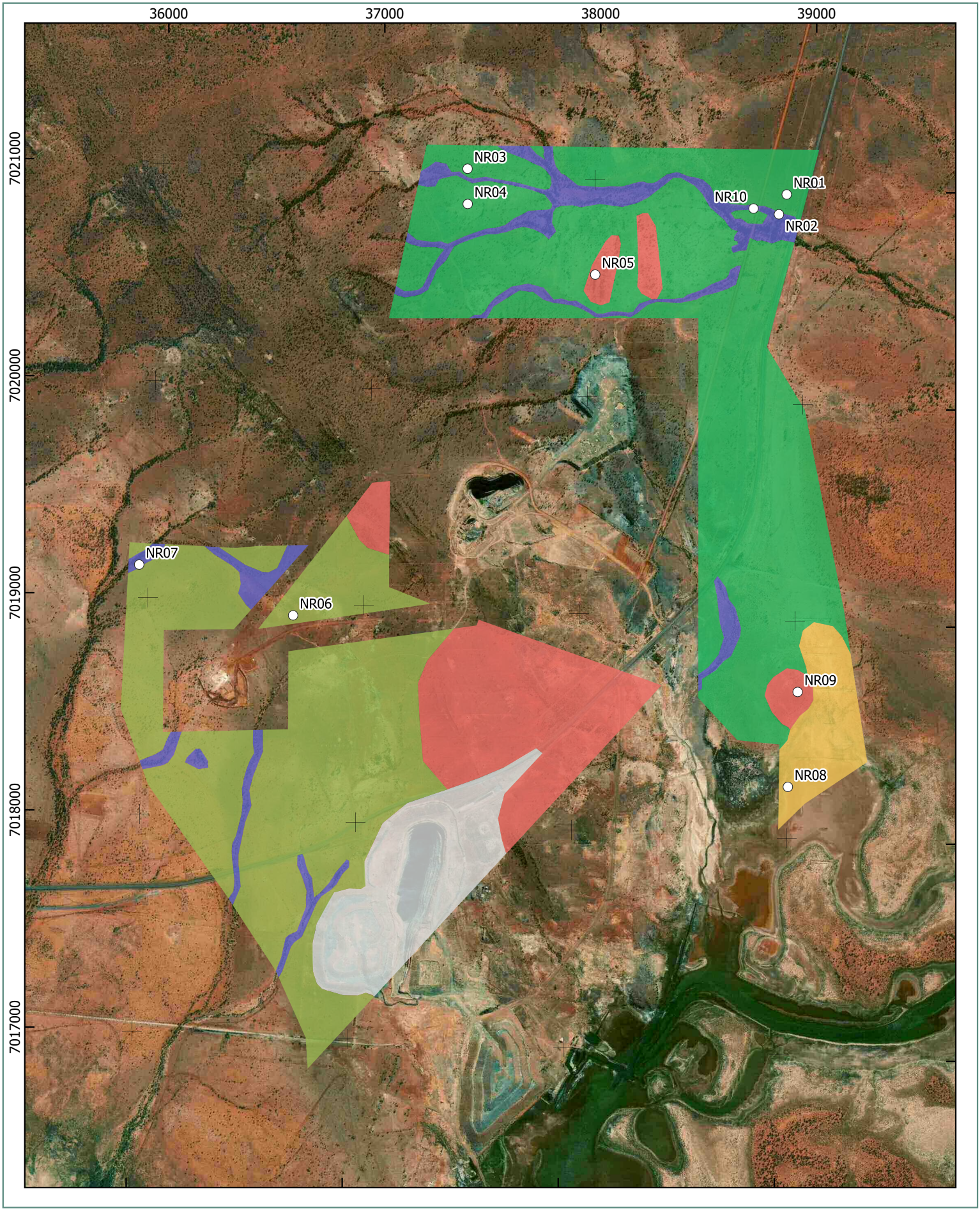
The assessment identified one vegetation type: D2 as being significant. The *Tecticornia* dominated vegetation of D2 on the salt pan at the eastern edge of the survey area is habitat for many *Tecticornia* species, including a potentially new species that has been identified as a result of this survey it is also restricted in the Study Area.

No other vegetation types were identified as significant due to being considered a TEC, PEC, have a degree of historical impact from threatening processes, play a role as a refuge, or provide a function to maintain ecological integrity of a significant ecosystem.

Table 3.5: Vegetation Types Recorded at the Survey Area

| Unit | Description | Landform, Soils & Geology | Associated Species & Significant Flora (in Bold) | Sites | Location in Survey Area | Area (ha) | Photograph |
|---|---|---|---|---|---|---|---|
| Drainage: drainage line on flat | | | | | | | |
| D1 | *Acacia aptaneura*, *Acacia caesaneura* and *Acacia macraneura* tall open shrubland, over ±*Eremophila pantonii*, ±*Eremophila youngii* subsp. *youngii* and *Acacia tetragonophylla* mid sparse shrubland, over ±*Aristida contorta* and ±*Setaria dielsii* low sparse tussock grassland. | Drainage: drainage line on flat. Red-orange sandy clay. Few or abundant ironstone, granite, or quartz fine or coarse gravel. | *Acacia sclerosperma* subsp. *sclerosperma*<br>*Cleome viscosa*<br>*Dactyloctenium radulans*<br>*Dichanthium sericeum* subsp. *humilius*<br>*Melaleuca xerophila*<br>*Pittosporum angustifolium*<br>**None** | NR02<br>NR07<br>NR10 | Mapped running through most of the north of the Survey Area, with smaller sections mapped in the south-west and south-east of the Survey Area. | 38 |  |
| Drainage: salt pan | | | | | | | |
| D2 | *Tecticornia peltata*, *Tecticornia* sp. 1 and *Tecticornia pergranulata* subsp. *pergranulata* low sparse shrubland, over *Eragrostis pergracilis* low sparse tussock grassland, over *Heliotropium curassavicum* and *Dysphania plantaginella* low isolated clumps of forbs. | Drainage: salt pan.<br>Light orange and white clay.<br>No rocks. | *Eragrostis dielsii*<br>*Frankenia laxiflora*<br>***Tecticornia* sp. nov.** | NR08 | Located in one area east of the highway on the eastern edge of the Survey Area. | 23 |  |
| Flat: plains | | | | | | | |
| F1 | *Acacia aptaneura*, ±*Hakea preissii* and ±*Acacia ?demissa* tall sparse shrubland, over ±*Eremophila fraseri* subsp. *fraseri*, *Acacia tetragonophylla* and ±*Santalum lanceolatum* mid sparse shrubland, over ±*Enneapogon caerulescens* and ±*Aristida contorta* low sparse tussock grassland. | Flats: plain.<br>Red-orange sand or sandy loam.<br>Abundant granite and quartz coarse gravel. | *Acacia grasbyi*<br>*Eremophila lachnocalyx*<br>*Eremophila spinosa*<br>*Ptilotus exaltatus*<br>*Ptilotus roei*<br>**None** | NR01<br>NR03<br>NR04 | The most dominant vegetation type in the north-east of the Survey Area, intersected by drainage lines of D1. | 204 |  |

| Unit | Description | Landform, Soils & Geology | Associated Species & Significant Flora (in Bold) | Sites | Location in Survey Area | Area (ha) | Photograph |
|---|---|---|---|---|---|---|---|
| F2 | *Senna glutinosa*, *Acacia synchronicia* and *Rhagodia drummondii* mid sparse shrubland, over *Ptilotus obovatus* and *Solanum lasiophyllum* low sparse shrubland, over *Aristida contorta* and *Enneapogon caerulescens* isolated tussock grasses. | Flats: plain.<br><br>Red sandy clay.<br><br>Abundant granite and ironstone cobbles. | *Euphorbia drummondii*<br>*Tribulus occidentalis*<br>**None** | NR06 | The most dominant vegetation type in the south-west of the Survey Area, intersected by drainage lines of D1. | 163 |  |
| Hill: ridges and crests | | | | | | | |
| S1 | *Acacia aptaneura* tall sparse shrubland, over *Senna artemisioides* and *Eremophila macmillaniana* mid sparse shrubland, over *Ptilotus obovatus* low sparse shrubland. | Hill: ridge.<br><br>Light brown sand or red sandy clay<br><br>Abundant granite cobbles. | *Aristida contorta*<br>*Enneapogon caerulescens*<br>*Euphorbia australis* var. *subtomentosa*<br>*Ptilotus helipteroides*<br>**None** | NR05<br>NR09 | Located in five areas in the centre and north of Survey Area. | 78 |  |




**Legend**

- Relevé Sites

**Vegetation Mapping**

- D1
- D2
- F1
- F2
- S1
- Mining/Disturbed Area

N

0 250 500 m

Scale 1:25,000 @ A4

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: Tim Hammer

Date: 09-06-2020

# Vegetation Types Recorded at Survey Area

Nannine Flora and Fauna Assessment

Prepared for Westgold Resources Limited

Figure 3.5

#### 3.2.2.2. Vegetation Condition

Vegetation condition in the Survey Area is presented in Table 3.6 and mapped in Figure 3.6.

The majority of the vegetation condition at the Survey Area was rated as Very Good (87%), with disturbances noted as low to medium grazing, low number of weeds, evidence of rabbits, and areas of cleared vegetation for tracks and roads. The remainder was rated as Excellent (4%) due to the clearing of vegetation for tracks and roads, and a small area was rated as Completely Degraded (9%), as the structure of the vegetation is no longer intact due to mining operations.

Table 3.6: Vegetation Condition Recorded at the Survey Area

| Vegetation Condition | Area (ha) | % of Survey Area | Disturbance Details |
|---|---|---|---|
| Excellent | 22 | 4 | Tracks |
| Very Good | 482 | 87 | Evidence of rabbits, low to medium grazing, low weeds, tracks |
| Completely Degraded | 51 | 9 | Mining area. Structure of vegetation no longer intact. |


**Legend**

**Nannine_Veg Condition_New**

- Completely Degraded
- Excellent
- Very Good

N

0 250 500 m

Scale 1:25,000 @ A4

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: Tim Hammer

Date: 09-06-2020

# Vegetation Condition Recorded at the Survey Area

Nannine Flora and Fauna Assessment

Prepared for Westgold Resources Limited

Figure 3.6

## 3.3. Terrestrial Fauna

### 3.3.1. Fauna Habitats

The fauna habitats within the Study Area were assessed and mapped into five categories (Table 3.7, Figure 3.10). Each habitat was determined based upon its potential to support different fauna assemblages, which are described in greater detail below.

Table 3.7: Fauna Habitat Types at the Study Area

| Habitat Type | Area Within Survey Area (Ha) | % of Survey Area | Area Within Study Area (Ha) | % of Study Area |
|---|---|---|---|---|
| Open Plain | 441.4 | 79.5 | 9,772.1 | 51.4 |
| Mulga Woodland | 46.3 | 8.4 | 1,836.6 | 9.7 |
| Salt Lake | 9.0 | 1.6 | 6,131.5 | 32.3 |
| Samphire Shrubland | 7.9 | 1.4 | 930.7 | 4.9 |
| Cleared/Developed | 50.6 | 9.1 | 314.2 | 1.7 |
| **Total** | **555.2** | **100** | **18,985.1** | **100** |

#### 3.3.1.1. Open Plain

The open plain habitat is by far the most widespread within both the Survey Area (441.4 ha, 79.5%) and Study Area, (9,776.5 ha, 51.4%). This habitat is characterised by very sparse *Acacia aptaneura*, *A. tetragonophylla* and *Hakea preissii* tall shrubland over *Eremophila fraseri* and *Ptilotus obovatus* low shrubland. The understory is mostly bare open ground, with patches of *Enneapogon caerulescens* and *Aristida contorta* low sparse tussock grassland. The substrate is light orange/brown loamy clay soils with quartz and ironstone cobbles of typically 50-90% abundance. The very limited vegetation present in this habitat means that few vertebrate fauna species will be resident there. Possibilities for refuge are very far apart, and there are minimal foraging resources.

Mammal species associated with this habitat type are likewise limited due to the sparse vegetation and include Red Kangaroos (*Osphranter rufus*) that utilise all habitats, and the Kultarr (*Antechinomys laniger*) which are typically recorded from open country amongst *Acacia* shrublands. The conservation significant Long-tailed Dunnart (*Sminthopsis longicaudata*) may utilise this habitat, although its preference would typically be for the rockier hills outside the Study Area to the north-west. Due to the reduced vegetation only micro bats that utilise open air to forage would be present (*Austronomus australis*, *Nyctophilus geoffroyi*, and *Scotorepens balstoni*).

Bird species associated with this habitat include most common species, however species such as the White-winged Fairy-Wren, Banded Whiteface, Crimson and Orange Chats, Black-faced Woodswallow, and Western Quail Thrush are often only associated with these open habitat types.

Reptile species associated with this habitat type include the ground-dwelling species such as the Yellow-spotted Monitor (*Varanus panoptes*), Lozenge-marked Dragon (*Ctenophorus scutulatus*), Western Netted Dragon (*C. reticulatus*), and the Goldfields Pebble-mimic Dragon (*Tympanocryptis pseudosephos*). The rocky soils and sparse vegetation limits the occurrence of some of the smaller skinks with the Common Desert Ctenotus (*Ctenotus leonhardii*) being one of the few species recorded from this habitat type. Habitat for arboreal species is limited due to the sparseness of taller vegetation.

Figure 3.7: Open Plain Fauna Habitat

#### 3.3.1.2. Mulga Woodland

The mulga woodland habitat type is the third largest, covering 46.3 ha or 8.4% of the Survey Area and 1,836.7 ha, or 9.7% of the Study Area. The vegetation in this habitat is typically dominated by *Acacia aptaneura*, *A. caesaneura* and *A. macraneura* tall open shrubland over *A. tetragonophylla* and *Eremophila* spp. moderately sparse shrubland. The ground cover consists of *Aristida contorta* and *Setaria dielsii* low sparse tussock grassland in loamy clay soils with quartz and ironstone cobble stones of variable density. Most of this habitat follows along drainage lines but may also occur in isolated low-lying patches throughout the Study Area, particularly closer to Lake Annean, where the soils become much sandier. To the north-east of the Study Area, this habitat type is more widespread although the Mulga is typically at lower density than along the drainage lines elsewhere.

Mammal species which are associated with this habitat type include Kangaroos (*Osphranter rufus*, *O. robustus*), and Dunnarts (*Sminthopsis longicaudata*, *S. macroura*) or native rodents (*Notomys alexis*, *Pseudomys hermannsburgensis*) which may forage amongst the tussock grasses and woody debris. Micro bats (*Austronomus australis*, *Chalinolobus gouldii*, *Nyctophilus geoffroyi*, *Scotorepens balstoni*, *Vespadelus finlaysoni*) forage on invertebrates both in the open air and amongst the *Acacia* species.

A wide variety of bird species are associated with this habitat and occur in different seasons and densities depending on local conditions and resource availability. Common species (Singing Honeyeater, Yellow-throated Miner and Spiny-cheeked Honeyeater, White-browed Babbler, Splendid Fairywren, Variegated Fairywren, Redthroat, Western Gerygone, Slaty-backed Thornbill, Chestnut-rumped Thornbill, Rufous Whistler, Crested Bellbird, Chiming Wedgebill, and Zebra Finch) forage amongst the sparse canopy of the tall Mulga shrubs. Ground foraging species (Emu, Common Bronzewing, Crested Pigeon, Diamond Dove, Little Button-quail, Western Quail-thrush, Mulga Parrot, Budgerigar and Bourke's Parrot) utilise fallen seed and annual herb resources which can result in large fluctuations in response to rainfall and associated increased plant growth. Predatory raptor species (Wedge-tailed Eagle, Whistling Kite, Nankeen Kestrel, and Brown Falcon) are also commonly recorded hunting across this landscape.

The pockets of denser vegetation in this habitat often provide a refuge for most of the small bird species, and are also more suitable for arboreal species such as the Mulga dragon (*Diporiphora amphiboluroides*), the Western Spiny-tailed Gecko (*Strophurus strophurus*) and the Tree Dtella (*Gehyra variegata*). The patches

of dense leaf litter and woody debris also form suitable microhabitats for ground geckos (*Diplodactylus pulcher*, *Lucasium squarrosum*, and *Nephrurus vertebralis*) and skinks (*Menetia greyii*, *Egernia depressa*). Where these patches are closer to Lake Annean, the sandier soils and leaf litter provide suitable microhabitat for fossorial skinks like the Broad Banded Sand Swimmer (*Eremiascincus richardsonii*) and the conservation significant Meekatharra Slider (*Lerista eupoda*). The greater availability of prey also means that predatory species such as the Stripe-tailed Pygmy Monitor (*Varanus caudolineatus*), Black-headed Monitor (*Varanus tristis*), Ringed Brown Snake (*Pseudonaja modesta*) and Stimson's Python (*Antaresia stimsoni*) are most likely to be found there.

Figure 3.8: Mulga Woodland Fauna Habitat

#### 3.3.1.3. Salt Lake

The salt lake fauna habitat forms only a small part of the Survey Area, covering 9.0 ha or 1.6% of the Survey Area, however it is the second most widespread habitat within the Study Area covering 6,131.5 ha or 32.3% of the Study Area. This describes the seasonally inundated tributaries and waterways which feed into Lake Annean to the south-west. Depending on rainfall these salt lakes may be underwater several months per year, so that very few plants are able to grow there. This means that from year to year, vegetation from the surrounding Samphire Shrubland habitat may infringe more onto the bare salt lake. For the most part though, it is bare ground with light orange or white loamy clay soils with no rocks.

In terms of the mammal and reptile fauna assemblage, certain animals like Kangaroos and some Dragon Lizards (the Salt Pan Dragon *Ctenophorus salinarum*) may traverse across to reach other preferred habitats. However, when water is present the salt lake habitat is often teeming with waterbirds and migratory shorebirds, many of which are of conservation significance (Table 3.8). The rainfall in early 2020 was atypically high (Figure 2.1), so when the survey was conducted in April there was still a large amount of water remaining in the deeper pools towards Lake Annean, and many waterbirds were recorded there. Insectivorous birds such as the Welcome Swallow, Fairy Martin, Tree Martin, and Fork-tailed Swift are much more likely to utilise this habitat at these times.

Likewise, the Flat-shelled Turtle (*Chelodina steindachneri*) and SRE Crustaceans will only be found when surface water is present, along with frogs (*Litoria rubella*, *Platyplectrum spenceri*, *Neobatrachus sutor*) so long as salinity levels remain suitably low.

Figure 3.9: Salt Lake & Samphire Shrubland Fauna Habitats

#### 3.3.1.4. Samphire Shrubland

The samphire shrubland habitat is the least abundant of the habitats used by fauna, covering 7.9 ha or 1.4% of the Survey Area and 930.7 ha or 4.9% of the Study Area. The vegetation is dominated by varying *Tecticornia* spp. low sparse shrubland over low sparse tussock grassland of *Eragrostis pergracilis*. The light orange to brown loamy clay soil has few pebbles present, and closer to the salt lakes may have isolated patches of the forbs *Heliotropium curassavicum* and *Dysphania plantaginella*.

As with the open plain habitat, Mammal species associated with this habitat type are restricted due to the sparse and inedible vegetation as well as the inhospitably salty soils.

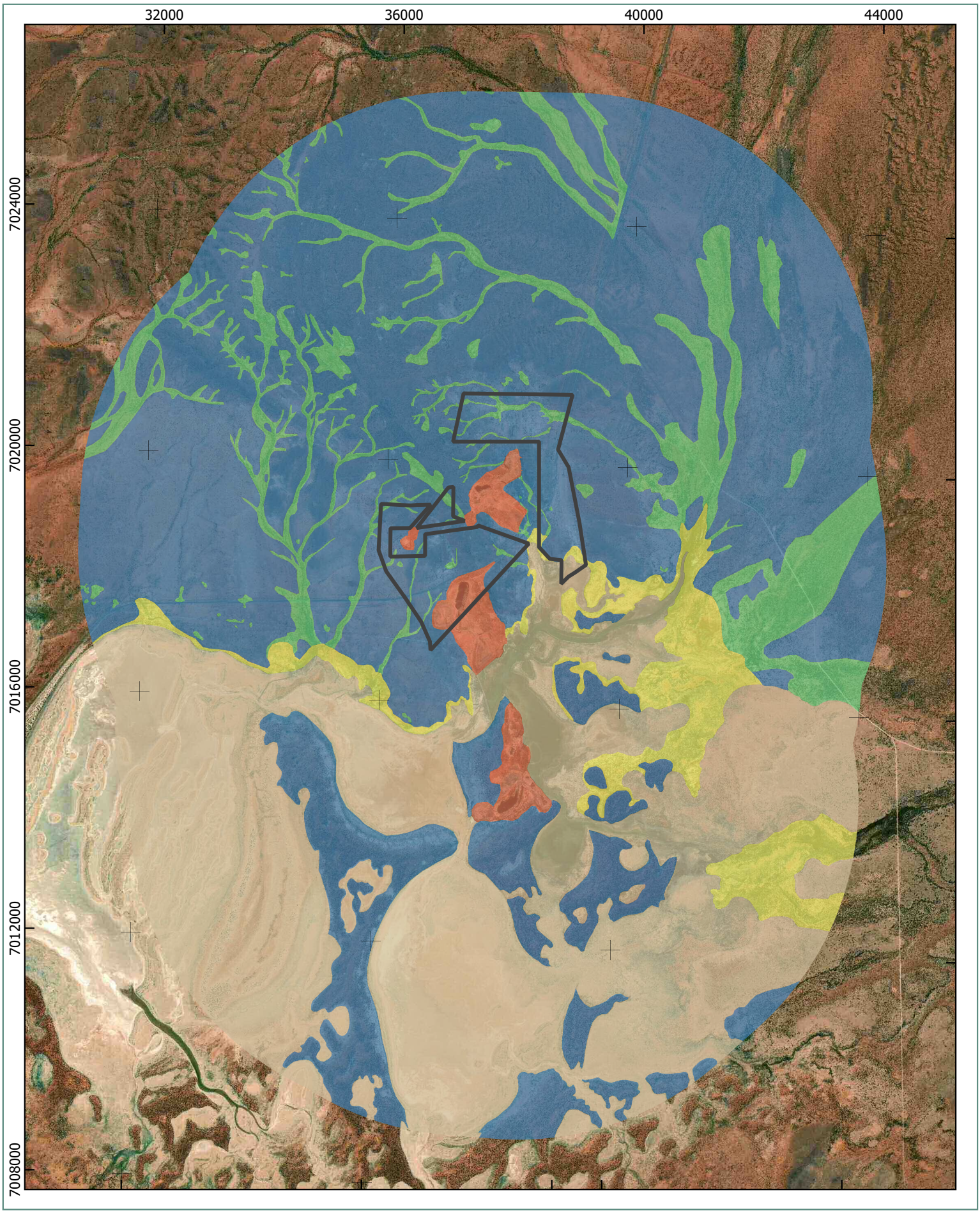
Bird species associated with this habitat include most common species however species such as White-winged Fairywren, Banded Whiteface, Crimson Chat, and Orange Chat are often only associated with these open habitat types.

The reptile assemblage associated with the low chenopod shrubland habitat type has a relatively high diversity (*Ctenotus leonhardii*, *C. mimetes*, *C. uber*, *Menetia greyii*, *Ctenophorus maculatus*, *C. reticulatus*, *C. salinarum*, *C. scutulatus*) that forage amongst the low shrubland vegetation and open areas in between.

#### 3.3.1.5. Cleared/Developed

The cleared/developed areas cover 50.6 ha or 9.1% of the Survey Area and 309.8 ha or only 1.7% of the Study Area. These areas are mostly historic open-pit mines and their associated waste dumps, so are mostly devoid of vegetation and the surrounding soil has been highly disturbed or modified.

No vegetation or fauna assemblages are associated with these areas.




**Legend**

- Survey Area
- Open Plain
- Salt Lake
- Samphire

**Fauna Habitats**

- Cleared/Developed
- Mulga

N

0 1 2 3 km

Scale 1:90000 @ A4

Coordinate System: GDA 1994 MGA Zone 51
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: Tim Hammer

Date: 25-06-2020

# Results of Fauna Habitat Mapping

Nannine Flora and Fauna Assessment

Prepared for Westgold Resources Limited

Figure 3.10

### 3.3.2. Vertebrate Fauna

The level 1 fauna assessment recorded 31 species in total, including four mammals (three introduced), 26 birds and one reptile (Table 3.8). No conservation significant fauna species were recorded during the field survey. The literature review and database search identified 28 mammals (eight introduced), 157 birds (one introduced), 61 reptiles and five frog species potentially occurring in the Study Area (Appendix E).

### 3.3.3. Conservation Significant Fauna

The desktop assessment identified fauna species that are listed under the current legislative framework. Three conservation lists have been developed at Commonwealth (EPBC Act) and State level (BC/WC Act and DBCA priority list).

The search indicated the potential presence of 27 significant fauna species, including one mammal, 22 birds, one reptile and three invertebrates (Table 3.8; Figure 3.11).

The level 1 survey techniques were tailored to those significant species potentially occurring within the Study Area. Following the field survey, the habitat across the Study Area was assessed and mapped, enabling the likelihood of occurrence for each conservation significant species to be determined (Table 3.8).

The presence of salt lakes within the Study Area indicates that the potential species list includes 13 migratory wetland birds that have the potential to seasonally occur there. The habitat requirements of these birds are very similar, so to simplify analyses they have been grouped together and addressed as one in Table 3.8. These 13 species are:

- Curlew Sandpiper (*Calidris ferruginea*),
- Sharp-tailed Sandpiper (*Calidris acuminata*)
- Marsh Sandpiper (*Tringa stagnatilis*)
- Common Greenshank (*Tringa nebularia*)
- Glossy Ibis (*Threskiornis falcinellus*)
- Red-necked Stint (*Calidris ruficollis*)
- White-winged Black Tern (*Sterna leucoptera*)
- Common Sandpiper (*Actitis hypoleucos)*
- Pectoral Sandpiper (*Calidris melanotos*)
- Wood Sandpiper (*Tringa glareola*)
- Gull-billed Tern (*Sterna nilotica*)
- Oriental Plover (*Charadrius veredus*)
- Caspian Tern (*Sterna caspia*)

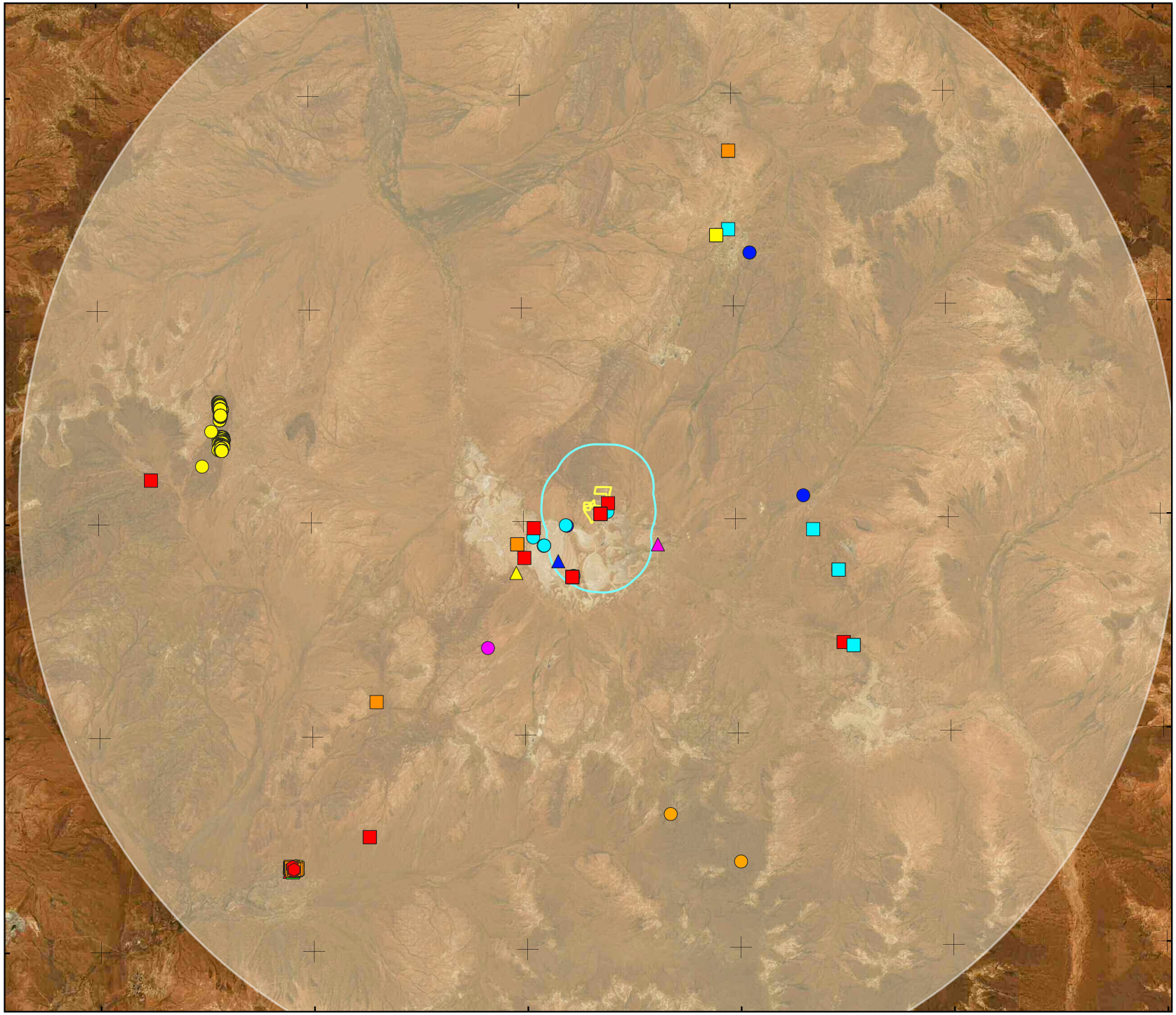
Three other species listed as migratory may also occur within the Study Area but have not been grouped here because their habitat requirements are different.

Table 3.8: Conservation Significant Fauna Species Potentially Occurring at the Study Area

| Species | Conservation Status | | | Preferred Habitats | Previous Records | Likelihood of Occurrence |
|---|---|---|---|---|---|---|
| | EPBC | BC | DBCA | | | |
| **Mammals** | | | | | | |
| Long-tailed Dunnart (*Sminthopsis longicaudata)* | - | - | P4 | Primarily rocky hills, breakaways, and plateaus with open Mulga, but may also occur in open plains with a stony substrate. | NatureMap, Four recent DBCA records within 30km. Also at Weld Range (ecologia 2009c) and Jack Hills (MBS 2005; ecologia 2009a). | **High** Suitable habitat occurs within the Study Area. Although stony plains are not the preferred habitat, there are rocky hills nearby. |
| **Birds** | | | | | | |
| Curlew Sandpiper *Calidris ferruginea* | CR, MI | CR, MI | - | Migratory/waterbird species are typically associated with coastal habitats. When there is water present, these species also inhabit inland ephemeral wetland habitat types. | NatureMap, PMST. DBCA records of these species are highly sporadic, although most have occurrences within the last 20 years. | **Medium** Migratory shorebird species could potentially utilise wetland habitats that form at salt lakes after significant rainfall events. |
| Migratory/waterbirds^ | MI | MI | - | | | |
| Night Parrot *Pezoporus occidentalis* | EN | CR | - | Most records are from long unburnt *Triodia* grasslands and/or Samphire shrublands featuring large dense clumps of vegetation. | No confirmed records in the area. PMST lists habitat to potentially be present within the study area. | **Very Low** Although samphire shrubland occurs within the Study Area, it is only dense in small, isolated patches. |
| Malleefowl *Leipoa ocellata* | VU | VU | - | Semi-arid and arid habitats. Variety of Mallee woodlands and shrublands. | NatureMap, plus two 39-year-old DBCA records around 30km from the Study Area. Signs found at Weld Range (ecologia Environment, 2009c). | **Low** No recent records, and suitable habitat does not occur in the Study Area. |
| Grey Falcon *Falco hypoleucos* | - | VU | - | Generally open inland plains and woodland habitats. | NatureMap, plus one DBCA record within the last 20 years near the Study Area | **High** Suitable foraging habitat occurs within the study area, but no breeding habitat. |
| Blue-billed Duck *Oxyura australis* | - | - | P4 | Wetlands, inland lakes. Almost entirely aquatic lifestyle; rarely seen on land. | One 20-year-old DBCA record 45km away at Lake Nallan. | **Low** Suitable seasonal salt lake/wetland habitats present within the study area. |
| Hooded Plover (*Thinornis cucullatus*) | - | - | P4 | Ocean beaches and inland lakes in southern Australia. | One recent DBCA record from Lake Nallan. | **Low** Suitable seasonal salt lake/wetland habitats present within the study area. |
| Fork-tailed Swift *Apus pacificus* | MI | MI | - | Nomadic, almost entirely aerial lifestyle over a variety of habitats; associated with storm fronts. | PMST, plus one 40-year-old DBCA record next to the Study Area. | **Medium** One old record, and suitable habitat occurs within the study area. |

| Species | Conservation Status | | | Preferred Habitats | Previous Records | Likelihood of Occurrence |
|---|---|---|---|---|---|---|
| | EPBC | BC | DBCA | | | |
| Grey Wagtail *Motacilla cinerea* | MI | MI | - | Occurs across Eurasia in a variety of habitats associated with moving water (rivers, streams). Some individuals migrate as far south as northern Australia. | PMST only. | **Low** Vagrant. No records nearby, and no suitable habitat present within Study Area |
| Yellow Wagtail *Motacilla flava* | MI | MI | - | Occurs across Europe, Western Asia, and Africa. Utilises a variety of damp or wet habitats with low vegetation, such as meadows, marshes, waterside pastures etc. | PMST only. | **Low** Vagrant. No records nearby, and no suitable habitat present within Study Area |
| Peregrine Falcon *Falco peregrinus* | - | OS | - | Widespread; coastal cliffs, riverine gorges, and wooded watercourses. | NatureMap, plus eight recent DBCA records within 40km. Also at Weld Range (ecologia Environment, 2009c) and Jack Hills (MBS Environmental, 2005; ecologia Environment, 2009a). | **High** Several records within 40 km and suitable habitat occurs within the study area |
| **Reptiles** | | | | | | |
| West Coast Mulga Slider/ Meekatharra Slider (*Lerista eupoda*) | - | - | P1 | Open mulga woodland on loamy soils between Cue and Meekatharra | NatureMap, and three recent DBCA records within 40km. Another 11 records exist within the Study Area itself, but they are over 20 years old. Also recorded at Weld Range (ecologia Environment, 2009c). | **High** Many records within and near the Study Area, and suitable habitat exists. |
| **Invertebrates** | | | | | | |
| Shield-backed Trapdoor Spider (*Idiosoma nigrum*) | VU | EN | - | N/A | PMST only. | **Very Low** Recent taxonomic information (Rix *et al.*, 2018) indicates that prior records in the area are actually *I. clypeatum*, whereas *I. nigrum* is restricted to the Avon Wheatbelt over 300km. |
| Northern Shield-backed Trapdoor Spider (*Idiosoma clypeatum*) | - | - | P3 | Little information is available, yet it is associated with ironstone ranges in the Murchison region; Blue Hills, Jack Hills, Weld Range. | There are many recent DBCA records from around 40km west in Weld Range. Also recorded at Jack Hills (ecologia 2009b) | **Low** No suitable habitat exists within the Study Area, and the closest records are almost 40km away. |
| Fairy Shrimp (*Branchinella simplex*) | - | - | P1 | Information is also scarce, but it appears to utilize salt lakes in southern inland WA. | NatureMap, and one 42-year-old DBCA record in the Study Area. Only 10 other records exist, all to the south. | **Low** Suitable habitat exists, but the only record in the area is very old. |

^ Remaining migratory birds are listed in text above.




## Legend

- Study Area
- Survey Area
- Search Buffer

### Fauna Search Results

- Actitis hypoleucos
- Apus pacificus
- Branchinella simplex
- Calidris acuminata
- Calidris ferruginea
- Calidris melanotos
- Calidris ruficollis
- Chlidonias leucopterus
- Falco hypoleucos
- Falco peregrinus
- Gelochelidon nilotica
- Hydroprogne caspia
- Idiosoma clypeatum
- Leipoa ocellata
- Lerista eupoda
- Oxyura australis
- Plegadis falcinellus
- Sminthopsis longicaudata
- Thinornis rubricollis
- Tringa glareola
- Tringa nebularia
- Tringa stagnatilis

N

0 10 20 km

Scale 1:700000 @ A4

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Units: Meter

Spectrum ECOLOGY

Author: Tim Hammer Date: 24-06-2020

# Results of the Fauna Database Searches

Nannine Flora and Fauna Assessment

Prepared for
Westgold Resources Ltd

Figure
3.11

### 3.3.4. Short Range Endemic Invertebrates

The WA Museum SRE invertebrate database searches returned five SRE species, including two Arachnids and three Crustaceans (Table 3.9).

Of the two Arachnids, one of these is the Anamid mygalomorph spider named *Aname* 'MYG001?'. The other is the Olpiid pseudoscorpion called *Austrohorus* 'sp. indet. (female)'. Both of these are single records from 2011 and were collected at Karbar station approximately 35 km south-west of the Study Area.

The Crustacea database search returned one species of the tiny, worm-like Parabathynellid, *Billibathynella humphreysi*, which was recorded seven times at Mt Padbury Station in 2004, around 30 km north-east of the Study Area. Two other SRE crustaceans from the Cyclopidae (Copepod) family have also been recorded nearby. *Metacyclops superincidentis* has a single record at Yarrabubba Station, approximately 30 km east of the Study Area. *Pescecyclops pilanus* also has three records at Yarrabubba Station, as well as one at Wondinong Station (100 km south), and another at Depot Springs Station (200 km south-east), although the years these were recorded are unknown.

The Mollusca database search did not return any results.

Table 3.9: WA Museum SRE Invertebrate Database Search Results

| Species | Previous Records | Likelihood of Occurrence | Potential for Significant Impact |
|---|---|---|---|
| **Arachnida** | | | |
| **Anamidae (Mygalomorph)** | | | |
| *Aname* `MYG001?` | One record from Karbar Station, 35 km south-west. | **Low**<br>Mygalomorph spiders in the Murchison (such as *I. clypeatum*) typically utilise abundant leaf litter on and near rocky hills. This microhabitat does not occur in the Study Area. | **Low**<br>If the distribution of this species extends into the Study Area at all, any individuals will occur at very low density. |
| **Olpiidae (Pseudoscopion)** | | | |
| *Austrohorus* 'sp. indet. (female)' | One record from Karbar Station, 35 km south-west. | **Low**<br>This species likely inhabits aggregated leaf litter, which occurs in some of the denser Mulga woodland patches in the Study Area, although these are usually isolated. | **Low**<br>Potential habitat in the Study Area is far from ideal, and not continuous. Drainage lines with Mulga are cleared of most leaf litter in rainfall events. |
| **Crustacea** | | | |
| **Parabathynellidae (Malacostracan)** | | | |
| *Billibathynella humphreysi* | Seven records, all from Mt Padbury Station, 30 km north-east. | **Low**<br>When there is water present, this species may inhabit the salt lakes found in the south of the Study Area. | **Low**<br>As this species is presumably restricted to water courses, the proposed development will not have an impact on the local population. |
| **Cyclopidae (Copepod)** | | | |
| *Metacyclops uperincidentis* | One record from Yarrabubba Station, 30 km east. | **Low**<br>When there is water present, this species may inhabit the salt lakes found in the south of the Study Area. | **Low**<br>As this species is presumably restricted to water courses, the proposed development will not have an impact on the local population. |
| *Pescecyclops pilanus* | Three records from Yarrabubba Station (30 km east), one from Wondinong Station (100 km south) and one from Depot Springs Station (200 km south-east). | | |

## 3.4. Limitations & Constraints

### 3.4.1. Flora & Vegetation

Survey specific limitations and constraints for the detailed flora assessment conducted at Survey Area are discussed in Table 3.10.

Table 3.10: Limitations & Constraints – Flora

| Limitation | Constraint | Comment |
|---|---|---|
| Availability of the contextual information at a regional and local scale. | No | There are no vegetation surveys or datasets available for contextual information to compare Level V vegetation associations at a regional scale. Beard mapping has been used, however this mapping is conducted at a coarse scale (1:250,000) and can only provide an approximate comparison. |
| Competency/experience of the consultant carrying out the survey including experience in bioregion surveyed. | No | Biologists involved in the field survey have more than 10 years combined experience in flora and vegetation and fauna surveys throughout Western Australia. |
| Restrictions to, or functionality of survey equipment and tools to complete the flora and vegetation assessment. | No | During the survey, there were no restrictions to or compromised functionality of survey equipment or tools. |
| Proportion of flora recorded and/or collected, any identification issues. | No | Only suspected or known significant and introduced flora, and flora that was part of vegetation communities were collected which is acceptable for a reconnaissance level survey.<br>A total of seven collected specimens were unable to be conclusively identified, indicated by the presence of a query. This is attributed to insufficient material or plants being sterile. |
| Survey effort and extent. | No | Prior to the field survey, relevés were selected to represent the diversity of vegetation and geology present at the Survey Area. This was sufficient to map and classify the vegetation of the Survey Area for a reconnaissance level survey.<br>Previous records of Priority flora and areas considered potential habitat were targeted. |
| Timing/weather/season/cycle. | No | The field survey was conducted in the ideal timing for a flora survey conducted in the Murchison region and Eremaean Botanical Province. Seasonal conditions were excellent, and rainfall was well above the long term median rainfall. |
| Disturbances (e.g. fire, flood, accidental human intervention) which affected results of survey. | No | No disturbances were recorded at the Survey Area that have affected the results of the survey. No areas were recently burnt within the Survey Area. |
| Remoteness and/or access problems. | No | There were no access restrictions at the Survey Area for this level of survey. Many established tracks allowed adequate access across the Survey Area as appropriate for a reconnaissance level survey. |

### 3.4.2. Fauna

Survey specific limitations and constraints for the level 1 fauna assessment conducted at the Project are discussed in Table 3.11.

Table 3.11: Limitations & Constraints – Fauna

| Limitation | Constraint | Comment |
|---|---|---|
| Availability of contextual (e.g. biogeographic) information on the region. | No | Background information about the region was available and sufficient. |
| Competency/experience of the consultant carrying out the survey. | No | Zoologists had relevant experience surveying within the greater region and areas immediately adjacent to the Project. |
| Scope (what faunal groups were sampled and were some sampling methods not able to be employed because of constraints such as weather conditions). | No | Sampling techniques were adequate for a level 1 terrestrial fauna survey. All fauna groups were sampled, and no survey constraints were experienced. |
| Proportion of fauna identified, recorded and/or collected. | No | All vertebrate fauna species encountered were identified in the field. Level 1 survey methods do not require the identification of all fauna species present within the Project. |
| Sources of information. | No | Database searches and previous survey reports provided a significant level of information, adequate to guide field survey design and effort. |
| The proportion of the task achieved and further work which might be needed. | No | All components of a level 1 fauna assessment were completed. |
| Timing/weather/season/cycle. | No | All dominant fauna groups, assemblages and major fauna habitat types were recorded. |
| Disturbances (e.g. fire, flood, accidental human intervention) which affected results of survey. | No | No disturbances were recorded during the survey. |
| Intensity (in retrospect, was the intensity adequate). | No | A level 1 assessment was adequate to identify faunal assemblages and fauna habitat present within the Survey Area. Targeted searches for significant fauna species were completed within areas of suitable habitat. |
| Completeness (was the relevant area fully surveyed. | No | All major fauna habitat types were sampled and defined. Habitat types that may host significant fauna species were surveyed. |
| Resources (degree of expertise available in animal identification to taxon level). | No | Resources available were adequate and did not compromise the outcome of the survey. |
| Remoteness and/or access problems. | No | No access restrictions were experienced within the Survey Area. |

# 4. DISCUSSION

## 4.1. Flora

### 4.1.1. Threatened Flora

One Threatened flora taxon was recorded during the database searches: *Eremophila rostrata* subsp. *rostrata*. This species was given a low likelihood of occurrence in the Survey Area as potentially suitable habitat does not occur and the previous record is more than 60 km away from the Survey Area.

### 4.1.2. Local & Regional Significance

Potential impacts to six significant flora recorded at the Survey Area during the current assessment, desktop assessment, or assigned a high likelihood of occurrence during the desktop assessment, are considered at a local and regional scale in Table 4.1.

Two of these species are considered to have a high local and regional significance at the Survey Area:

- *Tecticornia* sp. nov (potential new taxon); and
- *Calytrix verruculosa* (Priority 3, high likelihood of occurrence).

Table 4.1: Local & Regional Significance of the Significant Flora at the Survey Area

| Taxa | Recorded in Survey | Recorded in Desktop | Local Significance | | Regional Significance | |
|---|---|---|---|---|---|---|
| Priority 3 | | | | | | |
| *Acacia sclerosperma* subsp. *glaucescens* | No | Yes | Uncommon in the local area with only one known location within the Survey Area. However, this record was searched for during the survey and was not found and is unlikely to be present at the Survey Area. | Low | No other records from the Murchison IBRA region. All other records are in the Carnarvon IBRA region, with most in the vicinity of Shark Bay. However, due to the geographic disjunction with the remaining records the record in the Survey Area is likely to be an anomalous specimen or mis-identified. | Low |
| *Calytrix verruculosa* | No | No – High Likelihood | Uncommon in the local area, with six records within 40 km of the Project. | High | Known only from several locations in the Murchison IBRA region. | High |
| *Tecticornia cymbiformis* | No | No – High Likelihood | Common in the local area at three locations at Lake Annen. | Low | Widespread taxon known from several locations across the Murchison and Yalgoo IBRA regions. | Low |
| Novel Specimen | | | | | | |
| *Tecticornia* sp. nov. | Yes | No | Unusual and potentially novel specimen that may constitute a new species. | High | Unusual and potentially novel specimen that may constitute a new species. | High |
| Range Extension | | | | | | |
| *Hakea leucoptera* subsp. *sericipes* | Yes | No | Westerly range extension from known range (100 km). | Low | An uncommon, widespread taxon known from multiple IBRA regions. | Low |
| *Rhagodia drummondii* | Yes | No | Northerly range extension from with many occurrences to the south (70 km). | Low | A common species known from multiple IBRA regions. | Low |

## 4.2. Vegetation

### 4.2.1. Vegetation Resembling TECs or PECs

One PEC associated with flora and vegetation was recorded within the Survey Area during the desktop assessment: Austin System (Priority 3) described as saline stony plains with low rises and drainage foci supporting low halophytic shrublands with scattered Mulga and Snakewood.

Vegetation types D1 and F2 identified in this survey spatially overlap with the Austin System (Priority 3) PEC and have contain some aspects of the species reported for the PEC, including scattered Mulga (e.g. *Acacia aneura*) and halophytic shrubs (e.g. *Rhagodia drummondii*), however these areas were not saline in nature and did not contain any Snakewood (*Acacia eremaea*) and are therefore not considered to be part of the PEC.

### 4.2.2. Local & Regional Significance

Local and regional significance for each vegetation type is listed in Table 4.2. Local significance was determined using the other definitions for significant vegetation; whether it plays a role as refuge, has a degree of historical impact from threatening processes or maintains integrity of a significant ecosystem. Regional significance was determined by comparing the vegetation types of the Project with the pre-European vegetation association mapping undertaken by Beard (DPIRD, 2019) to determine potential regional extent.

Table 4.2: Local & Regional Significance of Vegetation Types at the Survey Area

| Vegetation Type | Local Significance | | Regional Significance | |
|---|---|---|---|---|
| **Drainage: drainage line on flat** | | | | |
| **D1 -** *Acacia aptaneura*, *Acacia caesaneura* and *Acacia macraneura* tall open shrubland, over ±*Eremophila pantonii*, ±*Eremophila youngii* subsp. *youngii* and Acacia tetragonophylla mid sparse shrubland, over ±*Aristida contorta* and ±*Setaria dielsii* low sparse tussock grassland. | Role as refuge: no significant flora recorded.<br>Restricted to drainage lines across the Survey Area but likely to be widespread across the Murchison due to association with widespread Beard unit. | Low | Associated with widespread Beard association 18.2. | Low |
| **Drainage: salt pan** | | | | |
| **D2 -** *Tecticornia peltata*, *Tecticornia* sp. 1 and *Tecticornia pergranulata* subsp. *pergranulata* low sparse shrubland, over *Eragrostis pergracilis* low sparse tussock grassland, over *Heliotropium curassavicum* and *Dysphania plantaginella* low isolated clumps of forbs. | Role as refuge: habitat for one significant flora.<br>Restricted distribution around salt lakes in the region, existing as habitat for many *Tecticornia* species, which are an under sampled and unknown group across WA. | High | Diverse *Tecticornia* communities with unknown regional extents.<br>Associated with a restricted Beard unit 1128.0.<br>Represents the wetland of national significance and ESA, Lake Annean. | High |
| **Flats: plain** | | | | |
| **F1 -** *Acacia aptaneura*, ±*Hakea preissii* and ±*Acacia ?demissa* tall sparse shrubland, over ±*Eremophila fraseri* subsp. *fraseri*, *Acacia tetragonophylla* and ±*Santalum lanceolatum* mid sparse shrubland, over ±*Enneapogon caerulescens* and ±*Aristida contorta* low sparse tussock grassland. | Role as refuge: habitat for 2 significant flora.<br>Does not have a restricted distribution, historical impact from threatening processes, or maintains a significant ecosystem. | Low | Associated with widespread Beard association 18.2. | Low |
| **F2** - *Senna glutinosa*, *Acacia synchronicia* and *Rhagodia drummondii* mid sparse shrubland, over *Ptilotus obovatus* and *Solanum lasiophyllum* low sparse shrubland, over *Aristida contorta* and *Enneapogon caerulescens* isolated tussock grasses. | Role as refuge: no significant flora recorded in present survey.<br>Likely corresponding to the Austin Land System PEC and restricted to the plains north of Lake Annean. | Low | Associated with widespread Beard association 18.2. | Low |
| **Hills: ridges and crests** | | | | |
| **S1 -** *Acacia aptaneura* tall sparse shrubland, over *Senna artemisioides* and *Eremophila macmillaniana* mid sparse shrubland, over *Ptilotus obovatus* low sparse shrubland. | Role as refuge: no significant flora recorded in present survey.<br>Does not have a restricted distribution, historical impact from threatening processes, or maintains a significant ecosystem. | Low | Associated with widespread Beard association 39.1. | Low |

## 4.3. Terrestrial Fauna

### 4.3.1. Fauna Habitats

The fauna habitats within the Study Area were assessed and mapped into five categories (Table 3.7, Figure 3.10). The Survey Area was mainly comprised of common fauna habitat types (open plain and Mulga woodland) that occur extensively in the surrounding region. Salt lakes and samphire shrubland typically form important habitats for Threatened species such as migratory birds and SRE invertebrate fauna species, however only a small area (16.9 ha) is located within the survey area with an additional 7,062 ha (combined salt lake and samphire shrubland habitats) mapped within 5 km of the Survey Area.

### 4.3.2. Conservation Significant Fauna

The fauna habitats recorded within the Survey Area form suitable habitat for 17 conservation significant fauna species; Long-tailed Dunnart (Sminthopsis longicaudata), Migratory Waterbirds (12 species), Grey Falcon (*Falco hypoleucos*), Fork-tailed Swift (*Apus pacificus*), Peregrine Falcon (*Falco peregrinus*) and West Coast Mulga Slider/ Meekatharra Slider (*Lerista eupoda*).

The Salt Lake and Samphire Shrubland habitats across Australia form important areas of habitat for EPBC Act listed Migratory Waterbirds. Lake Annean forms one of these areas and is located adjacent to the Survey Area, however only a small section of this lake, along its northern shore, is included within the Survey Area.

Mulga Woodland habitat forms suitable habitat for *Lerista eupoda*, particularly when leaf litter accumulates on loamy soils. This habitat type is common in the surrounding region and occurs in small pockets within the Survey Area along drainage areas.

The remaining three conservation significant fauna species (Grey Falcon, Fork-tailed Swift, and Peregrine Falcon) are wide ranging bird species that are expected to only utilise the Survey Area occasionally to forage. No suitable nesting habitat was recorded within the Survey Area.

### 4.3.3. Short Range Endemic Invertebrates

Short Range Endemic invertebrates are typically associated with habitats that support their primitive biology and ecology, such as moist sheltered area on the southern slopes of hills and ranges and in protected gullies and gorges. Dense Mulga woodland habitat can also form suitable habitats for SRE taxa particularly along drainage lines such as was recorded from the Survey Area. The limited extent of this habitat within the Survey Area (8.4%) and the large area recorded within 5 km of the Survey Area (1,836 ha) indicates that the likelihood of any SRE taxa being restricted to within the Survey Area is very low.

# 5. CONCLUSIONS

## 5.1. Threatened Flora

No Threatened flora taxa were recorded in the Survey Area during the current assessment. One Threatened flora taxon was recorded during the database searches: *Eremophila rostrata* subsp. *rostrata*. This taxon was assigned a low likelihood of occurrence due to the distance of known records and no potential habitat occurring within the Survey Area.

## 5.2. Significant Flora

Species that are considered to have high significance at a local and regional scale at the Survey Area include:

- *Tecticornia* sp. nov (potential new taxon) – recorded in Lake Annean; and
- *Calytrix verruculosa* (Priority 3) – high likelihood of occurrence.

## 5.3. Vegetation

One vegetation type, D2, is considered significant at a local and regional scale. D2 occurs on and fringing Lake Annean in the south-eastern corner of the Survey Area. It is considered significant as many *Tecticornia* species occur, including a potentially new species that has been identified as a result of this survey, is associated with a restricted Beard vegetation association, is listed as a ESA, and as a wetland of national significance, Lake Annean.

## 5.4. Terrestrial Fauna

The level 1 fauna survey and desktop assessment did not identify any conservation significant terrestrial fauna species that would be considerably impacted by the proposed development at Nannine. Five of the six vertebrate fauna species identified as having a medium or high likelihood of occurrence in the Study Area are in no way restricted to any of the habitats there, and most would in fact prefer to utilise more optimal habitats elsewhere. Only the Meekatharra Slider (*Lerista eupoda*) has a limited distribution in the region, but there is minimal suitable habitat for it within the Study Area, and almost none in the Survey Area.

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# Appendix A: Conservation Codes

## Appendix A1: Definitions of Conservation Categories under the EPBC Act

| Category | Definition |
|---|---|
| Extinct | A native species is eligible to be included in the extinct category at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died. |
| Extinct in the Wild | A native species is eligible to be included in the extinct in the wild category at a particular time if, at that time:<br>(a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or<br>(b) it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form. |
| Critically Endangered | A native species is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria. |
| Endangered | A native species is eligible to be included in the endangered category at a particular time if, at that time:<br>(a) it is not critically endangered; and<br>(b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria. |
| Vulnerable | A native species is eligible to be included in the vulnerable category at a particular time if, at that time:<br>(a) it is not critically endangered or endangered; and<br>(b) it is facing a high risk of extinction in the wild in the medium term future, as determined in accordance with the prescribed criteria. |
| Conservation Dependent | A native species is eligible to be included in the conservation dependent category at a particular time if, at that time:<br>(a) the species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered, or critically endangered; or<br>(b) the following subparagraphs are satisfied:<br>(i) the species is a species of fish;<br>(ii) the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised;<br>(iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory;<br>(iv) cessation of the plan of management would adversely affect the conservation status of the species. |

## Appendix A2: Definitions of Conservation Categories under the BC Act (DBCA 2019)

**Threatened Species:** Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as Threatened species under section 26(2) of the Biodiversity Conservation Act 2016 (BC Act).
*Threatened fauna* s that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for Threatened Fauna.
Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the Wildlife Conservation (Rare Flora) Notice 2018 for Threatened Flora.
The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

| Category | Definition |
|---|---|
| CR | **Critically endangered species**<br>Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines".<br>Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for critically endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for critically endangered flora. |
| EN | **Endangered species**<br>Threatened species considered to be "facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines".<br>Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for endangered flora. |
| VU | **Vulnerable species**<br>Threatened species considered to be "facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines".<br>Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for vulnerable fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for vulnerable flora. |

**Extinct species**: Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.

| Category | Definition |
|---|---|
| EX | **Extinct species**<br>Species where "there is no reasonable doubt that the last member of the species has died", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).<br>Published as presumed extinct under schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for extinct fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for extinct flora. |
| EW | **Extinct in the wild species**<br>Species that "is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).<br>Currently there are no Threatened fauna or Threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice. |

**Specially protected species**: Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.
Species that are listed as Threatened species (critically endangered, endangered, or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.

| | |
|---|---|
| MI | **Migratory species**<br>Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).<br>Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.<br>Published as migratory birds protected under an international agreement under **schedule 5** of the Wildlife Conservation (Specially Protected Fauna) Notice 2018. |
| CD | **Species of special conservation interest (Conservation dependant fauna)**<br>Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as Threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).<br>Published as conservation dependent fauna under **schedule 6** of the Wildlife Conservation (Specially Protected Fauna) Notice 2018. |
| OS | **Other specially protected species**<br>Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).<br>Published as other specially protected fauna under **schedule 7** of the Wildlife Conservation (Specially Protected Fauna) Notice 2018. |
| [1] The definition of flora includes algae, fungi, and lichens.<br>[2] Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population). | |

## Appendix A3: Definitions of Priority Species Classification (DBCA 2019)

**Priority species:** Possibly Threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as Threatened fauna or flora.
Species that are adequately known, are rare but not Threatened, or meet criteria for near Threatened, or that have been recently removed from the Threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.
Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

| Category | Definition |
|---|---|
| P1 | **Priority 1: Poorly-known species**<br>Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey. |
| P2 | **Priority 2: Poorly-known species**<br>Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey. |
| P3 | **Priority 3: Poorly-known species**<br>Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey. |
| P4 | **Priority 4: Rare, Near Threatened and other species in need of monitoring**<br>(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently Threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.<br>(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.<br>(c) Species that have been removed from the list of Threatened species during the past five years for reasons other than taxonomy |

## Appendix A4: Legal Status Definition of Listed Plants in Western Australia

| Legal Status | Definition |
|---|---|
| Declared Pest, Prohibited – s12 | Prohibited organisms are declared pests by virtue of section 22(1) and may only be imported and kept subject to permits. |
| Declared Pest – s22(2) | Declared pests must satisfy any applicable import requirements when imported and may be subject to control keeping requirements. |
| Permitted – s11 | Permitted organisms must satisfy applicable import requirements and import permits (where required). |
| Permitted, Requires Permit – r73 | Regulation 73 permitted organisms may be subject to restriction under legislation other than the BAM Act (2007). |
| Unlisted | Unlisted organisms are prohibited in WA. |
| **Control Categories** | **Definition** |
| C1 Exclusion | Organisms should be excluded from parts or all of WA. |
| C2 Eradication | Organisms should be eradicated from all or parts of WA. |
| C3 Management | Organisms should have some form of management applied that will alleviate the harmful impact of the organism, reduce the numbers or distribution of the organism, or prevent or contain the spread of the organism. |
| Unassigned | Declared pest that are recognised as having a harmful impact under certain circumstances where their subsequent control requirements are determined by a plan or other legislative arrangements under the Act. |
| **Keeping Categories** | **Definition** |
| Prohibited keeping | Can only be kept under a permit for public display, education, or scientific purposes. |
| Restricted keeping | Kept under a permit by private individuals due to a low risk of becoming a problem for the environment. |
| Exempt keeping | No permit or conditions are required for keeping. Organism may be subject to restrictions under the Wildlife Conservation Act (WCA, 1950). |

# Appendix B: Site Information

| Site: NR01 | Type: Relevé | Size: n/a | Date: 20/04/2020 | Botanist: Carmel Forrester |
|---|---|---|---|---|

| | |
|---|---|
| Landform: | Flat: plain |
| Slope, aspect: | Very Gentle, None |
| Soil: | Red, Orange Sand |
| Rocks: | Granite |
| Abundance: | Abundant |
| Size: | Cobbles |
| Fire: | >5 years |
| Condition: | Very Good |
| Notes: | Grazing (Low) |
| Veg Unit: | F1 |
| Location: | 50J 635240 mE 7028683 mN |

| Species | Height | Cover | Species | Height | Cover |
|---|---|---|---|---|---|
| *Acacia ?demissa* | 3 | 0.1 | *Eremophila fraseri* subsp. *fraseri* | 1.5 | 2 |
| *Acacia pteraneura* | 3 | 1 | *Goodenia tenuiloba* | 0.2 | 0.1 |
| *Acacia tetragonophylla* | 2 | 0.1 | *Ptilotus roei* | 0.05 | 0.1 |
| *Aristida contorta* | 0.2 | 0.1 | *Santalum lanceolatum* | 1 | 0.1 |

| Site: NR02 | Type: Relevé | Size: n/a | Date: 20/04/2020 | Botanist: Carmel Forrester |
|---|---|---|---|---|

| | |
|---|---|
| Landform: | Drainage: Drainage line on flat |
| Slope, aspect: | Very Gentle, None |
| Soil: | Light, Red, Orange Clay |
| Rocks: | Ironstone |
| Abundance: | Very Few |
| Size: | Fine Gravel |
| Fire: | >5 years |
| Condition: | Very Good |
| Notes: | Grazing (Low), Weeds (Medium) |
| Veg Unit: | D1 |
| Location: | 50J 635203 mE 7028592 mN |

| Species | Height | Cover | Species | Height | Cover |
|---|---|---|---|---|---|
| *Acacia caesaneura* | 5 | 25 | *Dactyloctenium radulans* | 0.2 | 30 |
| *Acacia macraneura* | 7 | 14 | *Dichanthium sericeum* subsp. *humilius* | 0.3 | 1 |
| *Acacia tetragonophylla* | 2 | 1 | *Eragrostis xerophila* | 0.4 | 0.1 |
| *Cenchrus ciliaris* | 0.5 | 2 | *Maireana ?villosa* | 0.5 | 2 |
| *Cenchrus setiger* | 0.5 | 2 | *Setaria dielsii* | 0.5 | 2 |
| *Cleome viscosa* | 0.5 | 0.1 | - | - | - |

| Site: NR03 | Type: Relevé | Size: n/a | Date: 20/04/2020 | Botanist: Carmel Forrester |
|---|---|---|---|---|

| | |
|---|---|
| Landform: | Flat: plain |
| Slope, aspect: | Very Gentle, None |
| Soil: | Red, Orange Sandy Loam |
| Rocks: | Quartz, Ironstone |
| Abundance: | Abundant |
| Size: | Coarse Gravel |
| Fire: | >5 years |
| Condition: | Excellent |
| Notes: | Grazing (Low) |
| Veg Unit: | F1 |
| Location: | 50J 633766 mE 7028817 mN |

| Species | Height | Cover | Species | Height | Cover |
|---|---|---|---|---|---|
| *Atriplex codonocarpa* | 0.2 | 0.5 | *Ptilotus exaltatus* | 0.02 | 0.1 |
| *Hakea preissii* | 2 | 2 | *Sclerolaena cuneata* | 0.2 | 0.5 |

| Site: NR04 | Type: Relevé | Size: n/a | Date: 20/04/2020 | Botanist: Carmel Forrester |
|---|---|---|---|---|

| | |
|---|---|
| Landform: | Flat: plain |
| Slope, aspect: | Very Gentle, None |
| Soil: | Light, Orange, Cream Sand |
| Rocks: | Granite |
| Abundance: | Many |
| Size: | Medium Gravel |
| Fire: | >5 years |
| Condition: | Very Good |
| Notes: | Grazing (Low), Tracks |
| Veg Unit: | F1 |
| Location: | 50J 633765 mE 7028655 mN |

| Species | Height | Cover | Species | Height | Cover |
|---|---|---|---|---|---|
| *Acacia aptaneura* | 4 | 2 | *Eremophila lachnocalyx* | 0.5 | 0.1 |
| *Enneapogon caerulescens* | 0.2 | 1 | *Ptilotus obovatus* | 0.3 | 0.1 |
| *Eremophila spinosa* | 0.02 | 1 | - | - | - |

| Site: NR05 | Type: Relevé | Size: n/a | Date: 20/04/2020 | Botanist: Carmel Forrester |
|---|---|---|---|---|

| | |
|---|---|
| Landform: | Hill: ridge |
| Slope, aspect: | Moderate, None |
| Soil: | Cream, Brown Sand |
| Rocks: | Granite |
| Abundance: | Abundant |
| Size: | Boulders |
| Fire: | >5 years |
| Condition: | Very Good |
| Notes: | Fauna (Rabbit), Grazing (Low) |
| Veg Unit: | S1 |
| Location: | 50J 634351 mE 7028324 mN |

| Species | Height | Cover | Species | Height | Cover |
|---|---|---|---|---|---|
| *Acacia aptaneura* | 3 | 5 | *Ptilotus helipteroides* | 0.2 | 0.1 |
| *Enneapogon caerulescens* | 0.3 | 1 | *Ptilotus obovatus* | 0.2 | 1 |
| *Euphorbia australis var. subtomentosa* | 0.2 | 0.1 | *Senna artemisioides* subsp. ?*oligophylla* | 1 | 2 |

| Site: NR06 | Type: Relevé | Size: n/a | Date: 20/04/2020 | Botanist: Carmel Forrester |
|---|---|---|---|---|

| | |
|---|---|
| Landform: | Flat: plain |
| Slope, aspect: | Gentle, None |
| Soil: | Red Sandy Clay |
| Rocks: | Granite, Ironstone |
| Abundance: | Abundant |
| Size: | Medium Gravel |
| Fire: | >5 years |
| Condition: | Very Good |
| Notes: | Tracks |
| Veg Unit: | F2 |
| Location: | 50J 632938 mE 7026772 mN |

| Species | Height | Cover | Species | Height | Cover |
|---|---|---|---|---|---|
| *Acacia synchronicia* | 2 | 2 | *Rhagodia drummondii* | 1 | 0.1 |
| *Aristida contorta* | 0.2 | 0.1 | *Senna glutinosa* | 1.5 | 3 |
| *Enneapogon caerulescens* | 0.2 | 0.1 | *Solanum lasiophyllum* | 0.2 | 0.1 |
| *Euphorbia drummondii* | 0.02 | 0.1 | *Tribulus occidentalis* | 0.05 | 0.1 |
| *Ptilotus obovatus* | 0.5 | 0.5 | - | - | - |

| Site: NR07 | Type: Relevé | Size: n/a | Date: 20/04/2020 | Botanist: Carmel Forrester |
|---|---|---|---|---|

| | |
|---|---|
| Landform: | Drainage: drainage line on flat |
| Slope, aspect: | Moderate, South |
| Soil: | Red, Orange Sandy Loam |
| Rocks: | Quartz, Ironstone |
| Abundance: | Abundant |
| Size: | Cobbles |
| Fire: | 2-5 years |
| Condition: | Very Good |
| Notes: | Grazing (Low) |
| Veg Unit: | D1 |
| Location: | 50J 632229 mE 7027013 mN |

| Species | Height | Cover | Species | Height | Cover |
|---|---|---|---|---|---|
| *Acacia aptaneura* | 6 | 30 | *Aristida contorta* | 0.2 | 25 |
| *Acacia tetragonophylla* | 3 | 2 | *Dactyloctenium radulans* | 0.2 | 5 |

| Site: NR08 | Type: Relevé | Size: n/a | Date: 21/04/2020 | Botanist: Carmel Forrester |
|---|---|---|---|---|

| | |
|---|---|
| Landform: | Drainage: salt pan |
| Slope, aspect: | Level, - |
| Soil: | Light, Orange, White Clay |
| Rocks: | No rocks |
| Abundance: | - |
| Size: | - |
| Fire: | >5 years |
| Condition: | Excellent |
| Notes: | Tracks |
| Veg Unit: | D2 |
| Location: | 50J 635216 mE 7025959 mN |

| Species | Height | Cover | Species | Height | Cover |
|---|---|---|---|---|---|
| *Dysphania plantaginella* | 0.2 | 0.1 | *Tecticornia pergranulata* subsp. *pergranulata* | 0.2 | 2 |
| *Eragrostis pergracilis* | 0.2 | 1 | *Tecticornia* sp. 1 | 0.3 | 5 |
| *Heliotropium curassavicum* | 0.0.5 | 0.1 | *Tecticornia* sp. 2 | 0.2 | 2 |
| *Tecticornia peltata* | 0.4 | 7 | *Tecticornia* sp. nov. | 0.2 | 1 |

| Site: NR09 | Type: Relevé | Size: n/a | Date: 21/04/2020 | Botanist: Carmel Forrester |
|---|---|---|---|---|

| | |
|---|---|
| Landform: | Hill: crest |
| Slope, aspect: | Gentle, None |
| Soil: | Red, Orange, Sandy Clay |
| Rocks: | Granite, Quartz |
| Abundance: | Abundant |
| Size: | Cobbles |
| Fire: | >5 years |
| Condition: | Very Good |
| Notes: | Grazing (Low) |
| Veg Unit: | S1 |
| Location: | 50J 635266 mE 7026395 mN |

| Species | Height | Cover | Species | Height | Cover |
|---|---|---|---|---|---|
| *Acacia aptaneura* | 4 | 2 | *Eremophila macmillaniana* | 1.5 | 3 |
| *Aristida contorta* | 0.2 | 1 | *Senna artemisioides* subsp. *helmsii* | 1 | 2 |

| Site: NR10 | Type: Relevé | Size: n/a | Date: 21/04/2020 | Botanist: Carmel Forrester |
|---|---|---|---|---|
| Landform: | Drainage: drainage line on flat | | | |
| Slope, aspect: | Gentle, None | | | |
| Soil: | Light, Red, Orange Sandy Clay-Loam | | | |
| Rocks: | Granite, Quartz | | | |
| Abundance: | Few | | | |
| Size: | Coarse Gravel | | | |
| Fire: | 2-5 years | | | |
| Condition: | Good | | | |
| Notes: | Grazing (Medium), Tracks, Weeds (Low) | | | |
| Veg Unit: | D1 | | | |
| Location: | 50J 635086 mE 7028620 mN | | | |

| Species | Height | Cover | Species | Height | Cover |
|---|---|---|---|---|---|
| *Acacia aptaneura* | 7 | 30 | *Eremophila pantonii* | 2 | 6 |
| *Acacia caesaneura* | 5 | 18 | *Eremophila youngii* subsp. *youngii* | 2 | 3 |
| *Acacia sclerosperma* subsp. *sclerosperma* | 2 | 1 | *Maireana ?planifolia* | 1 | 0.5 |
| *Dactyloctenium radulans* | 0.1 | 5 | *Maireana* sp. 2 | 0.3 | 1 |

# Appendix C: Flora Likelihood of Occurrence

| Status | Family | Taxon | Description | Habitat | Closest Record to Project (km) | Likelihood |
|---|---|---|---|---|---|---|
| P3 | Fabaceae | *Acacia burrowsiana* | Stout shrub or tree, to 5 m high, bark grey, fibrous, fissured, smooth on upper branches; phyllodes sub-rigid, sub-glaucous, erect, coarsely pungent | Red-brown loams with ironstone rubble on surface, calcrete soils, laterite, quartz. Flats adjacent to watercourses, crests of low rises, breakaways | 59.4 | Low |
| P3 | Fabaceae | *Acacia sclerosperma subsp. glaucescens* | Spreading shrub, 1-3 m high, branchlets puberulous, sometimes glabrous. Fl. yellow | Sand, sandy loam, stony soils | 0.0 | Recorded |
| P4 | Fabaceae | *Acacia speckii* | Bushy, rounded shrub or tree, 1.5-3 m high | Rocky soils over granite, basalt or dolerite. Rocky hills or rises. | 10.6 | Medium |
| P2 | Elatinaceae | *Bergia auriculata* | Prostrate perennial, herb | Clay soils. Mud flats. | 62.4 | Low |
| P1 | Elatinaceae | *Beyeria lapidicola* | Shrub to 1 m. | Plain with a currently dry creek bed. Red-orange sandy clay, fine gravel. Ferrous. No evidence of fire. Good condition. Old track runs through centre of site. | 52.8 | Low |
| P3 | Myrtaceae | *Calytrix verruculosa* | Shrub, 0.4-0.75 m high. Fl. pink/white | Sandy clay. | 18.7 | High |
| P4 | Sapindaceae | *Dodonaea amplisemina* | Dioecious, multi-stemmed shrub, 0.3-1 m high | Red-brown sandy clay on basalt and gabbro and banded ironstone or on dolerite and quartzite. Rocky hills. | 26.3 | Low |
| P3 | Rutaceae | *Drummondita miniata* | Divaricately branched shrub, 0.5-2 m high. Fl. orange-red | Laterite. Breakaways. | 32.7 | Low |
| P3 | Poaceae | *Eragrostis sp. Erect spikelets (P.K. Latz 2122)* | Caespitose grass 31cm high | Calcrete platform. | 20.8 | Low |
| P3 | Poaceae | *Eremophila arachnoides subsp. arachnoides* | Shrub 1.7 m tall. Flowers pale lilac. | On shallow brown loams over limestone. | 63.3 | Low |
| P3 | Scrophulariaceae | *Eremophila fasciata* | Erect shrub, 0.6-0.9 m high. Fl. blue-violet | Growing from base to top of hillside, more up gullies. Brown / red ironstone gravel. | 30.7 | Medium |
| P1 | Scrophulariaceae | *Eremophila retropila* | Spreading shrub, 0.7-1.7 m high, to 4.2 m wide. Fl. purple-red-white | Gravelly loam. Stony flats. | 24.6 | Medium |
| Threatened | Scrophulariaceae | *Eremophila rostrata subsp. rostrata* | Shrub, to 3 m high, with a three-parted leaf apex | Hard, light brown, sandy loams, granite. | 57.8 | Low |
| P4 | Goodeniaceae | *Goodenia berringbinensis* | Ascending annual, herb, 0.1-0.3 m high. Fl. yellow | Red sandy loam. Along watercourses. | 55.8 | Low |
| P4 | Proteaceae | *Grevillea inconspicua* | Intricately branched, spreading shrub, 0.6-2 m high. Fl. white/pink-white, Jun to Aug. | Loam, gravel. Along drainage lines on rocky outcrops, creeklines. | 33.3 | Medium |
| P3 | Lamiaceae | *Hemigenia virescens* | Dwarf shrub 40 cm high. | Sand banks. | 18.0 | Medium |
| P3 | Malvaceae | *Hibiscus krichauffianus* | ow or ascending shrub, (0.03-)0.2-0.7 m high. Fl. purple-pink | Red sandy soils. | 64.8 | Low |

| Status | Family | Taxon | Description | Habitat | Closest Record to Project (km) | Likelihood |
|---|---|---|---|---|---|---|
| P3 | Myrtaceae | *Homalocalyx echinulatus* | Shrub, 0.45-1 m high. Fl. pink | Laterite. Breakaways, sandstone hills. | 34.0 | Medium |
| P1 | Brassicaceae | *Lepidium xylodes* | Erect shrub, 0.4-1.5 m high, stems becoming spinescent. Fl. white/cream | Gravelly loam, clayey sand. | 64.8 | Low |
| P3 | Brassicaceae | *Menkea draboides* | Prostrate, spreading annual, herb, to 0.6 m wide. Fl. white/cream | Red sand or clay, granite. | 42.0 | Low |
| P3 | Myrtaceae | *Micromyrtus placoides* | Shrub, 0.5-2.3 m high, sometimes widely spreading with several stems or branches from the base | Red-orange sandy clay, orange-yellow sandy clay to clayey loam, coarse gravel, banded ironstone, laterite, quartz, basalt. Gently undulating plains, dry creek beds, hillcrests, ridges. | 53.7 | Low |
| P3 | Proteaceae | *Petrophile pauciflora* | Shrub, ca 1 m high. Fl. yellow | Decaying & dissected granite breakaways. | 46.7 | Low |
| P3 | Lamiaceae | *Prostanthera ferricola* | Erect, openly-branched shrub, 0.3-1 m high | Shallow red-brown skeletal sandy loam on banded ironstone, laterite, basalt or quartz. Gently inclined mid to upper slopes of hills, rocky crests, outcrops. | 68.3 | Low |
| P3 | Lamiaceae | *Prostanthera petrophila* | Spreading shrub, 0.6-1.5 m high. Fl. white | Lateritic soils. | 50.6 | Low |
| P1 | Amaranthaceae | *Ptilotus actinocladus* | Prostrate annual herb with glabrescent stems and leaves | | 64.8 | Low |
| P3 | Amaranthaceae | *Ptilotus beardii* | Compact, perennial shrub, 0.15-0.5 m high, leaves linear, 2-10 mm long, 0.5-3 mm wide; spike pink, hemispherical, 15-30 mm long, 20-40 mm wide, 5-8 -flowered; tepals 14-17 mm long; 2 fertile stamens, staminodes 3; ovary glabrous; style slightly curved, 9.9-11.1 mm long, eccentrically fixed to ovary. Fl. pink-red | Clayey soils. Saline flats, low breakaways | 42.7 | Low |
| P3 | Amaranthaceae | *Ptilotus lazaridis* | Herb or shrub, to 0.6 m high. Fl. pink/red | Clay loam. Floodplains. Calcrete. | 7.7 | Low |
| P3 | Amaranthaceae | *Ptilotus luteolus* | Shrub to 18 inches. | On hillslopes. | 20.9 | Medium |
| P1 | Asteraceae | *Rhodanthe sphaerocephala* | Erect annual, herb, to 0.25 m high, with ascending branches | Clayey loam. On flats. | 64.8 | Low |
| P3 | Phyllanthaceae | *Sauropus sp. Woolgorong (M. Officer s.n. 10/8/94)* | Shrub, 0.3-1 m high. Fl. yellow | Red sand. Plains. | 55.0 | Low |
| P3 | Malvaceae | *Sida picklesiana* | Compact shrub with yellow flowers growing up to 1 m tall. | Breakaway scree slope. | 39.3 | Low |

| Status | Family | Taxon | Description | Habitat | Closest Record to Project (km) | Likelihood |
|---|---|---|---|---|---|---|
| P1 | Rhamnaceae | *Stenanthemum mediale* | Erect shrub, ca 0.35 m high, leaves entire | Red clayey sand. | 51.7 | Low |
| P3 | Chenopodiaceae | *Tecticornia cymbiformis* | Erect, perennial shrub, 0.3-0.5 m high | Saline soils. Along the edge of creeklines. | 5.0 | High |
| P3 | Zygophyllaceae | *Tribulus adelacanthus* | Prostrate herb, plants villous; leaflet pairs 3-6; fruits 5-winged, lacking spines, 10-14 mm high. | Rocky hills and hillslopes with rocky soils over granite. | 26.4 | Low |
| P3 | Myrtaceae | *Verticordia jamiesonii* | Shrub, 0.2-0.6 m high. Fl. white/pink | Sandy clay soils. Lateritic breakaways. | 51.9 | Low |

# Appendix D: Flora Species List

| Family | Taxon | Comment & Significance |
|---|---|---|
| Amaranthaceae | *Ptilotus exaltatus* | - |
| | *Ptilotus helipteroides* | - |
| | *Ptilotus obovatus* | - |
| | *Ptilotus roei* | - |
| Boraginaceae | *Heliotropium curassavicum* | - |
| Chenopodiaceae | *Atriplex codonocarpa* | - |
| | *Dysphania plantaginella* | - |
| | *Eremophea spinosa* | - |
| | *Maireana ?planifolia* | Inadequate material (sterile) |
| | *Maireana ?villosa* | Inadequate material (sterile) |
| | *Maireana* sp. 1 | Inadequate material (sterile) |
| | *Maireana* sp. 2 | Inadequate material (sterile) |
| | *Rhagodia drummondii* | Range extension |
| | *Sclerolaena cuneata* | - |
| | *Tecticornia doliiformis* | - |
| | *Tecticornia peltata* | - |
| | *Tecticornia pergranulata* subsp. *pergranulata* | - |
| | *Tecticornia* sp. 1 | Inadequate material (sterile) |
| | *Tecticornia* sp. 2 | Inadequate material (sterile) |
| | *Tecticornia* sp. 3 | Inadequate material (sterile) |
| | *Tecticornia* sp. 4 | Inadequate material (sterile) |
| | *Tecticornia* sp. nov. | Possible new species (affinity to *Tecticornia undulata*) |
| Cleomaceae | *Cleome viscosa* | - |
| Cucurbitaceae | *Citrullus colocynthis* | Range extension; Weed |
| Euphorbiaceae | *Euphorbia australis* var. *subtomentosa* | - |
| | *Euphorbia drummondii* | - |
| Fabaceae | *Acacia ?demissa* | Inadequate material |
| | *Acacia aptaneura* | - |
| | *Acacia caesaneura* | - |
| | *Acacia grasbyi* | - |
| | *Acacia macraneura* | - |
| | *Acacia pteraneura* | - |
| | *Acacia sclerosperma* subsp. *sclerosperma* | - |
| | *Acacia synchronicia* | - |
| | *Acacia tetragonophylla* | - |
| | *Senna artemisioides* subsp. *?oligophylla* | - |
| | *Senna artemisioides* subsp. *helmsii* | - |
| | *Senna glutinosa* | - |
| Frankeniaceae | *Frankenia laxiflora* | - |
| Goodeniaceae | *Goodenia tenuiloba* | - |
| | *Scaevola spinescens* | - |

| Family | Taxon | Comment & Significance |
|---|---|---|
| Malvaceae | *Abutilon* ?sp. Dioicum (A.A. Mitchell PRP 1618) | Inadequate material (sterile) |
| | *Abutilon cryptopetalum* | - |
| | *Hibiscus* sp. Gardneri (A.L. Payne PRP 1435) | - |
| Myrtaceae | *Melaleuca xerophila* | - |
| Pittosporaceae | *Pittosporum angustifolium* | - |
| Poaceae | *Aristida contorta* | - |
| | *Cenchrus ciliaris* | Weed |
| | *Cenchrus setiger* | Weed |
| | *Dactyloctenium radulans* | - |
| | *Dichanthium sericeum* subsp. *humilius* | - |
| | *Enneapogon caerulescens* | - |
| | *Eragrostis dielsii* | - |
| | *Eragrostis pergracilis* | - |
| | *Eragrostis xerophila* | - |
| | *Setaria dielsii* | - |
| Portulacaceae | *Portulaca oleracea* | - |
| Proteaceae | *Hakea leucoptera* subsp. *sericipes* | Range Extension |
| | *Hakea preissii* | - |
| Santalaceae | *Exocarpos aphyllus* | - |
| | *Santalum lanceolatum* | - |
| Scrophulariaceae | *Eremophila fraseri* subsp. *fraseri* | - |
| | *Eremophila lachnocalyx* | - |
| | *Eremophila macmillaniana* | - |
| | *Eremophila pantonii* | - |
| | *Eremophila youngii* subsp. *youngii* | - |
| Solanaceae | *Solanum lasiophyllum* | - |
| Zygophyllaceae | *Tribulus occidentalis* | Range Extension |
| | *Tribulus suberosus* | - |

# Appendix E: Fauna Species List

| | | Conservation status | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | EPBC Act | BC Act | DBCA | Naturemap | DBCA | PMST | Weld Range (ecologia 2009b) | Jack Hills (MBS 2005) | Jack Hills (ecologia 2009a) | This Survey |
| **Mammals** | | | | | | | | | | | |
| **Tachyglossidae** | | | | | | | | | | | |
| *Tachyglossus aculeatus* | Short-beaked Echidna | | | | X | | | X | X | X | |
| **Dasyuridae** | | | | | | | | | | | |
| *Antechinomys laniger* | Kultarr | | | | X | | | X | | | |
| *Dasykaluta rosamondae* | Little Red Kaluta | | | | X | | | | | | |
| *Ningaui ridei* | Wongai Ningaui | | | | | | | X | | | |
| *Pseudantechinus woolleyae* | Woolley's Pseudantechinus | | | | X | | | X | X | X | |
| *Sminthopsis crassicaudata* | Fat-tailed Dunnart | | | | X | | | | | | |
| *Sminthopsis dolichura* | Little Long-tailed Dunnart | | | | | | | X | | | |
| *Sminthopsis longicaudata* | Long-tailed Dunnart | | | P4 | X | X | | X | X | X | |
| *Sminthopsis macroura* | Stripe-faced Dunnart | | | | X | | | X | X | X | |
| **Macropodidae** | | | | | | | | | | | |
| *Osphranter robustus* | Euro | | | | X | | | X | X | X | |
| *Osphranter rufus* | Red Kangaroo | | | | X | | | X | X | X | X |
| **Muridae** | | | | | | | | | | | |
| *Notomys alexis* | Spinifex Hopping-mouse | | | | X | | | X | X | X | |
| *Pseudomys desertor* | Desert Mouse | | | | X | | | | | | |
| *Pseudomys hermannsburgensis* | Sandy Inland Mouse | | | | X | | | X | X | X | |
| **Emballonuridae** | | | | | | | | | | | |
| *Taphozous hilli* | Hill's Sheathtail-bat | | | | X | | | X | | | |
| **Molossidae** | | | | | | | | | | | |

| | | Conservation status | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | EPBC Act | BC Act | DBCA | Naturemap | DBCA | PMST | Weld Range (ecologia 2009b) | Jack Hills (MBS 2005) | Jack Hills (ecologia 2009a) | This Survey |
| *Austronomus australis* | White-striped Free-tailed Bat | | | | | | | X | X | X | |
| **Vespertilionidae** | | | | | | | | | | | |
| *Chalinolobus gouldii* | Gould's Wattled Bat | | | | X | | | X | | X | |
| *Nyctophilus geoffroyi* | Lesser Long-eared Bat | | | | X | | | X | | | |
| *Scotorepens balstoni* | Inland Broad-nosed Bat | | | | X | | | X | | X | |
| *Vespadelus finlaysoni* | Finlayson's Cave Bat | | | | X | | | X | | X | |
| **Introduced Mammals** | | | | | | | | | | | |
| **Camelidae** | | | | | | | | | | | |
| *Camelus dromedarius* | Camel | | | | | | X | | | | |
| **Bovidae** | | | | | | | | | | | |
| *Bos taurus* | European Cattle | | | | X | | | X | | | X |
| *Capra hircus* | Goat | | | | X | | X | X | | X | |
| **Felidae** | | | | | | | | | | | |
| *Felis catus* | Cat | | | | X | | X | X | | | X |
| **Canidae** | | | | | | | | | | | |
| *Canis lupus familiaris* | Dog | | | | | | X | X | | | |
| *Vulpes vulpes* | Red Fox | | | | X | | X | X | | | |
| **Leporidae** | | | | | | | | | | | |
| *Oryctolagus cuniculus* | Rabbit | | | | X | | X | X | | | X |
| **Muridae** | | | | | | | | | | | |
| *Mus musculus* | House Mouse | | | | | | | X | X | | |
| **Birds** | | | | | | | | | | | |

| | | Conservation status | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | EPBC Act | BC Act | DBCA | Naturemap | DBCA | PMST | Weld Range (ecologia 2009b) | Jack Hills (MBS 2005) | Jack Hills (ecologia 2009a) | This Survey |
| **Dromaiidae** | | | | | | | | | | | |
| *Dromaius novaehollandiae* | Emu | | | | X | | | X | X | X | X |
| **Anatidae** | | | | | | | | | | | |
| *Cygnus atratus* | Black Swan | | | | X | | | | | | X |
| *Stictonetta naevosa* | Freckled Duck | | | | X | | | | | | |
| *Tadorna tadornoides* | Australian Shelduck | | | | X | | | | | | X |
| *Malacorhynchus membranaceus* | Pink-eared Duck | | | | X | | | | | | |
| *Chenonetta jubata* | Australian Wood Duck | | | | X | | | | | | |
| *Anas superciliosa* | Pacific Black Duck | | | | X | | | | | | |
| *Anas gracilis* | Grey Teal | | | | X | | | | | | X |
| *Anas rhynchotis* | Australian Shoveler | | | | X | | | | | | |
| *Aythya australis* | Hardhead | | | | X | | | | | | |
| *Oxyura australis* | Blue-billed Duck | | | P4 | | X | | | | | |
| *Biziura lobata* | Musk Duck | | | | X | | | | | | X |
| **Megapodiidae** | | | | | | | | | | | |
| *Leipoa ocellata* | Malleefowl | VU | VU | | X | X | X | S | | | |
| **Podicipedidae** | | | | | | | | | | | |
| *Poliocephalus poliocephalus* | Hoary-headed Grebe | | | | X | | | | | | |
| *Tachybaptus novaehollandiae* | Australasian Grebe | | | | X | | | | | | |
| **Threskiornithidae** | | | | | | | | | | | |
| *Threskiornis spinicollis* | Straw-necked Ibis | | | | X | | | | | | |
| *Threskiornis falcinellus* | Glossy Ibis | MI | MI | | | X | | | | | |

| | | Conservation status | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | EPBC Act | BC Act | DBCA | Naturemap | DBCA | PMST | Weld Range (ecologia 2009b) | Jack Hills (MBS 2005) | Jack Hills (ecologia 2009a) | This Survey |
| *Platalea flavipes* | Yellow-billed Spoonbill | | | | X | | | X | | | |
| **Ardeidae** | | | | | | | | | | | |
| *Ardea modesta* | Eastern Great Egret | | | | X | | | | | | |
| *Ardea novaehollandiae* | White-faced Heron | | | | X | | | | | | |
| *Ardea pacifica* | White-necked Heron | | | | X | | | | | | |
| **Pelecanidae** | | | | | | | | | | | |
| *Pelecanus conspicillatus* | Australian Pelican | | | | X | | | | | | |
| **Phalacrocoracidae** | | | | | | | | | | | |
| *Phalacrocorax sulcirostris* | Little Black Cormorant | | | | X | | | | | | |
| **Accipitridae** | | | | | | | | | | | |
| *Accipiter cirrocephalus* | Collared Sparrowhawk | | | | X | | | X | | X | |
| *Accipiter fasciatus* | Brown Goshawk | | | | X | | | X | X | X | |
| *Hieraaetus morphnoides* | Little Eagle | | | | X | | | | | | |
| *Aquila audax* | Wedge-tailed Eagle | | | | X | | | X | X | X | X |
| *Circus approximans* | Swamp Harrier | | | | X | | | | | | |
| *Circus assimilis* | Spotted Harrier | | | | X | | | | | | |
| *Elanus caeruleus* | Black-shouldered Kite | | | | | | | | | X | |
| *Haliastur sphenurus* | Whistling Kite | | | | X | | | X | X | X | X |
| *Hamirostra melanosternon* | Black-breasted Buzzard | | | | X | | | X | X | X | |
| *Milvus migrans* | Black Kite | | | | X | | | | | | |
| **Otididae** | | | | | | | | | | | |
| *Ardeotis australis* | Australian Bustard | | | | X | | | | | | |

| | | Conservation status | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | EPBC Act | BC Act | DBCA | Naturemap | DBCA | PMST | Weld Range (ecologia 2009b) | Jack Hills (MBS 2005) | Jack Hills (ecologia 2009a) | This Survey |
| **Rallidae** | | | | | | | | | | | |
| *Porzana fluminea* | Australian Spotted Crake | | | | X | | | | | | |
| *Fulica atra* | Eurasian Coot | | | | X | | | | | | |
| *Tribonyx ventralis* | Black-tailed Native-hen | | | | X | | | | | | |
| **Turnicidae** | | | | | | | | | | | |
| *Turnix velox* | Little Button-quail | | | | X | | | X | | X | |
| **Burhinidae** | | | | | | | | | | | |
| *Burhinus grallarius* | Bush Stone-curlew | | | | | | | X | X | | |
| **Recurvirostridae** | | | | | | | | | | | |
| *Cladorrhynchus leucocephalus* | Banded Stilt | | | | X | | | | | | |
| *Himantopus himantopus* | Black-winged Stilt | | | | X | | | | | | |
| *Recurvirostra novaehollandiae* | Red-necked Avocet | | | | X | | | | | | |
| **Charadriidae** | | | | | | | | | | | |
| *Vanellus tricolor* | Banded Lapwing | | | | X | | | | | | |
| *Erythrogonys cinctus* | Red-kneed Dotterel | | | | X | | | | | | |
| *Peltohyas australis* | Inland Dotterel | | | | X | | | | | | |
| *Charadrius ruficapillus* | Red-capped Plover | | | | X | | | | | | |
| *Charadrius veredus* | Oriental Plover | MI | MI | | | | X | | | | |
| *Thinornis cucullatus* | Hooded Plover | | | P4 | | X | | | | | |
| *Elseyornis melanops* | Black-fronted Dotterel | | | | X | | | | | | |
| **Scolopacidae** | | | | | | | | | | | |
| *Actitis hypoleucos* | Common Sandpiper | MI | MI | | | X | X | | | | |

| | | Conservation status | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | EPBC Act | BC Act | DBCA | Naturemap | DBCA | PMST | Weld Range (ecologia 2009b) | Jack Hills (MBS 2005) | Jack Hills (ecologia 2009a) | This Survey |
| *Calidris ruficollis* | Red-necked Stint | MI | MI | | | X | | | | | |
| *Calidris acuminata* | Sharp-tailed Sandpiper | MI | MI | | | X | X | | | | |
| *Calidris melanotos* | Pectoral Sandpiper | MI | MI | | X | X | X | | | | |
| *Calidris ferruginea* | Curlew Sandpiper | CR & MI | CR | | | X | X | | | | |
| *Tringa stagnatilis* | Marsh Sandpiper | MI | MI | | | X | | | | | |
| *Tringa nebularia* | Common Greenshank | MI | MI | | | X | X | | | | |
| *Tringa glareola* | Wood Sandpiper | MI | MI | | X | X | | | | | |
| Laridae | | | | | | | | | | | |
| *Larus novaehollandiae* subsp. *novaehollandiae* | Silver Gull | | | | X | | | | | | |
| *Sterna nilotica* | Gull-billed Tern | MI | MI | | X | X | | | | | |
| *Sterna caspia* | Caspian Tern | MI | MI | | | X | | | | | |
| *Sterna hybrida* subsp. *javanica* | Whiskered Tern | | | | X | | | | | | |
| *Sterna leucoptera* | White-winged Black Tern | MI | MI | | | X | | | | | |
| Columbidae | | | | | | | | | | | |
| **Columba livia* | Domestic Pigeon | | | | X | | X | | | | |
| *Geopelia cuneata* | Diamond Dove | | | | X | | | X | X | X | |
| *Geopelia striata* | Zebra Dove | | | | X | | | | | | |
| *Ocyphaps lophotes* | Crested Pigeon | | | | X | | | X | X | X | |
| *Phaps chalcoptera* | Common Bronzewing | | | | X | | | X | X | X | |
| Cuculidae | | | | | | | | | | | |

| | | Conservation status | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | EPBC Act | BC Act | DBCA | Naturemap | DBCA | PMST | Weld Range (ecologia 2009b) | Jack Hills (MBS 2005) | Jack Hills (ecologia 2009a) | This Survey |
| *Chrysococcyx basalis* | Horsfield's Bronze Cuckoo | | | | X | | | X | | | |
| *Chrysococcyx osculans* | Black-eared Cuckoo | | | | | | | X | | | |
| *Cacomantis pallidus* | Pallid Cuckoo | | | | X | | | X | | | |
| **Strigidae** | | | | | | | | | | | |
| *Ninox novaeseelandiae* | Southern Boobook | | | | | | | X | | | |
| **Podargidae** | | | | | | | | | | | |
| *Podargus strigoides* | Tawny Frogmouth | | | | X | | | X | | X | |
| **Caprimulgidae** | | | | | | | | | | | |
| *Eurostopodus argus* | Spotted Nightjar | | | | X | | | X | X | X | |
| **Aegothelidae** | | | | | | | | | | | |
| *Aegotheles cristatus* | Australian Owlet-nightjar | | | | X | | | X | X | X | |
| **Apodidae** | | | | | | | | | | | |
| *Apus pacificus* | Pacific (Fork-tailed) Swift | MI | MI | | | X | X | | | | |
| **Alcedinidae** | | | | | | | | | | | |
| *Todiramphus pyrrhopygius* | Red-backed Kingfisher | | | | X | | | | X | X | |
| *Todiramphus sanctus* | Sacred Kingfisher | | | | X | | | | | | |
| **Meropidae** | | | | | | | | | | | |
| *Merops ornatus* | Rainbow Bee-eater | | | | X | | | | | | |
| **Falconidae** | | | | | | | | | | | |
| *Falco berigora* | Brown Falcon | | | | X | | | X | X | X | X |
| *Falco cenchroides* | Australian Kestrel | | | | X | | | X | X | X | |
| *Falco hypoleucos* | Grey Falcon | | VU | | X | X | | | | | |

| | | Conservation status | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | EPBC Act | BC Act | DBCA | Naturemap | DBCA | PMST | Weld Range (ecologia 2009b) | Jack Hills (MBS 2005) | Jack Hills (ecologia 2009a) | This Survey |
| *Falco longipennis* | Australian Hobby | | | | X | | | X | X | | |
| *Falco peregrinus* | Peregrine Falcon | | OS | | X | X | | X | X | | |
| **Cacatuidae** | | | | | | | | | | | |
| *Cacatua roseicapilla* | Galah | | | | X | | | X | X | X | |
| *Cacatua sanguinea* | Little Corella | | | | X | | | | | | |
| *Nymphicus hollandicus* | Cockatiel | | | | X | | | X | | X | X |
| **Psittacidae** | | | | | | | | | | | |
| *Platycercus varius* | Mulga Parrot | | | | X | | | X | | X | |
| *Platycercus zonarius* | Australian Ringneck | | | | X | | | X | X | X | |
| *Neophema bourkii* | Bourke's Parrot | | | | X | | | X | | | |
| *Neophema elegans* | Elegant Parrot | | | | X | | | X | | | |
| *Melopsittacus undulatus* | Budgerigar | | | | X | | | X | X | X | |
| *Pezoporus occidentalis* | Night Parrot | EN | CR | | | | X | | | | |
| **Ptilonorhynchidae** | | | | | | | | | | | |
| *Ptilonorhynchus maculatus* | Spotted Bowerbird | | | | X | | | | | | |
| *Ptilonorhynchus maculatus* subsp. *guttatus* | Western Bowerbird | | | | X | | | X | | | |
| **Maluridae** | | | | | | | | | | | |
| *Malurus lamberti* | Variegated Fairy-wren | | | | X | | | X | | X | |
| *Malurus leucopterus* | White-winged Fairy-wren | | | | X | | | X | | | |
| *Malurus splendens* | Splendid Fairy-wren | | | | X | | | X | X | X | X |
| **Meliphagidae** | | | | | | | | | | | |

| | | Conservation status | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | EPBC Act | BC Act | DBCA | Naturemap | DBCA | PMST | Weld Range (ecologia 2009b) | Jack Hills (MBS 2005) | Jack Hills (ecologia 2009a) | This Survey |
| *Certhionyx variegatus* | Pied Honeyeater | | | | X | | | | | | |
| *Acanthagenys rufogularis* | Spiny-cheeked Honeyeater | | | | X | | | X | X | X | X |
| *Lichmera indistincta* | Brown Honeyeater | | | | X | | | | X | | |
| *Conopophila whitei* | Grey Honeyeater | | | | | | | X | | | |
| *Epthianura aurifrons* | Orange Chat | | | | X | | | X | | | |
| *Epthianura tricolor* | Crimson Chat | | | | X | | | X | X | X | |
| *Manorina flavigula* | Yellow-throated Miner | | | | X | | | X | X | X | |
| *Purnella albifrons* | White-fronted Honeyeater | | | | X | | | | | X | |
| *Gavicalis virescens* | Singing Honeyeater | | | | X | | | X | X | X | X |
| *Ptilotula penicillata* | White-plumed Honeyeater | | | | | | | X | | X | |
| Pardalotidae | | | | | | | | | | | |
| *Pardalotus rubricatus* | Red-browed Pardalote | | | | X | | | | | | |
| *Pardalotus striatus* | Striated Pardalote | | | | X | | | | X | X | |
| Acanthizidae | | | | | | | | | | | |
| *Pyrrholaemus brunneus* | Redthroat | | | | X | | | X | X | X | |
| *Smicrornis brevirostris* | Weebil | | | | | | | X | | | |
| *Gerygone fusca* | Western Gerygone | | | | X | | | X | X | X | |
| *Acanthiza apicalis* | Broad-tailed (Inland) Thornbill | | | | X | | | X | X | X | X |
| *Acanthiza chrysorrhoa* | Yellow-rumped Thornbill | | | | X | | | X | X | X | |
| *Acanthiza robustirostris* | Slaty-backed Thornbill | | | | X | | | X | | X | X |
| *Acanthiza uropygialis* | Chestnut-rumped Thornbill | | | | X | | | X | X | X | |
| *Aphelocephala leucopsis* | Southern Whiteface | | | | X | | | X | X | X | |

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| *Aphelocephala nigricincta* | Banded Whiteface | | | | X | | | | | | |
| **Pomatostomidae** | | | | | | | | | | | |
| *Pomatostomus superciliosus* | White-browed Babbler | | | | X | | | X | X | X | |
| *Pomatostomus temporalis* | Grey-crowned Babbler | | | | X | | | X | X | X | X |
| **Psophodidae** | | | | | | | | | | | |
| *Cinclosoma castaneothorax* | Chestnut-breasted Quail-thrush | | | | X | | | X | X | X | |
| *Cinclosoma clarum* | Western Chestnut Quail-thrush | | | | X | | | | | | |
| *Cinclosoma marginatum* | Western Quail-thrush | | | | X | | | | | | |
| *Psophodes occidentalis* | Western Wedgebill | | | | X | | | | X | X | |
| **Artamidae** | | | | | | | | | | | |
| *Artamus personatus* | Masked Woodswallow | | | | X | | | X | | | |
| *Artamus cinereus* | Black-faced Woodswallow | | | | X | | | X | X | X | |
| *Artamus cyanopterus* | Dusky Woodswallow | | | | X | | | | | | |
| *Artamus minor* | Little Woodswallow | | | | X | | | X | X | X | |
| **Cracticidae** | | | | | | | | | | | |
| *Cracticus nigrogularis* | Pied Butcherbird | | | | X | | | X | X | X | X |
| *Cracticus torquatus* | Grey Butcherbird | | | | X | | | X | X | X | |
| *Cracticus tibicen* | Australian Magpie | | | | X | | | X | X | X | |
| Campephagidae | | | | | | | | | | | |
| *Coracina novaehollandiae* | Black-faced Cuckoo-shrike | | | | X | | | X | X | X | |
| *Coracina maxima* | Ground Cuckoo-shrike | | | | X | | | X | | X | |
| *Lalage tricolor* | White-winged Triller | | | | X | | | X | X | X | |

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| **Neosittidae** | | | | | | | | | | | |
| *Daphoenositta chrysoptera* | Varied Sittella | | | | X | | | | X | X | |
| **Pachycephalidae** | | | | | | | | | | | |
| *Colluricincla harmonica* | Grey Shrike-thrush | | | | X | | | X | X | X | |
| *Oreoica gutturalis* | Crested Bellbird | | | | X | | | X | X | X | X |
| *Pachycephala rufiventris* | Rufous Whistler | | | | X | | | X | X | X | X |
| **Rhipiduridae** | | | | | | | | | | | |
| *Rhipidura albiscapa* | Grey Fantail | | | | X | | | X | | | |
| *Rhipidura leucophrys* | Willie Wagtail | | | | X | | | X | X | X | |
| Monarchidae | | | | | | | | | | | |
| *Grallina cyanoleuca* | Magpie-lark | | | | X | | | X | | X | |
| **Corvidae** | | | | | | | | | | | |
| *Corvus bennetti* | Little Crow | | | | X | | | X | X | X | |
| *Corvus orru* | Torresian Crow | | | | X | | | X | X | X | |
| **Petroicidae** | | | | | | | | | | | |
| *Melanodryas cucullata* | Hooded Robin | | | | X | | | X | | X | |
| *Microeca fascinans* | Jacky Winter | | | | X | | | | X | | |
| *Petroica goodenovii* | Red-capped Robin | | | | X | | | X | X | X | X |
| *Megaluridae* | | | | | | | | | | | |
| *Cincloramphus mathewsi* | Rufous Songlark | | | | | | | X | X | X | |
| **Hirundinidae** | | | | | | | | | | | |
| *Cheramoeca leucosterna* | White-backed Swallow | | | | X | | | X | X | | |

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| *Hirundo neoxena* | Welcome Swallow | | | | X | | | X | | | X |
| *Petrochelidon ariel* | Fairy Martin | | | | X | | | X | | | |
| *Petrochelidon nigricans* | Tree Martin | | | | X | | | | X | | |
| **Dicaeidae** | | | | | | | | | | | |
| *Dicaeum hirundinaceum* | Mistletoebird | | | | X | | | X | | | |
| **Estrildidae** | | | | | | | | | | | |
| *Emblema pictum* | Painted Finch | | | | | | | | | X | |
| *Taeniopygia guttata* | Zebra Finch | | | | X | | | X | X | X | X |
| **Motacillidae** | | | | | | | | | | | |
| *Motacilla flava* | Yellow Wagtail | MI | MI | | | | X | | | | |
| *Motacilla cinerea* | Grey Wagtail | MI | MI | | | | X | | | | |
| *Anthus australis* | Australian Pipit | | | | X | | | X | X | X | |
| **Reptiles** | | | | | | | | | | | |
| **Cheluidae** | | | | | | | | | | | |
| *Chelodina steindachneri* | Flat-shelled Turtle | | | | X | | | | | | |
| **Carphodactylidae** | | | | | | | | | | | |
| *Nephrurus vertebralis* | Midline Knob-tailed Gecko | | | | X | | | X | | | |
| *Nephrurus wheeleri* subsp. *wheeleri* | Banded Knob-tailed Gecko | | | | X | | | | | | |
| **Diplodactylidae** | | | | | | | | | | | |
| *Diplodactylus conspicillatus* | Fat-tailed Gecko | | | | | | | | X | | |
| *Diplodactylus pulcher* | Fine-faced Gecko | | | | X | | | X | X | | |
| *Lucasium stenodactylum* | Sandplain Gecko | | | | | | | | X | X | |

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| *Lucasium squarrosum* | | | | | X | | | X | | | |
| *Oedura fimbria* | Western Marbled Velvet Gecko | | | | | | | X | X | X | |
| *Rhynchoedura ornata* | Western Beaked Gecko | | | | X | | | | X | X | |
| *Strophurus strophurus* | | | | | X | | | | X | | |
| *Strophurus wellingtonae* | Western Shield Spiny-tailed Gecko | | | | X | | | X | | | |
| Gekkonidae | | | | | | | | | | | |
| *Gehyra punctata* | Spotted Dtella | | | | | | | X | X | X | |
| *Gehyra variegata* | Variegated Dtella | | | | X | | | X | X | X | |
| *Heteronotia binoei* | Bynoe's Gecko | | | | X | | | X | X | X | |
| Agamidae | | | | | | | | | | | |
| *Gowidon longirostris* | Long-nosed Dragon | | | | | | | X | X | | |
| *Ctenophorus caudicinctus* | Ring-tailed Dragon | | | | X | | | X | X | X | X |
| *Ctenophorus nuchalis* | Central Netted Dragon | | | | X | | | X | X | X | |
| *Ctenophorus isolepis* | Central Military Dragon | | | | X | | | | | | |
| *Ctenophorus reticulatus* | Western Netted Dragon | | | | X | | | X | X | | |
| *Ctenophorus salinarum* | Salt Pan Dragon | | | | X | | | | | | |
| *Ctenophorus scutulatus* | Lozenge-marked Dragon | | | | X | | | X | X | | |
| *Diporiphora amphiboluroides* | Mulga Dragon | | | | X | | | | X | X | |
| *Moloch horridus* | Thorny Devil | | | | | | | X | | | |
| *Pogona minor* | Western Bearded Dragon | | | | | | | X | X | X | |
| *Tympanocryptis pseudosephos* (*prior T. cephalus*) | Goldfields Pebble-mimic Dragon | | | | X | | | X | X | | |

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| **Pygopodidae** | | | | | | | | | | | |
| *Delma australis* | | | | | | | | | | | |
| *Delma butleri* | | | | | | | | | X | | |
| *Pygopus nigriceps* | Western Hooded Scaly-foot | | | | | | | X | | | |
| **Scincidae** | | | | | | | | | | | |
| *Cryptoblepharus buchananii* | | | | | X | | | | | | |
| *Ctenotus helenae* | Clay-soil Ctenotus | | | | X | | | | | | |
| *Ctenotus leonhardii* | | | | | X | | | X | X | | |
| *Ctenotus schomburgkii* | | | | | X | | | X | X | | |
| *Ctenotus severus* | | | | | X | | | X | X | X | |
| *Ctenotus uber* | Spotted Ctenotus | | | | X | | | X | | | |
| *Cyclodomorphus melanops* | Spinifex Slender Blue-tongue | | | | | | | | X | X | |
| *Egernia depressa* | Southern Pygmy Spiny-tailed Skink | | | | X | | | X | X | X | |
| *Eremiascincus richardsonii* | Broad-banded Sand Swimmer | | | | X | | | X | X | | |
| *Lerista bipes* | | | | | X | | | | | | |
| *Lerista desertorum* | | | | | X | | | | | | |
| *Lerista eupoda* | West Coast Mulga Slider/Meekatharra Slider | | | P1 | X | X | | X | | | |
| *Lerista macropisthopus* | | | | | X | | | | | X | |
| *Lerista nichollsi* | | | | | | | | X | | | |
| *Lerista rhodonoides* | | | | | | | | X | X | X | |
| *Lerista timida* | Timid Slider | | | | X | | | | | | |

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| *Menetia greyii* | Common Dwarf Skink | | | | X | | | X | X | X | |
| **Varanidae** | | | | | | | | | | | |
| *Varanus caudolineatus* | Stripe-tailed Pygmy Monitor | | | | X | | | X | X | | |
| *Varanus giganteus* | Perentie | | | | | | | X | | X | |
| *Varanus gouldii* | Bungarra or Sand Monitor | | | | X | | | | | X | |
| *Varanus panoptes* | Yellow-spotted Monitor | | | | X | | | X | X | X | |
| *Varanus tristis* | Black-headed Monitor | | | | | | | X | X | | |
| **Typhlopidae** | | | | | | | | | | | |
| *Ramphotyphlops hamatus* | | | | | | | | X | X | X | |
| **Pythonidae** | | | | | | | | | | | |
| *Antaresia perthensis* | Pygmy Python | | | | X | | | X | X | X | |
| *Antaresia stimsoni* | Stimson's Python | | | | X | | | | | | |
| **Elapidae** | | | | | | | | | | | |
| *Brachyurophis approximans* | NW Shovel-nosed Snake | | | | | | | X | X | | |
| *Demansia psammophis* | Yellow-faced Whipsnake | | | | | | | | | X | |
| *Furina ornata* | Moon Snake | | | | | | | X | | | |
| *Parasuta monachus* | Monk Snake | | | | X | | | X | | | |
| *Pseudechis butleri* | Spotted Mulga Snake | | | | X | | | X | | | |
| *Pseudonaja mengdeni* | Western Brown Snake | | | | X | | | | | X | |
| *Pseudonaja modesta* | Ringed Brown Snake | | | | X | | | X | | | |
| *Simoselaps bertholdi* | Jan's Banded Snake | | | | X | | | | | | |
| *Suta fasciata* | Rosen's Snake | | | | X | | | X | | | |

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| **Amphibians** | | | | | | | | | | | |
| **Hylidae** | | | | | | | | | | | |
| *Cyclorana maini* | Sheep Frog | | | | X | | | | X | | |
| *Cyclorana platycephala* | Water-holding Frog | | | | X | | | | X | | |
| *Litoria rubella* | Little Red Tree Frog | | | | X | | | X | X | | |
| **Limnodynastidae** | | | | | | | | | | | |
| *Neobatrachus sutor* | Shoemaker Frog | | | | X | | | | | | |
| *Platyplectrum spenceri* | Centralian Burrowing Frog | | | | X | | | | X | | |
| **Invertebrates** | | | | | | | | | | | |
| **Thamnocephalidae** | | | | | | | | | | | |
| *Branchinella simplex* | Fairy Shrimp | | | P1 | X | X | | | | | |
| **Idiopidae** | | | | | | | | | | | |
| *Idiosoma clypeatum* | Northern Shield-backed Trapdoor Spider | | | P3 | | X | | | | | |
| *Idiosoma nigrum* | Shield-backed Trapdoor Spider | VU | EN | | | | X | | | | |