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Four-phase short-range endemic invertebrate fauna survey for the Worsley Mine Expansion Project

Prepared for South32 Worsley Alumina Pty Ltd

September 2023

Final Report

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Table of Abbreviations

Abbreviation	Description
ALA	Atlas of Living Australia
ALUM	Australian Land Use and Management
BBM	Boddington Bauxite Mine
BGM	Boddington Gold Mine
BC Act	*Biodiversity Conservation Act 2019*
BoM	Bureau of Meteorology
BTC	Bauxite Transport Corridor
CBME	Contingency Bauxite Mining Envelope
COI	Cytochrome Oxidase Subunit I
DBCA	Department of Biodiversity Conservation and Attractions
DE	Development Envelope
DWER	Department of Water and Environmental Regulation
EIA	Environmental impact assessment
EP Act	*Environmental Protection Act 1986*
EPA	Environmental Protection Authority
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
ERD	Environmental Review Document
ESA	Environmentally Sensitive Areas
ESD	Environmental Scoping Document
IBRA	Interim Biogeographic Regionalisation of Australia
IDF	Indicative Disturbance Footprint
JAF01	IBRA region “Northern Jarrah Forest”
MNES	Matters of national environmental significance
OES	Outback Ecology Services

Abbreviation	Description
PAA	Primary Assessment Area
PBA	Primary Bauxite Area
PHR	Potential Habitat Rating
RLA	Refinery Lease Area
SCP	Swan Coastal Plain
SRE	Short-range endemic
WA	Western Australia
WAM	Western Australian Museum
WMDE	Worsley Mine Development Envelope
WME	Worsley Mine Expansion

1 INTRODUCTION

This report documents the results of a four-phase short-range endemic (SRE) invertebrate fauna survey conducted for the Worsley Mine Expansion (WME) Proposal (the 'Proposal') in 2019 and 2020. South32 Worsley Alumina Pty Ltd (South32) operates the Worsley Bauxite-Alumina Project (the Project), located in the southwest of Western Australia (WA), which includes the Boddington Bauxite Mine (BBM) near Boddington and the Worsley Refinery (the Refinery) near Collie (Figure 1-1).

The Proposal seeks to expand existing mining activities at the BBM and the Refinery. Specifically, the WME is for the:

- expansion of the existing mining areas at the BBM
- development of a bauxite transport corridor
- development of a contingency mining area and maintenance work at the Refinery
- development of associated mine/support infrastructure.

The Proposal includes activities being undertaken in three Development Envelopes (Table 1-1; Figure 1-1):

- Worsley Mining Development Envelope (WMDE)
- Bauxite Transport Corridor (BTC)
- Contingency Bauxite Mining Envelope (CBME).

Collectively, the Development Envelopes are referred to as the Primary Assessment Area (PAA).

Table 1-1 Description and area of each of the Proposal elements

Component	Description	Area (ha)
WMDE	Bauxite mine expansion.	27,796
BTC	Bauxite transport corridor within existing and proposed BBM active mining areas.	4,146^
CBME	May be required if bauxite supply is disrupted (e.g., catastrophic failure or other impacts) resulting in low bauxite inventory at the Refinery. Clearing for maintenance requirements may also occur in the CBME.	747
PAA	Incorporating the WMDE, BTC and CBME.	29,357[+]

^ 3,332 ha of the BTC is overlapped by the WMDE.
[+] The overlap between the WMDE and BTC has been considered such that the area associated with the outer boundary of the two Development Envelopes has been calculated.

Phoenix Environmental Sciences (Phoenix) has undertaken a series of Level 2 SRE surveys for the Proposal, as follows:

- two-phase survey of the CBME in 2019
- single phase survey of the WMDE and BTC in 2019[1]

[1] A single phase SRE survey of the WMDE and BTC was undertaken to compliment an SRE survey undertaken in 2012

- two-phase regional survey in 2020
- two-phase survey of rehabilitated areas within the Saddleback mining area in 2020.

This report presents the results of all of these surveys (section 5.2), as well as the SRE taxa identified through several key desktop data sources (section 5.1). The desktop and field results are then consolidated in section 6 to present and discuss the collective SRE values of the PAA and the Indicative Disturbance Footprint (IDF) for the Proposal (Figure 1-1).

The IDF referred to in this report is not current and was not made available at the time of writing. The IDF has since been updated to be significantly reduced in size. Therefore, this assessment does not reflect the recent changes made to the IDF.

1.1 BACKGROUND

Two previous SRE surveys have been undertaken in proximity of the PAA. In 2011 and 2012, Phoenix (2012b) undertook spring and autumn SRE invertebrate fauna surveys for the Worsley Primary Bauxite Area (PBA; Figure 1-2); the surveys were a commitment of the Worsley Biodiversity and Forest Management Plan (South32 2012) focusing on the BBM mine operations. Outback Ecology Services (OES) was commissioned by Newmont Asia Pacific to investigate SREs in relation to the proposed Residue Disposal Area & Waste Rock Dump Expansion, as part of the Life of Mine Extension Project (Outback Ecology 2012; Strategen 2013) of the Boddington Gold Mine (BGM). The BGM project is located within the northern third of the WMDE.

Phoenix (2012b) sampled sites over an 85,500 ha area, including sites within the PBA and reference sites outside it in State Forest. A total of 21 taxa in at least 13 genera from 13 families and six Orders (comprising 368 individuals) were recorded. Five taxa were considered Confirmed SREs, all millipedes. Two species were considered Likely SREs (Potential SRE; WAM 2013), both sucking millipedes and a further 15 taxa were considered potential SREs (Potential SRE; WAM 2013), under Phoenix' 2012 SRE classification system. Phoenix have since adopted the WAM categorisation for SREs (WAM 2013) (section 2.3).

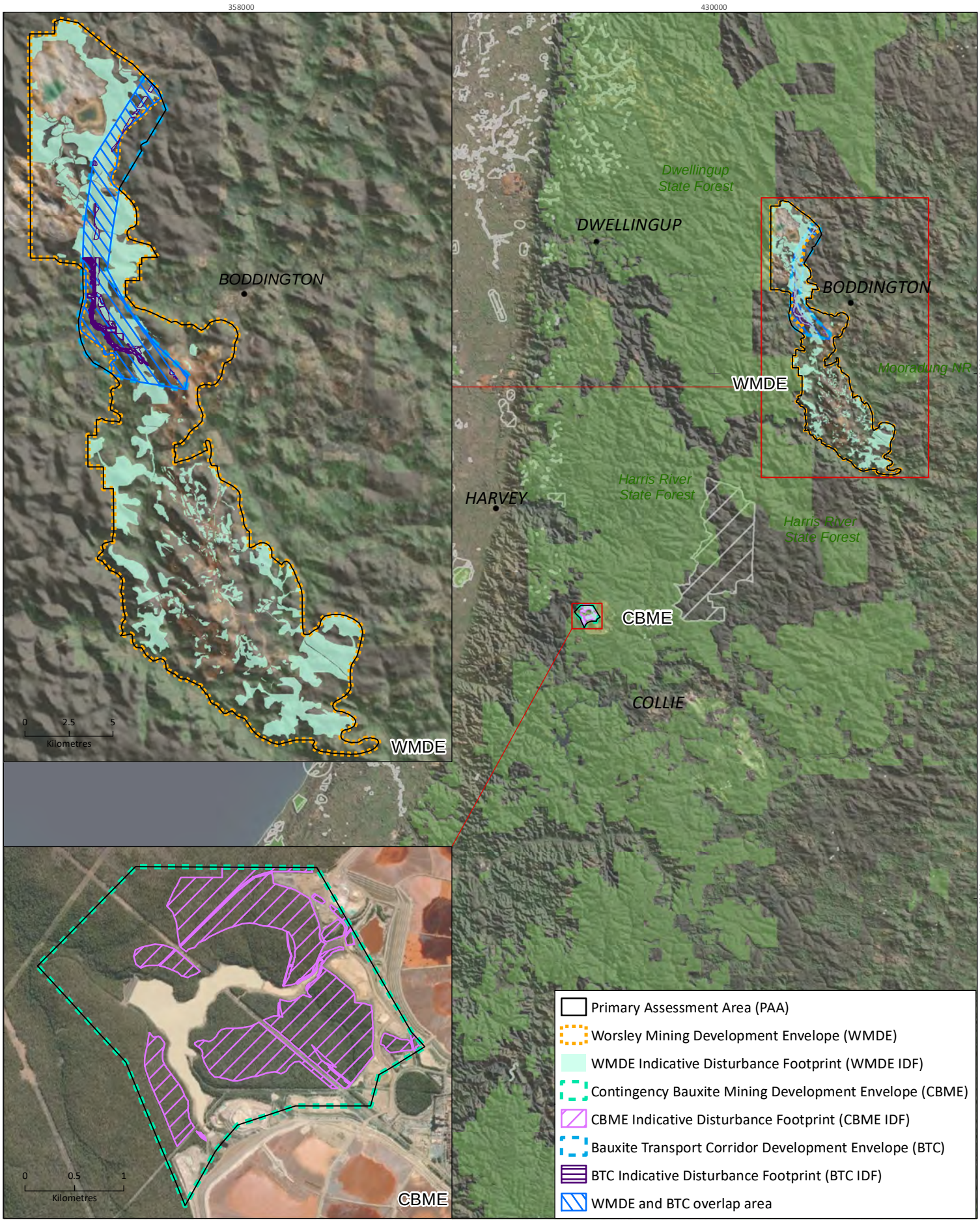
Phoenix (2012b) identified and sampled five habitat types with the potential to harbour SREs (Jarrah woodland, Wandoo woodland, heathland, rocky outcrops and a creekline in Wandoo woodland) via ten sites surveyed in spring 2011 and a further seven sites in autumn 2012. Only one site at Marradong was located in an area scheduled for mining at that time. The remaining 16 sites were all outside of areas scheduled for mining (Phoenix 2012b). However, it appears that three of those sites have since been cleared, but under the current Proposal no further sites will be lost.

Similarly in 2011, OES (2012) undertook an SRE survey for the BGM, which is located in the northern third of the WMDE. The survey recorded a total of 24 Potential SRE species, including two mygalomorph spiders, one scorpion, four millipedes, two slaters, two snails and 13 undescribed earthworms. From the perspective of habitats that have the potential to support SREs, OES (2012) concluded that granite outcrops and *Melaleuca* swampland habitats had a High potential, *Allocasuarina* and Wandoo woodland had a High potential and the remaining habitats had a Low potential, based on a similar analysis (Table 6 in Outback Ecology 2012) to that of Phoenix (Phoenix 2019a, b). Four of the sites surveyed by Outback Ecology (2012) are proposed to be cleared under the Proposal (where SRE habitat potential was rated Low (1), and High (3); as per section 4.2).

In May 2019, Phoenix undertook a desktop assessment of the WMDE and CBME to determine the risk of the Proposal to SREs. It consisted of a review of the above mentioned surveys (Outback Ecology 2012; Phoenix 2012b), WAM database search (Arachnida, Mollusca and Crustacea; WAM 2019) within a 5 kilometre (km) buffer of the WMDE and CBME and field assessment habitat evaluation. The assessment used a two-tier habitat rating system: High and Low risk of supporting SREs, based on the

most recent vegetation mapping for the Proposal (Mattiske 2020). The review determined few of the known species were considered highly restricted.

The WAM database was again interrogated for this report, with the search area expanded to cover much of the Northern Jarrah Forest, in order to provide greater spatial context. In so doing it was discovered that much taxonomic work had since been completed and incorporated into the database and therefore many taxa returned in March 2019 were not present or had changed in the December 2019 output; accordingly the desktop component of the previous risk assessments (Phoenix 2019a, b) required updating.



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Worlsey Mine Expansion Project

Project No	1331
Date	23/08/2021
Drawn by	IN
Map author	AJ

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Kilometers

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Environmentally sensitive areas

DBCA managed land

Figure 1-1

Project location and proposal elements

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1.2 SCOPE OF WORK

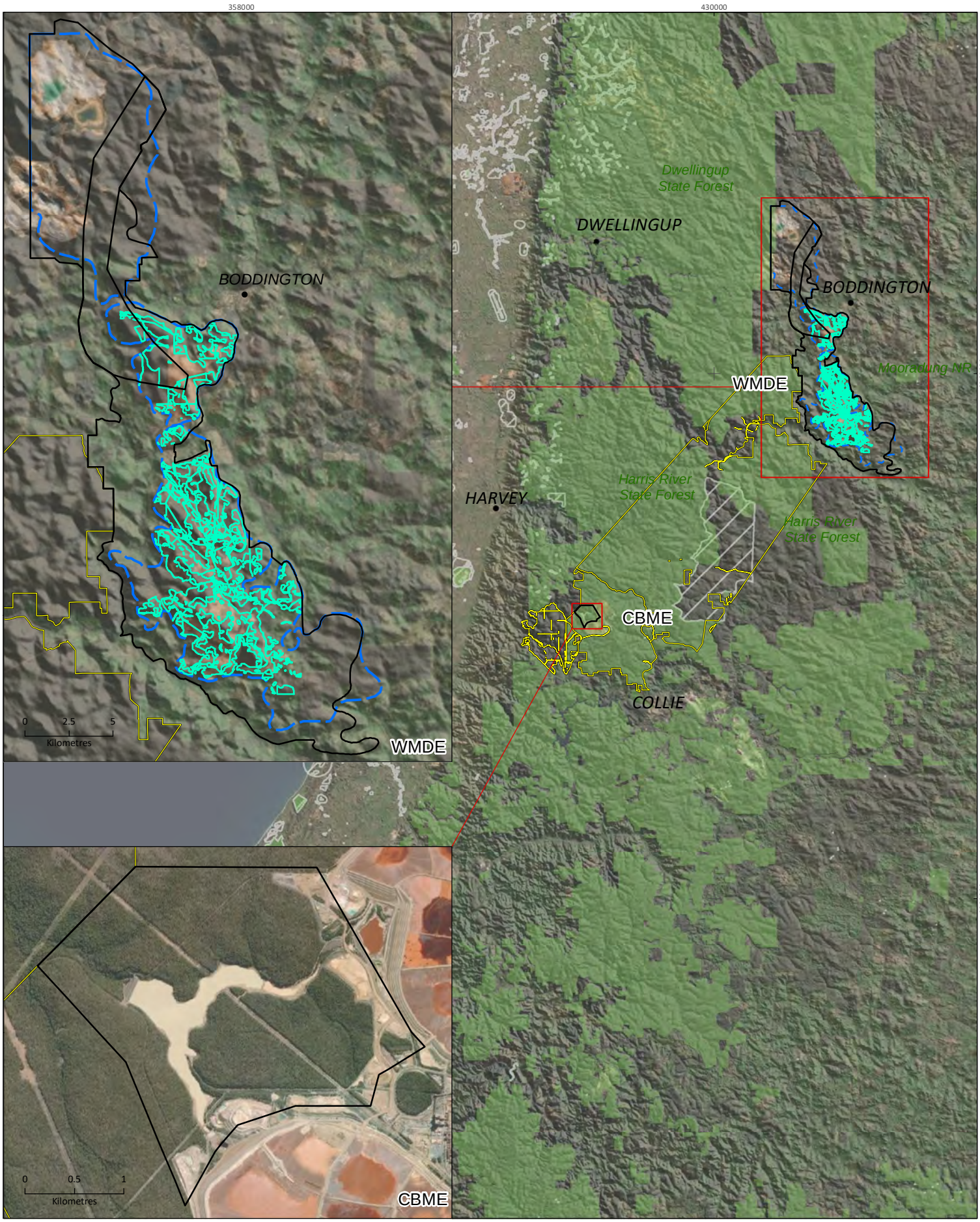
The scope of works was as follows:

- complete a desktop assessment of SREs in relation to the PAA (CBME, WMDE and BTC)
- conduct a four-phase (four seasons) Level 2 SRE survey in compliance with Environmental Protection Authority (EPA) survey guidelines (EPA 2016c) comprising sites within the WMDE, CBME and regional reference sites (located between the WMDE and CBME)
- undertake data analysis, sample processing and species identifications for samples collected during the field survey
- consolidate the desktop and field survey SRE records to generate a single dataset of the SRE values for the PAA
- prepare a technical report that:
    - presents the consolidated SRE records for the PAA
    - presents key conclusions of all studies (past and present) and addresses key items identified in the Environmental Scoping Document (ESD)
    - detail how the EPA Guidance has been met for all surveys
    - undertake a quantitative cumulative impact assessment
    - include maps showing the survey effort, occurrence of significant species, areas of direct/indirect impacts and SRE fauna habitat
    - determine the likelihood of the fauna habitats to support SRE invertebrate species.

1.3 STUDY AREA

Three study areas were surveyed during the survey program (Figure 1-2):

- WME study area – the 2019 study area was the WME, specifically encompassing the WMDE/BTC and CBME. Note, there is a high degree of overlap of the BTC with the WDME (approximately 3,332 ha or 80%).
- Regional study area – SRE survey specifically targeting reference sites within Crown land between the CBME and WMDE. The regional study area outlined in Figure 1-2 shows the general extent of the regional reference sites.
- Rehabilitation study area – areas of previously mined and rehabilitated with native vegetation at the Saddleback mining area.



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- Primary Assessment Area (PAA)
- Rehabilitation study area
- Regional study area
- Primary Bauxite Area (PBA) 2005 ERMP MS719
- DBCA managed land
- Environmentally sensitive areas

Figure 1-2

Study areas

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2 LEGISLATIVE CONTEXT

The protection of fauna in WA is principally governed by three acts:

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- State *Biodiversity Conservation Act 2016* (BC Act)
- State *Environmental Protection Act 1986* (EP Act).

2.1 COMMONWEALTH

Under the EPBC Act, actions that have, or are likely to have, a significant impact on a matter of national environmental significance (MNES), require approval from the Australian Government minister for the Environment. The EPBC Act provides for the listing of Threatened native fauna as MNES.

Few invertebrate taxa from WA are listed as MNES. Those that are mostly include species that have experienced significant range contractions and population declines due to habitat loss, for example the Margaret River Marron (*Cherax tenuimanus*) (Critically Endangered) and the Shield-backed Trapdoor Spider (*Idiosoma nigrum*) (Vulnerable) (DoEE 2018).

2.2 STATE

In WA, the BC Act provides for the listing of Threatened fauna species (Government of Western Australia 2018a, b)[2] in the following categories:

- Critically Endangered (CR) – species facing an extremely high risk of extinction in the wild in the immediate future[3]
- Endangered (EN) – species facing a very high risk of extinction in the wild in the near future[3]
- Vulnerable (VU) – species facing a high risk of extinction in the wild in the medium-term future[3].

Species may also be listed as specially protected (SP) under the BC Act under the category of 'species of special conservation interest' (conservation dependent fauna, CD), including species with a restricted natural range.

The Department of Biodiversity, Conservation and Attractions (DBCA) administers the BC Act and also maintains a non-statutory list of Priority fauna. Priority species are still considered to be of conservation significance – that is they may be Threatened – but cannot be considered for listing under the BC Act until there is adequate understanding of threat levels imposed on them. Species on the Priority fauna lists are assigned to one of four Priority (P) categories, P1 (highest) – P4 (lowest), based on level of knowledge/concern.

Few SRE invertebrate taxa are currently listed under the BC Act and while there are several invertebrate species on DBCA's Priority list (some of which are SRE taxa), these lists cannot be relied on as a complete guide to significant invertebrate taxa within a particular location. The most up-to-

[2] The *Wildlife Conservation (Specially Protected Fauna) Notice 2018* and the *Wildlife Conservation (Rare Flora) Notice 2018* have been transitioned under regulations 170, 171 and 172 of the *Biodiversity Conservation Regulations 2018* to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the BC Act.

[3] As determined in accordance with criteria set out in the ministerial guidelines.

date listings of terrestrial invertebrates and their distribution are available through the WA Museum invertebrate databases.

2.3 OVERVIEW OF SRE INVERTEBRATES

SRE fauna are defined as animals that display restricted geographic distributions, nominally less than 10,000 km^2, that may also be disjunct and highly localised (Harvey 2002; Ponder & Colgan 2002). Short-range endemism in terrestrial invertebrates is believed to have evolved through two primary processes (Harvey 2002), relictual short-range endemism – where drying climate has forced range contraction into small pockets with remaining moist conditions (e.g. south-facing rock faces or slopes of mountains or gullies) – and habitat specialist SREs that may have settled in particular isolated habitat types (e.g. rocky or granite outcrops) by means of dispersal and evolved in isolation into distinct species. However, SRE invertebrates have also been reported in more widespread habitats such as spinifex plains or woodlands mainly in groups with low dispersal capabilities such as mygalomorph spiders and millipedes.

SRE fauna need to be considered in environmental impact assessments (EIA) as localised, small populations of species are generally at greater risk of changes in conservation status due to environmental change than other, more widely distributed taxa (EPA 2016c). Accordingly, the EPA's environmental factor guideline for terrestrial fauna (EPA 2016a) recognises species with restricted distribution as significant fauna.

There can be uncertainty in categorising a specimen as SRE due to a number of factors including poor regional survey density, lack of taxonomic research and problems of identification, i.e., specimens that may represent SREs cannot be identified to species level based on the life stage at hand. For example, in contrast to mature males, juvenile and female millipedes, mygalomorph spiders and scorpions cannot be identified to species level. Molecular techniques such as 'barcoding' (Hebert *et al.* 2003a; Hebert *et al.* 2003b) are routinely employed to overcome taxonomic or identification problems.

Currently, there is no accepted system to determine the likelihood that a species is an SRE. The WA Museum applies a three tier-rating: Confirmed, Potential and not SRE (Western Australian Museum 2013). Phoenix uses a classification similar to that of the WA Museum, which was employed in this assessment (Table 2-1). Any SRE categorisation of a taxon is based on the information available at the time. As new information emerges from additional surveys, the SRE status may change.

Table 2-1 Short-range endemic categories

SRE category	Criteria
Confirmed	Distribution <10,000 km^2. Taxonomy of the group is well known (but not necessarily published); group is well-represented in collections, in particular from the region in question; high levels of endemism exist in documented species; inference is often possible from immature specimens.
Likely	Distribution <10,000 km^2. Taxonomically poorly resolved group but group is generally well-represented in collections; unusual morphology for the group (e.g., some form of troglomorphism); often recorded as singletons in survey and few, if any, regional records.
Potential	Distribution <10,000 km^2. Taxonomically poorly resolved group; patchy distribution, often common in certain microhabitats, but no other regional records; congeners (= species in the same genus) often widespread.
Widespread (not SRE)	Distribution >10,000 km^2.

3 EXISTING ENVIRONMENT

3.1 INTERIM BIOGEOGRAPHIC REGIONALISATION OF AUSTRALIA

The Interim Biogeographic Regionalisation of Australia (IBRA) classifies Australia's landscapes into large 'bioregions' and 'subregions' based on climate, geology, landform, native vegetation and species information (DoEE 2016). The study areas are situated within the Northern Jarrah Forest subregion (JAF01) which is 1,898,799 hectares (ha) in area. The PAA represents 1.55% of the JAF01 subregion. The CBME is located only 10 km north of the northern boundary of the Southern Jarrah Forest subregion (JAF02) but its structure and features are more aligned with the features of JAF01.

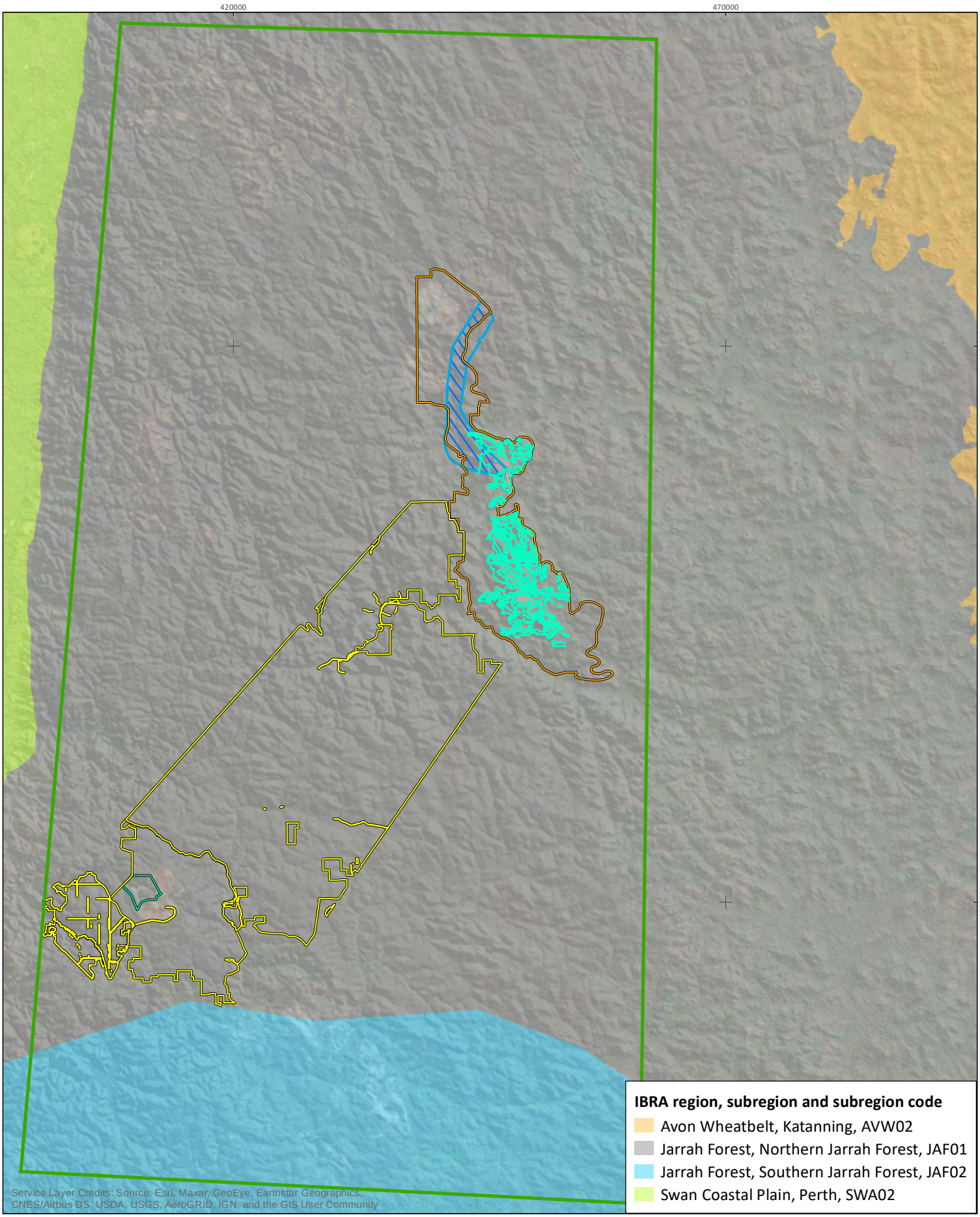
The Northern Jarrah Forest vegetation is comprised predominantly of Jarrah - Marri forest in the west with Bullich and Blackbutt in the valleys. Heath is found on granite rocks. The subregion has moderate species richness (400 – 600 species per km) and contains the following special values (Williams & Mitchell 2001):

- primary populations of Critical Weight Range mammals, e.g., Southern Brown Bandicoot, Chuditch, Woylie, Brush-tailed Phascogale and Quokka and Western Ring-tailed Possum in riparian habitats
- granite outcrops and associated flora/fauna.

Almost 20 years ago, Williams and Mitchell (2001) noted that the:

- south-eastern and northern portions were generally poorly represented in conservation reserves
- there was a paucity of invetebrate data, and particularly with respect to habitat requirements for virtually all invertebrates
- the woolbelt and wheatbelt portions of the subregion (< 600 mm isohyet) have been extensively cleared for agriculture; the study area lies in the south-centre of the subregion, adjacent to this portion
- *Phytophthora* disease impacts were accelerating in the 500 – 700 mm rainfall zone
- *Armillaria* fungus was a critical threat in eastern areas of woodlands and forest.

The JAF02 subregion is characterised by jarrah-marri forest on laterite gravels, which occur in a mosaic with a variety of species-rich shrublands (Hearn *et al.* 2002). The understory component of the forest and woodland reflects the more mesic nature of this area. Community diversity is typically greater in the lower slopes or near granite soils where there are rapid changes in site conditions.



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- Desktop search area
- Rehabilitation study area
- Regional study area
- Worsley Mining Development Envelope (WMDE)
- Contingency Bauxite Mining Development Envelope (CBME)
- Bauxite Transport Corridor Development Envelope (BTC)
- WMDE and BTC overlap area

Figure 3-1

Study area in relation to IBRA bioregions and subregions

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3.2 CLIMATE AND WEATHER

The climate of the Northern Jarrah (JAF01) and Southern Jarrah (JAF02) IBRA subregions are described as Warm Mediterranean (Hearn *et al.* 2002; Williams & Mitchell 2001). The nearest Bureau of Meteorology (BoM) weather station with comprehensive data collection and recent historic climate to the WMDE and BTC is Dwellingup (no. 009538, Latitude: -32.71 Longitude: 116.06) approximately 53 km to the north. BoM weather station Collie (no. 009628, Latitude: -33.36 Longitude: 116.15) has recorded rainfall data continuously since 1899 but stopped recording temperature in 1975.

Dwellingup (1935–2021) records the highest mean maximum monthly temperature (29.7°C) in January and February (lowest in July, 15.1°C) and the lowest minimum mean monthly temperature (5.5°C) in July and August, with the highest in February, 14.6°C (BoM 2021; Figure 3-2).

Daily mean maximum temperatures recorded at Dwellingup preceding and during the 2019 survey, from January 2019 to December 2019, were consistently approximately 1°C above the long-term annual average. Similarly, in 2020, daily mean maximum temperatures were above the long-term in all months except November (Figure 3-2). Daily mean minimum temperatures at Dwellingup were above average in 22 of 24 months through 2019 and 2020; the exceptions being January and May 2019 (Figure 3-2).

The average annual rainfall at Dwellingup is 1,225.9 mm with June, July, and August recording the highest monthly averages (235.1, 232.8 and 193.7 mm, respectively). Dwellingup experienced a very dry year in 2019, with just 69% of the long-term average rainfall being received (841.9 mm); June was an exception to this receiving above average rainfall. 2020 was not as dry (1,060.5 mm) but was still well below the long-term average (Figure 3-2).

To the south, rainfall at Collie over the period 2019-2020 was highly variable compared with the long-term data. In 2019, June was the only month that came close to the long-term monthly average, otherwise it was a very dry year (544.7 mm), receiving only 59% of the long-term average (927 mm). In 2020, more rainfall was received at Collie in total (770 mm), which was 83% of the long-term average. Despite this rainfall in March, May, September, and November were above the long-term average (Figure 3-2).

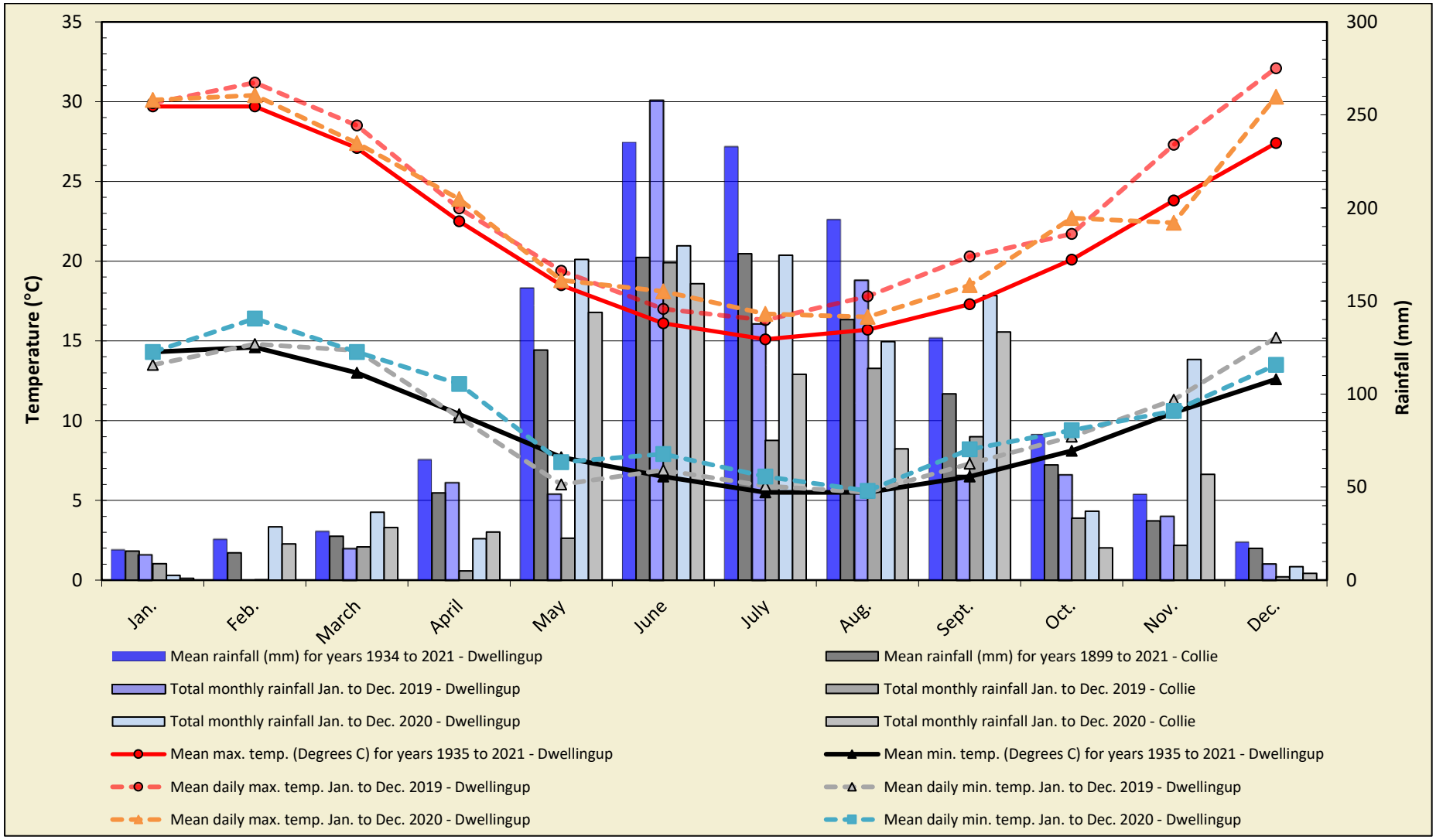


Figure 3-2 **Annual climate and weather data for Dwellingup (no. 9538) and Collie (no. 009628) and mean monthly data for the 12 months preceding the field surveys (2019) (BoM 2020)**

3.3 LAND USE

The land use statistics provided below (Table 3-1) are derived from the Australian Bureau of Agriculture and Resource Economics and Sciences' (ABARES) Catchment Scale Land Use Mapping for WA 2018 dataset (ABARES 2018), for the JAF01 subregion. The dataset is a compilation derived from various vector datasets. The date (2008 to 2018) and scale (1:5 000 to 1:250 000) of each dataset, therefore, reflects the source data. Land use is classified according to the Australian Land Use and Management (ALUM) Classification (v8); a three-tiered hierarchical structure.

Land may be subject to a number of concurrent land uses, hence why the total area (2.26 million ha) is greater than the 1.9 million ha for the JAF01 subregion. For example, 'multiple-use production forest' may provide timber production, conservation, recreation, grazing and water catchment land uses. In such cases, production forestry is identified as the 'prime' land use.

According to ABARES (2018), land use in the proximity of the study areas is dominated to the west by production native forests and to the east by various categories of agriculture (Figure 3-3; Table 3-1). The study areas straddle the boundary of the wetter, more dissected western, Jarrah Forest and the drier, less dissected, eastern Jarrah Forest.

At the bioregion scale 38.32% of the JAF01 subregion has been cleared to date. Of the 61.68% that remains uncleared, 41.34% is production native forests and 20.10% is conservation and natural environments. Almost 35% is classified as dryland agriculture and plantations. Intensive uses, which includes mining, is only 47,028 ha (2.08%).

According to this dataset, mining comprises only 7,428.3 ha (0.33%) of the JAF01 subregion; however, this is less than the area of the BBM's PBA (22,083 ha or 1.16% of the JAF01; approved in 2012) and also Alcoa's mining operations which at the time of writing, Gardner and Stoneman (no date) calculated disturbance to have totalled 13,500 ha or ~1.6% of JAF01, since 1963. They further calculated that by the time Alcoa's reserves are exhausted its operations will have directly removed (and presumably successfully rehabilitated habitat for flora, vertebrate and some invertebrate fauna) 5.6% of JAF01 (Gardner & Stoneman no date).

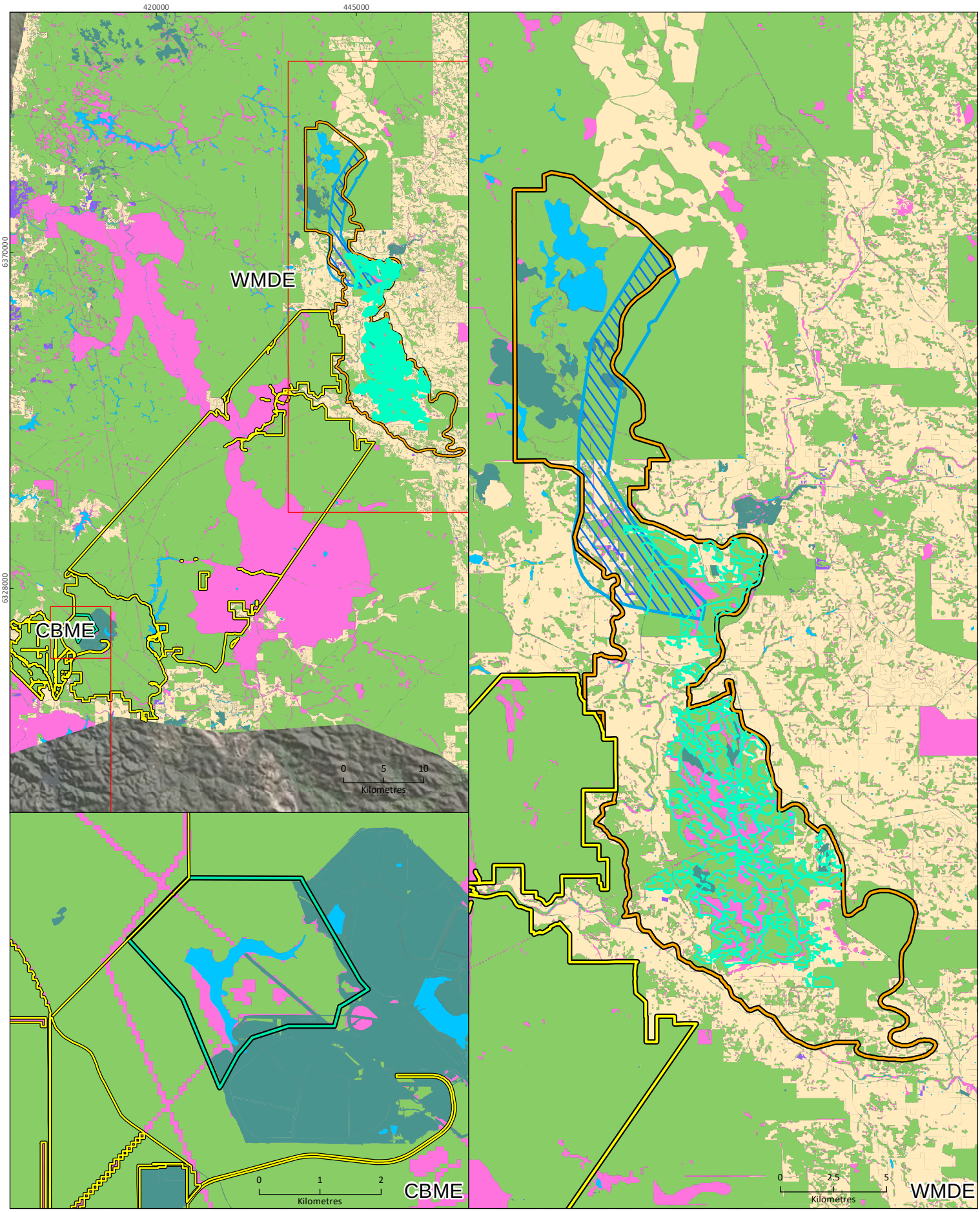
Further, the BGM Tailings Storage Facility for example, is classified as a reservoir/dam, which while not strictly incorrect, does not reflect its primary use, which is to store waste material for an intensive land use type, mining.

Thus, the limitations of this dataset need to be recognised; nonetheless, it is one of the most comprehensive single datasets available to analyse and contextualise a project of the scale of the Proposal.

Table 3-1 Land use in the Northern Jarrah Forest subregion (ABARES 2018)

Land use	Area (ha)	% of subregion
Cleared	**865,923.14**	**38.32%**
Intensive uses	**47,028.61**	**2.08%**
Intensive animal production	667.54	0.03%
Intensive horticulture	79.33	0.00%
Manufacturing and industrial	543.64	0.02%
Mining	7,428.33	0.33%
Residential and farm infrastructure	29,170.69	1.29%
Services	4,398.37	0.19%

Land use	Area (ha)	% of subregion
Transport and communication	4,258.65	0.19%
Utilities	184.24	0.01%
Waste treatment and disposal	297.82	0.01%
Production from dryland agriculture and plantations	**781,274.90**	**34.57%**
Cropping	574,418.87	25.42%
Grazing modified pastures	172,911.17	7.65%
Land in transition	826.19	0.04%
Perennial horticulture	23.52	0.00%
Plantation forests	33,092.46	1.46%
Seasonal horticulture	2.69	0.00%
Production from irrigated agriculture and plantations	**8,790.95**	**0.39%**
Grazing irrigated modified pastures	3,798.95	0.17%
Irrigated cropping	25.60	0.00%
Irrigated land in transition	194.95	0.01%
Irrigated perennial horticulture	4,302.72	0.19%
Irrigated seasonal horticulture	468.73	0.02%
Production from relatively natural environments	**18,443.68**	**0.82%**
Grazing native vegetation	18,443.68	0.82%
Water	**10,385.00**	**0.46%**
Channel/aqueduct	5.77	0.00%
Reservoir/dam	10,369.17	0.46%
Water	10.06	0.00%
Uncleared	**1,394,086.09**	**61.68%**
Conservation and natural environments	**454,360.21**	**20.10%**
Managed resource protection	7,120.76	0.32%
Nature conservation	235,004.08	10.40%
Other minimal use	212,235.37	9.39%
Production from relatively natural environments	**934,299.20**	**41.34%**
Production native forests	934,299.20	41.34%
Water	**5,426.68**	**0.24%**
Lake	742.85	0.03%
Marsh/wetland	4,296.48	0.19%
River	387.35	0.02%
Total	**2,260,009.23**	**100.00%**



South32 Ltd

Worsley Mine Expansion Project

Project No	1331
Date	23/08/2021
Drawn by	IN
Map author	AJ

1:610,000 (at A4) GDA 1994 MGA Zone 50

P:\GIS\Projects\Worsley\1331-WME-S32-TIN\Mapping\MapDocuments\Figures\1331_Fig3_3_Landuse.mxd

- Rehabilitation study area
- Regional study area
- Worsley Mining Development Envelope (WMDE)
- Contingency Bauxite Mining Development Envelope (CBME)
- Bauxite Transport Corridor Development Envelope (BTC)
- WMDE and BTC overlap area

Land use (2018)

- 1 Conservation and natural environments
- 2 Production from relatively natural environments
- 3 Production from dryland agriculture and plantations
- 4 Production from irrigated agriculture and plantations
- 5 Intensive uses
- 6 Water

Figure 3-3

Land use in the Northern Jarrah Forest subregion based on the Catchment Scale Land Use Mapping for Western Australia 2018 (ABARES 2018)

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3.4 CONSERVATION RESERVES AND ENVIRONMENTALLY SENSITIVE AREAS

The CBME and WMDE do not intersect any conservation reserves or Environmentally Sensitive Areas (ESAs). The CBME intersects the Harris River State Forest. The WMDE is bordered by the Dwellingup State Forest to the west, with the Harris River State Forest within close proximity (1 km) to the south-west and Mooradung Nature Reserve approximately 7 km to the east (Figure 1-1). The nearest ESA to the CBME is located approximately 4.3 km west-north-west (ESA 10785) and the nearest ESA to the WMDE is located approximately 13.5 km to the south-west (ESA 6956) (Figure 1-1). ESA 10785 represents a rare flora locality. ESA 6956 is a large ESA which intersects south-western part of Lane Poole Reserve, a reserve set aside for recreation, wildlife conservation and heritage values. Lake Yourdamung, Harris River, Old Growth Forest, rare flora, and threatened fauna habitat are all located within this ESA.

4 METHODS

The biological survey was conducted in accordance with relevant survey guidelines and guidance, including:

- EPA *Statement of Environmental Principles, Factors and Objectives* (EPA 2016b)
- EPA *Environmental Factor Guideline: Terrestrial fauna* (EPA 2016a)
- EPA *Technical Guidance: Sampling of short-range endemic invertebrate fauna* (EPA 2016c).

A desktop review was completed prior to the commencement of the field surveys (Phoenix 2019b), however significant changes in the taxonomy of many of the returned taxa by the WAM means that the 2019 desktop results are no longer valid and are thus re-analysed here. The review has included:

- a review of the data obtained during previous BBM surveys (Phoenix 2012b), with consideration given the changes in the taxonomy as highlighted by the 2019 WAM taxonomic identification
- a review of SRE records held by the WAM Arachnology, Myriapodology, Mollusc and Crustacea databases.

4.1 DESKTOP REVIEW

Searches of the WAM Arachnid, Myriapod, Mollusca and Crustacea databases were conducted to generate a list of SRE records within a 100 km^2 search radius of the WME study areas (Table 4-1).

Three significant other desktop data sources for the current survey were the two previous surveys conducted in the proximity of the PAA (Outback Ecology 2011; Phoenix 2012b) and a similar large scale SRE survey conducted for the Huntly Mine Expansion Proposal (Phoenix 2021), concurrently with the 2020 survey (referred to as 'the Huntly survey' in this report; Table 4-2).

As some of the SRE records from Phoenix (2012b) and Outback Ecology (2012) were submitted to the WAM, the WAM database records were treated as the most current status for each taxa but additional records from these surveys were collated into the desktop dataset. The SRE records from the Huntly survey were also incorporated into the desktop dataset.

Table 4-1 Databases reviewed for the desktop review

Database	Target group/s	Search coordinates and extent
WAM Arachnid and Myriapod Database, Mollusca Database, and Crustacea Database (WAM 2019)	Arachnid, myriapod and mollusc SREs	100 km^2 search area encompassing the study area between -32.4321°S, 116.0271°E (northwest corner) and -33.5167°S, 116.583°E (southeast corner)

Table 4-2 Survey reports included in the desktop review

Report author	Survey description	Project
Phoenix (2012b)	Level 2 SRE invertebrate survey	Worsley Mine Expansion Proposal
Phoenix (2021)	Level 2 SRE invertebrate survey	Huntly Mine Expansion Proposal
Outback Ecology (2012)	Level 2 SRE invertebrate survey	Newmont BGM – site information provided in Appendix 2

4.2 HABITAT MAPPING

The vegetation units defined by Mattiske (2020) were re-interpreted in relation to SRE terrestrial fauna, based on:

Vegetation structure – e.g., forest, woodland, heath/shrubland.

Canopy cover is related to sunlight penetration and in turn level of shading on the ground and therefore ground-temperature and thus ultimately the vegetation/sites propensity to dry out. Which is important as SREs are thought to be constrained within habitats that support more mesic conditions.

Soils/substrate – vegetation types were split based on propensity of the soil to hold water, e.g., forests with clay-loam soils were split from forests with sandy substrates.

Landform/Landscape position – where a vegetation type was located was also considered important in defining SRE habitats, for example forests in valley floors (which tend to grow on clay-loam soils) were considered distinct from forests on mid-slopes and ridges or hilltops. Conversely, forests on mid-slopes with wet clay-loam soils were considered distinct from forests with sandy soils. But forests with a with a different combination of trees were not necessarily considered to be different habitat, except for where there was a wholesale change, e.g., jarrah/marri dominated forests versus wandoo dominated vegetation, which typically occurs as a more open woodland.

Thus, a combination of biotic and a-biotic factors was used to delineate SRE fauna habitats. In this way the most broadly distributed forest types growing on similar soils, in similar landscape positions were grouped for example, while, the most distinct habitats, such as shrublands on clay-loam soils in valley floors, or heathland on granite/hilltops are separated and treated as unique. This method is thus completely in line with EPA (2016c; pg 11), which states that:

"The likelihood of SRE fauna occurring can be inferred from the occurrence or otherwise of geographic boundaries, landform changes or habitat isolates…habitat isolates can be identified from vegetation type mapping…as this represents the smallest thematic unit. Vegetation types reflect changes in geology, landform, soil type and hydrology – all of which are likely factors in governing the distribution of SRE taxa."

The difference to that stated in EPA (2016c) is that here we have grouped vegetation types based on structure and then separated them based on those important a-biotic factors, as there is in fact no evidence that we are aware of that SREs are restricted to single vegetation units, more commonly they appear to be restricted to vegetation structure and landform e.g. woodlands on south facing slopes, woodlands on creeklines or shrublands in basins.

Each SRE fauna habitat has been attributed a numerical a code (1-12) that is consistent with other SRE studies undertaken by Phoenix in the Northern Jarrah forest (Phoenix 2021), noting that some numbers may be missing here which are related to habitat types that are not present in the PAA.

Based on the same principles presented above, each SRE fauna habitat was then rated for its potential to support SREs (Potential Habitat Rating; PHR) as follows:

High – defined/known areas of habitat that contain elements that often give rise to specialisation or dependency in invertebrate fauna, such as aspect (e.g., south-facing slopes, deeply incised gullies), geological features (e.g., granite), soil types that retain water (e.g., clay, loam).

Low – areas of largely intact native vegetation that occur broadly across the landscape, are less incised and typically link more restricted habitats. This includes land that was cleared but has since been rehabilitated or is in the process of being rehabilitated.

None – land that has been previously cleared for other uses that no longer contains native vegetation.

Fauna habitats for the regional survey were based on habitat descriptions and related back to the SRE habitats defined by the vegetation mapping.

4.3 FIELD SURVEY

The surveys comprised:

- SRE wet pit trapping (see 4.3.2)
- active foraging (see 4.3.3)
- litter/soil sieving (see 4.3.4).

The Level 2 SRE field survey for the CBME was undertaken over four visits (phases) in two-seasons from April to November 2019 with ten systematic SRE sites sampled (Figure 4-1; Table 4-4). Foraging was not undertaken in the first field visit as traps were being installed during a period when conditions were dry and no substantial rain had been received at that point. SREs are less likely to be active during dry conditions as they have evolved to retreat into their refugia (e.g. aestivating underground) during these periods (EPA 2016c), and are therefore harder to locate by hand.

The Level 2 SRE field survey for the WMDE was undertaken in two visits over a single-season between October and November 2019 (Table 4-3), with 21 systematic SRE sites sampled (Figure 4-1; Table 4-5). Foraging was undertaken in the first field visit only. In the second visit almost 40 site descriptions were completed across the WMDE in order to ground-truth the interpreted habitat mapping (Appendix 1).

In 2020, a Level 2 field survey was conducted both outside (i.e. within the regional study area) and inside the WME, with the sites inside the WME (within the WMDE) surveying rehabilitated areas.

Outside the WME, four visits were completed over two-seasons between May and October 2020 (Table 4-3). Wet pitfall trapping was completed at 15 sites (Figure 4-1; Table 4-6) 'back-to-back', i.e., the winter/spring traps replaced the autumn traps. Foraging was undertaken on trip 2, trip 3 and trip 4, with trip 4 being a foraging only trip to capture additional spring specimens.

The rehabilitation survey comprised eight sites within the proximity of the Saddleback Mine and entirely within the WMDE (Figure 4-1; Table 4-7). Rehabilitation sites were located within areas revegetated between 5 and 36 years ago. The survey was completed between September and December 2020 (Table 4-3). Foraging was undertaken on trip 1 and trip 2 only as conditions were considered too dry during trip 3.

Table 4-3 Survey field dates and personnel

Survey area	Phase	Field start date	Field end date	Field person 1	Field person 2
CBME	1	09/Apr/2019 (T1)	10/Apr/2019	Jarrad Clark	Melinda Henderson
		05/Jun/2019 (T2)	07/Jun/2019	Jarrad Clark	Simon Pynt
	2	25/Sep/2019 (T3)	27/Sep/2019	Jarrad Clark	Simon Pynt
		09/Nov/2019 (T4)	10/Nov/2019	Jarrad Clark	Simon Pynt
WMDE	1	07/Oct/2019 (T1)	11/Oct/2019	Simon Pynt	Michael Lohr
		04/Nov/2019 (T2)	08/Nov/2019	Jarrad Clark	Simon Pynt
Regional	1	12/May/2020 (T1)	15/May/2020	Anna Jacks	Simon Pynt
		7/July/2020 (T2)	10 July/2020	Anna Jacks	Caitlin Nagle
	2	7/July/2020 (T2)	10 July/2020	Anna Jacks	Caitlin Nagle
		24/Aug/2020 (T3)	28/Aug/2020	Michael Lohr	Caitlin Nagle
		22/Oct/2020 (T4)	23/Oct/2020	Anna Jacks	Paula Strickland
Saddleback mine rehab. areas	1	2/Sep/2020 (T1)	3/Sep/2020	Simon Pynt	Michael Lohr
		19/Oct/2020 (T2)	21/Oct/2020	Anna Jacks	Paula Strickland
	2	19/Oct/2020 (T2)	21/Oct/2020	Anna Jacks	Paula Strickland
		2/Dec/2020 (T3)	3/Dec/2020	Anna Jacks	Michael Lohr

4.3.1 Site selection

Site selection in 2019 was based on the interpreted habitat mapping (section 4.2) undertaken in the desktop review (Phoenix 2019a, b) whereby habitats with an SRE potential rating of both High and Low were selected.

Survey sites for the regional study area were pre-selected using aerial imagery and were chosen to represent the various habitats within the WME study area. These included, but were not limited to, typical SRE habitats such as drainage-lines and creek riparian zones, south-facing slopes, and granite outcrops.

Rehabilitation survey sites were based on systematic survey sites currently established for vertebrate fauna monitoring surveys (Biostat 2021). The rehabilitation age of the eight sites ranged in age from between 5 and 36 years.

4.3.2 SRE wet pit trapping

Wet pitfall trapping sites comprised five one-litre plastic containers with 100 mm diameter opening, dug-in flush with the surface. Traps were half-filled with a 80% propylene glycol, 20% Ethanol solution, which has been shown to preserve DNA under laboratory conditions in invertebrates (Vink *et al.* 2005) and from which Phoenix has successfully sequenced Cytochrome Oxidase Subunit I (COI) in previous surveys.

All traps were covered with a 'roof' elevated 25 mm above the trap to minimise vertebrate by-catch, as per the license conditions. The sites within the CBME remained open for 57 nights during Phase 1- and 45-nights during Phase 2 (Table 4-4). The 21 sites established at the WMDE/BTC remained open for 31 nights (Table 4-5). The 15 sites from the regional survey remained open for 56 and 48 nights

during phase 1 and phase 2 respectively (Table 4-6). The sites within the rehabilitation study area remained open for 48 and 45 nights over the two survey phases (Table 4-7).

4.3.3 Active foraging

Active foraging for SRE invertebrate groups comprised inspection of logs, larger plant debris, the underside of bark of larger trees and the underside of rocks. A standardised approach was undertaken whereby each site was sampled for a minimum one person-hour per site. This sample method particularly targeted trap-door spiders, pseudoscorpions, millipedes, and slaters. All specimens were immediately preserved in 100% ethanol and stored separately to litter sieve samples (see section 4.3.4).

Active foraging in the WME study area was only undertaken in June 2019 (CBME) and October 2019 (CBME and WMDE) as conditions were too dry during the April and November field visits. Active foraging was undertaken in May, July, August, and October 2020 for the regional survey, and in September and October 2020 for the rehabilitation survey.

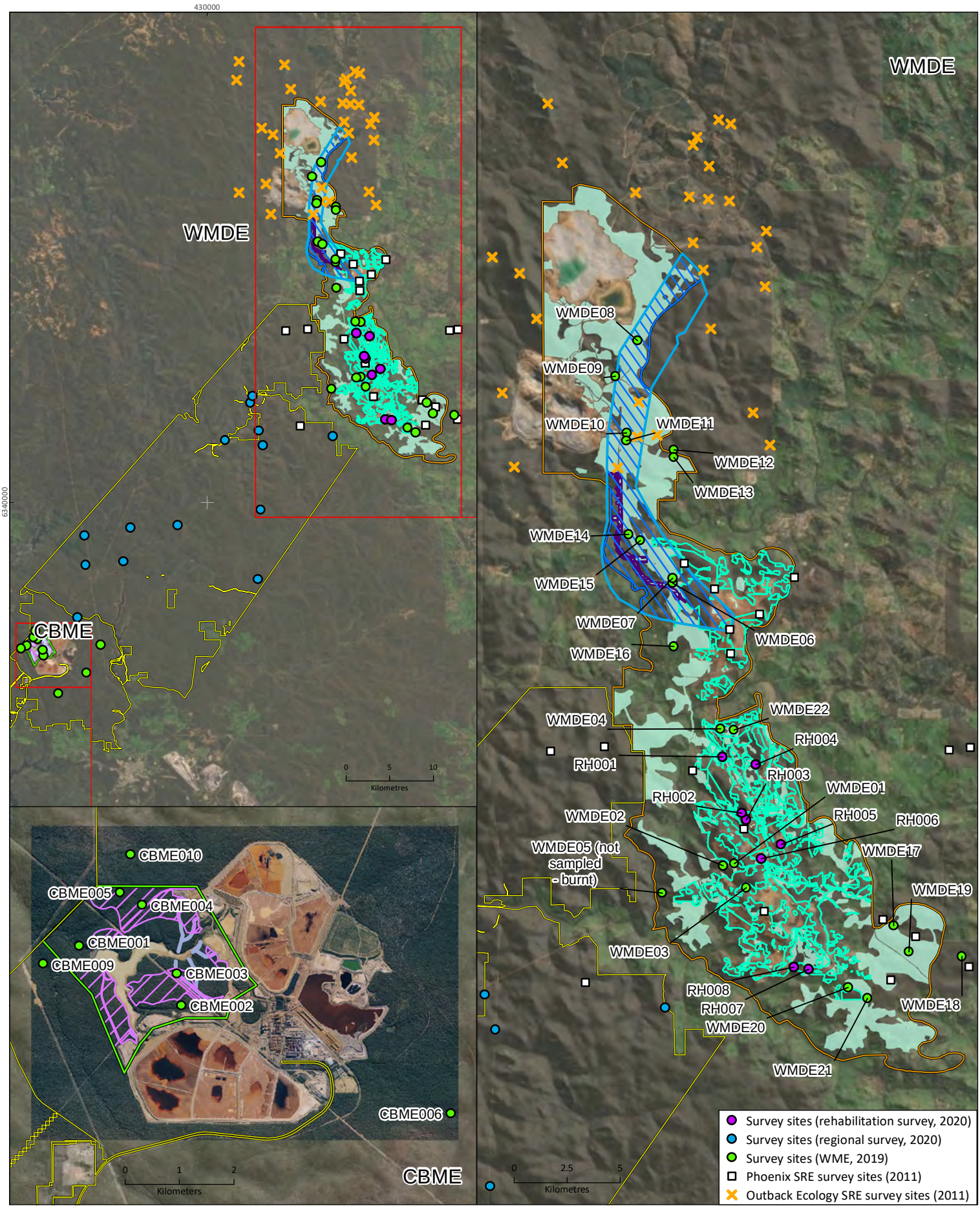
4.3.4 Litter/soil sieving

Four combined litter/soil sifts were completed at trap site, except for the rehabilitation sites where a single sieve was conducted at each site (Table 4-4–Table 4-7). The collection of leaf litter samples was standardised volumetrically by the diameter and height (310 mm x 50 mm = 1.55 L) of the sieves which were completely filled with litter and the upper layers of underlying soil.

Samples were taken from areas of litter accumulation and from the soil underneath of large logs and even from rotting wood debris on top of or inside logs.

This sample method particularly targeted small arachnids (e.g., harvestmen), pseudoscorpions, millipedes, and slaters. Samples were sieved through three stages of decreasing mesh size over a round tray and invertebrates were picked from the sieves and tray with forceps on site and immediately preserved in 100% ethanol, being stored separately to any hand-collected specimens (see section 4.3.3).

Litter sieving was undertaken in June 2019 (CBME) and October 2019 (CBME and WMDE) as conditions were too dry during the April and November 2019 field visits of the WME study area. Litter sifts were undertaken in May, July, August, and October 2020 for the regional survey, and in September and October 2020 for the rehabilitation survey.



South32 Ltd

Worsley Mine Expansion Project

Project No	1331
Date	23/08/2021
Drawn by	IN
Map author	AJ

1:560,000 (at A4) GDA 1994 MGA Zone 50

- Rehabilitation study area
- Regional study area
- Worsley Mining Development Envelope (WMDE)
- WMDE Indicative Disturbance Footprint (WMDE IDF)
- Contingency Bauxite Mining Development Envelope (CBME)
- CBME Indicative Disturbance Footprint (CBME IDF)
- CBME IDF (Proposed Maintenance Clearing Areas)
- Bauxite Transport Corridor Development Envelope (BTC)
- BTC Indicative Disturbance Footprint (BTC IDF)
- WMDE and BTC overlap area

Figure 4-1

Survey site locations from previous and current surveys

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Table 4-4 CBME site locations and survey effort

Site	Habitat type	Latitude	Longitude	Phase 1			Phase 2		
				Wet pits (no. nights)	Active foraging (hrs)[1]	Litter/soil sieves (qty)[1]	Wet pits (no. nights)	Active foraging (hrs)[1]	Litter/soil sieves (qty)[1]
CBME001	Open jarrah-marri forest deep valleys (15)	-33.2229	116.0276	57	1	4	45	1	4
CBME002	Open Eucalypt woodland (9)	-33.2330	116.0477	57	1	4	45	1	4
CBME003	Open jarrah-marri forest (4)[2]	-33.2277	116.0469	57	1	4	45	1	4
CBME004	Open jarrah-marri forest (4)[2]	-33.2162	116.0401	57	1	4	45	1	4
CBME005	Open Eucalypt woodland (9)	-33.2141	116.0358	57	1	4	45	1	4
CBME006	Medium forest; jarrah-marri (Shepherd *et al.* 2002)	-33.2513	116.1007	57	1	4	45	1	4
CBME007	Medium forest; jarrah-marri (Shepherd *et al.* 2002)	-33.2226	116.1180	57	1	4	45	1	4
CBME008	Medium forest; jarrah-marri (Shepherd *et al.* 2002)	-33.2725	116.0657	57	1	4	45	1	4
CBME009	Medium forest; jarrah-marri (Shepherd *et al.* 2002)	-33.2258	116.0205	57	1	4	45	1	4
CBME010	Medium forest; jarrah-marri (Shepherd *et al.* 2002)	-33.2078	116.0380	57	1	4	45	1	4
			Total	**570**	**10**	**40**	**450**	**10**	**40**

[1] undertaken in June and October 2019 only as conditions were too dry during the April and November 2019 field visits.

[2] within IDF

Table 4-5 WMDE site locations and survey effort

Site	Habitat type	Latitude	Longitude	Wet pits (no. nights)	Active foraging (hrs)[1]	Litter/soil sieves (qty)[1]
WMDE01	Heath/shrubland (3)	-32.9477	116.4400	31	1	4
WMDE02	Open Jarrah/Marri forest (4)	-32.9486	116.4345	31	1	4
WMDE03	Open Jarrah/Marri forest (4)	-32.9580	116.4460	31	1	4
WMDE04	Open Jarrah/Marri forest (4)	-32.8904	116.4335	31	1	4
WMDE05*	Heath/shrubland (3)	-32.9601	116.4037	Burnt, not surveyed		
WMDE06 [2]	Open Jarrah/Marri woodland (2)	-32.8285	116.4098	31	1	4
WMDE07 [2]	Open Jarrah/Marri forest (4)	-32.8263	116.4097	31	1	4
WMDE08 [2]	Heath/shrubland (3)	-32.7255	116.3928	31	1	4
WMDE09	Open Eucalypt woodland (9)	-32.7406	116.3816	31	1	4
WMDE10 [2]	Open Jarrah/Marri forest (4)	-32.7646	116.3871	31	1	4
WMDE11	Melaleuca woodland/shrubland (1)	-32.7679	116.3869	31	1	4
WMDE12	Open Eucalypt woodland (9)	-32.7720	116.4109	31	1	4
WMDE13 [2]	Open Jarrah/Marri forest (4)	-32.7750	116.4107	31	1	4
WMDE14 [2]	Open Jarrah/Marri woodland (2)	-32.8077	116.3879	31	1	4
WMDE15 [2]	Open Jarrah/Marri forest (4)	-32.8103	116.3937	31	1	4
WMDE16	Open Jarrah/Marri forest-woodland (7)	-32.8554	116.4103	31	1	4
WMDE17	Melaleuca woodland/shrubland (1)	-32.9745	116.5201	31	1	4
WMDE18	Open Eucalypt woodland (9) (outside WMDE)	-32.9875	116.5544	31	1	4
WMDE19	Open Jarrah/Marri forest (4)	-32.9855	116.5277	31	1	4
WMDE20 [2]	Open Jarrah/Marri forest-woodland (7)	-33.0005	116.4971	31	1	4
WMDE21 [2]	Open Jarrah/Marri woodland (2)	-33.0051	116.5067	31	1	4
WMDE22 [2]	Open Jarrah/Marri forest (4)	-32.8910	116.4403	31	1	4
			Total	**651**	**21**	**84**

[1] undertaken in October 2019 only as conditions were too dry during the April and November 2019 field visits.
* site was not surveyed as it had been recently burnt.
[2] within IDF

Table 4-6 Regional site locations and survey effort

Site	Habitat type	Latitude	Longitude	Phase 1			Phase 2		
				Wet pits (no. nights)	Active foraging (hrs)[1]	Litter/soil sieves (qty)[1]	Wet pits (no. nights)	Active foraging (hrs)[1]	Litter/soil sieves (qty)[1]
SRE001	Open Wandoo woodland (10)	-32.9733	116.3043	56	1	4	48	1	4
SRE002	Open Jarrah/Marri woodland (2)	-33.0122	116.2732	56	1	4	48	1	4
SRE003	Open Jarrah/Marri forest (4)	-33.0086	116.4048	56	1	4	48	1	4
SRE004	Open Jarrah/Marri forest (4)	-33.003	116.3139	56	1	4	48	1	4
SRE005	Open Jarrah/Marri woodland (2)	-32.9666	116.3069	56	1	4	48	1	4
SRE006	Jarrah woodland on granite (3)	-33.0177	116.3192	56	1	4	48	1	4
SRE007	Open Jarrah/Marri forest (4)	-33.0842	116.3160	56	1	4	48	1	4
SRE008	Open Jarrah/Marri forest-woodland (7)	-33.1562	116.3122	56	1	4	48	1	4
SRE009	Open Jarrah/Marri woodland (2)	-33.2676	115.9744	56	1	4	48	1	4
SRE010	Melaleuca woodland/shrubland (1)	-33.1939	116.0897	56	1	4	48	1	4
SRE011	Open Jarrah/Marri woodland (2)	-33.1400	116.1008	56	1	4	48	1	4
SRE012	Jarrah woodland on granite (5)	-33.1095	116.0993	56	1	4	48	1	4
SRE013	Open Jarrah/Marri woodland (2)	-33.1019	116.1561	56	1	4	48	1	4
SRE014	Open Jarrah/Marri forest (4)	-33.0998	116.2139	56	1	4	48	1	4
SRE015	Open Jarrah/Marri forest (4)	-33.1366	116.1471	56	1	4	48	1	4
			Total	**840**	**15**	**60**	**720**	**15**	**60**

[1] phase 1 foraging and litter sifting includes trip 1 and trip 2, phase 2 foraging and litter sifting includes trip 3 and trip 4.

Table 4-7 Rehabilitation study area site locations and survey effort

Site	Habitat type	Latitude	Longitude	Phase 1			Phase 2		
				Wet pits (no. nights)	Active foraging (hrs)[1]	Litter/soil sieves (qty)[1]	Wet pits (no. nights)	Active foraging (hrs)[1]	Litter/soil sieves (qty)[1]
RH001	15-year-old rehabilitation	-32.9024	116.4344	48	1	1	45	1	1
RH002	22-year-old rehabilitation	-32.9262	116.4440	48	1	1	45	1	1
RH003[2]	36-year-old rehabilitation	-32.9291	116.4461	48	1	1	45	1	1
RH004	18-year-old rehabilitation	-32.9057	116.4510	48	1	1	45	1	1
RH005	27-year-old rehabilitation	-32.9398	116.4635	48	1	1	45	1	1
RH006	5-year-old rehabilitation	-32.9460	116.4538	48	1	1	45	1	1
RH007[2]	9-year-old rehabilitation	-32.9926	116.4773	48	1	1	45	1	1
RH008	13-year-old rehabilitation	-32.9917	116.4695	48	1	1	45	1	1
			Total	**384**	**8**	**8**	**360**	**8**	**8**

[1] phase 1 foraging and litter sifting includes trip 1 and phase 2 foraging and litter sifting includes trip 2.

4.4 IDENTIFICATION OF SRE TAXA

4.4.1 Morphological identification

Taxonomists with recognised and proven taxonomic qualifications and experience were engaged to undertake high-level morphological identifications of specimens within SRE groups (Table 4-8). In all cases, identifications relied on direct comparison with reference material from the WAM. The reliance on the WAM reference collections provides the important regional context in the assessment of short-range endemism for unpublished taxa.

Table 4-8 Taxonomic specialists who identified the SRE invertebrates from the survey

Personnel	Taxonomic group/s
Dr Cathy Car	Diplopoda
Dr Simon Judd	Isopoda
Dr Erich S. Volshenk	Scorpiones, Pseudoscorpiones
Dr Sharon Zuiddam	Opiliones
Mrs Anna Jacks	Mygalomorphae, Eupulmonata
Dr Mark Harvey	Mygalomorphae, Diplopoda, Opiliones
Dr Julianne Waldock	Mygalomorphae

4.4.2 Molecular species identification

Molecular sequencing was attempted for 231 specimens from the survey and surrounding areas to determine species level identification where morphological taxonomy could not be applied or resulted in indeterminate species allocations (Table 4-9).

A total of 106 specimens from the survey were initially sequenced, mostly females and juveniles of taxa that rely on male reproductive morphology to provide a species level determination: 74 mygalomorph spiders, 31 millipedes and one land snail.

Subsequently, 16 specimens located only within the Indicative Disturbance Footprint (IDF) and/or PAA were selected for further analyses against the WA Museum molecular database. Five of these were isopods which required subsampling, seven were mygalomorph spiders and four were millipedes. All five isopods failed to sequence, so only the mygalomorph and millipede samples were compared to the WA Museum database.

A third round of molecular analyses to try and elucidate species level taxonomy of specimens which were indeterminate due to poor condition, juvenile life stage or incomplete knowledge on taxonomy were selected to be sequenced in order to further define their taxonomy (land snails, isopods, millipedes and pseudoscorpions). A total of 128 specimens were identified as requiring additional analyses of which 103 specimens were indeterminate species and 25 were reference specimens, i.e. known species or morphospecies retrieved from the WA Museum Arachnid collection or Simon Judd's isopod collection. Where possible, known morphospecies from the project were selected as reference specimens in the analysis. Only 54 specimens produced a successful sequenced and were able to be analysed against each other and other known material.

The molecular identification of species based on comparisons between the mitochondrial gene COI (Cytochrome OxidaseI) is referred to as DNA barcoding. A molecular framework for COI exists at the

WAM for mygalomorph spiders (Castalanelli 2014; Helix 2012) and increasingly also for other taxonomic groups. DNA was extracted from each specimen and the 658 base pair COI gene was amplified by Genotyping Australia using universal COI primers (Folmer *et al.* 1994). The data was subsequently compared to previously published sequences uploaded into GenBank using the BLAST function in Geneious Prime v11.1.5. Sequences were also compared inhouse, to Phoenix's molecular database. The top blast hits for each major taxon were reported, the sequences from the survey were added, duplicate sequences were removed, and remaining sequences then analysed with a Maximum Likelihood phylogenetic analysis using a GTR+G model of evolution and 100 bootstraps (RAxML). Distances were calculated via tree-based estimates of identical bases in Geneious Prime.

Species identification based on COI barcoding is not without problems as sequence divergence within species can be high and may exceed that between species in some taxa, including SRE target groups (Bond 2004; Boyer *et al.* 2007; Köhler & Johnson 2012). For example, sequence divergences of up to 10% may be considered to represent the same species in some genera of mygalomorph spiders, with evidence of some groups displaying less than 5% divergence between species. In *Dampetrus* harvestmen and *Karaops* spiders however, intra-specific divergences extend only up to 6% and in millipedes less than 5% (Phoenix unpublished data). Species delineation was determined through analysis of pairwise similarity matrices and RAxML trees showing clusters of specimens with similar DNA to those from the current survey, the Huntly survey, and GenBank, and if other clusters were present but clearly forming a separate species. *Antichiropus* millipedes were all within 97% similarity, while mygalomorph spiders ranged from 93.5% to 100% similarity. Confidence in determining conspecific species was highest for taxa with 97% pairwise similarity and above.

Comparison of sequences is the most effective way of determining if conspecific species have been collected from another source. GenBank stores the world's largest collection of publicly available DNA sequences, with contributions from both private and public organisations, including tertiary and government research institutions; however, it is up to the discretion of the owner to share the sequences to GenBank. While not everything that has been morphologically identified has been sequenced, and not everything that has been sequenced has been shared with GenBank, it is still the largest collection of data available and most likely to return similar species. Recently, there has been a shift to molecular identification of SREs and so the GenBank database is growing and becoming more accurate.

Table 4-9 Molecular sequencing of specimens per study area

High order	CBME	WMDE/BTC	Regional/Reference	Rehabilitation	Total successful
Mygalomorphae	20 (5 failed)	19 (2 failed)	35 (3 failed)	0	74
Diplopoda	11 (2 failed)	12	12	0	35
Mollusca	0	0	8 (1 failed, 7 NS)	1	9
Isopoda	1 (2 failed, 1 NS)	18 (6 failed, 8 NS)	28 (10 failed, 8 NS)	0	47
Pseudoscorpiones	2 (2 failed)	4 (1 failed)	3 (2 failed)	0	9
Opiliones	12 (7 failed, 3 poor sequences)	10 (2 failed)	35 (4 failed, 1 poor sequence, 2 NS)	0	57
Total	**46**	**63**	**121**	**1**	**231**

NS = unable to be sequenced

4.4.3 Nomenclature

The nomenclature follows a number of taxon-specific references; however, many invertebrate species are currently unnamed requiring morphospecies designation as listed in this report. These are adopted from the nomenclatural systems developed by the WAM or other respective taxonomic authorities. Interim Project specific codes are used for some of the species identified using molecular tools pending a code-designation by the WAM. Reference collections for these morphospecies generally reside with WAM as expected by EPA (2016c).

4.5 STATISTICAL ANALYSIS OF SURVEY EFFECTIVENESS

In order to assess whether further diversity remained hidden due to under sampling, species rarefaction-extrapolation (R/E) curves and the associated 95% confidence intervals, using iNEXT (Chao *et al.* 2014; Hsieh *et al.* 2016), were generated. These curves help to determine whether the collection adequately represents the SRE invertebrate fauna of the study area.

iNEXT focuses on three measures of Hill numbers of order q: species richness (q=0), Shannon diversity (q=1), and Simpson diversity (q=2). The diversity estimates used abundance-based data (Gotelli 2011).

An abundance-based estimator tallies the abundance of each species within each sample. Individual sample size R/E curves were produced for six of the most species-rich Orders (infraorder for trap-door spiders) in order to determine if the rate of discovery of new species slowed down or reached saturation with an increase in sample size. Results are represented by the means of repeated resampling (1,000 bootstrap replicates). Examining the slope of these curves allowed assessment of the impact of under sampling on estimating diversity which is discussed section 0. Analyses were run on the six most species-rich Orders (infraorder for trap-door spiders):

- Arachnida
    - harvestmen (Opiliones)
    - pseudoscorpions (Pseudoscorpiones)
    - scorpions (Scorpiones)
    - trap-door spiders (Mygalomorphae)
- Diplopoda
    - millipedes
- Malacostraca
    - slaters (Isopoda)

4.6 TAXA RISK RATINGS

The calculated risk to SRE taxa arising from the Proposal are presented in Table 5-5. The risk ratings were determined as follows:

- **Low –**
    - taxa that are not restricted to the PAA IDF or
    - taxa that occur from habitat un-mapped by Mattiske (Mattiske 2020) (i.e. outside the PAA) or

  - taxa in more than one habitat type, but including at least one Low potential SRE habitat or
  - taxa from at least one Low potential habitat type

- **High –**
  - taxa restricted to the PAA IDF or
  - taxa restricted to High potential SRE habitat.

4.7 QUANTITATIVE CUMULATIVE IMPACT ASSESSMENT

Two-spatial datasets were used as the basis for the cumulative impact assessment:

- Mattiske (2012), 12,733 ha – vegetation mapping of the Worsley Bauxite mine PBA

Mattiske (2020), 29,357 ha – vegetation mapping of the WME PAA. From this, SRE fauna habitat types and SRE habitat potential ratings were derived and applied to Mattiske (2012).

The cumulative impact assessment was then completed as follows:

1. both datasets were clipped to the PAA and IDF.
2. in the case of Mattiske (2012) the extent did not cover the entire PAA, therefore the two datasets were unequal in extent which would have limited the analysis to only the extent of Mattiske (2012). To resolve this the Mattiske (2020) dataset was inspected to test whether polygons attributed as 'native vegetation' or 'cleared' as of 2020 could be aggregated with the Mattiske (2012); by determining whether Mattiske (2020) 'cleared' polygons were cleared before or after 2012 using aerial imagery and other datasets.

   It was determined that in all but approximately 320 ha, the result of refinement of vegetation mapping over time, the Mattiske (2020) dataset could be confidently used to 'fill in' 16,623.3 ha of the Mattiske (2012) dataset (<2%).
3. The sum of the area (ha) of SRE fauna habitat and SRE habitat potential rating before 2012 and between 2012 and 2020 was calculated.
4. From these two outputs the area (ha) of SRE habitat cleared during the period 2012-2020 was determined.
5. The intersection of the Mattiske 2020 dataset with the PAA IDF was then used to calculate the area (ha) of SRE fauna habitat clearing under the Proposal.
6. The data is presented in tabular and spatial formats.

Polygons attributed the equivalent of 'rehabilitated' were treated as cleared (see section 6.5).

4.8 COMPLIANCE WITH ESD AND EPA GUIDELINES

Compliance with EPA guidelines pertinent to SREs and the ESD (EPA 2020) for the Proposal are provided in (Table 4-10). The previous surveys conducted for the BBM and BGM (Outback Ecology 2012; Phoenix 2012a) in 2011 and 2012 were compliant with the SRE survey guidelines at the time of the survey and are also considered compliant with the current EPA guidance on SREs (EPA 2016c). The current survey (2019 and 2020) is compliant with EPA (2016c).

Table 4-10 Compliance with EPA guidelines and ESD

Area	Survey	Survey level	Survey timing	Sampling methods	Compliance
WMDE/ BTC	Phoenix 2019	L2	One phase: • spring 2019	20 sites: • Wet traps • Foraging • Litter sieving • Blower-vacuum 40 Site descriptions	✓ EAG: Terrestrial fauna (EPA 2016a) ✓ TG: SREs (EPA 2016c) ✓ ESD (EPA 2020)
	Phoenix (2012b)	L2	Two-phase: • spring 2011 • autumn 2012	18 sites: • Wet traps • Foraging • Litter sieving	✓ EAG: Terrestrial fauna (EPA 2016a) ✓ TG: SREs (EPA 2016c)
	Outback Ecology (2012)	L2	One phase: • spring 2011	24 sites: • Wet traps • Foraging • Litter sieving 7 targeted search sites	✓ EAG: Terrestrial fauna (EPA 2016a) ✓ TG: SREs (EPA 2016c)
	Phoenix 2020 – rehab.	L2	Two-phase: • spring 2020	8 sites • Wet traps • Foraging • Litter sieving	✓ EAG: Terrestrial fauna (EPA 2016a) ✓ TG: SREs (EPA 2016c)
CBME	Phoenix 2020	L2	Two-phase: • autumn 2019 • spring 2019	10 sites: Wet traps, Foraging, Litter, sieving, Blower-vacuum	✓ EAG: Terrestrial fauna (EPA 2016a) ✓ TG: SREs (EPA 2016c) ✓ ESD (EPA 2020)
Regional	Phoenix 2020	L2	Two-phase: • autumn 2019 • spring 2019	15 sites: Wet traps, Foraging, Litter, sieving, Blower-vacuum	✓ EAG: Terrestrial fauna (EPA 2016a) ✓ TG: SREs (EPA 2016c) ✓ ESD (EPA 2020)
		Total	**Four phases**	**142 sites**	**Compliant**

4.9 SURVEY PERSONNEL

The personnel involved in the survey are presented in Table 4-11.

Table 4-11 Project team

Name	Qualifications	Years' exp.	Role/s
Jarrad Clark	BSc. (Env. Mgmt)	20	Project manager, field survey, sample processing, data management and spatial analysis, reporting
Anna Jacks	BSc. (Env. Science) (Hons)	15	Field survey, sample processing, data management and spatial analysis, reporting
Simon Pynt	BSc. (Zool.)	10	Field survey
Michael Lohr	PhD (Zool.)	2	Field survey and sample processing
Caitlin Nagle	MSc (Zool.)	1	Field survey and sample processing
Paula Strickland	MSc (Trop Bio and Cons)	1	Field survey and sample processing
Brendan Thomson	BSc. (Env. Mgt. and Env. Planning)	1	Sample processing
Dr Paige Maroni	PhD Candidate (Molecular Biology)	5	Molecular analyses
Melinda Henderson	BSc. (Biol. Sci and Cons. Biol) (Hons)	1	Field survey
Dr. Ikrom Nishanbaev	PhD (GIS)	GIS	Map production and spatial data analysis
Dr Mark Harvey	PhD	NA	Arachnid and pseudoscorpion taxonomy
Dr Julianne Waldock	PhD	NA	Millipedes and arachnid taxonomy
Dr Cathy Car	PhD	NA	Millipede taxonomy
Dr Simon Judd	PhD	NA	Isopod taxonomy
Dr Erich Volschenk	PhD	NA	Scorpion and pseudoscorpion taxonomy
Karen Crews	BSc. Hons (Env. Biol.)	15	Report review

5 RESULTS

5.1 DESKTOP REVIEW

The desktop results returned a total 244 taxa that have the potential to be SREs (Table 5-1), comprising 43 Confirmed SREs (overwhelmingly millipedes), three Likely SREs (all slaters) and 198 Potential SREs (dominated by trap-door spiders and slaters). The taxa occur primarily outside the PAA (235 taxa), 46 previously known from within the PAA, of which six are not known from outside of the PAA. The status and location relative to Project components of each taxon is provided in Table 5-2. Of the 244 taxa identified, seven are currently known only from within the PAA and one of these is restricted to the PAA IDF (grey shaded rows in Table 5-2).):

- **mygalomorphs (trap-door spiders)**
    - *Aname* 'Dwellingup' (Potential) – WMDE/BTC, also restricted to the IDF
    - *Aname* 'MYG242' (Potential) – WMDE, not in IDF
    - *Eucyrtops* 'marradong' (Confirmed) – WMDE, not in IDF
- **Millipedes**
    - *Antichiropus* 'saddleback2' DIP137 (Confirmed) – WMDE, not in IDF
    - *Antichiropus* 'SB1' (Confirmed) – WMDE, not in IDF
    - Siphonotidae 'Marradong' (Potential) – WMDE, not in IDF
- **Isopods**
    - *Acanthodillo* sp. indet. B (Worsley) – WMDE, not in IDF

Table 5-1 Summary of SRE taxa in the desktop review area per PAA section

Higher order (no. taxa)	CBME	WMDE	WMDE and BTC	Outside PAA	Total
Confirmed	**0**	**6**	**2**	**41**	**43**
Land snails	0	0	0	3	3
Millipedes	1	5	1	37	49
Scorpions	0	0	0	1	1
Likely	**0**	**0**	**0**	**3**	**3**
Slater	0	0	0	3	3
Potential	**10**	**34**	**14**	**191**	**198**
Harvestmen	1	5	0	16	17
Land snails	0	4	1	15	14
Millipedes	2	5	3	8	9
Mygalomorphae	5	17	9	101	106
Pseudoscorpions	0	1	1	13	13
Scorpions	0	0	0	6	6
Slaters	2	2	0	31	32
Velvet worms	0	0	0	1	1
Total	**11**	**39**	**15**	**235**	**244**

Table 5-2 Desktop records of SRE invertebrates in the study area

Species	SRE Status	CBME	WMDE	WMDE and BTC	Outside PAA	Total
Mygalomorph trap-door spiders		**8**	**27**	**17**	**816**	**868**
Actinopodidae			**3**		**8**	**11**
Missulena `MYG198`	P		1		2	3
Missulena `MYG639`	P				1	1
Missulena `sp. indet`	P		2		5	7
Anamidae		**4**	**12**	**11**	**395**	**422**
Aname `Brennan sp. 1`	P				1	1
Aname `Brennan sp. 2`	P				1	1
Aname `Dwellingup`	P			1		1
Aname `mainae group, female`	P				1	1
Aname `mainae`	P				141	141
Aname `MYG119`	P				5	5
Aname `MYG120`	P				1	1
Aname `MYG121`	P				5	5
Aname `MYG161`	P				4	4
Aname `MYG184`	P				1	1
Aname `MYG242`	P		2			2
Aname `MYG405`	P				1	1
Aname `MYG496`	P				2	2
Aname `MYG522`	P				3	3
Aname `sp. indet`	P	2		4	9	15
Aname `sp. nov.`	P				1	1
Aname `wilga`	P				1	1
Aname 'Phoenix0004'	P				3	3
Aname 'Phoenix0006'	P				1	1
Aname 'Phoenix0010'	P				1	1
Aname 'Phoenix0020'	P				1	1
Aname 'Phoenix0036'	P				3	3
Aname 'Phoenix0037'	P				1	1
Anamidae 'Phoenix0009'	P				2	2
Anamidae sp. indet.	P				18	18
Kwonkan `gelorup`	P				8	8
Kwonkan `MYG060`	P				1	1
Kwonkan `MYG096`	P				1	1
Kwonkan `sp. indet`	P				6	6
Kwonkan `sp. nov.`	P				1	1
Kwonkan 'Phoenix0005'	P				2	2
Kwonkan 'Phoenix0008'	P				1	1
Proshermacha `MYG449`	P				5	5
Proshermacha `MYG471`	P				3	3

Species	SRE Status	CBME	WMDE	WMDE and BTC	Outside PAA	Total
Proshermacha `MYG485`	P		6		3	9
Proshermacha `MYG488`	P				1	1
Proshermacha `MYG495`	P				2	2
Proshermacha `MYG596`	P				1	1
Proshermacha `MYG646`	P	1				1
Proshermacha `MYG658`	P		1		1	2
Proshermacha `MYG659`	P				1	1
Proshermacha `sp. indet`	P	1	2	3	50	56
Proshermacha `villosa`	P				11	11
Proshermacha 'MYG485'	P				39	39
Proshermacha 'Phoenix0023'	P				2	2
Proshermacha 'Phoenix0024'	P				1	1
Proshermacha 'Phoenix0027'	P				2	2
Proshermacha 'Phoenix0028'	P				2	2
Teyl `Brennan sp. 2`	P				1	1
Teyl `mandgedal sp. group`	P				1	1
Teyl `MYG241`	P				6	6
Teyl `MYG245`	P		1	1	1	3
Teyl `MYG249`	P				4	4
Teyl `MYG631`	P				1	1
Teyl `sp. indet`	P			2	9	11
Teyl `waldockae`	P				12	12
Teyl 'MYG245'	P				1	1
Teyl 'MYG355'	P				2	2
Teyl 'Phoenix0007'	P				4	4
Teyl 'Phoenix0019'	P				1	1
Teyl 'Phoenix0021'	P				1	1
Barychelidae		**4**	**2**	**2**	**30**	**38**
Barychelidae sp. indet.	P				2	2
Synothele `MYG640`	P	3				3
Synothele `sp. indet`	P	1		1	6	8
Synothele harveyi	P				1	1
Synothele 'Phoenix0015'	P				11	11
Synothele 'Phoenix0016'	P				9	9
Synothele rubripes	P		2	1	1	4
Idiopidae			**10**	**4**	**374**	**388**
Bungulla disrupta	P				2	2
Bungulla parva	P				4	4
Eucanippe nemestrina	P		2		6	8
Eucyrtops `arthur_river`	P				2	2
Eucyrtops `efoveate sp.`	P				2	2
Eucyrtops `marradong`	P		1			1

Species	SRE Status	CBME	WMDE	WMDE and BTC	Outside PAA	Total
Eucyrtops `MYG142`	P				2	2
Eucyrtops `MYG645`	P				4	4
Eucyrtops `sp. indet`	P		5	1	8	14
Eucyrtops latior	P				10	10
Eucyrtops 'Phoenix0003'	P				10	10
Eucyrtops 'Phoenix0029'	P				3	3
Eucyrtops 'Phoenix0030'	P				1	1
Eucyrtops 'Phoenix0032'	P				4	4
Eucyrtops 'Phoenix0033'	P				7	7
Eucyrtops 'WorsleyDNA06'	P				4	4
Eucyrtops latior					1	1
Euoplos `minimus`	P				1	1
Euoplos `sp. nov.`	P				1	1
Euoplos `sylvaticus`	P				4	4
Euoplos festivus	P				2	2
Euoplos inornatus	P				10	10
Euoplos 'Phoenix0011'	P				2	2
Euoplos 'Phoenix0012'	P				1	1
Gaius `Voyager sp.`	P				1	1
Gaius cooperi	P				12	12
Idiopidae sp. indet.	P				14	14
Idiosoma `Donnelly River group`	P				1	1
Idiosoma `MYG075`	P				1	1
Idiosoma `MYG187`	P			1	2	3
Idiosoma `nannup`	P				1	1
Idiosoma `sp. indet`	P		2	2	17	21
Idiosoma `twig-lining spp. group`	P				1	1
Idiosoma 'Phoenix0035'	P				10	10
Idiosoma schoknechtorum	P				6	6
Idiosoma sigillatum	P				210	210
Idiosoma 'WAM T129362'	P				7	7
Migidae					**10**	**10**
Bertmainius opimus	P				10	10
Opiliones (Harvestmen)		**1**	**26**	**5**	**138**	**170**
Caddidae					**1**	**1**
Hesperopilio mainae	P				1	1
Neopilionidae			**1**		**29**	**30**
Ballarra `sp. indet`	P		1			1
Ballarra longipalpus	P				14	14
Megalopsalis `sp. indet`	P	1			15	15
Triaenonychidae			**25**	**5**	**82**	**112**
Calliuncus `sp. indet`	P		12		15	27

Species	SRE Status	CBME	WMDE	WMDE and BTC	Outside PAA	Total
Nunciella `sp. 5`	P				1	1
Nunciella `sp. 6`	P				1	1
Nunciella `sp. 9`	P				1	1
Nunciella `sp. indet`	P		1		2	3
Nunciella `sp. nov.`	P				5	5
Nunciella karriensis	P				2	2
Nunciella sp. indet.	P				1	1
Triaenonychidae `GEN008` `dna S Zuiddam study`	P				5	5
Triaenonychidae `GEN008` `sp.5, dna S. Zuiddam study`	P				1	1
Triaenonychidae `genus 003` `sp.`	P		4	1		5
Triaenonychidae 'genus 008' sp. indet.	P		8	4	41	53
Triaenonychidae sp. indet.	P				7	7
Eupnoi					**25**	**25**
Eupnoi sp. indet.	P				25	25
Pseudoscorpions				**1**	**53**	**54**
Chernetidae					**13**	**13**
`PSEAAF` `PSE130`	P				2	2
Balgachernes occultus	P				8	8
Calymmachernes angulatus	P				3	3
Chthoniidae				**1**	**3**	**4**
Austrochthonius `austini`	P			1	1	2
Austrochthonius `lesueuri`	P				1	1
Austrochthonius strigosus	P				1	1
Garypidae					**1**	**1**
Synsphyronus `sp. 7/2`	P				1	1
Olpiidae					**10**	**10**
Beierolpium `sp. 8/4 lge`	P				1	1
Beierolpium `sp. 8/4`	P				3	3
Beierolpium `sp. indet`	P				5	5
Olpiidae sp. indet.	P				1	1
Pseudotyrannochthoniidae					**25**	**25**
Pseudotyrannochthonius `Harms sp. Darling Range 1`	P				25	25
Atemnidae					**1**	**1**
Atemnidae sp. indet.	P				1	1
Scorpions					**194**	**194**
Buthidae					**14**	**14**
Lychas `majeri`	P				3	3
Lychas `sp. indet`	P				1	1
Lychas `subsplendens`	P				9	9
Isometroides 'jarrah'	P				1	1

Species	SRE Status	CBME	WMDE	WMDE and BTC	Outside PAA	Total
Urodacidae					**180**	**180**
Urodacus `sp. indet`	P				2	2
Urodacus `woodwardii`	P				5	5
Urodacus planimanus	C				173	173
Millipede		**5**	**53**	**21**	**398**	**477**
Dalodesmidae			**1**	**5**	**3**	**9**
`cf Sphaerotrichopus` `sp. indet`	P		1	5		6
Dalodesmidae 'Phoenix0038'	P				2	2
Dalodesmidae sp. indet.	P				1	1
Iulomorphidae					**55**	**55**
Dinocambala ingens	P				50	50
Iulomorphidae `genus indet.` `large, black.`	C				3	3
Iulomorphidae `genus indet.` `small, brown`	P				2	2
Paradoxosomatidae		**3**	**32**	**14**	**312**	**361**
Antichiropus `arfa`	C				1	1
Antichiropus `bancroft, DIP105`	C				1	1
Antichiropus `boddington`	C				3	3
Antichiropus `DIP045`	C				2	2
Antichiropus `DIP056`	C				2	2
Antichiropus `DIP066, boyagin`	C				1	1
Antichiropus `DIP108, mt saddleback`	C	3	1	1	4	9
Antichiropus `GI`	C				15	15
Antichiropus `goldmine`	C		2		3	5
Antichiropus `lane poole` DIP181	C				2	2
Antichiropus `marradong`	C		5	6	14	25
Antichiropus `minnivale 2`	C				2	2
Antichiropus `minnivale 3`	C				1	1
Antichiropus `mt saddleback` DIP108	C		3		6	9
Antichiropus `naturaliste`	C				1	1
Antichiropus `Norman Road 1`	C				5	5
Antichiropus `saddleback2` DIP137	C		4			4
Antichiropus `saddleback3` DIP182	C				1	1
Antichiropus `SB1`	C		1			1
Antichiropus `serpentine`	C				2	2
Antichiropus `southwest` DIP183	C				1	1
Antichiropus `sp. indet`	C		17	7	114	138
Antichiropus `tuttaning`	C				3	3
Antichiropus `UBS2`	C				60	60
Antichiropus `UBS3`	C				23	23
Antichiropus `worsley DIP176`	C				2	2
Antichiropus `yilliminning`	C				1	1
Antichiropus 'dwellingup'	C				5	5

Species	SRE Status	CBME	WMDE	WMDE and BTC	Outside PAA	Total
Antichiropus 'forest'	C				3	3
Antichiropus 'holyoake'	C				2	2
Antichiropus 'jarrah'	C				3	3
Antichiropus 'Marradong'	C				8	8
Antichiropus 'Mini'	C				4	4
Antichiropus 'Myara'	C				3	3
Antichiropus nanus	C				8	8
Antichiropus 'southern'	C				6	6
Siphonotidae		**2**	**20**	**2**	**28**	**52**
Siphonotidae `DIP indet.` `cacaoi`	P				5	5
Siphonotidae `DIP indet.` `sp. indet`	P	1	1	2	1	5
Siphonotidae `DIPAAF` `DIP188` `boddington`	C				1	1
Siphonotidae `DIPAAG` `DIP189` `collie`	C				9	9
Siphonotidae `DIPAAG` `DIP192` `mt saddleback`	C		16		5	21
Siphonotidae `DIPAAG` 'Phoenix0040, DIP219'	C				3	3
Siphonotidae `genus indet.` `Marradong`	P		1			1
Siphonotidae 'DIPAAF' 'cf. michaelseni'		1	2		4	7
Isopod		**2**			**427**	**429**
Armadillidae		**1**			**173**	**174**
Acanthodillo `sp. 3 (Judd 2002)`	P				2	2
Acanthodillo '1'	P				1	1
Acanthodillo flavus	P				10	10
Acanthodillo sp. indet. A (Worsley)	P				2	2
Acanthodillo sp. indet. B (Worsley)	P		1		0	1
Acanthodillo sp. indet.	P				5	5
Buddelundia `sp. 1 (Judd 2002)`	P				1	1
Buddelundia `sp. 4 (Judd 2002)`	P				7	7
Buddelundia `sp. 5 (Judd 2002)`	P				5	5
Buddelundia `sp. 6 (Judd 2002)`	P				1	1
Buddelundia `sp. indet`	P				2	2
Buddelundia '5' (Huntly)	P				78	78
Buddelundia albomaculata	P				1	1
Buddelundia nigripes	P	1			10	11
Buddelundia opaca	P				2	2
Buddelundia sp. indet.	P				2	2
Cubaris `sp. 1 (Judd 2002)`	P				2	2
Pseudodiploexochus `sp. 1 (Judd 2002)`	P				3	3
Pseudodiploexochus `sp. 2 (Judd 2002)`	P				5	5
Pseudodiploexochus sp. indet.	L				14	14
Pseudolaureola `sp. 5 (Judd 2002)`	P				1	1
Spherillo `sp. 2 (Judd 2002)`	P				9	9
Spherillo `sp. 3 (Judd 2002)`	P				1	1

Species	SRE Status	CBME	WMDE	WMDE and BTC	Outside PAA	Total
Spherillo `sp. 4 (Judd 2002)`	P				6	6
Spherillo `sp. indet`	P				1	1
Spherillo '1'					4	4
Philosciidae					**181**	**181**
Laevophiloscia perlata	P				1	1
Laevophiloscia '1'	P				137	137
Laevophiloscia sp. indet.	P				9	9
Philosciidae 's/1'	L				28	28
Philosciidae sp. indet.	P				6	6
Styloniscidae		**1**			**67**	**68**
Styloniscus `sp. 1 (Judd 2002)`	P	1			57	58
Styloniscus '7'	P				6	6
Styloniscus sp. indet.	P				4	4
Paraplatyarthridae					**6**	**6**
Paraplatyarthridae sp. indet.	P				5	5
Paraplatyarthrus sp. indet.	P				1	1
Trichorhina sp. indet.	P		17		8	25
Land snails			**14**		**256**	**270**
Bothriembryontidae			**1**		**225**	**226**
Bothriembryon `sp. indet`	P				27	27
Bothriembryon cf. *bradshawi*	P				1	1
Bothriembryon cf. *indutus*	P				3	3
Bothriembryon cf. *irvineanus*	P				7	7
Bothriembryon cf. *naturalistarum*	P				1	1
Bothriembryon cf. *serpentinus*	P		1		16	17
Bothriembryon irvineanus	C				46	46
Bothriembryon naturalistarum	C				8	8
Bothriembryon serpentinus	C				116	116
Charopidae			**9**		**17**	**26**
cf.*Westralaoma* sp. indet.	P				2	2
Charopidae sp. indet.	P				5	5
Velvet worms					**3**	**3**
Peripatopsidae					**3**	**3**
Kumbadjena occidentalis	P				3	3
Grand Total		**16**	**137**	**44**	**2,296**	**2,494**

1 – Taxa shaded in grey are known only from within the PAA.

2 – P = Potential, L = Likely, C = Confirmed. P2 = Priority 2, P3 = Priority 3.

5.2 FIELD SURVEY

5.2.1 SRE habitats

Nine native SRE fauna habitats are described from the study area based on the Mattiske (2020) vegetation mapping (Table 5-3; Figure 5-1 and Figure 5-2). Rehabilitated land is not considered native SRE fauna habitat but is still considered SRE habitat due to the refugia it has the capability to provide (e.g. vegetation, coarse woody debris, leaf litter). Cleared land is not considered native SRE fauna habitat but is presented in Table 5-3 for completeness. Collectively, native vegetation represents approximately 44% of the PAA; the other approximately 56% is cleared or previously disturbed land, e.g., plantations, dams, and rehabilitation areas (Table 5-3). The native vegetation/habitat is dominated by Marri, Jarrah and Wandoo woodlands or forests, in different positions in the landscape, which convey different micro-climatic conditions that influence SRE habitat distribution. Minor occurrences of heath/shrubland are also present (0.6%). Several sites are outside of the area mapped by Mattiske (2020), but site descriptions from the survey indicate primarily Jarrah and Marri woodland and forest habitats.

Table 5-3 SRE fauna habitats of the PAA

	Fauna habitat	Vegetation units (Mattiske 2021)	SRE potential habitat rating	Survey sites	CBME	CBME IDF (ha)	WMDE (ha)	WMDE IDF (ha)	BTC (ha)	BTC IDF* (ha)	PAA (ha)	PAA (%)	PAA IDF (ha)	PAA IDF (%)
1	*Melaleuca* woodlands/shrublands on seasonally wet or water-logged clays and clay loams on valley floors	A, A1, A2	High	WMDE11, WMDE17, SRE010	0.0	0.0	125.9	32.6	39.8	7.0	134.6	0.5%	39.6	0.1%
2	Open Jarrah/Marri woodlands on sands, clay-loam or sandy-gravel on lower slopes and valley floors	CW, D, DG	High	WMDE06, WMDE14, WMDE21, SRE002, SRE005, SRE009, SRE011, SRE013	17.9	9.8	399.3	165.7	151.8	34.8	427.3	1.5%	210.3	0.7%
3	Heath/shrubland on shallow soils on granite or outcrops	E, G1, G2, G3, G4	High	WMDE01, WMDE08, SRE006	0.0	0.0	169.1	20.5	11.9	2.5	171.2	0.6%	23.0	0.1%
4	Open forest of Jarrah/Marri on sandy-loam gravelly soils on mid-slopes and ridges	H, M2, MG, P, PS, PW, R, S, SP, ST, T, TS	Low	CBME003, CBME004, WMDE02, WMDE03, WMDE04, WMDE07, WMDE15, WMDE19, WMDE22, SRE003, SRE004, SRE007, SRE014, SRE015	400.2	212.5	6,704.0	4,283.6	1,596.6	79.9	7,371.3	25.1%	4,576.0	15.6%
5	Open forest of Jarrah/Marri forest, seasonally moist, sandy gravels on slopes	SW	High	SRE012	17.7	12.9	9.2	0.5	0.0	0.0	26.9	0.1%	13.4	0.05%
6	Cleared land (including plantations, and dams)	CL, CL-Ag, CL-other, Dam, PL, PL- Ag, Rehab-Ag	None	None	225.6	0.0	12,802.5	1,985.6	1,136.3	165.7	13,186.1	44.9%	2,151.3	7.3%
7	Open forest to woodland of Jarrah/Marri on slopes and less undulating hills	AD, H1, H2, HG, W, Z	Low	WMDE16, WMDE20, SRE008	0.0	0.0	1,582.4	894.7	221.0	13.9	1,621.7	5.5%	908.6	3.1%
8	Open woodland of Wandoo on clay and clay-loam soils on lower slopes	M, Y, YG	High	WMDE10, WMDE13	0.0	0.0	2,174.2	744.6	549.2	37.4	2,420.8	8.2%	782.0	2.7%

Fauna habitat		Vegetation units (Mattiske 2021)	SRE potential habitat rating	Survey sites	CBME	CBME IDF (ha)	WMDE (ha)	WMDE IDF (ha)	BTC (ha)	BTC IDF* (ha)	PAA (ha)	PAA (%)	PAA IDF (ha)	PAA IDF (%)
9	Open *Eucalyptus* woodlands (wet) on sands, clay-loam or sandy-gravel on lower slopes and valley floors	AX, AY, AY/D, B, CQ, L, Q	High	CBME001, CBME002, CBME005, WMDE09, WMDE18, WMDE12	74.5	13.6	640.0	174.5	285.3	35.7	772.2	2.6%	223.8	0.8%
10	Open woodlands of Wandoo and Flooded Gum on seasonally wet or water-logged clays and clay loams on valley floors	AC	High	SRE001	0.0	0.0	34.2	0.0	0.0	0.0	34.2	0.1%	0.0	0.00%
12	Rehabilitation (post-mining rehabilitation using mostly native species)	Rehab	Low	RH001, RH002, RH003, RH004, RH005, RH006, RH007, RH008	10.6	7.0	3,155.6	598.6	153.8	11.2	3,190.5	10.9%	616.7	2.1%
				Total	**746.5**	**255.9**	**27,796.5**	**8,900.9**	**4,145.7**	**387.9**	**29,356.6**	**100.0%**	**9,544.7**	**32.5%**

*BTC IDF includes the development of bauxite transport routes and associated infrastructure only (i.e. the portion of the IDF within the BTC that does not overlap with the WMDE IDF).

South32 Ltd

Worsley Mine Expansion Project

Project No	1331
Date	14/09/2021
Drawn by	IN
Map author	AJ

0 250 500

Meters

1:25,000 (at A4) GDA 1994 MGA Zone 50

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Regional study area

Contingency Bauxite Mining Development Envelope (CBME)

CBME Indicative Disturbance Footprint (CBME IDF)

Figure 5-1

Potential SRE habitats in the CBME

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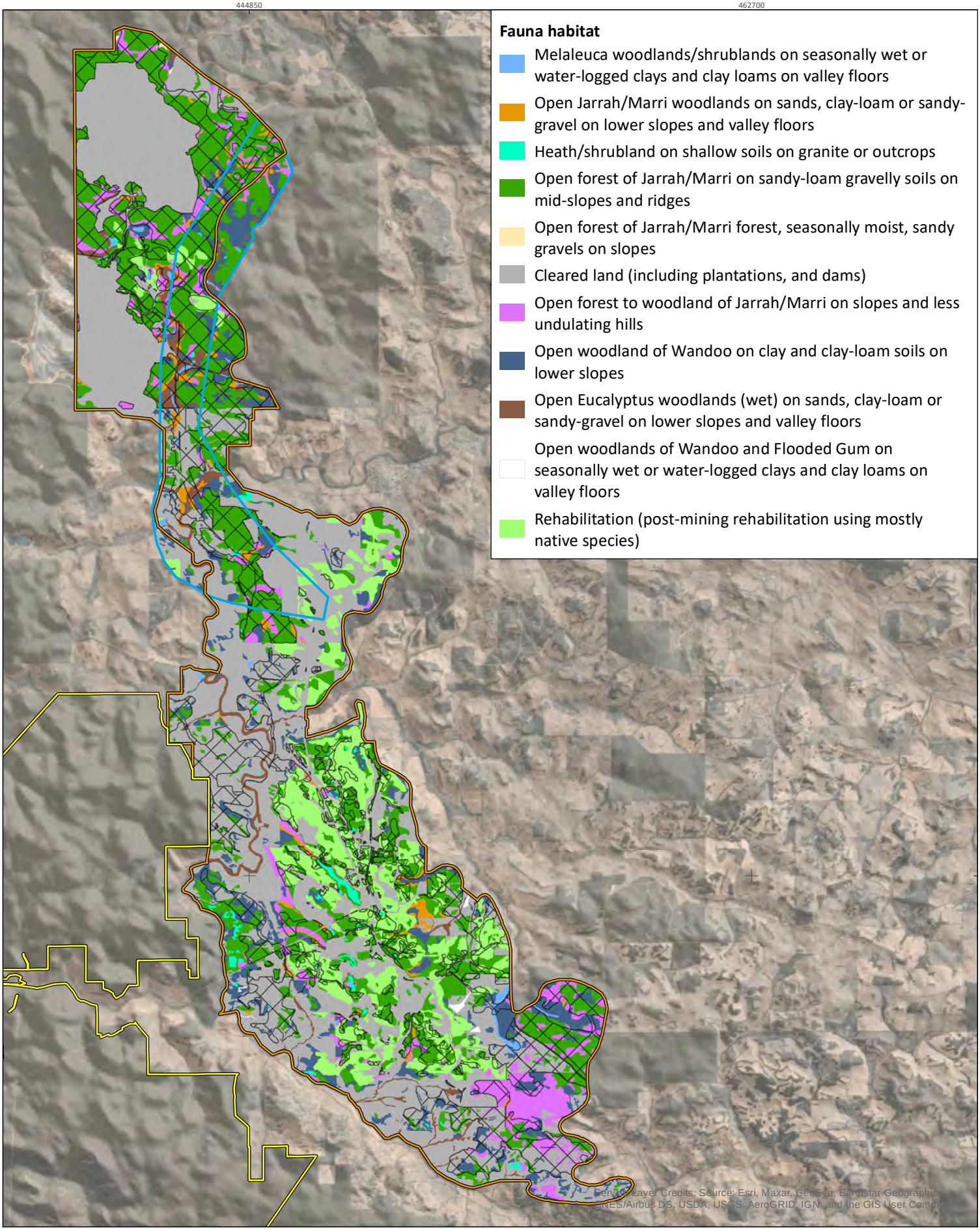

South32 Ltd

Worsley Mine Expansion Project

Project No	1331
Date	14/09/2021
Drawn by	IN
Map author	AJ

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- Regional study area
- Worsley Mining Development Envelope (WMDE)
- Bauxite Transport Corridor Development Envelope (BTC)
- WMDE and BTC IDFs

Figure 5-2

Potential SRE habitats in the WMDE/BTC

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5.2.2 SRE records

A total of 972 specimens of invertebrates from groups known to include SREs were obtained from the field surveys of the CBME, WMDE/BTC (2019) and regional study area (2020 survey), including rehabilitation areas. A total of 121 individuals were recorded from the CBME, 249 from the WMDE, 80 WMDE/BTC and 522 from regional study area. This equated to 141 taxa from at least 29 families and at least 57 genera.

Of these, 108 taxa (73.5%) are considered SREs (Table 5-4).

- 8 are Confirmed SREs (all millipedes)
- 13 are Likely SREs (all isopods)
- 87 are Potential SREs which are represented by:
    - 36 taxa of mygalomorphs (trap-door spiders)
        - one of which is a P3 species, *Euoplos inornatus* (recorded within the regional study area)
    - four taxa of land snails
    - 12 taxa of millipedes
    - 13 taxa of isopods
    - six taxa of pseudoscorpions
    - 16 opiliones.

With respect to the SREs, a total of 56 taxa were recorded inside the WMDE, BTC or CBME and of these, 15 are known only from within the PAA, they consisted of:

- two mygalomorph spiders
- four millipedes
- five isopods
- two opiliones
- two pseudoscorpions.

Five of these 15 taxa (33%) known only from the PAA were further restricted to the IDF (CBME or WMDE/BTC). They consisted of three millipedes, two isopods and one mygalomorph spider:

- Opiliones
    - Triaenonychidae ‘genus 003’ 'WorsleyDNA27' (Potential), Identified as a unique species using molecular techniques due to poorly resolved morphological taxonomy. One specimen was found at WMDE10.
- isopods
    - *Pseudodiploexochus* sp. indet. A (Likely), Morphologically identified as a new species. One specimen was found at WMDE10.
    - *Paraplatyarthrus* sp. indet. D (Likely), recorded form one site only, WMDE06.
- millipedes (all recorded from a single site)
    - Siphonotidae ‘DIPAAF’ ‘WorsleyDNA14’ (Potential), DNA sequencing recognised this species as a unique species and was collected at WMDE06.

  - Siphonotidae 'DIPAAF' 'WorsleyDNA15' (Potential), DNA sequencing recognised this species as a unique species and was collected at CBME004.

The remaining 10 SRE taxa collected within the PAA were not confined to the IDF. All were able to be identified to morphospecies level based on morphological examination by experts (#) or molecular analysis (*), however, sufficient comparative genetic resources were available for the Pseudoscorpions and these may represent described species.

- Mygalomorph spiders
  - *Idiosoma* 'MYG741, WorsleyDNA05'* (Potential)
  - *Bungulla* 'WorsleyDNA11'* (Potential)
- Pseudoscorpions
  - *Beierolpium* 'WorsleyDNA18'* (Potential)
  - *Beierolpium* 'WorsleyDNA19'* (Potential)
- Opiliones
  - Trianonychidae 'genus 008' 'WorsleyDNA30'* (Potential, many records from rehabilitation)
- Millipedes
  - *Antichiropus* 'DIP202, WorsleyDNA18'* (Potential)
  - Siphonotidae 'DIPAAF' 'cf. michaelseni'* (Likely)
- isopods
  - *Paraplatyarthrus* sp. indet. B*# (Likely)
  - *Paraplatyarthrus* sp. indet. C*# (Likely)
  - *Pseudodiploexochus* sp. indet. B*# (Likely).

Of the taxa that were collected within the PAA, only four are described species (*Eucanippe nemestrina*, *Synothele rubripes, Podykipus leptoiuloides* and *Buddelundia nigripes),* 40 are morphospecies (able to be designated a unique name or code based on distinct morphology or genetics, and 12 are indeterminate taxa that have unresolved taxonomy due to either the specimens being of poor condition, a female or juvenile specimen that does not possess identifying characteristics (e.g., mygalomorphs and millipedes), and/or genetic sequencing failed. Some of these taxa have poor morphologic and/or molecular knowledge such that identification cannot be taken any further (opiliones, some pseudoscorpions and some isopods,). They may represent a morphospecies or species found in the survey or desktop review. These are:

- mygalomorphs
  - *Proshermacha* sp. indet. (Potential): Sequencing failed to return a sequence
  - *Aname* sp. indet. (Potential): Sequencing failed to return a sequence
- opiliones
  - Triaenonychidae 'genus 008' sp. indet. (Potential): No available morphological knowledge, molecular sequencing failed
  - *Megalopsalis* sp. indet. (Potential): No available morphological knowledge, molecular sequencing failed

  - *Nunciella* sp. indet. (Potential): No available morphological knowledge, molecular sequencing failed

- pseudoscorpions
  - *Indolpium* sp. indet. (Potential) unknown taxonomy, molecular sequencing failed
  - *Beierolpium* sp. indet. (Potential) female and juvenile specimens, molecular sequencing failed
- isopods
  - *Acanthodillo* sp. indet. (Potential) female/juvenile, molecular sequencing failed
  - *Laevophiloscia sp*. indet. (Potential) damaged specimens, molecular sequencing failed
  - *Paraplatyarthrus* sp. indet. (Potential) damaged specimens, molecular sequencing failed
  - Philosciidae sp. indet. (Potential) damaged specimens, molecular sequencing failed
  - *Styloniscus sp.* indet. (Potential) damaged specimens, molecular sequencing failed

A total of 250 specimens were sequenced, mostly indeterminate taxa due to being juveniles, females, too small and singletons or poor condition. Of these, 31 were from the WMDE, 27 from the CBME, 47 from the regional study area, and one from the rehabilitation study area. Of the 250 specimens that were sequenced, 19 specimens failed to obtain a sequence. Of the specimens that were successfully sequenced, 29 taxa were found be significantly different to specimens where a taxonomist was able to allocate a species or morphospecies identification, of which 16 were from the WMDE (indicated by the morphospecies code 'WorsleyDNA##'), and 13 were from the regional study area (indicated by the morphospecies code 'Phoenix####').

Consideration for SRE status of all taxa recorded is largely due to taxonomic uncertainty, with most only known from specimens collected within the study area or are subsumed within a species complex known to comprise multiple taxa whose distributions are currently not well defined.

From the full list of 141 taxa collected, 24 species have been formally described, of which five are considered SREs (*Armadillo flavus*, *Ballara longipalpis*, *Euoplos inornatus, Synothele rubripes* and *Buddelundia nigripes*). A further 81 are morphospecies that were allocated names based on previously collected specimens, or newly collected specimens that were not the same as any other species known from the WAM collection or by the taxonomist. The majority (70) of the morphospecies are considered SREs.

The remaining 36 taxa were assigned indeterminate due to poor taxonomic knowledge, poor genetic knowledge, inadequate life stage or sex, or a specimen in poor condition. Of these, 28 belong to taxa that have SRE representatives. They could represent any of the collected or previously collected taxa, or possibly new taxa. Of the indeterminate taxa, 12 are recorded from 21 sites in the IDF, and while it is likely some of these represent species recorded during the survey, some of these may represent new species (Table 5-4).

A total of 44 of the taxa collected in the surveys were also returned in the desktop review. This includes 29 taxa that were collected from the PAA, although none that were restricted to the IDF.

5.2.3 Rehabilitation survey

Eighteen taxa from groups known to include SREs were collected from the rehabilitation survey sites (Appendix 6). The assemblage comprised:

- isopods (nine taxa, comprising five potential SRE species, one Likely SRE species and three widespread SRE species (which are therefore not SREs)
- mygalomorph trap-door spiders (three taxa, comprising two Potential SRE and one widespread (and therefore not an SRE)
- opiliones (harvest men) (two taxa, however one is indeterminate and may represent the taxon already recorded at the rehabilitation sites (both Potential SREs)
- millipedes (one taxon, known to be widespread and therefore not an SRE)
- land snail (two taxa, both Potential SRE)
- scorpion (one taxon, known to be widespread and therefore not an SRE).

These included one Likely SRE and eleven Potential SRE taxa (Table 5-4), with isopods, mygalomorphs, opiliones and a land snail making up the SRE collection. The remaining six are widespread species. Of the SRE taxa, none of these are formally described species, seven are morphospecies and the remaining five are indeterminate. All SRE taxa recorded at rehabilitation sites have been recorded in other surveys before, either from the surveys in the PAA and regional study areas, or from the desktop study area.

The number of invertebrate taxa and the number of SRE taxa collected at each site/rehabilitation year are presented in Figure 5-3. The data indicate that rehabilitation age has a weak positive relationship with the number of SRE species recorded ($R^2 = 0.25$), i.e., the age of rehabilitation only explains around 25% of the variation in the number of SRE taxa at any one site. With regards to the total number of invertebrate taxa recorded, there is a moderate positive relationships with rehabilitation age ($R^2 = 0.4$), i.e., rehabilitation age accounts for just over 40% of the variation in the total number of invertebrate taxa.

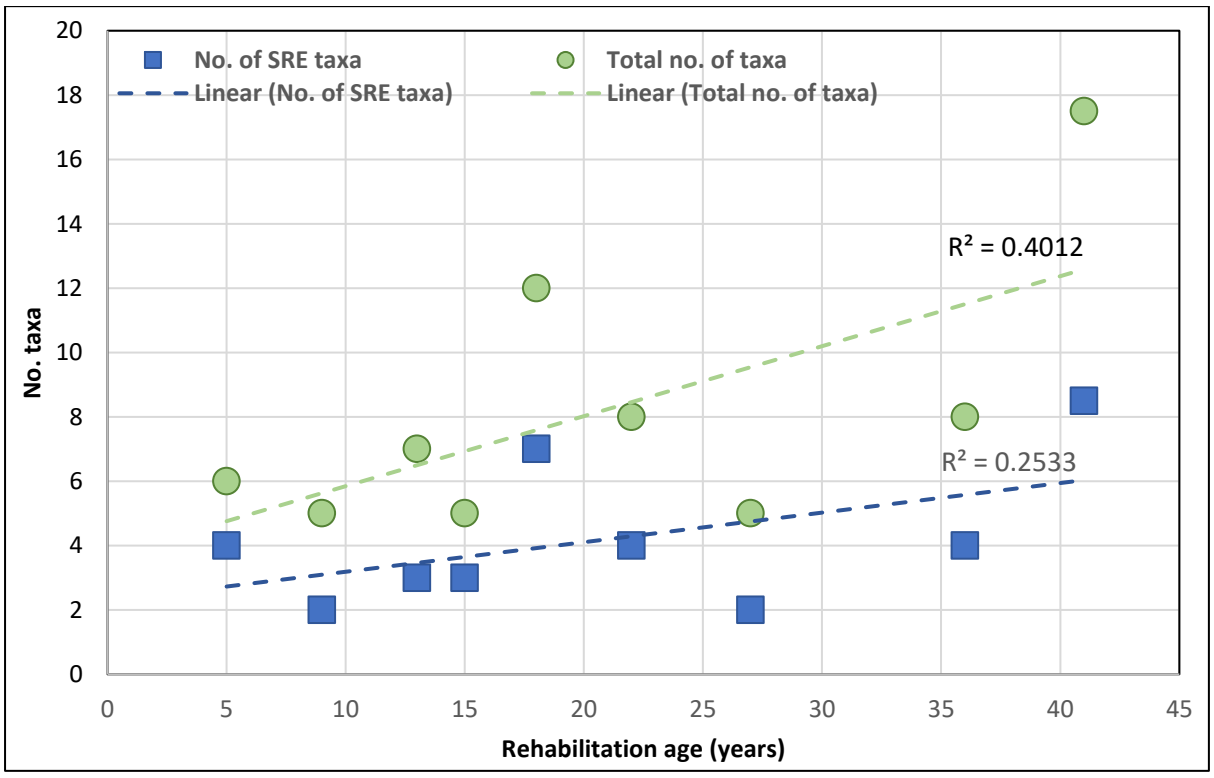


Figure 5-3 Summary of SRE invertebrate taxa based on rehabilitation age

Table 5-4 Records of SRE invertebrates from the surveys

1 – Grey shading indicates taxon has not been recorded outside of the PAA, bold type indicates taxon only found in the PAA IDF. Underlined sites = inside IDF
2 – P = Potential, L = Likely, C = Confirmed, P3 = Priority 3
3 – H = High, L=Low, NM = not mapped

Species[1]	SRE status[2]	Fauna habitat	Hab. no.	Sites[1]	PHR	CBME	CBME IDF	WMDE	WMDE IDF	BTC	BTC IDF*	Regional	Rehab.	Outside PAA	Outside PAA IDF	Comments
Arachnida (spiders) - Infraorder: Mygalomorphae, Family Actinopidae																
Missulena 'MYG198'	P	Melaleuca woodland, Jarrah woodland	1, 2	WMDE011, SRE005	H	x	x	x	x	x	x	✓	x	✓	✓	A handful of other records from the area are known
Missulena 'MYG639'	P	Marri forest	NM	CBME009	NM	x	x	x	x	x	x	✓	x	✓	✓	Morphologically identified as a unique sp., collected from reference site
Missulena 'Phoenix0046'	P	Jarrah/Marri woodland	4	SRE004	L	x	x	x	x	x	x	✓	x	✓	✓	95.4% similarity with M. 'MYG051' loc. South Coast
Missulena sp. indet. (Female)	P	Jarrah/Marri woodland, Marri/Melaleuca woodland	1, 2, 4	SRE007, SRE010, SRE011	H (1, 2), L (4)	x	x	✓	x	x	x	✓	x	✓	✓	Collected from three locations outside the PAA, sequencing failed
Arachnida (spiders) - Infraorder: Mygalomorphae, Family Anamidae																
Aname sp. indet.	P	Open Marri/Jarrah Forest	4	WMDE07, SRE003	L	x	x	✓	✓	✓	x	✓	x	?	?	Molecular sequencing failed. One *Aname* was recorded from the IDF at WMDE07. Five other *Aname* are also known from the survey or desktop search, the nearest being *A.* 'MYG242' which is known from approximately 880 m east and 2 km east of WMDE07, and while it

Species[1]	SRE status[2]	Fauna habitat	Hab. no.	Sites[1]	PHR	CBME	CBME IDF	WMDE	WMDE IDF	BTC	BTC IDF*	Regional	Rehab.	Outside PAA	Outside PAA IDF	Comments
																cannot be confirmed, given the proximity to these records, it most likely represents *A*. 'MYG242'.
Aname 'Phoenix0037'	P	Rehabilitation	12	RH001, RH004	L	x	x	x	x	x	x	x	✓	✓	✓	Not collected in 2019. Not of concern as found in the rehab areas and in Huntly survey
Aname 'WorsleyDNA09'	P	Jarrah/Marri woodland	NM	CBME08	NM	x	x	x	x	x	x	✓	x	✓	✓	Sequencing indicates a unique species
Anamidae 'Phoenix0022'	P	Marri/Jarrah woodland	2	SRE009	H	x	x	x	x	x	x	✓	x	✓	✓	
Anamidae sp. indet.	P	Marri/Jarrah woodland	2,4	SRE002, SRE014	H (2) L (4)	x	x	x	x	x	x	✓	x	✓	✓	Sequencing failed
Proshermacha 'MYG485'	P	Jarrah woodland/ forest, rehabilitation	4, 9, 12	CBME002, SRE003, RH005, RH008	L (4, 12) H (9)	✓	x	x	x	x	x	✓	✓	✓	✓	Common within a restricted range
Proshermacha 'MYG646'	P	Marri forest, Jarrah/Marri woodland, Marri/Melaleuca woodland	1, 2, 3, 8, 9	CBME001, SRE008, SRE010, SRE013	H	✓	x	x	x	x	x	✓	x	✓	✓	Collected at three reference sites
Proshermacha 'MYG658'	P	Open Jarrah/Marri forest	4	CBME04	L	✓	✓	✓	x	x	x	✓	x	✓	✓	Also found at a site between the WMDE and CBME (WAM). Phoenix specimen previously called A. PhoenixDNA04'
Proshermacha 'WorsleyDNA12'	P	Open eucalypt woodland	9	CBME002, CBME008	H	✓	x	x	x	x	x	x	x	✓	✓	Sequencing indicates a unique species

Species[1]	SRE status[2]	Fauna habitat	Hab. no.	Sites[1]	PHR	CBME	CBME IDF	WMDE	WMDE IDF	BTC	BTC IDF*	Regional	Rehab.	Outside PAA	Outside PAA IDF	Comments
Proshermacha sp. indet.	P	Open Jarrah/Marri forest/woodland	1, 2, 3, 4, 8	WMDE07, SRE002, SRE009, SRE014	H (1, 2, 3), L (4)	x	x	✓	✓	✓	x	✓	x	?	?	Sequence failed. One *Proshermacha* was recorded from the IDF at WMDE07. Four other *Proshermacha* are also known from the survey or desktop search, the nearest being *P*. 'MYG485' which is known from approximately 880 m east and another 10 records east and south of WMDE07, and while it cannot be confirmed, given the proximity to these records, it highly likely to represents *P*. 'MYG485'.
Teyl 'Phoenix0017'	P	Jarrah/Marri woodland	4	SRE004	L	x	x	x	x	x	x	✓	x	✓	✓	
Arachnida (spiders) - Infraorder: Mygalomorphae, Family Barychelidae																
Aurecocrypta 'Phoenix0014'	P	Jarrah/Marri woodlands, various understories	2, 4	SRE007, SRE011, SRE014	H (2), L (4)	x	x	x	x	x	x	✓	x	✓	✓	
Synothele rubripes	P	Jarrah/Marri woodlands, various understories	2, 3, 4, 7	WMDE03, WMDE08, WMDE20, SRE005	H (2, 3) L (4, 7)	x	x	✓	✓	✓	x	✓	x	✓	✓	Collected from three locations in WMDE, two in WMDE IDF and one site outside the PAA
Synothele 'MYG640'	P	Jarrah/Marri woodlands, various understories	9, 4	CBME002, CBME003,	L (4), H (9)	✓	✓	x	x	x	x	✓	x	✓	✓	Collected from four locations of which one is outside the PAA

Species[1]	SRE status[2]	Fauna habitat	Hab. no.	Sites[1]	PHR	CBME	CBME IDF	WMDE	WMDE IDF	BTC	BTC IDF*	Regional	Rehab.	Outside PAA	Outside PAA IDF	Comments
				CBME004, CBME006												
Synothele 'WorsleyDNA17'	P	Jarrah/Marri woodlands, various understories	NM	CBME008	NM	x	x	x	x	x	x	✓	x	✓	✓	
Barychelidae sp. indet.	P	Jarrah/Marri woodlands, various understories	4	SRE007	L	x	x	x	x	x	x	✓	x	✓	✓	Sequencing failed
Barychelidae 'WorsleyDNA10'	P	Jarrah/Marri woodland	NM	CBME008	NM	x	x	x	x	x	x	✓	x	✓	✓	Was morphologically identified and sequenced. Both returned this as a unique species
Arachnida (spiders) - Infraorder: Mygalomorphae, Family Idiopidae																
Bungulla 'WorsleyDNA11'	P	Open eucalypt woodland	9	CBME001	H	✓	x	x	x	x	x	x	x	x	✓	One records of this species, a new species from outside of the IDF
Eucyrtops 'collie'	P	Jarrah/Marri woodland	2, 3	SRE003 SRE009	H	x	x	x	x	x	x	✓	x	✓	✓	Not collected in 2019
Eucyrtops 'MYG645'	P	Melaleuca woodland/shrubland, Jarrah/Marri/ Wandoo woodland, open eucalyptus woodland	1, 4, 9	CBME002, CBME003, CBME004, CBME007, WMDE001, WMDE002, WMDE017, WMDE019	H (1, 9), L (4)	✓	✓	✓	✓	x	x	✓	x	✓	✓	Collected from four sites within and outside the CBME
Eucyrtops 'Phoenix0001'	P	Marri/Banksia woodland	4	SRE014	L	x	x	x	x	x	x	✓	x	✓	✓	Not collected in 2019

Species[1]	SRE status[2]	Fauna habitat	Hab. no.	Sites[1]	PHR	CBME	CBME IDF	WMDE	WMDE IDF	BTC	BTC IDF*	Regional	Rehab.	Outside PAA	Outside PAA IDF	Comments
Eucyrtops 'Phoenix0018'	P	Jarrah/Marri forest	4	SREOpp001	L	x	x	x	x	x	x	✓	x	✓	✓	Not collected in 2019
Eucyrtops 'Phoenix0033'	P	Jarrah/Marri woodland/forest	2	SRE011, SRE013	H	x	x	x	x	x	x	✓	x	✓	✓	Not collected in 2019
Eucyrtops 'Phoenix0043'	P	Jarrah woodland with Allocas. & Banksia	7	SRE008	L	x	x	x	x	x	x	✓	x	✓	✓	Not collected in 2019
Eucyrtops 'Phoenix0044'	P	Wandoo woodland, Jarrah woodland, Jarrah/Marri woodland	1, 2, 4	SRE001, SRE002, SRE004	H (1, 2) L (4)	x	x	x	x	x	x	✓	x	✓	✓	Not collected in 2019
Eucyrtops 'Phoenix0045'	P	Open jarrah/Marri woodland	4	SRE003	L	x	x	x	x	x	x	✓	x	✓	✓	Not collected in 2019
Eucyrtops 'WorsleyDNA06'	P	Open Jarrah/Marri woodland, open eucalypt woodland, Melaleuca woodland/shrubland, heath/shrubland, Wandoo woodland	8, 9	WMDE09, WMDE10, WMDE12, WMDE13	H (8, 9)	x	x	✓	✓	✓	x	✓	x	✓	✓	Recorded from four locations, 1 outside the PAA, also recorded at Huntly, sequencing indicates a unique species
Euoplos inornatus	P/P3	Jarrah woodland	2	SRE005	H	x	x	x	x	x	x	✓	x	✓	✓	Not collected in 2019, one male specimen collected
Euoplos 'Phoenix0013'	P	Jarrah woodland with Allocasuarina and Banksia	3	SRE006	H	x	x	x	x	x	x	✓	x	✓	✓	Not collected in 2019, three juveniles from one site
Idiosoma 'Phoenix0002'	P	Jarrah woodland with Allocas, Jarrah/Marri forest	4	SRE007, Opp001	L	x	x	x	x	x	x	✓	x	✓	✓	

Species[1]	SRE status[2]	Fauna habitat	Hab. no.	Sites[1]	PHR	CBME	CBME IDF	WMDE	WMDE IDF	BTC	BTC IDF*	Regional	Rehab.	Outside PAA	Outside PAA IDF	Comments
Idiosoma 'MYG741, WorsleyDNA05'	P	Open Jarrah/Marri forest, open Jarrah/Marri woodland, Wandoo woodland, open eucalypt woodland, Melaleuca woodland/shrubland	4, 2, 8, 9, 1	CBME05, WMDE02, WMDE06, WMDE10, WMDE17	L (4), H (2, 8, 9, 1)	✓	x	✓	✓	✓	✓	x	x	x	✓	Collected from the WMDE, BTC and CBME, including the WMDE and BTC IDFs, sequencing indicates a unique species
Eucanippe nemestrina	P	Open Jarrah/Marri forest	4	WMDE03	L	x	x	✓	x	x	x	✓	x	✓	✓	One record from the WMDE but outside IDF. Also known from near Kojonup
Idiopidae sp. indet. (female/juvenile)	P	Jarrah/Marri forest/woodland	2, 4	SRE002, SRE003, SRE004, SRE007, SRE011	H (2), L (4)	x	x	x	x	x	x	✓	x	✓	✓	Sequencing failed
Arachnida (pseudoscorpions)																
Pseudotyrannochthonius sp. indet.	P	Marri woodland	NM	CBME010	NM	x	x	x	x	x	x	✓	x	✓	✓	Not in PAA. Attempts at sequencing this specimen in 2022 failed
Beierolpium 'WorsleyDNA18'	P	Open Jarrah/Marri forest	4	WMDE04	L	x	x	✓	x	x	x	x	x	?	✓	Molecular ID only, however may also be *B. bornemisszai* (widespread, reference specimens failed to amplify)
Beierolpium 'WorsleyDNA19'	P	Open Jarrah/Marri forest	4	WMDE02	L	x	x	✓	x	x	x	x	x	?	✓	Molecular ID only, however, may also be *B. bornemisszai* (widespread, reference specimen failed to amplify)
Beierolpium sp. indet.	P	Open Jarrah/Marri forest	4	CBME003	L	✓	✓	x	x	x	x	x	x	?	?	Specimen sequenced but failed to amplify. May represent one of the above

Species[1]	SRE status[2]	Fauna habitat	Hab. no.	Sites[1]	PHR	CBME	CBME IDF	WMDE	WMDE IDF	BTC	BTC IDF*	Regional	Rehab.	Outside PAA	Outside PAA IDF	Comments
																species. *Beierolpium bornemisszai* was recorded 600 m, 1.8 km and 6.6 km away from this record, so while it cannot be confirmed, this specimen is highly likely to represent this widespread species.
Euryolpium sp. indet.	P	Jarrah/Marri woodland	NM	CBME06	L	x	x	x	x	x	x	✓	x	✓	✓	One record from outside the PAA. Attempts at sequencing failed
Indolpium sp. indet.	P	Open Jarrah/Marri forest	4	WMDE02	L	x	x	✓	x	x	x	x	x	✓	✓	Two juveniles from one site, may or may not represent a known species. Failed to amplify
Arachnida (Opiliones)																
Megalopsalis sp. indet.	P	Open Jarrah/Marri forest	4	CBME004, CBME009,	L	✓	✓	x	x	x	x	✓	x	?	?	These specimens failed to amplify and is likely represent 'DNA23' which is locally abundant in the regional survey area
Megalopsalis 'WorsleyDNA22'	P	Open Jarrah/Marri forest	4, 7	SRE003, SRE008	L	x	x	x	x	x	x	✓	x	✓	✓	Molecular sequencing revealed 97.3% divergence between these two specimens
Megalopsalis 'WorsleyDNA23'	P	Open Jarrah/Marri forest, Heath/shrubland	2, 3, 4	SRE006, SRE007, SRE011, SRE014	H (2, 3) L (4)	x	x	x	x	x	x	✓	x	✓	✓	Molecular sequencing revealed 98.4 – 98.1% divergence between these specimens

Species[1]	SRE status[2]	Fauna habitat	Hab. no.	Sites[1]	PHR	CBME	CBME IDF	WMDE	WMDE IDF	BTC	BTC IDF*	Regional	Rehab.	Outside PAA	Outside PAA IDF	Comments
Ballara longipalpis	P	Wandoo woodlands, Jarrah/Marri woodland/forest	2, 3, 4, 10	SRE001, SRE002, SRE003, SRE004, SRE006, SRE007, SRE008, SRE009, SRE011, SRE013	H (2, 3, 10) L (4)	x	x	x	x	x	x	✓	x	✓	✓	
Calliuncus sp. indet.	P	Open Marri/Jarrah/ Sheoak woodland, Marri/Jarrah woodland	2	CBME006, SRE013	H	✓	x	✓	x	x	x	✓	x	✓	✓	Molecular sequencing of one failed to amplify. Likely same as *Calliuncus* 'WorsleyDNA21'
Calliuncus 'WorsleyDNA21'	P	Open Jarrah/Marri forest/woodland, melaleueca woodland	1, 2, 4, 5	CBME010, WMDE003, WMDE016, WMDE021, SRE010, SRE011, SRE012,	H (1, 2, 5) L (4)	x	x	✓	✓	x	x	✓	x	✓	✓	Molecular sequencing revealed one clade with likely broad intraspecific species divergence.
Nunciella 'WorsleyDNA25'	P	Open Jarrah/Marri forest	5	SRE012	H	x	x	x	x	x	x	✓	x	✓	✓	Molecular sequencing reveal this may be a distinct species from the others in the Triaenonychidae family
Nunciella sp. indet.	P	Open Jarrah/Marri forest, open Eucalypt woodland	4, , 9	CBME001, CBME003, CBME004, CBME005, CBME010,	H (9L (4)	✓	✓	x	x	x	x	✓	x	?	?	Collected from four sites within the CBME, these specimens failed to amplify and may represent a new species or a species within any of the *Nunciella* or Triaenonychidae morphospecies, most likely Triaenonychidae 'Phoenix0029' which was

Species[1]	SRE status[2]	Fauna habitat	Hab. no.	Sites[1]	PHR	CBME	CBME IDF	WMDE	WMDE IDF	BTC	BTC IDF*	Regional	Rehab.	Outside PAA	Outside PAA IDF	Comments
																recorded between 8 km SW, and 20 km NE of the IDF sites CBME003 and CBME004, with the closes record being 2 km.
Triaenonychidae 'genus 003' sp. indet.	P	Open Jarrah/Marri forest, open eucalypt woodland, Wandoo woodland	4	WMDE02, WMDE03	L	x	x	✓	✓	✓	x	✓	x	✓	✓	These specimens failed to amplify. Likely same as *Calliuncus* 'WorsleyDNA21' at WMDE003.
Triaenonychidae 'genus 003' 'WorsleyDNA24'	P	Open Jarrah/Marri forest	2	SRE009	H	x	x	x	x	x	x	✓	x	✓	✓	Molecular sequencing revealed these are likely unique species, however more research is required for greater understanding of this group
Triaenonychidae 'genus 003' 'WorsleyDNA26'	P	Open eucalyptus woodland	9	WMDE12	H	x	x	x	x	x	x	✓	x	✓	✓	Molecular sequencing revealed these are likely unique species, however more research is required, , however more research is required for greater understanding of this group
Triaenonychidae 'genus 003' 'WorsleyDNA27'	**P**	**Open wandoo woodland**	**8**	**WMDE10**	**H**	**x**	**x**	✓	✓	**x**	**x**	**x**	**x**	**x**	**x**	**Molecular sequencing revealed these are likely unique species, however more research is required for greater understanding of this group**

Species[1]	SRE status[2]	Fauna habitat	Hab. no.	Sites[1]	PHR	CBME	CBME IDF	WMDE	WMDE IDF	BTC	BTC IDF*	Regional	Rehab.	Outside PAA	Outside PAA IDF	Comments
Trianonychidae 'genus 008' 'WorsleyDNA28'	P	Open Jarrah/Marri woodland	2	SRE009	H	x	x	x	x	x	x	✓	x	✓	✓	Molecular sequencing revealed this specimens is likely an undescribed unique species.
Trianonychidae 'genus 008' 'WorsleyDNA29'	P	Melaleuca woodland/shrubland, Open Jarrah/Marri woodland/forest	1, 2, 4,	CBME009, SRE009, SRE010, SRE011, SRE013, SRE014	H (1, 2) L (4)	x	x	x	x	x	x	✓	x	✓	✓	Molecular sequencing revealed this specimens is likely an undescribed unique species.
Trianonychidae 'genus 008' 'WorsleyDNA30'	P	Melaleuca woodland/shrubland, Open Jarrah/Marri forest, rehabilitation	1, 4, 12	WMDE015, WMDE017, RH002, RH003, RH004, RH006	1 (H) L (4, 12)	✓	✓	x	x	x	x	✓	✓	x	✓	Molecular sequencing revealed this is a unique species. Although this species has not been recorded outside of the PAA, it appears to favour rehabilitated areas
Triaenonychidae 'genus 008' sp. indet.	P	Open Jarrah/Marri woodland, open Jarrah/Marri forest, Melaleuca woodland/shrubland, heath/shrubland, Wandoo woodland, rehabilitation	1, 2, 3, 4, 7, 8, 12	WMDE01, WMDE03, WMDE04, WMDE07, WMDE10, WMDE13, SRE009, RH002, RH003, RH004, RH006	H (1, 2, 3, 8) L (4, 7, 12),	x	x	✓	✓	✓	x	✓	✓	✓	✓	Collected from a variety of sites in the WMDE. These specimens were damaged or of an indeterminable life stage, and also failed sequencing attempts. The specimen found in the IDF at WMDE10 likely represent Triaenonychidae 'genus 008' 'DNA027' which as was also recorded at that site, WMDE13 is likely to represent Triaenonychidae 'genus 008' 'DNA26 as that

Species[1]	SRE status[2]	Fauna habitat	Hab. no.	Sites[1]	PHR	CBME	CBME IDF	WMDE	WMDE IDF	BTC	BTC IDF*	Regional	Rehab.	Outside PAA	Outside PAA IDF	Comments
																was recorded only 375 m away. The specimen at WMDE07 could be a new species or another recorded specie, but it is impossible to determine based on morphology and failed genetic analyses, and the specimen at RH003 is highly likely to represent Triaenonychidae 'genus 008' 'DNA30' which was also found at that site.
Myriapoda (millipedes)																
'cf *Sphaerotrichopus*' sp. indet.	P	Open Jarrah/Marri woodland, Melaleuca and Marri woodland	1, 2	WMDE15, SRE010, SRE011	H	x	x	✓	x	✓	✓	x	x	?	?	Molecular sequencing failed but highly likely to be conspecific with *S.* 'WorsleyDNA01' which was the only species to be returned from genetic sequencing and includes specimens located 5 km north
'cf *Sphaerotrichopus*' 'WorsleyDNA01'	P	Open Jarrah/Marri forest, open eucalypt woodland, Wandoo woodland	4, 8, 9	WMDE10, WMDE12, WMDE15	H (8, 9) L (4),	x	x	✓	✓	✓	x	✓	x	✓	✓	Molecular sequences indicated the same species were recorded at three sites; one is a reference site for the WMDE

Species[1]	SRE status[2]	Fauna habitat	Hab. no.	Sites[1]	PHR	CBME	CBME IDF	WMDE	WMDE IDF	BTC	BTC IDF*	Regional	Rehab.	Outside PAA	Outside PAA IDF	Comments
Iulomorphidae sp. indet	P	Jarrah/Marri woodland/forest	4, 5	SRE012, SRE014	H (5) L(4)	x	x	x	x	x	x	✓	x	✓	✓	Molecular sequencing efforts failed to amplify for these specimens. Likely to be representatives of Iulomorphidae 'WorsleyDNA20'
Iulomorphidae 'WorsleyDNA20'	P	Jarrah/Marri woodland/forest	2, 4, 9	CBME001, CBME004, CBME005, SRE013, SRE015	H (9) L (4)	✓	✓	x	x	x	x	✓	x	✓	✓	Molecular sequencing revealed these specimens to be conspecific with each other 97.4 – 99.7% conspecifity.
Antichiropus 'DIP097, marradong'	C	Heath/shrubland	3	WMDE08	H	x	x	✓	✓	✓	x	✓	x	✓	✓	Also recorded by Phoenix (2012) outside of the PAA
Antichiropus 'DIP046, boddington	C	Jarrah/Marri forest/woodland, woodland, Wandoo woodland	2, 4, 5, 10	SRE001, SRE004, SRE011, SRE012, SRE013, SRE015	H (2, 5, 10), L (4)	x	x	x	x	x	x	✓	x	✓	✓	
Antichiropus 'DIP108, mt saddleback'	C	Jarrah/Marri forest/woodland, woodland, Wandoo woodland, Melaleuca/Marri woodland	1, 2, 4, 5, 9, 10	CBME001, CBME002, CBME003, CBME006, CBME008, CBME009, WMDE006, SRE001, SRE009, SRE010, SRE012, SRE013, SRE014, SRE015	H (1, 2, 5, 9, 10) L (4),	✓	✓	✓	✓	x	x	✓	x	✓	✓	Specimens previously known as *A*. 'DIP177' are now also known as A. 'DIP108'

Species[1]	SRE status[2]	Fauna habitat	Hab. no.	Sites[1]	PHR	CBME	CBME IDF	WMDE	WMDE IDF	BTC	BTC IDF*	Regional	Rehab.	Outside PAA	Outside PAA IDF	Comments
Antichiropus 'DIP202, WorsleyDNA18'	P	Heath/shrubland	4	WMDE04	L	x	x	✓	x	x	x	x	x	x	✓	Molecular sequencing indicated this is a unique species
Antichiropus 'DIP176, worsley'	C	Open Marri/Sheoak woodland, Jarrah/ Marri/Wandoo woodland	NM	CBME007, CBME010	NM	x	x	x	x	x	x	✓	x	✓	✓	Collected outside of the PAA
Antichiropus sp. indet.	P	Jarrah/Marri forest, Melaleuca and Marri woodland	1, 2, 4, 5	SRE010, SRE012, SRE013, SRE015	H (1, 2, 5), L (4)	x	x	x	x	x	x	✓	x	✓	✓	Sequencing failed
Podykipus leptoiuloides	P	Jarrah/Marri forest/woodland, woodland, Wandoo woodland, Melaleuca/Marri woodland, Heath/shrubland	1, 2, 3, 4, 5, 9, 10	CBME007, CBME008, CBME001, WMDE008, SRE001, SRE003, SRE004, SRE006, SRE007, SRE009, SRE010, SRE011, SRE012, SRE014	H (1, 2, 3, 5, 9, 10), L (4)	✓	x	✓	✓	x	x	✓	x	✓	✓	
Siphonotidae 'DIPAAF' 'DIP188' 'boddington'	C	Wandoo woodland, Jarrah/Marri woodland	2, 10	SRE001, SRE011	H	x	x	x	x	x	x	✓	x	✓	✓	Only collected in 2020 survey
Siphonotidae 'DIPAAG' 'DIP189' 'collie'	C	Marri forest, Jarrah/Marri woodland, open eucalypt woodland	2, 3, 4	CBME009, SRE003, SRE006, SRE011	H (2, 3), L (4)	x	x	x	x	x	x	✓	x	✓	✓	Collected from one site within the CBME and two CBME reference sites. Previously known as 'Hesperisiphon' 'mt saddleback' and

Species[1]	SRE status[2]	Fauna habitat	Hab. no.	Sites[1]	PHR	CBME	CBME IDF	WMDE	WMDE IDF	BTC	BTC IDF*	Regional	Rehab.	Outside PAA	Outside PAA IDF	Comments
																Heterosiphon' 'WorsleyDNA16'
Siphonotidae 'DIPAAG' 'DIP192' 'mt saddleback'	C	Jarrah/Marri woodland/forest	4, 5, 9	CBME002, CBME008, SRE007, SRE012	H (5, 9), L (4)	✓	x	x	x	x	x	✓	x	✓	✓	Collected from four sites
Siphonotidae 'DIPAAH' 'DIP190' 'harris river'	C	Jarrah woodland with Allocasuarina	3	SRE006	H	x	x	x	x	x	x	✓	x	✓	✓	Only collected in 2020 survey
Siphonotidae 'DIPAAF' 'cf. *michaelseni*'	P	Woodland, open woodland, open eucalypt woodland	7,9	WMDE16, WMDE09, CBME005	L (7), H (9)	✓	✓	✓	x	x	x	x	x	x	✓	Specimens sequenced, collected from both the CBME and WMDE
Siphonotidae 'DIPAAF' 'WorsleyDNA14'	**P**	**Open Jarrah/Marri woodland**	**2**	**WMDE06**	**H**	**x**	**x**	✓	**x**	**x**	✓	**x**	**x**	**x**	**x**	**Sequencing resulted in a unique species, previously called 'Megalosiphon' 'WorsleyDNA14'**
Siphonotidae 'DIPAAF' 'WorsleyDNA15'	**P**	**Open Jarrah/Marri forest**	**4**	**CBME004**	**L**	✓	✓	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**Sequencing resulted in a unique species, previously called 'Megalosiphon' 'WorsleyDNA15'**
Siphonotidae 'DIPAAF' 'sp. indet.'	P	Open woodland	NM	CBME010	NM	x	x	x	x	x	x	✓	x	✓	✓	Sequencing failed, previously called 'Megalosiphon' sp. indet.
Malacostraca (slaters)																
Acanthodillo sp. indet.	P	Open Jarrah/Marri forest, rehabilitation	4, 12	WMDE07, SRE014, SRE007, RH003	L	x	x	✓	✓	✓	x	✓	✓	?	?	One very small indeterminate specimen from inside the WMDE IDF at WMDE07, additional specimens recorded outside the PAA, however given

Species[1]	SRE status[2]	Fauna habitat	Hab. no.	Sites[1]	PHR	CBME	CBME IDF	WMDE	WMDE IDF	BTC	BTC IDF*	Regional	Rehab.	Outside PAA	Outside PAA IDF	Comments
																none of the more common specimens are known from nearby and the presence of several highly endemic taxa from this genus, the specimen from WMDE07 potentially represents a restricted species. The indeterminate specimen collected from the rehabilitation area indicates this species is resilient tto disturbance.
Acanthodillo '5'	P	Jarrah/Marri woodland	NM	CBME06	NM	x	x	x	x	x	x	✓	x	✓	✓	One record from outside the PAA
Armadillo flavus	P	Mari/Jarrah woodland/forest	2, 3, 4	SRE006, SRE013, SRE015	H (2, 3) L (4)	x	x	x	x	x	x	✓	x	✓	✓	Collected from three sites outside the PAA
Buddelundia '04'	P	Open Jarrah/Marri woodland, open Jarrah/Marri forest, open eucalypt woodland	2, 4, 9	WMDE06, WMDE07, WMDE09	L (4), H (2, 9)	x	x	✓	x	✓	✓	x	x	✓	✓	Collected from three sites in the WMDE and BTC, one in the BTC IDF, also desktop records
Buddelundia nigripes	P	Open Jarrah/Marri forest, eucalypt woodland	9, 4, NM	CBME003, CBME004, CBME005, CBME009, SRE009	L (4), high (9)	✓	✓	x	x	x	x	✓	x	✓	✓	Collected from five sites, of which three are in the CBME and two are outside the PAA

Species[1]	SRE status[2]	Fauna habitat	Hab. no.	Sites[1]	PHR	CBME	CBME IDF	WMDE	WMDE IDF	BTC	BTC IDF*	Regional	Rehab.	Outside PAA	Outside PAA IDF	Comments
Buddelundia sp. indet.	P	Open Jarrah/Marri forest	10	SRE001	H	x	x	✓	✓	✓	x	✓	x	✓	✓	Poorly preserved specimens, may represent an existing or new species
Buddelundia sp. indet. A	L	Open eucalypt woodland, Wandoo woodland	8, 9	WMDE12, WMDE13	H	x	x	✓	✓	x	x	✓	x	✓	✓	Collected from two locations, one is within the CBME and one is outside of the PAA
Pseudodiploexochus '1'	L	Open Jarrah/Marri forest, open Jarrah/Marri woodland	10, 4, 2,	CBME001, CBME004, CBME009, WMDE02, WMDE06, WMDE22, SRE009, SRE011	H (2, 10), L (4)	✓	✓	✓	✓	✓	✓	✓	x	✓	✓	Collected from within the WMDE, BTC and CBME IDFs and also outside the PAA
***Pseudodiploexochus* sp. indet. A**	**L**	**Wandoo woodland**	**8**	**WMDE10**	**H**	**x**	**x**	✓	✓	✓	**x**	x	x	**x**	**x**	**Collected from one location in the WMDE IDF**
Pseudodiploexochus sp. indet. B	L	Open Jarrah/Marri forest/woodland	7	WMDE16	L	x	x	✓	x	x	x	x	x	x	✓	Collected from one location in the WMDE but not the IDF
Pseudodiploexochus sp. indet.	L	Jarrah/Marri forest	2, 4	SRE013, SRE015	H (2) L (4),	x	x	x	x	x	x	✓	x	✓	✓	Attempts at sequencing these specimens failed
Styloniscus '1'	P	Open Jarrah/Marri forest, open eucalypt woodland, Wandoo woodland, rehabilitation	1, 2, 4, 8, 9, 10, 12	CBME001 to CBME010, WMDE03, WMDE07, WMDE13, SRE009, SRE010, SRE013, RH001	H (1, 2, 8, 9, 10), L (4, 12)	✓	✓	✓	✓	✓	x	✓	✓	✓	✓	Located throughout the PAA and also outside of the PAA

Species[1]	SRE status[2]	Fauna habitat	Hab. no.	Sites[1]	PHR	CBME	CBME IDF	WMDE	WMDE IDF	BTC	BTC IDF*	Regional	Rehab.	Outside PAA	Outside PAA IDF	Comments
Styloniscus '7'	P	Open Jarrah/Marri forest, Jarrah/Marri woodland, Melaleuca woodland, rehabilitation	1, 2, 4, 9	CBME003, CBME004, CBME005, CBME009, WMDE04, WMDE06, SRE009, SRE010, SRE011	H (1, 2, 9) L (4)	✓	✓	✓	x	✓	✓	✓	✓	✓	✓	Located throughout the PAA and also outside of the PAA
Styloniscus 'A' (Worsley)	L	Open Jarrah/Marri woodland	4	SRE015	L	x	x	x	x	x	x	✓	x	✓	✓	Located outside of the PAA
Styloniscus 'B' (Worsley)	L	Open Jarrah/Marri woodland	2	SRE013	H	x	x	x	x	x	x	✓	x	✓	✓	Located outside of the PAA
Styloniscus sp. indet.	P	Open Jarrah/Marri forest, Jarrah/Marri woodland with mixed understories	1, 2, 3, 4	CBME004, SRE006, SRE010, SRE011, SRE013	H (1, 2, 3) L (4)	✓	✓	x	x	x	x	✓	x	?	?	One record, lacking pigment, additional specimens collected in 2020, unsure if conspecific. Attempts at sequencing these specimens failed. The site from within the IDF at CBME004 also has records of locally abundant *S*. '1' and *S*. '7' and this specimen is likely to represent one of these taxa
Laevophiloscia '1'	P	Open Marri forest, open eucalypt woodland, heath/shrubland, open Jarrah/Marri	9, 8, 4, 2, 10, 3,	CBME001, CBME007, CBME009, CBME010, WMDE01,	L (3, 4), H (2, 8, 9, 10)	✓	✓	✓	✓	✓	x	✓	✓	✓	✓	Collected throughout the WMDE and CBME and also outside of the PAA, also collected from 12 of the sites from 2020 survey

Species[1]	SRE status[2]	Fauna habitat	Hab. no.	Sites[1]	PHR	CBME	CBME IDF	WMDE	WMDE IDF	BTC	BTC IDF*	Regional	Rehab.	Outside PAA	Outside PAA IDF	Comments
		forest, open Jarrah/Marri woodland, Wandoo woodland, rehabilitation		WMDE03, WMDE08, WMDE10, WMDE19, WMDE21, WMDE22, plus 12 sites from 2020 (reg/RH)												
Laevophiloscia cf. perlata	P	Open Jarrah/Marri woodlands	2	SRE005	H	x	x	x	x	x	x	✓	x	✓	✓	Molecular sequencing of an indeterminate species matched this with a reference specimen from a previous survey Phoenix 2012), outside of the PAA
Laevophiloscia sp. indet.	P	Open Jarrah/Marri forest, open eucalypt woodland, Melaleuca woodland/shrubland, Wandoo woodland, rehabilitation	1, 4, 7, 8, 9	WMDE02, WMDE03, WMDE10, WMDE11, WMDE12, WMDE16, WMDE20, RH006, 7 sites from regional survey	H (1, 8, 9), L (4, 7)	x	x	✓	✓	✓	x	✓	✓	?	?	May represent a known species and multiple species but specimens were in poor condition or unidentifiable life stage/gender, also collected from 12 of the sites from 2020 survey. Some specimens sequenced in 2022 but many had been discarded or failed to amplify. The specimens recorded from the IDF are likely to be *L*. '1' given these species were also collected at the same site (WMDE10)

Species[1]	SRE status[2]	Fauna habitat	Hab. no.	Sites[1]	PHR	CBME	CBME IDF	WMDE	WMDE IDF	BTC	BTC IDF*	Regional	Rehab.	Outside PAA	Outside PAA IDF	Comments
																or within 1 km of the site (WMDE20)
Philosciidae '1'/'S' (Worsley)	L	Jarrah/Marri woodland	3, 4	SRE004, SRE006	H (3), L (4)	x	x	x	x	x	x	✓	x	✓	✓	May represent a known species and multiple species but species were in poor condition or unremarkable life stage/gender
Philosciidae *sp.* indet.	P	Rehabilitation	12	RH004, RH007, RH008	L	x	x	x	x	x	x	x	✓	?	?	Attempts at sequencing these specimens failed. The specimen recorded from the IDF in RH007 indicates this species is resilient to disturbance and not at risk to development, it is probably *L*. '1'.
Paraplatyarthrus sp. indet.	L	Open Jarrah/Marri woodland, open Jarrah/Marri forest, rehabilitation	2, 4, 12	WMDE06, WMDE07, WMDE22, CBME006, SRE007, RH002, RH003	H (2), L (4, 12)	x	x	✓	✓	✓	✓	✓	✓	?	?	May or may not be multiple species and similar to other morphospecies from the survey. Specimens were in poor condition too small to determine morphospecies. Specimens from 3 sites within the IDF were recorded. The specimen at WMDE06 is likely to represent *Paraplatyarthrus* sp. indet. D which was recorded at the same site. The specimens from

Species[1]	SRE status[2]	Fauna habitat	Hab. no.	Sites[1]	PHR	CBME	CBME IDF	WMDE	WMDE IDF	BTC	BTC IDF*	Regional	Rehab.	Outside PAA	Outside PAA IDF	Comments
																WMDE07 is 250 m away from WMDE06 so also likely to represent *Paraplatyarthrus* sp. indet. D. the specimen from WMDE22 is 640 m away from *Paraplatyarthrus* sp. indet. C so is most likely to be that species, however cannot be confirmed.
Paraplatyarthrus sp. indet. A	L	Heath/shrubland, Wandoo woodland, Jarrah woodland near creeklines	2, 3, 4, 10	WMDE01, SRE001, SRE003, SRE004, SRE005	H (2, 3, 10) L (4)	x	x	✓	x	x	x	✓	x	✓	✓	Collected from one site in the WMDE, a unique species, additional specimens collected at four sites outside the WME in 2020
Paraplatyarthrus sp. indet. B	L	Open Jarrah/Marri forest	4	WMDE02	L	x	x	✓	x	x	x	x	x	x	✓	Three specimens at one site
Paraplatyarthrus sp. indet. C	L	Open Jarrah/Marri forest	4	WMDE04	L	x	x	✓	x	x	x	x	x	x	✓	Collected from one site in the WMDE, a unique species according to taxonomist
***Paraplatyarthrus* sp. indet. D**	**L**	**Open Jarrah/Marri woodland**	**2**	**WMDE06**	**H**	**x**	**x**	✓	**x**	✓	✓	**x**	**x**	**x**	**x**	**Collected from one site in the WMDE/BTC IDF, a unique species according to taxonomist**
Eupulmonata (land snails)																
Bothriembryon cf. *bradshawi*	P	Rehabilitation	12	RH004	L	x	x	x	x	x	x	x	✓	✓	✓	Also recorded at Huntly

Species[1]	SRE status[2]	Fauna habitat	Hab. no.	Sites[1]	PHR	CBME	CBME IDF	WMDE	WMDE IDF	BTC	BTC IDF*	Regional	Rehab.	Outside PAA	Outside PAA IDF	Comments
Charopidae 'sp. indet'	P	Marri and Melaleuca woodland, Jarrah woodland	1	SRE010	H	x	x	x	x	x	x	✓	x	✓	✓	These specimens were all protoconch life stage (juvenile). Sequencing failed
Annoselix cf. *dolosa*	P		12	SRE005, SRE009, RH002, RH005	L	x	x	✓	x	x	x	✓	✓	✓	✓	
Luinodiscus sp. indet.	P	Jarrah/Marri woodlands/forest	2, 4	SRE002, SRE005, SRE011, SRE015	H (2), L(4)	x	x	x	x	x	x	✓	x	✓	✓	Very small specimens. These specimens were un-available to sequence in 2022

* BTC IDF includes the development of bauxite transport routes and associated infrastructure only (i.e. the portion of the IDF within the BTC that does not overlap with the WMDE IDF).

5.2.4 SRE taxa and fauna habitats

The summary of SRE taxa recorded per native habitat type are presented below (Table 5-5). SRE taxa were recorded from all nine native habitats, as well as the rehabilitation areas:

- SRE habitat 1 (High) – *Melaleuca* woodlands/shrublands on seasonally wet or water-logged clays and clay loams on valley floors: 18 taxa
- SRE habitat 2 (High) – Open Jarrah/Marri woodlands on sands, clay-loam or sandy-gravel on lower slopes and valley floors: 48 taxa
- SRE habitat 3 (High) – Heath/shrubland on shallow soils on granite or outcrops: 16 taxa
- SRE habitat 4 (Low) – Open forest of Jarrah/Marri on sandy-loam gravelly soils on mid-slopes and ridges: 64taxa
- SRE habitat 5 (High) – Open forest of Jarrah/Marri forest, seasonally moist, sandy gravels on slopes: 9 taxa
- SRE habitat 7 (Low) – Open forest to woodland of Jarrah/Marri on slopes and less undulating hills: 10 taxa
- SRE habitat 8 (High) – Open woodland of Wandoo on clay and clay-loam soils on lower slopes: 10 taxa
- SRE habitat 9 (High) – Open *Eucalyptus* woodlands (wet) on sands, clay-loam or sandy-gravel on lower slopes and valley floors: 24 taxa
- SRE habitat 10 (High) – Open woodlands of Wandoo and Flooded Gum on seasonally wet or water-logged clays and clay loams on valley floors: 10 taxa
- SRE habitat 12 (Low) – Rehabilitation (post-mining rehabilitation using mostly native species): 12 taxa.

Habitat type 4 (Open forest of Jarrah/Marri on sandy-loam gravelly soils on mid-slopes and ridges) recorded the highest number of SRE taxa. This is also the most widespread habitat in the PAA (7,366.6 ha) and the most sampled. Of the taxa recorded in this habitat however, 11 SRE morphospecies have been recorded only from this habitat type.

Of the SRE taxa recorded, 76 were collected from the seven High potential SRE habitats considered to have high potential to support SREs (1, 2, 3, 5, 8, 9 and 10); 44 of these were also recorded from a Low potential habitat. The most speciose High potential habitat was habitat 2, in which 48 SRE taxa were recorded, followed by habitat 9 from which 24 SRE taxa were collected. Species richness in the High potential habitats roughly correlated with number of sites sampled.

In total, 39 taxa were recorded from a single habitat type in the field surveys, although 11 of these are also known from desktop records (Table 5-5). Fourteen taxa were recorded from single High potential SRE habitats (1, 2, 3, 8, 9 and 10) that are not known from desktop records.

Table 5-5 Summary of SRE taxa recorded in this survey with respect to fauna habitat

1 - Bold rows indicate taxa that were collected only in the WMDE or CBME. Blue shading represents taxa known only from the PAA IDF.
2 – Not mapped.

Taxa[1]	Fauna habitat											Known from desktop records or outside PAA	Project risk rating
	High SRE potential							Low SRE potential			NM[2]		
	1	2	3	5	8	9	10	4	7	12	0		
MYGALOMORPHAE													
Aname sp. indet.								●				●	Low
Aname 'Phoenix0037'										●		●	Low
Proshermacha 'MYG658'								●				●	Low
Aname 'WorsleyDNA09'											●	●	Low
Anamidae 'Phoenix022'		●										●	Low
Anamidae sp. indet.		●						●				●	Low
Aurecocrypta 'Phoenix0014'		●						●					Low
Barychelidae 'WorsleyDNA10'											●	●	Low
Barychelidae sp. indet.								●				●	Low
Eucyrtops 'collie'		●	●									●	Low
Eucyrtops 'MYG645'	●		●			●		●			●	●	Low
Eucyrtops 'Phoenix0001'								●				●	Low
Eucyrtops 'Phoenix0018'												●	Low
*Eucyrtops '*Phoenix0033'		●											Low
Eucyrtops 'Phoenix0043'									●			●	Low
Eucyrtops 'Phoenix0044'		●						●				●	Low
Eucyrtops 'Phoenix0045'								●				●	Low
Eucyrtops 'WorsleyDNA06'					●	●						●	Low
Euoplos inornatus		●										●	Low
Euoplos 'Phoenix0013'			●									●	Low
Idiosoma 'Phoenix0002'								●				●	Low
Idiosoma 'MYG741'	●	●			●	●		●				●	Low
Eucanippe nemestrina								●				●	Low
Idiopidae sp. indet		●						●					Low
Missulena 'MYG198'	●	●										●	Low
Missulena 'MYG639'											●	●	Low
Missulena 'Phoenix0046'								●				●	Low
Missulena sp. indet.	●	●						●				●	Low
***Bungulla* 'WorsleyDNA11'**							●					●	Low
Proshermacha 'MYG646'	●	●				●			●			●	Low

Taxa[1]	Fauna habitat											Known from desktop records or outside PAA	Project risk rating
	High SRE potential							Low SRE potential			NM[2]		
	1	2	3	5	8	9	10	4	7	12	0		
Proshermacha 'MYG485'						●		●		●	●	●	Low
Proshermacha sp. indet.		●						●				●	Low
Proshermacha 'WorsleyDNA12'						●					●	●	Low
Synothele 'MYG640'						●		●			●	●	Low
Synothele rubripes		●	●					●	●			●	Low
Synothele 'WorsleyDNA17'											●	●	Low
Teyl 'Phoenix0017'								●					Low
OPILIONES													
Ballara longipalpis		●	●	●			●	●	●			●	Low
Calliuncus sp. indet.		●									●	●	Low
Calliuncus 'WorsleyDNA21'	●	●		●							●		Low
Megalopsalis sp. indet.								●			●	●	Low
Megalopsalis 'WorsleyDNA22'								●	●			●	Low
Megalopsalis 'WorsleyDNA23'		●	●					●				●	Low
Nunciella sp. indet.						●	●				●	●	Low
Nunciella 'WorsleyDNA25'				●								●	Low
Triaenonychidae 'genus 003' sp. indet.								●				●	Low
Triaenonychidae 'genus 003' 'WorsleyDNA24'		●										●	Low
Triaenonychidae 'genus 003' 'WorsleyDNA26'							●						High
Triaenonychidae 'genus 003' 'WorsleyDNA27'						●							High
Triaenonychidae 'genus 008' sp. indet.		●	●		●			●		●	●	●	Low
Triaenonychidae 'genus 008' 'WorsleyDNA28'		●										●	Low
Triaenonychidae 'genus 008' 'WorsleyDNA29'	●	●						●			●	●	Low
Triaenonychidae 'genus 008' 'WorsleyDNA30'	●							●		●		●	Low
PSEUDOSCORPIONES													
Beierolpium sp. indet.								●				●	Low
***Beierolpium* 'WorsleyDNA18'**								●					Low
***Beierolpium* 'WorsleyDNA19'**								●					Low
Euryolpium sp. indet.											●	●	Low

Taxa[1]	Fauna habitat											Known from desktop records or outside PAA	Project risk rating
	High SRE potential							Low SRE potential			NM[2]		
	1	2	3	5	8	9	10	4	7	12	0		
Indolpium sp. indet.								●				●	Low
Pseudotyrannochthonius sp. indet.											●	●	Low
MILLIPEDE													
Antichiropus '097, Marradong'			●									●	Low
Antichiropus 'DIP046, boddington'		●		●			●	●					Low
Antichiropus 'DIP108, Mt Saddleback'	●	●		●		●	●				●	●	Low
Antichiropus DIP176, Worsley'											●	●	Low
***Antichiropus* 'DIP202, WorsleyDNA18'**								●					Low
Antichiropus sp. indet.	●	●		●				●				●	Low
Sphaerotrichopus sp. indet.	●	●										●	Low
'cf *Sphaerotrichopus*?' 'WorsleyDNA01'					●	●		●					Low
Podykipus leptoiuloides	●	●	●	●			●	●					Low
Siphonotidae 'DIPAAF' 'DIP188' 'boddington'		●					●					●	Low
Siphonotidae 'DIPAAG' 'DIP189' 'collie'		●	●					●			●	●	Low
Siphonotidae 'DIPAAG' 'DIP192' 'mt saddleback'				●		●		●			●	●	Low
Siphonotidae 'DIPAAH' 'DIP190' 'harris river'			●									●	Low
'DIPAAF' 'cf. michaelseni'						●			●			●	Low
Siphonotidae **'DIPAAF' 'WorsleyDNA14'**		●											High
Siphonotidae **'DIPAAF' 'WorsleyDNA15'**								●					High
Siphonotidae 'DIPAAF' sp. indet.											●	●	Low
Iulomorphidae 'WorsleyDNA20'		●				●		●					Low
Iulomorphidae sp. indet.				●				●				●	Low
ISOPODA													
Acanthodillo '5'											●	●	Low
Acanthodillo sp. indet.								●		●		●	Low
Acanthodillo flavus		●	●					●				●	Low
Buddelundia '04'		●				●		●				●	Low

Taxa[1]	Fauna habitat											Known from desktop records or outside PAA	Project risk rating
	High SRE potential							Low SRE potential			NM[2]		
	1	2	3	5	8	9	10	4	7	12	0		
Buddelundia nigripes		●				●		●			●	●	Low
Buddelundia sp. indet.							●					●	Low
***Buddelundia* sp. indet. A**					●	●							Low
Laevophiloscia '1'	●	●	●		●	●	●	●	●		●	●	Low
Laevophiloscia sp. indet.	●	●	●		●	●		●	●	●	●	●	Low
Paraplatyarthrus sp. indet.		●						●		●	●	●	Low
***Paraplatyarthrus* sp. indet. A**		●	●				●	●					Low
***Paraplatyarthrus* sp. indet. B**								●					Low
***Paraplatyarthrus* sp. indet. C**								●					Low
***Paraplatyarthrus* sp. indet. D**		●											High
Philosciidae '1/s'			●					●			●	●	Low
Philosciidae sp. indet										●		●	Low
Pseudodiploexochus '1'		●				●		●			●		Low
***Pseudodiploexochus* sp. indet. A**					●								High
***Pseudodiploexochus* sp. indet. B**									●				Low
Pseudodiploexochus sp. indet		●						●					Low
Styloniscus '1'	●	●			●	●	●	●			●	●	Low
Styloniscus '7'	●	●				●		●			●	●	Low
***Styloniscus* 'A' (worsley)**								●					Low
Styloniscus 'B' (worsley)		●										●	Low
Styloniscus sp. indet.	●	●	●					●				●	Low
EUPULMONATA													
Annoselix cf. *dolosa*										●		●	Low
Bothriembryon cf. *bradshawi*										●		●	Low
Charopidae 'sp. indet'	●											●	Low
Luinodiscus sp. indet.		●						●				●	Low

5.3 STATISTICAL ANALYSIS OF SURVEY COMPLETENESS

The species records for the surveys were aggregated across sampling methods per site for the species accumulation analysis. Despite extensive, multi-season survey effort conducted to date within and in proximity to the PAA, the curves of all four indices for four of the six Orders examined (Figure 5-4, Figure 5-7 – Figure 5-9) continued to increase at a relatively steep rate. This suggests that many species in these Orders remain to be collected: Mygalomorphae, Pseudoscorpiones, Diplopoda and Isopoda. The curves of the indices for the opiliones (Figure 5-5) and Scorpiones (Figure 5-6) reach an asymptote, suggesting few taxa remain undetected.

Almost identical results for the nearby Huntly SRE surveys were also generated (Phoenix 2021).

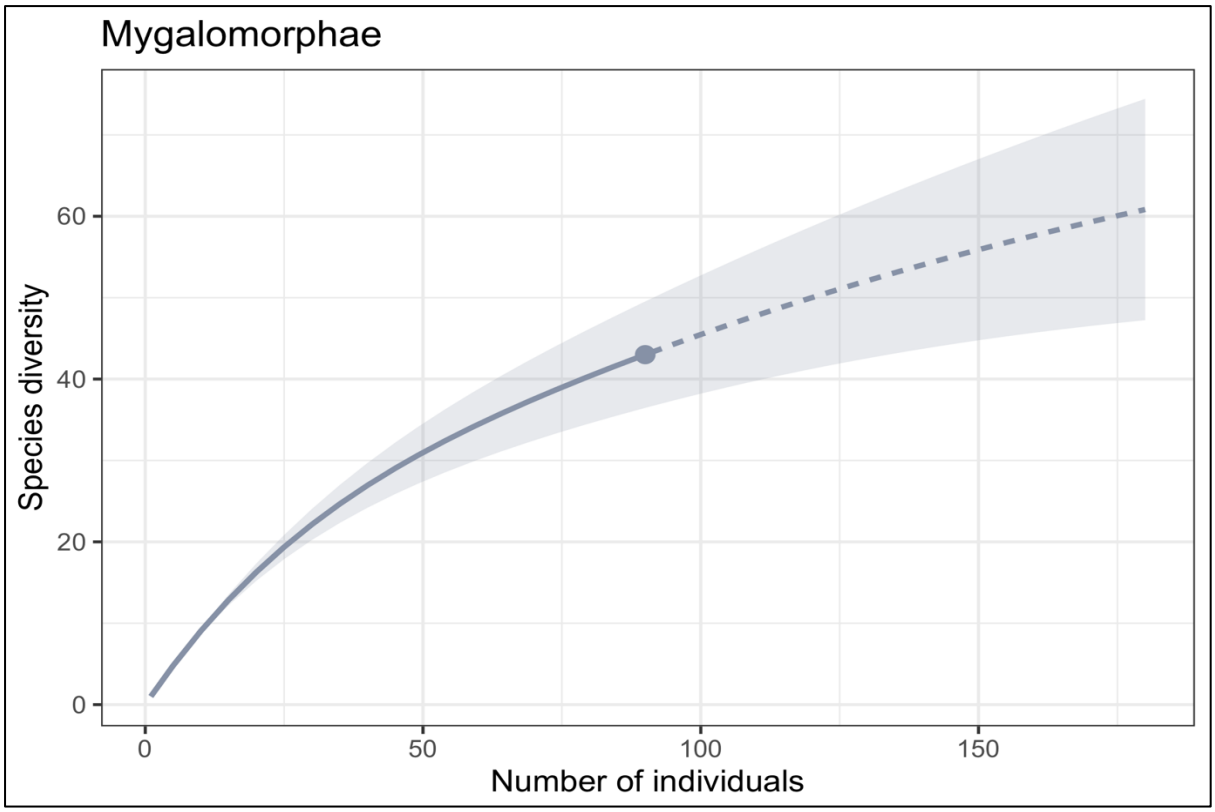


Figure 5-4 Species accumulation curve for Mygalomorphae

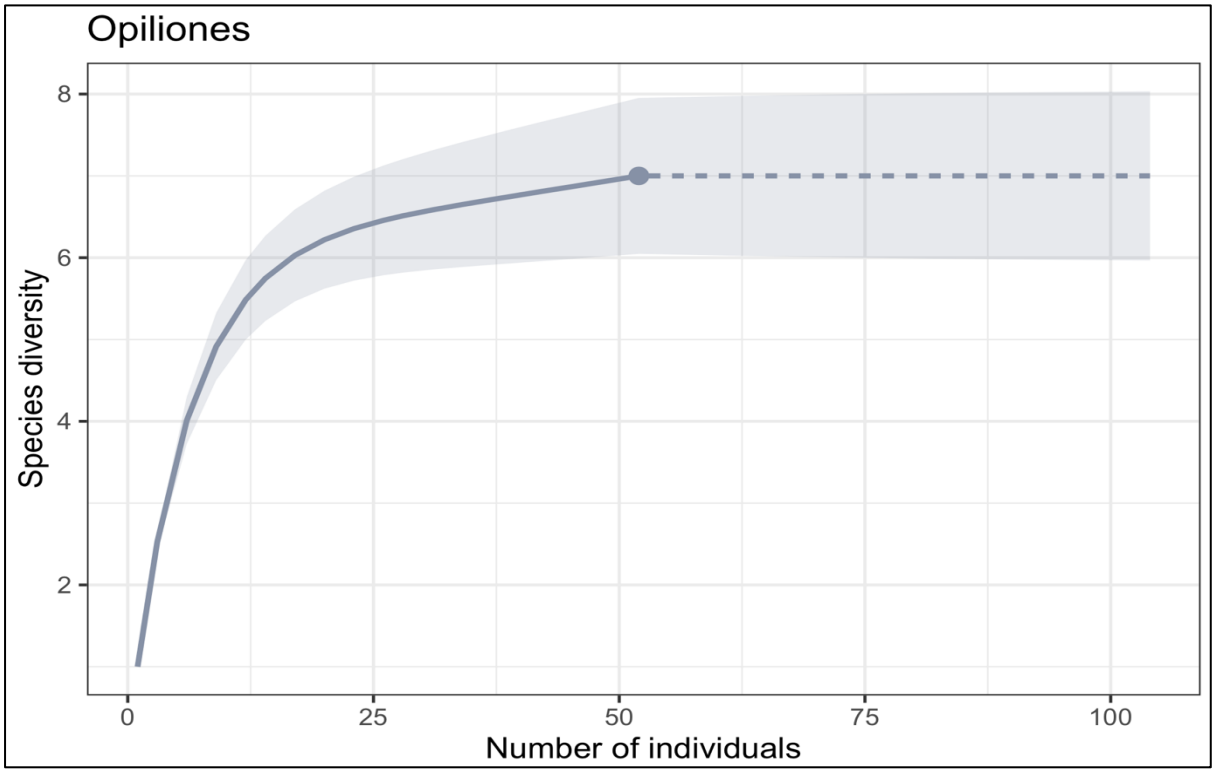


Figure 5-5 Species accumulation curve for Opiliones

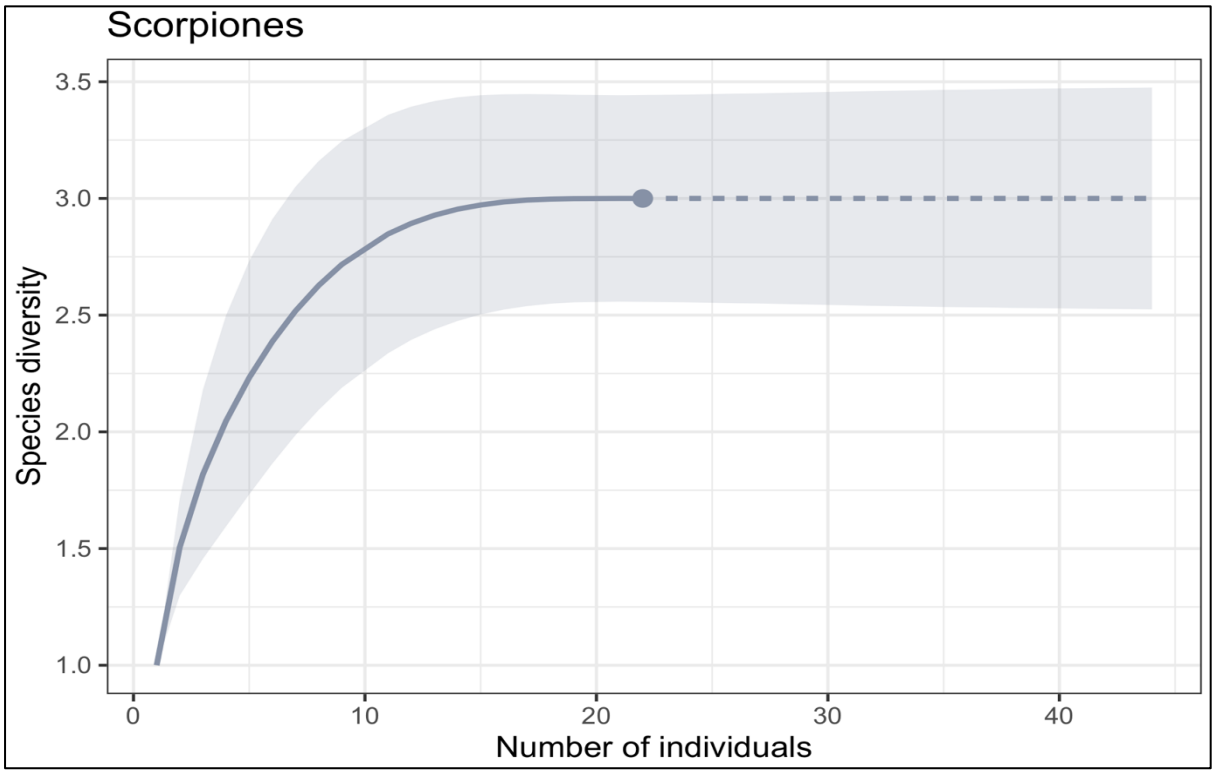


Figure 5-6 Species accumulation curve for Scorpiones

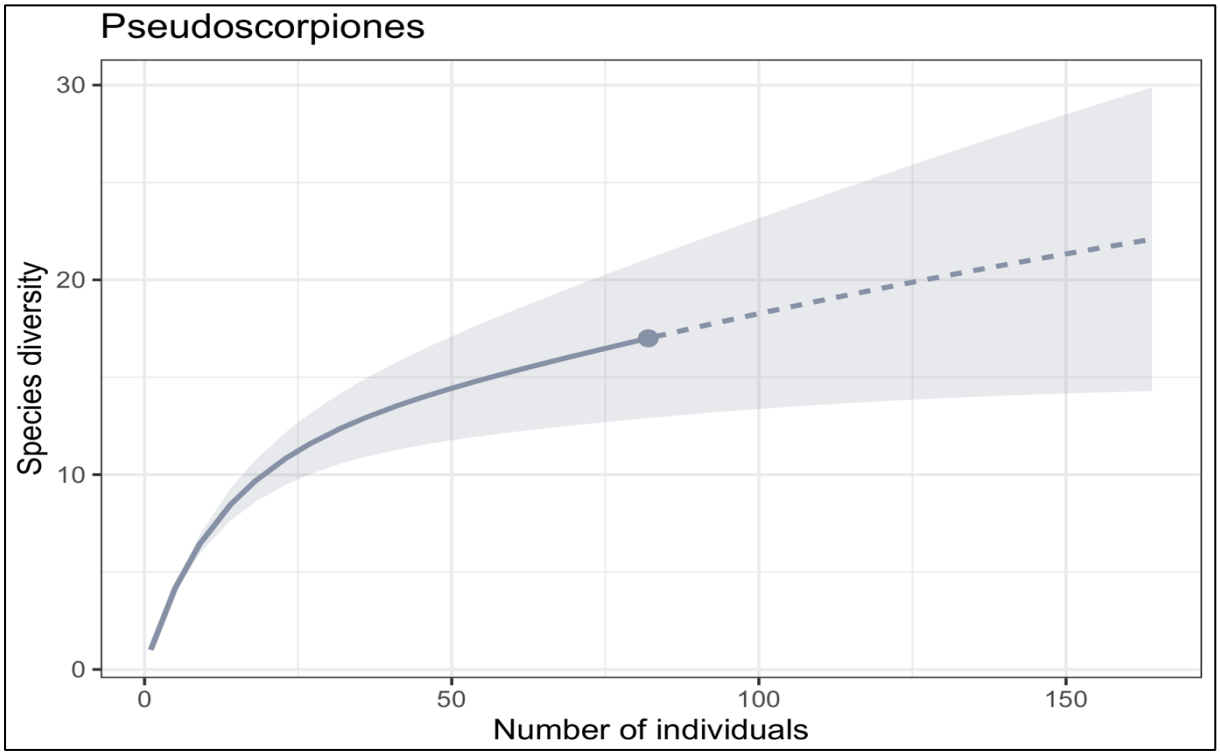


Figure 5-7 Species accumulation curve for Pseudoscorpiones

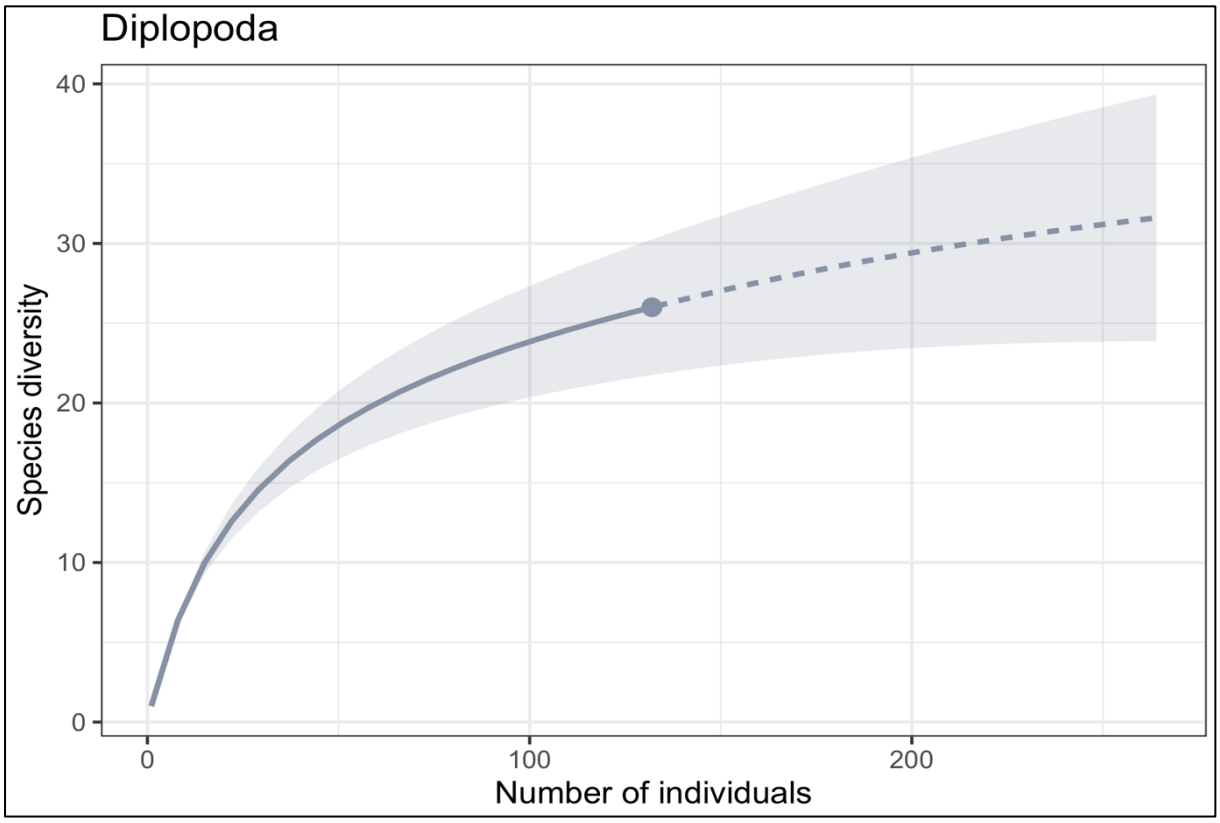


Figure 5-8 Species accumulation curve for Diplopoda

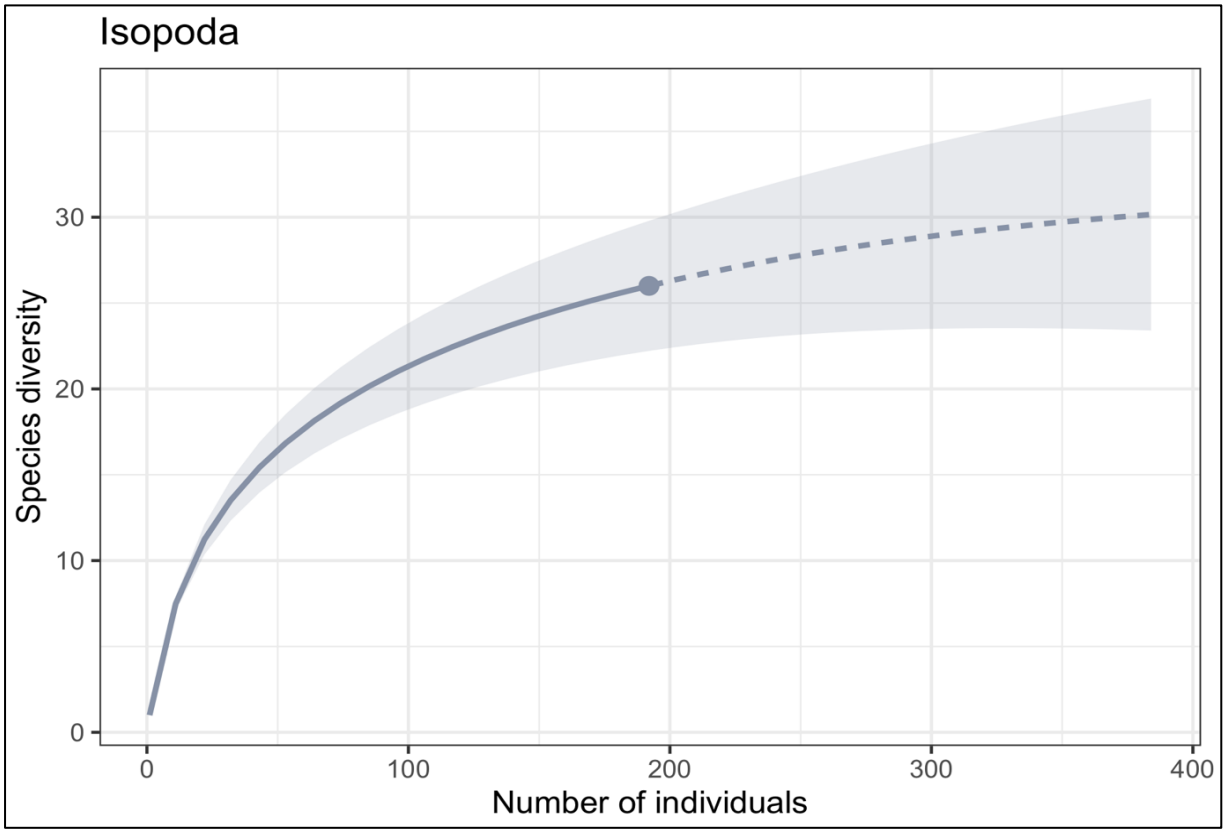


Figure 5-9 Species accumulation curve for Isopoda

5.4 SURVEY LIMITATIONS

The limitations of the surveys have been considered in accordance with EPA (2016c) in (Table 5-6).

Table 5-6 Consideration of potential survey limitations

Limitations	Limitation of surveys	Comments
Competency/experience of survey personnel, including taxonomy	No	All field personnel have previous experience in conducting SRE surveys, with the field leads each having over 10 years' experience in invertebrate fauna surveys. Identifications were conducted by personnel with appropriate expertise, including specialist morphological and molecular taxonomists. Taxonomic resolution was achieved to the lowest level possible. Several taxa remain indeterminate due to poor taxonomic knowledge, poor genetic knowledge, inadequate life stage or sex, or a specimen in poor condition. The indeterminate 'SRE' taxa could represent any of the collected or previously collected taxa, or possibly new taxa. Uncertainty in taxonomic resolution could be rectified through further investigation by taxonomists (e.g., describing a species), and/or further surveys to locate more specimens to provide more morphologic or genetic material for comparison. Comparison of genetic material for matches with previously collected taxa in GenBank is limited by the voluntary uploading of sequence data

Limitations	Limitation of surveys	Comments
		to this database. Some collections reside within the WAM that have not been sequenced or uploaded to GenBank.
Scope and completeness - were all target groups sampled, were all planned survey methods implemented successfully, was the study area fully surveyed	No	All target SRE groups and habitats within the study area (i.e. WME, regional and rehabilitation study areas) were surveyed in accordance with the scope of work. Two habitats (5 and 10) were surveyed at only one site (see section 5.2.1). This is not considered a limitation for the survey due to the very low representation of these habitats in the study area and because similar habitats were well sampled. Habitat 2 is similar to habitat 5 and habitat 8 is similar to habitat 10.
Intensity - in retrospect, was the intensity adequate	No	The survey intensity was appropriate for the area that was surveyed, and faunal groups targeted, including significant species.
Proportion of fauna identified, recorded and/or collected	Partial	A diverse collection of species was returned from the surveys indicating that a suitable proportion of fauna was collected. All SRE groups were identified by relevant group experts, however many are either undescribed species or unable to be identified to species level because they are females or juvenile specimens.
Availability of adequate contextual information	Partial	Surveys have previously been undertaken within the vicinity of the study area to provide contextual information for the Project, however due to the high biological diversity within the region, previously uncollected taxa are ever-present.
Timing, weather, season, cycle	No	May to October is the optimal timing for SRE surveys in the south-west (EPA 2016c). Surveys for each site were undertaken, at least in part, during these months. Rainfall preceding and during the 2019 survey was consistently lower than average with the exception of June which had slightly higher rainfall than average. Temperatures were also consistently 1C higher than the long-term average (section 3.2; Figure 3-2). Conditions were dry during the fourth 2020 foraging trip, which likely influenced collections in this phase. The lower-than-average rainfall in 2019 is unlikely to have influenced the results significantly. The rehabilitation survey was undertaken between September and November, so was largely within the optimal period, with the Phase one samples being entirely within the optimal period for sampling.
Disturbances which affected the results of the survey	No	One pre-selected 2019 site was fire affected prior to survey rendering it unsuitable to be included in the survey, however an additional two sites were picked up to counter this.
Remoteness and/or access problems	No	All areas of the study area were accessible by vehicle or on foot.

6 CONSOLIDATED RESULTS / DISCUSSION

In assessing development proposals, the EPA has the objective of protecting terrestrial fauna so that biological diversity and ecological integrity are maintained (EPA 2016a). Considerations for SRE fauna in EIA at the State level include significance of values present, current state of knowledge of those values, potential impacts and the scale at which the impacts are assessed (EPA 2016a).

In this section, the consolidated SRE results of the desktop review and field surveys are presented and discussed to provide a current assessment of SRE values for the PAA. The assessment considers the Proposal components and inter-survey variation, proposed and cumulative impacts to SREs and finally, discusses the rehabilitation results with respect to SREs.

It should be noted that the results discussed in the sections below combine records from both the desktop search area and field surveys.

6.1 SRE TAXA

A total of 244 SRE taxa are known from the desktop area and 108 from the current field surveys (2019 and 2020), collectively representing 305 taxa, with 60 known from both desktop records and field surveys (Figure 6-1 – Figure 6-6). Of these, 87 have been recorded in the PAA (from the desktop search and surveys), including 20 that have, to date, only been collected from the PAA and of which six only from the IDF (Table 6-1).

Five of the taxa known only from the PAA are represented by mygalomorph trap-door spiders (Figure 6-1), six are represented by millipedes (Figure 6-3) six are represented by isopods (Figure 6-4), two are represented by pseudoscorpions (Figure 6-2) and one is represented by opiliones (Figure 6-2).

SREs are most diverse in the WMDE, which is a reflection of the higher survey effort and much larger study area. Sixteen SRE taxa are common to the CBME and WMDE, comprising one described species, 11 morpho-species and four indeterminate species.

Table 6-1 Summary of all SRE known taxa within the Proposal components

SRE status	CBME	CBME IDF	WMDE	WMDE IDF	BTC	BTC IDF*	Both PAA (CBME and WMDE/ BTC)	PAA only	PAA IDF only
Confirmed	2	1	8	2	3	1	2	3	0
Likely	1	1	9	5	4	3	1	5	2
Potential	25	14	57	33	31	9	14	14	4
Total	**28**	**16**	**74**	**40**	**38**	**13**	**16**	**22**	**6**

* BTC IDF includes the development of bauxite transport routes and associated infrastructure only (i.e. the portion of the IDF within the BTC that does not overlap with the WMDE IDF).

The six taxa currently restricted to the IDF (Table 6-2) have all only been recorded from a single site and therefore single habitat. These taxa have all been allocated as a distinct species or morphospecies:

1. *Paraplatyarthus* sp. indet. D. (Likely) – BTC IDF
2. *Pseudodiploexochus* sp. indet. A (Likely) – WMDE IDF
3. *Aname* 'Dwellingup' (Potential) – WMDE IDF (recorded only from the desktop search. This identification is not recognised by the WA Museum taxonomists (Section 6.1.3))
4. Triaenonychidae `genus 003` `WorsleyDNA27` (Potential) – WMDE IDF
5. Siphonotidae 'DIPAAF' 'WorsleyDNA14' (Potential) – BTC IDF
6. Siphonotidae 'DIPAAF' 'WorsleyDNA15' (Potential) – CBME IDF.

The additional 14 taxa known from within the PAA only, have also been assigned to a morphospecies or recognised as a distinct species:

Millipedes

1. *Antichiropus* 'saddleback 2' DIP137 (Confirmed) – WMDE
2. *Antichiropus* 'DIP202, WorsleyDNA18' (Confirmed) – WMDE
3. *Antichiropus* 'SB1' (Confirmed) – WMDE
4. Siphonotidae 'genus indet. Marradong' (Potential) –WMDE.

Mygalomorph trap-door spiders

5. *Aname* 'MYG242' (Potential) – WMDE
6. *Eucyrtops* 'marradong' (Confirmed) – WMDE
7. *Idiosoma* 'MYG741' (Potential) – CBME and WMDE
8. *Bungulla* 'WorsleyDNA11' (Potential) – CBME

Isopods

9. *Acanthodillo* 'sp. worsley B' (Potential) – WMDE
10. *Paraplatyarthrus* sp. indet. B (Likely) – WMDE
11. *Paraplatyarthrus* sp. indet. C (Likely) – WMDE
12. *Pseudodiploexochus* sp. indet. B (Likely) – WMDE

Pseudoscorpions

13. *Beierolpium* 'WorsleyDNA18' – WMDE
14. *Beierolpium* 'WorsleyDNA19' – WMDE

A further 12 indeterminate taxa which were unable to be identified morphologically due to sex or life stage, and attempt to sequence them failed are known from within the IDF. Many of these are likely to represent known or recorded taxa, however some may represent new taxa:

- *Aname* sp. indet. (Potential) – WMDE: Molecular sequencing failed. Five other *Aname* are also known from the survey or desktop search, the nearest being *A*. 'MYG242' which is known from approximately 880 m east and 2 km east of WMDE07, and while it cannot be confirmed, given the proximity to these records, this species most likely represents *A*. 'MYG242'.
- *Proshermacha* sp. indet. (Potential) – WMDE: Sequence failed. One *Proshermacha* was recorded from the IDF at WMDE07. Four other Proshermacha are also known from the survey

or desktop search, the nearest being *P*. 'MYG485' which is known from approximately 880 m east and another 10 records east and south of WMDE07, and while it cannot be confirmed, given the proximity to these records, it highly likely to represents P. 'MYG485'.

- *Beierolpium* sp. indet. (Potential) – CBME: Specimen sequenced but failed to amplify. *Beierolpium bornemisszai,* a widespread pseudoscorpion was recorded 600 m, 1.8 km and 6.6 km away from this record, so while it cannot be confirmed, this specimen is highly likely to represent this widespread species.
- *Megalopsalis* sp. indet. (Potential) – CBME: These specimens failed to amplify and is likely represent Megalopsalis 'WorsleyDNA23' which is locally abundant in the regional survey area
- *Nunciella* sp. indet. (Potential) – CBME: Collected from four sites within the CBME, these specimens failed to amplify and may represent a new species or a species within any of the *Nunciella* or Triaenonychidae morphospecies, mist likely Triaenonychidae 'Phoenix0029' which was recorded between 8 km SW, and 20 km NE of the IDF sites CBME003 and CBME004, with the closes record being 2 km.
- Triaenonychidae 'genus 008' sp. indet. (Potential) – WMDE and Rehabilitation: Collected from a variety of sites in the WMDE. These specimens were damaged or of an indeterminable life stage, and also failed sequencing attempts. The specimens found in the IDF at WMDE10 likely represent Triaenonychidae 'genus 008' 'DNA027' which as was also recorded at that site, while the specimen at WMDE13 is likely to represent Triaenonychidae 'genus 008' 'DNA26' which has been recorded 375 m away. The specimen at WMDE07 could be a new species or another recorded species, but it is impossible to determine based on morphology and failed genetic analyses. The specimen at RH003 is highly likely to represent Triaenonychidae 'genus 008' 'DNA30' which was also found at that site.
- 'cf *Sphaerotrichopus'* sp. indet. (Potential) – WMDE: Molecular sequencing failed but highly likely to be conspecific with *S*. 'WorsleyDNA01' which was the only species to be returned from genetic sequencing and includes specimens located 5 km north.
- *Acanthodillo* sp. indet. (Potential) – WMDE: One very small indeterminate specimen from inside the WMDE IDF at WMDE07 with additional indeterminate specimens recorded outside the PAA, however given none of the more common specimens are known from nearby and the presence of several highly endemic taxa from this genus, this specimen potentially represents a restricted species. The indeterminate specimen collected from the rehabilitation area indicates this species is resilient to disturbance and not at risk to development.
- *Styloniscus* sp. indet. (Potential) – CBME: Attempts at sequencing these specimens failed. The specimen is from the IDF at CBME004 which also has records of locally abundant *S*. '1' and *S*. '7' and is likely to represent one of these taxa
- *Laevophiloscia* sp. indet. (Potential) – WMDE: Specimens sequenced failed to amplify. The specimens recorded from the IDF are likely to represent *L*. '1' given this species was also collected at the same site (WMDE10) or within 1 km of the site (WMDE20).
- Philosciidae sp. indet. (Potential) – Rehabilitation: Attempts at sequencing these specimens failed. The specimen recorded from the IDF in RH007 indicates this species is resilient to disturbance and not at risk to development, it is probably *Laevophiloscia* '1'.
- *Paraplatyarthrus* sp. indet. (Likely) – WMDE: Specimens from 3 sites within the IDF were recorded. The specimen at WMDE06 is likely to represent *Paraplatyarthrus* sp. indet. D which was recorded at the same site. The specimens from WMDE07 is 250 m away from WMDE06 so also likely to represent *Paraplatyarthrus* sp. indet. D. the specimen from WMDE22 is 640

m away from *Paraplatyarthrus* sp. indet. C so is most likely to be that species, however cannot be confirmed.

None of the species that were collected from the PAA represent a Threatened or Priority species. The Priority 3 species *Euoplos inornatus* was collected during the regional survey in 2020 (Figure 6-1).

The taxa identified as being unique species from molecular sequencing were analysed against the current dataset and available sequences on GenBank. Further comparisons with WAM molecular data may reveal more matches with known taxa.

Comparison with specimens lodged with the WAM can also be made; however, it is increasingly difficult to obtain a viable sequence from specimens that are not fixed, preserved, or stored appropriately for molecular work, i.e., where they have been collected in ethylene glycol or propylene glycol solutions, preserved in a low-quality preservative, stored for long periods of time un-chilled, handled by many people, or specimens that have been dried out.

6.1.1 Confirmed SREs

Seven Confirmed SREs have been recorded from the PAA, all of these within the WMDE and two also from the CBME (Table 6-2). Five of these (*Antichiropus* 'goldmine', *Antichiropus* 'DIP097, marradong', *Antichiropus* 'DIP108, mt saddleback', *Antichiropus* 'SB1' and Siphonotidae 'DIPAAG' 'DIP189' 'collie') have also been collected outside the PAA, confirming wider distributions than the PAA. *Antichiropus* 'DIP137, saddleback 2' and *Antichiropus* `DIP202, WorsleyDNA18` have only been collected from the WMDE but records for both taxa are outside the WMDE IDF. No confirmed SRE taxa are recorded from the IDF only.

6.1.2 Likely SREs

Eight Likely SRE taxa have been recorded from the PAA, all of these within the WMDE, including four within the BTC, and one also from the CBME (Table 6-2). Of these, five were recorded from the IDF, of which two are currently only known from the IDF:

1. *Paraplatyarthus* sp. indet. D. – BTC IDF
2. *Pseudodiploexochus* 'sp. indet. A' – BTC IDF.

Paraplatyarthus sp. indet. D. is known from a single site, WMDE06 within High SRE potential habitat, Open Jarrah/Marri woodland. The site is described as:

"Woodland of Jarrah and Marri to 28m with midstory of young Jarrah and Marri over diverse low shrubs and grass trees to 2.5m."

Pseudodiploexochus 'sp. indet. A' is also known from a single site, WMDE10, in High SRE potential habitat, Wandoo woodland. The site is described as:

"Woodland of Jarrah and Marri to 27m over midstory of smaller Jarrah and Marri over an understorey dominated by low ericaceous shrubs to 20cm."

6.1.3 Potential SREs

A total of 68 Potential SRE taxa have been recorded from the PAA, of which 14 are currently known only from the PAA (Table 6-2). Four of these are currently restricted to the IDF:

1. *Aname* 'Dwellingup' (WMDE IDF)
2. Siphonotidae 'DIPAAF' 'WorsleyDNA14' (BTC IDF)

3. Siphonotidae 'DIPAAF' 'WorsleyDNA15' (CBME IDF)
4. Triaenonychidae `genus 003` `WorsleyDNA27` (WMDE IDF).

All three taxa are known from only single records, limiting comments about potential distribution and habitat preferences. The *Aname* 'Dwellingup' is a very old desktop record, from 1979 located in habitat described as Open forest of Jarrah/Marri on sandy-loam gravelly soils on mid slopes and ridges. This record may match more recent collections genetically but it was not able to be sequenced due to the age of specimen and was not able to be compared morphologically to others because the specimen is not able to be retrieved from the WA Museum collection (Pers. comm. J. Waldock 23 November 2022). As identifications made during this period were not in line with WA Museum naming protocols, the WA Museum does not currently recognise the informal name *Aname* sp. 'dwellingup' until the specimen can be located and re-identified (Pers. comm. J. Waldock 29 August 2023).

Siphonotidae 'DIPAAF' 'WorsleyDNA15' was recorded from site CBME04 in Low potential SRE habitat Open Jarrah/Marri forest. The site was described as:

"Forest of Jarrah and Marri over *Banksia* and *Persoonia*, over tall shrubs, over grass trees and *Macrozamia*, over low shrubs. Dieback free. Plentiful, deep litter and stick and log debris."

Siphonotidae 'DIPAAF' 'WorsleyDNA14' was collected from site WMDE06 in High potential SRE habitat, Open Jarrah/Marri woodland. The site was described as:

"Woodland of Jarrah and Marri to 28m with midstory of young Jarrah and Marri over diverse low shrubs and grass trees to 2.5m."

Triaenonychidae `genus 003` `WorsleyDNA27`, was recorded from WMDE10 in High Potential SRE habitat, Open woodland of Wandoo on clay and clay-loam soils on lower slopes. The site was described as:

"Woodland of Jarrah and Marri to 27m over midstory of smaller Jarrah and Marri over understory dominated by low ericaceus shrubs about 20 cm."

Table 6-2 Consolidated SRE records by Proposal component

Species	Source/s	CBME	CBME IDF	WMDE	WMDE IDF	BTC	BTC IDF*	Out of PAA	Out of PAA IDF
Confirmed SRE									
Antichiropus 'goldmine'	Phoenix (2012), OES (2011), WAM	X	X	✓	X	X	X	✓	✓
Antichiropus 'DIP097, marradong'	Phoenix (2012), OES (2011), WAM	X	X	✓	✓	✓	✓	✓	✓
Antichiropus 'DIP108, mt saddleback'	Current survey, Phoenix (2012), WAM	✓	✓	✓	X✓	✓	✓	✓	✓
Antichiropus 'DIP137, saddleback 2'	Phoenix (2012), WAM	X	X	✓	X	X	X	X	✓
Antichiropus 'SB1'	Phoenix (2012), WAM	X	X	✓	X	X	X	X	✓
Antichiropus 'DIP202, WorsleyDNA18'	Current survey	X	X	✓	X	X	X	X	✓
Siphonotidae `DIPAAG` `DIP192` `mt saddleback`	Phoenix (2012), WAM	✓	X	✓	X	X	X	✓	✓
Likely SRE									
Buddelundia sp. indet. A	Current survey	X	X	✓	✓	X	X	✓	✓
Paraplatyarthrus sp. indet. B	Current survey	X	X	✓	X	X	X	X	✓

Species	Source/s	CBME	CBME IDF	WMDE	WMDE IDF	BTC	BTC IDF*	Out of PAA	Out of PAA IDF
Paraplatyarthrus sp. indet. A	Current survey	X	X	✓	X	X	X	X	✓
***Paraplatyarthrus* sp. indet. D**	**Current survey**	**X**	**X**	**✓**	**X**	**✓**	**✓**	**X**	**X**
Paraplatyarthrus sp. indet.	Current survey	X	X	✓	✓	✓	X	✓	✓
Pseudodiploexochus '1'	Current survey, Phoenix (2012)	✓	✓	✓	✓	✓	X	✓	✓
***Pseudodiploexochus* sp. indet. A**	**Current survey**	**X**	**X**	**✓**	**✓**	**✓**	**X**	**X**	**X**
Pseudodiploexochus sp. indet. B	Current survey	X	X	✓	X	X	X	X	✓
Potential SRE									
Acanthodillo 'sp. worsley B'	WAM	X	X	✓	X	X	X	X	✓
Acanthodillo sp. indet.	Current survey, Phoenix (2021), Phoenix (2012)	X	X	✓	✓	✓	X	✓	✓
***Aname* `Dwellingup`[1]**	**WAM**	**X**	**X**	**✓**	**✓**	**✓**	**X**	**X**	**X**
Aname `MYG242`	Phoenix (2012), WAM	X	X	✓	X	X	X	X	✓
Aname 'Phoenix0037'	Current survey, Phoenix (2021)	X	X	✓	X	X	X	X	✓
Aname sp. indet.	Current survey, WAM, Phoenix (2012)	✓	X	✓	✓	X	X	✓	✓
Annoselix cf. *dolosa*	Current survey, WAM	X	X	✓	X	X	X	✓	✓
Antichiropus sp. indet.	Current survey, Phoenix (2012), WAM, Phoenix (2021)	X	X	✓	✓	✓	X	✓	✓
Austrochthonius 'austini'	WAM	X	X	✓	✓	✓	X	✓	✓
Ballarra 'sp. indet'	WAM	X	X	✓	X	X	X	✓	✓
Beierolpium `WorsleyDNA18`	Current survey	X	X	✓	X	X	X	✓	✓
Beierolpium `WorsleyDNA19`	Current survey	X	X	✓	X	X	X	✓	✓
Beierolpium sp. indet.	Current survey, Phoenix (2021), WAM	✓	✓	✓	X	X	X	✓	✓
Bothriembryon cf. bradshawi	Current survey, Phoenix (2021)	X	X	✓	X	X	X	✓	✓
Bothriembryon cf. serpentinus	WAM	X	X	✓	X	X	X	✓	✓
Buddelundia 'sp. 4'	Current survey, Phoenix (2012)	X	X	✓	✓	✓	X	✓	✓
Buddelundia nigripes	Current survey, Phoenix (2021), WAM	✓	✓	X	X	X	X	✓	✓
Bungulla 'WorsleyDNA11'	Current survey	✓	X	X	X	X	X	X	✓
Calliuncus 'sp. indet'	Current survey, Phoenix (2021), WAM	X	X	✓	X	X	X	✓	✓

Species	Source/s	CBME	CBME IDF	WMDE	WMDE IDF	BTC	BTC IDF*	Out of PAA	Out of PAA IDF
Calliuncus `WorsleyDNA21`	Current survey	X	X	✓	✓	X	X	✓	✓
Eucanippe nemestrina	WAM	X	X	✓	X	X	X	✓	✓
Eucyrtops 'marradong'	WAM	X	X	✓	X	X	X	X	✓
Eucyrtops `MYG645`	Current survey, Phoenix (2012), WAM	✓	✓	✓	✓	X	X	✓	✓
Eucyrtops 'WorsleyDNA06'	Current survey, Phoenix (2021)	X	X	✓	✓	✓	X	✓	✓
Eucyrtops sp. indet.	Phoenix (2012), WAM	X	X	✓	✓X	X	X	✓	✓
Idiosoma sp. indet.	Current survey, Phoenix (2012), Phoenix (2021)	X	X	✓	✓	X	X	✓	✓
Idiosoma `MYG187`	WAM	X	X	✓	✓	✓	X	✓	✓
Idiosoma 'MYG741, WorsleyDNA05'	Current survey	✓	X	✓	✓	✓	X	✓	✓
Indolpium sp. indet.	Current survey	X	X	✓	X	X	X	✓	✓
Iulomorphidae `WorsleyDNA20`	Current survey	✓	✓	X	X	X	X	✓	✓
Laevophiloscia '1'	Current survey, Phoenix (2021)	✓	✓	✓	✓	✓	X	✓	✓
Laevophiloscia sp. indet.	Current survey, Phoenix (2021)	X	X	✓	✓	✓	X	✓	✓
Luinodiscus cf. repens	WAM	X	X	✓	X	X	X	✓	✓
Luinodiscus cf. sublestus	Phoenix (2012), WAM	X	X	✓	X	X	X	✓	✓
Megalopsalis sp. indet.	Current survey, WAM	✓	✓	X	X	X	X	✓	✓
Missulena 'MYG198'	Current survey, Phoenix (2012), Phoenix (2021), WAM	X	X	✓	X	X	X	✓	✓
Missulena sp. indet	Current survey, Phoenix (2012), WAM	X	X	✓	X	X	X	✓	✓
Bungulla 'WorsleyDNA11'	Current survey	✓	X	X	X	X	X	X	✓
Nunciella sp. indet.	Current survey, Phoenix (2012), WAM, Phoenix (2021)	✓	✓	X	X	X	X	✓	✓
Philosciidae sp. indet.	Current survey, Phoenix (2021)	X	X	✓	✓	X	X	✓	✓
Podykipus eptoiuloides	Current survey,	X	X	✓	✓	X	X	✓	✓
Proshermacha `MYG485`	Current survey, Phoenix (2012), WAM, Phoenix (2021)	✓	X	✓	X	X	X	✓	✓
Proshermacha 'MYG646'	Current survey, WAM	✓	X	X	X	X	X	✓	✓
Proshermacha `MYG658`	Phoenix (2012), WAM	✓	✓	✓	X	X	X	✓	✓
Proshermacha 'WorsleyDNA12'	Current survey	✓	X	X	X	X	X	✓	✓
Proshermacha sp. indet.	Current survey, Phoenix (2021), WAM	X	X	✓	✓	✓	X	✓	✓

Species	Source/s	CBME	CBME IDF	WMDE	WMDE IDF	BTC	BTC IDF*	Out of PAA	Out of PAA IDF
Siphonotidae 'DIPAAF' 'WorsleyDNA14'	**Current survey**	**X**	**X**	✓	**X**	✓	✓	**X**	**X**
Siphonotidae 'DIPAAF' 'WorsleyDNA15'	**Current survey**	✓	✓	**X**	**X**	**X**	**X**	**X**	**X**
Siphonotidae 'Marradong'	Phoenix (2012), WAM	X	X	✓	X	X	X	X	✓
Siphonotidae 'DIPAAF' 'cf. *michaelseni*'	Current survey	✓	✓	✓	X	X	X	X	✓
Siphonotidae 'DIPAAF' 'sp. indet'	Current survey, WAM	X	X	✓	✓	✓	X	✓	✓
'cf *Sphaerotrichopus*?' 'WorsleyDNA01'	Current survey	X	X	✓	✓	✓	X	✓	✓
'cf *Sphaerotrichopus*?' sp. indet.	Current survey	X	X	✓	X	✓	✓	✓	✓
Styloniscus '1'	Current survey, Phoenix (2021)	✓	✓	✓	✓	✓	X	✓	✓
Styloniscus '7'	Current survey, Phoenix (2021)	✓	✓	✓	✓	✓	X	✓	✓
Styloniscus sp. indet.	Current survey, Phoenix (2021)	✓	✓	X	X	X	X	✓	✓
Synothele 'MYG640'	Current survey, WAM	✓	✓	X	X	X	X	✓	✓
Synothele rubripes	Current survey, WAM	X	X	✓	✓	✓	X	✓	✓
Synothele 'sp. indet'	Phoenix (2012), WAM	✓	✓	✓	✓	✓	X	✓	✓
Teyl `MYG245`	Phoenix (2012), WAM	X	X	✓	✓	✓	X	✓	✓
Teyl 'sp. indet'	WAM	X	X	✓	✓	✓	X	✓	✓
Triaenonychidae 'genus 003' sp. indet.	Current survey	X	X	✓	✓	✓	X	✓	✓
Triaenonychidae `genus 003` `WorsleyDNA27`	**Current survey**	**X**	**X**	✓	✓	**X**	**X**	**X**	**X**
Triaenonychidae 'genus 008' `WorsleyDNA30`	Current survey	X	X	✓	✓	✓	X	✓	✓
Triaenonychidae 'genus 008' sp. indet.	Current survey, Phoenix (2021)	X	X	✓	✓	✓	X	✓	✓
Trichorhina 'W'	Phoenix (2012)	X	X	✓	X	X	X	✓	✓
Westralaoma 'sp. indet'	WAM	X	X	✓	X	X	X	✓	✓
cf. *Westralaoma* '1'	WAM	X	X	✓	X	✓	X	✓	✓

* BTC IDF includes the development of bauxite transport routes and associated infrastructure only (i.e. the portion of the IDF within the BTC that does not overlap with the WMDE IDF)

[1] not currently recognised by the WAM Museum

6.1.4 Analysis of surrogate taxa and habitats

The EPA (2016c) allows for the use of a risk-based approach to impact assessment where surveys have been completed and potential SREs are only known from the impact area (in this case there are seven such species, of which six have been recorded from recent field surveys) (Table 5-5). In such cases, the EPA (2016c) recommends the use of habitat and biological surrogates for inferring distributional boundaries of taxa, where the likelihood of SRE fauna occurring can be inferred from the occurrence

or otherwise of geographic boundaries, landform changes or habitat isolates (where habitat isolates can be identified from vegetation type mapping).

Accordingly, this section reviews the six taxa only known from the Proposal IDFs, using species records from this survey (2019 and 2020) and the Huntly surveys (Phoenix 2021) only, for which there is a full suite of environmental variables recorded for each site. A total of 45 taxa from seven genera are listed below (Table 6-3), ten *Aname* or *Proshermacha* trap-door spiders, seven *Paraplatyarthrus* isopods, four pseudodiploexochus isopods, eight Siphonotidae millipedes and three 'genus003' opiliones.

Siphonotidae millipedes in the area appear to have the potential to have slightly larger ranges, with Siphonotidae 'DIPAAG' 'DIP189' 'collie' and Siphonotidae 'DIPAAF' 'cf. michaelseni' being found at the WMDE and CBME. Again, there is no obvious limiting factors in the environmental variables with most taxa being recorded from a wide range of conditions (such as topography, slope, soils, litter, or vegetation cover).

For the seven *Paraplatyarthrus* isopods, again there is limited assemblage overlap between the three study areas. The only exception is *Paraplatyarthrus* 'sp. indet', which is not a distinct morphospecies, but a collection of specimens that could not be placed in an existing taxon designation. Within this genus four singletons were recorded and thus environmental variable variation is relatively narrow. Based on the separate assemblages and majority singleton records it is assumed that the genus is relatively rare, possibly cryptic, and highly range-restricted, which can be expected of a genera with Gondwana ancestry.

A similar result is apparent for the *Pseudodiploexochus* isopods, which are also of Gondwana ancestry. Of these, one taxa (*Pseudodiploexochus* '1') was common to the BBM and Worsley Refinery. However, *Pseudodiploexochus* 'sp. indet. A' and *Pseudodiploexochus* 'sp. indet. B' are only known from singleton records. The group of *Pseudodiploexochus* 'sp. indet' are found from Huntly, south to the PAA, but may represent any of the known taxa or new taxa. Due to the limited records for this genus, it is difficult to draw firm conclusions, but once again the data is tending towards suggesting the *Pseudodiploexochus* genus is highly range-restricted. The records of *Pseudodiploexochus* recorded from both the CBME and WMDE come from both High and Low potential SRE habitats, that is Jarrah/Marri forest on hillslopes, undulating plains, and valleys. *Pseudodiploexochus* 'sp. indet. A' and *Pseudodiploexochus* 'sp. indet. B' were both recorded from Low potential SRE habitat, open Jarrah/Marri forest on mid-slopes or undulating hills.

The *Aname* genus (trap-door spiders) represents the most commonly recorded SRE across WA. At least ten taxa have been recorded within this study. *Aname* 'Dwellingup' was not recorded from the field surveys but was returned from the WA Museum database output, having been collected in 1979. Of the ten *Aname* taxa known from the surveys, six (60%) are known from singleton records, which limits the ability to consider them as surrogates to *Aname* 'Dwellingup'. That being said it is apparent that the genus is known from a range of habitat types and vegetation units in the area, as well as a wide range of environmental conditions. Once again however, there is virtually no overlap in the assemblages of the BBM (WMDE), Worsley Refinery (CBME) and Huntly survey areas, with the exception of *Aname* 'Phoenix0037', which was recorded from the BBM and Huntly survey area. Thus, while there are no obvious trends in the data due to the predominance of singletons, on the balance, it would appear *Aname* also represents a genus containing highly range-restricted taxa in the Northern Jarrah Forest bioregion.

Opiliones display typical habits of a relictual group with specimens rarely encountered. Few described species in WA, particularly for the Trianonychidae family which boasts a meagre xx described species. Within this family, the taxonomy is poorly understood. Four genera are known from the study area of which two are described genera (*Nunciella* and *Calliuncus*) and two are completely unknown (i.e.. 'genus 003' or 'genus 008'). Prior to this study, all specimens were assigned a species or 'morpho-species' code to genus level (i.e. no species level identifications were made). Molecular sequencing

for this study was undertaken and results indicate several range restricted species exist. Specimens within the four genera were further split into eight morpho-species. However, other than material from the survey, no comparable sequences were able to be analysed i.e. not available. This limits the accuracy of the analyses as ideally a larger subset of data is required to ascertain clear clades.

The analysis of the six genera containing taxa restricted solely to the IDF provides a strong argument that all seven species are likely to be highly range-restricted. However, the data does not suggest that each is likely to be highly habitat-dependent with many members of each genera being recorded from different habitat types/vegetation units and sites with highly variable environmental conditions. Therefore, it is expected that the species would be found to be more 'widespread' within their 'short-range' distribution, i.e., it is unlikely they are restricted to solely within the IDF.

The results of the sequencing of indeterminate species undertaken late in 2022 revealed only two matches to a known species and 12 potentially new species. The reason for this is poorly known taxonomy (sheer number of undescribed species and genera), and the lack of molecular data available.

Without comparative data, it is still difficult to reliably distinguish clades. As molecular analyses are a fairly newly used technique in EIA (10 years) relatively few comparable sequences are available. This is particularly true in the Northern Jarrah Forest where very few invertebrate surveys for EIA have been undertaken in the last decade (references). Mygalomorph spiders are reasonably well known, both taxonomically and molecular data, however the remaining groups remain poorly studied. For example, with the Opiliones, No reference specimens were included in the analyses because the known taxa are not from the area. Several described species are from the Far South-west and South Coast regions of WA are known; however, they are known to be restricted to coastal areas. There are records of the genus are from the Northern Jarrah Forest (ALA), however one.

Some groups display high rates of molecular divergence (e.g. most species of Antichiropus millipede), whereas others have large Pairwise distances (e.g. some mygalomorph spiders).

For these reasons, taxonomy of most SRE groups remains ambiguous. For example many genera within the Triaenonychidae family of Opiliones are not described (e.g. 'Genus003', and 'Genus 008'), likewise with Diplopoda families Iulomorphidae and Siphonotidae, where genera in the latter family are known as 'DIPAAF, DIPAAG etc.) and Iulomorphidae genera are unknown altogether. Similarly, isopods are only known to family or genus level and the majority of species, while known, are undescribed.

Three specimens form the survey did produce a successful sequence however were not able to attribute a morphospecies code because the reference specimens failed (all isopods). In these cases we cannot confidently say tell whether they are a new species or conspecific with a known taxon.

Table 6-3 Recorded environmental variables for other members of Genera currently restricted to the IDF. Taxa in bold are confined to the IDF. Rows shaded in grey are taxa that are found in both the PAA and Huntly survey area

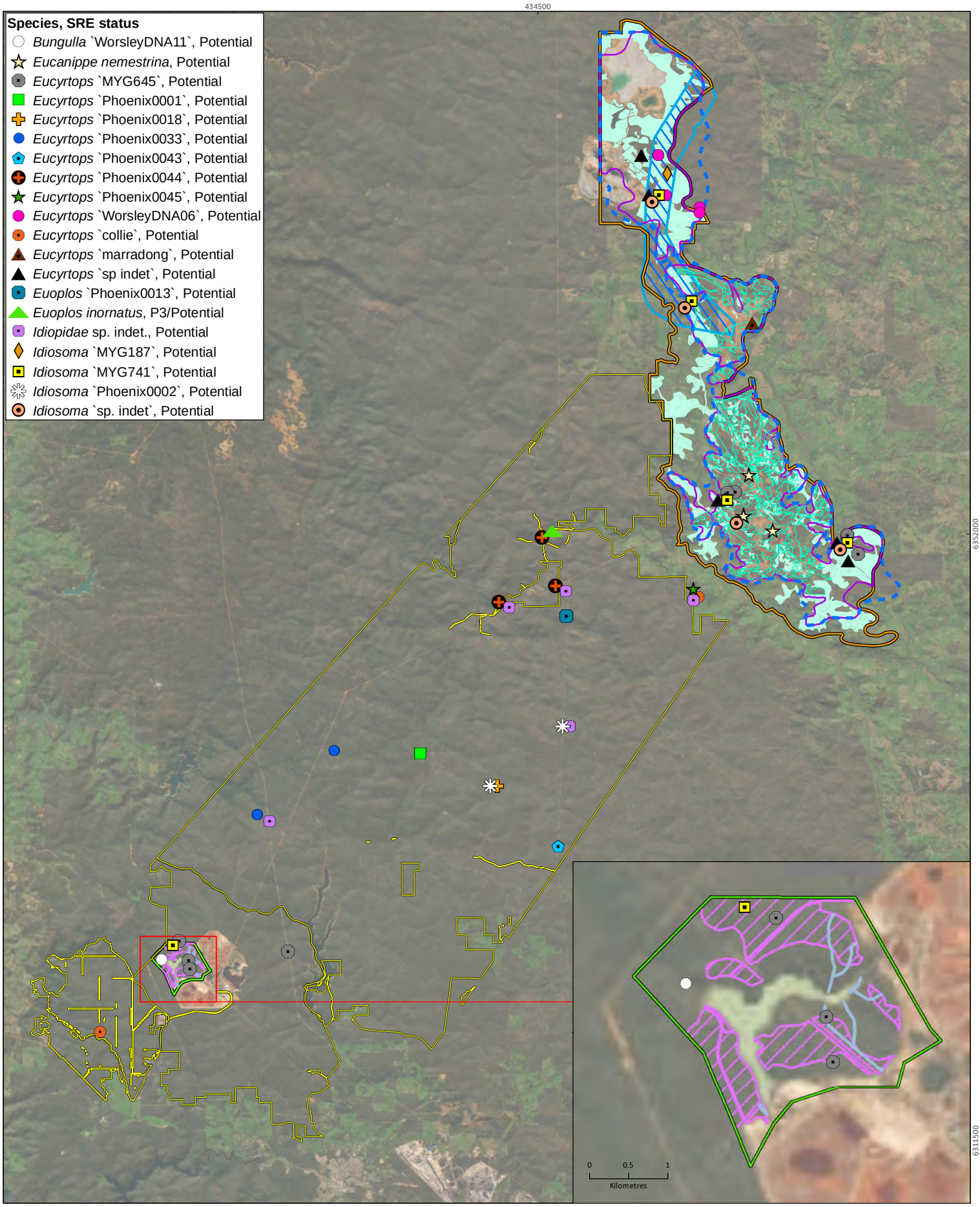
Taxon name (32)	SRE status	Project area	No. Sites recorded	Veg. unit code	Fauna habitat no.	Topography	Slope	Soil types	Avg. rock cover (%)	Avg. litter cover (%)	Avg. litter depth (cm)	Litter distribution	Avg. total veg. cover (%)	Avg. tree cover (%)	Avg. shrub cover (%)	Fire age (years)
Siphonotidae – Millipedes (8)																
Siphonotidae 'DIPAAF' WorsleyDNA14'	**P**	**BBM**	**1**	**D**	**2**	**hill slope**	**negligible**	**gravel–alluvial**	**0.0**	**20.0**	**1.0**	**Even**	**90.0**	**35.0**	**50.0**	**>10**
Siphonotidae 'DIPAAF' 'WorsleyDNA15'	**P**	**WR**	**1**	**ST**	**4**	**hill top**	**negligible**	**sandy-loam**	**0.0**	**80.0**	**8.0**	**Even**	**80.0**	**65.0**	**25.0**	**>5**
Siphonotidae 'DIPAAG' 'DIP189' 'collie'	C	BBM, Huntly, WR	10	AC, CW, Q, null	2, 9, 10, null	drainage line, hill slope, river, undulating plain, null	negligible, gentle, moderate	clay, clay-loam, rocks, laterite, loam, sand, peat, sandy clay, loam, sandy-loam	10.8	92.2	5.2	Even	46.5	42.6	40.6	1-5, >5
Siphonotidae 'DIPAAF' 'cf. michaelseni'	Likely	BBM, WR	3	AY, Q, Z	7, 9	hill slope	gentle, moderate	gravel–alluvial, loam, sandy-loam	0.0	35.0	3.0	Even	78.3	51.7	46.7	>10, >5
Siphonotidae 'DIPAAF' 'DIP188' 'boddington'	Confirmed	BBM	2				gentle, moderate	loam, sandy-loam, laterite		88.8	2.8	Even	0.0	51.3	28.8	>5
Siphonotidae 'DIPAAF' 'sp. indet'	Potential	WR	1			hill top	gentle	sandy-loam	0.0	2.0	2.0	Even	50.0	30.0	40.0	>10

Taxon name (32)	SRE status	Project area	No. Sites recorded	Veg. unit code	Fauna habitat no.	Topography	Slope	Soil types	Avg. rock cover (%)	Avg. litter cover (%)	Avg. litter depth (cm)	Litter distribution	Avg. total veg. cover (%)	Avg. tree cover (%)	Avg. shrub cover (%)	Fire age (years)
Siphonotidae 'DIPAAG' 'DIP192' 'mt saddleback'	Confirmed	BBM	2				negligible, moderate	loam, clay-loam, loam, laterite		100.0	5.0	Even	0.0	74.0	78.0	1-5
Siphonotidae 'DIPAAH' 'DIP190' 'harris river'	Confirmed	BBM	1				moderate	sandy clay, loam, rocks, laterite		100.0	3.0	Even	0.0	40.0	75.0	1-5
***Paraplatyarthrus* - Isopods (7)**																
***Paraplatyarthrus* 'sp. indet. A'**	**P**	**BBM**	**4**				gentle, moderate	**sandy clay, loam, laterite, sandy-loam, rocks**		**88.3**	**2.7**	**Even**	**0.0**	**56.7**	**41.7**	**>5**
***Paraplatyarthrus* 'sp. indet. D'**	**L**	**BBM**	**1**	**D**	**2**	**hill slope**	**negligible**	**gravel–alluvial**	**0.0**	**20.0**	**1.0**	**Even**	**90.0**	**35.0**	**50.0**	**>10**
Paraplatyarthridae 'sp. indet'	P	Huntly	4	D, S	2, 4	hill slope, undulating plain	gentle	sand, clay-loam, laterite, sandy clay, loam, clay	15.0	88.0	3.0	Even	87.0	56.0	32.0	1-5, >5
Paraplatyarthrus 'sp. indet'	L	BBM, WR	6	D, P, Rehab, ST,	2, 4, 12,	hill slope, seasonally wet area,	negligible, gentle, moderate	gravel–alluvial, loam, laterite, sandy clay	0.0	54.0	3.3	Even	58.3	37.5	46.7	1-5, >5, >10
Paraplatyarthrus 'sp. indet'	P	Huntly	1	T	4	undulating plain	negligible	clay-loam, laterite		100.0	5.0	Even	75.0	55.0	40.0	>5
Paraplatyarthrus 'sp. indet. B'	L	BBM	1	P	4	hill slope	gentle	gravel–alluvial, loam	0.0	50.0	2.0	Even	80.0	30.0	45.0	>5
Paraplatyarthrus 'sp. indet. C'	L	BBM	1	S	4	hill slope	gentle	gravel–alluvial, loam	0.0	30.0	1.0	Even	75.0	25.0	45.0	>10

Taxon name (32)	SRE status	Project area	No. Sites recorded	Veg. unit code	Fauna habitat no.	Topography	Slope	Soil types	Avg. rock cover (%)	Avg. litter cover (%)	Avg. litter depth (cm)	Litter distribution	Avg. total veg. cover (%)	Avg. tree cover (%)	Avg. shrub cover (%)	Fire age (years)
Pseudodiploexochus – isopods (4)																
***Pseudodiploexochus* 'sp. indet. A'**	**Likely**	**BBM**	**1**	**M**	**4**	**hill slope**	**gentle**	**gravel–alluvial, loam**	**0.0**	**30.0**	**1.0**	**Even**	**70.0**	**35.0**	**30.0**	**>10**
Pseudodiploexochus '1'	Likely	BBM, WR	8	CQ, D, P, ST,	2, 4, 9,	hill slope, hill top, river,	negligible, gentle, moderate, steep	gravel–alluvial, loam, clay-loam, laterite, sand, peat, sandy-loam	0.0	71.9	7.3	Even	65.0	50.0	42.5	>5, 5-10, >10
Pseudodiploexochus 'sp. indet'	Likely	BBM, Huntly	15	CW, E, PS, S, ST, T, W,	2, 4, 7,	creek, gully, hill slope, undulating plain	negligible, gentle, moderate	rocks, laterite, gravel–alluvial, sandy-loam, loam, clay-loam, laterite	25.0	94.4	4.1	Even	74.1	48.8	34.7	1-5, >5
Pseudodiploexochus 'sp. indet. B'	Likely	BBM	1	Z	7	hill slope	gentle	gravel–alluvial, sandy-loam	0.0	30.0	1.0	Even	80.0	55.0	65.0	>10
Mygalomorphae trap-door spiders (10)																
***Aname* 'Dwellingup'**	**P**	**BBM**	**1**	**H**	**4**											
Proshermacha (*Aname*) 'MYG658'	P	BBM, WR	3	ST	4	hill top	negligible	sandy-loam	0.0	80.0	8.0	Even	80.0	65.0	25.0	>5
Aname 'Phoenix0004'	P	Huntly	3	CW, P, ST	2, 4	creek, hill slope, plain	negligible, gentle, moderate	clay-loam, laterite, sandy-loam		93.3	4.0	Even	85.0	53.3	30.0	1-5, >5
Aname 'Phoenix0006'	P	Huntly	1	null	null	hill slope	moderate	loam, clay-loam, laterite	10.0	100.0	5.0	Even	85.0	65.0	40.0	>5

Taxon name (32)	SRE status	Project area	No. Sites recorded	Veg. unit code	Fauna habitat no.	Topography	Slope	Soil types	Avg. rock cover (%)	Avg. litter cover (%)	Avg. litter depth (cm)	Litter distribution	Avg. total veg. cover (%)	Avg. tree cover (%)	Avg. shrub cover (%)	Fire age (years)
Aname 'Phoenix0020'	P	Huntly	1	W	7	plain	gentle	gravel–alluvial, loam	15.0	100.0	3.0	Even	85.0	65.0	20.0	>5
Aname 'Phoenix0036'	P	Huntly	3	CW, T, W	2, 4, 7	creek, hill slope, plain	gentle, moderate	gravel–alluvial, loam, rocks, sandy-loam, laterite	15.0	98.3	4.3	Even	85.0	40.0	35.0	>5
Aname 'Phoenix0037'	P	BBM, Huntly	4	PS, Rehab	4, 12	BEA, hill slope, null	negligible, moderate	gravel–alluvial, clay-loam, loam, sandy clay, laterite	10.0	70.0	2.2	Even	13.0	53.0	32.0	>5
Aname 'sp. indet'	P	BBM	2	P, null	4, null	hill slope, null	gentle, moderate	gravel–alluvial, loam, sandy-loam, rocks, laterite	0.0	52.5	0.8	Even	37.5	32.5	22.5	>5, >10
Proshermacha (*Aname*)'MYG485'	P	WR	1	Q	9	hill slope	gentle	sandy-loam	0.0	70.0	4.0	Even	60.0	4.0	30.0	>5
Aname 'WorsleyDNA09'	P	WR	1	null	null	undulating plain	gentle	sandy-loam	0.0	70.0	8.0	Even	65.0	40.0	40.0	1-5
Opiliones Harvestmen (3)																
Triaenonychidae `genus 003` `WorsleyDNA24`	P	WR	1	null	2	hill slope	moderate	loam, clay loam, laterite	0.0	100.0	5.0	Even	85.0	50.0	55.0	>5

Taxon name (32)	SRE status	Project area	No. Sites recorded	Veg. unit code	Fauna habitat no.	Topography	Slope	Soil types	Avg. rock cover (%)	Avg. litter cover (%)	Avg. litter depth (cm)	Litter distribution	Avg. total veg. cover (%)	Avg. tree cover (%)	Avg. shrub cover (%)	Fire age (years)
Triaenonychidae `genus 003` `WorsleyDNA26`	P	WR	1	null	9	WMDE12	gentle	gravel–alluvial, clay loam	0.0	20.0	0.5	Even	90.0	40.0	5.0	>5
Triaenonychidae `genus 003` `WorsleyDNA27`	**P**	**BBM**	**1**	**M**	**8**	**WMDE10**	**gentle**	**gravel–alluvial, loam**	**0.0**	**30.0**	**1.0**	**Even**	**70.0**	**35.0**	**30.0**	**>10**



South32 Ltd
Worsley Mine Expansion Project

Project No	1331
Date	21/02/2023
Drawn by	IN
Map author	AJ

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Kilometres

1:326,100 (at A4) GDA 1994 MGA Zone 50

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- Regional study area
- PBA Primary Bauxite Area 2005 ERMP MS719
- Rehabilitation study area
- PreExisting Approval Area
- Worsley Mining Development Envelope (WMDE)
- Bauxite Transport Corridor Development Envelope (BTC)
- WMDE and BTC overlap area
- WMDE IDF
- CBME Proposed Maintenance Clearing Areas
- CBME Indicative Footprint
- Contingency Bauxite Mining Development Envelope (CBME)

Figure 6-1a

Records of SRE Mygalomohps (Family: Idiopidae) from the PAA and survey

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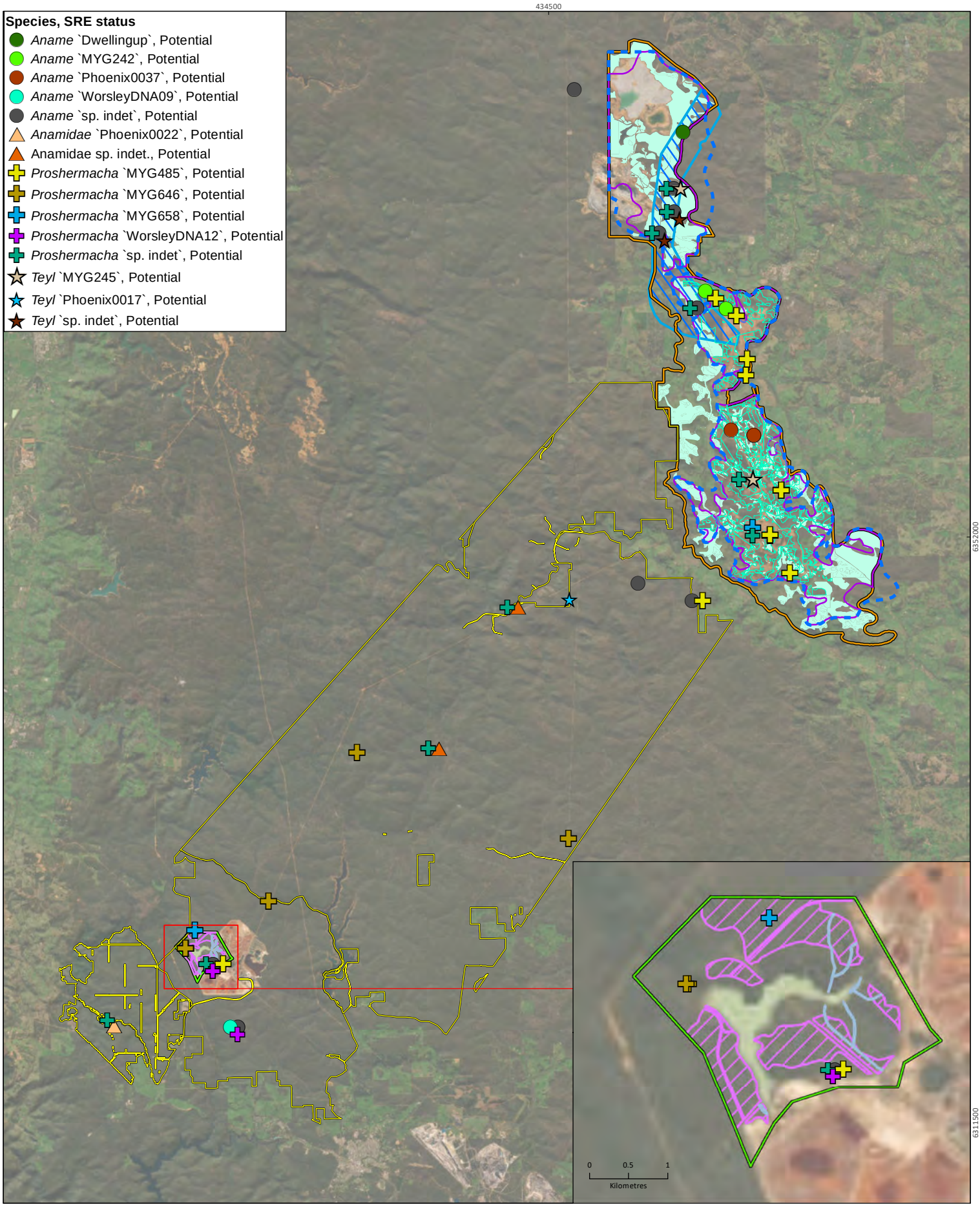

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Map author	AJ

0 4.5 9
Kilometres

1:337,539 (at A4) GDA 1994 MGA Zone 50

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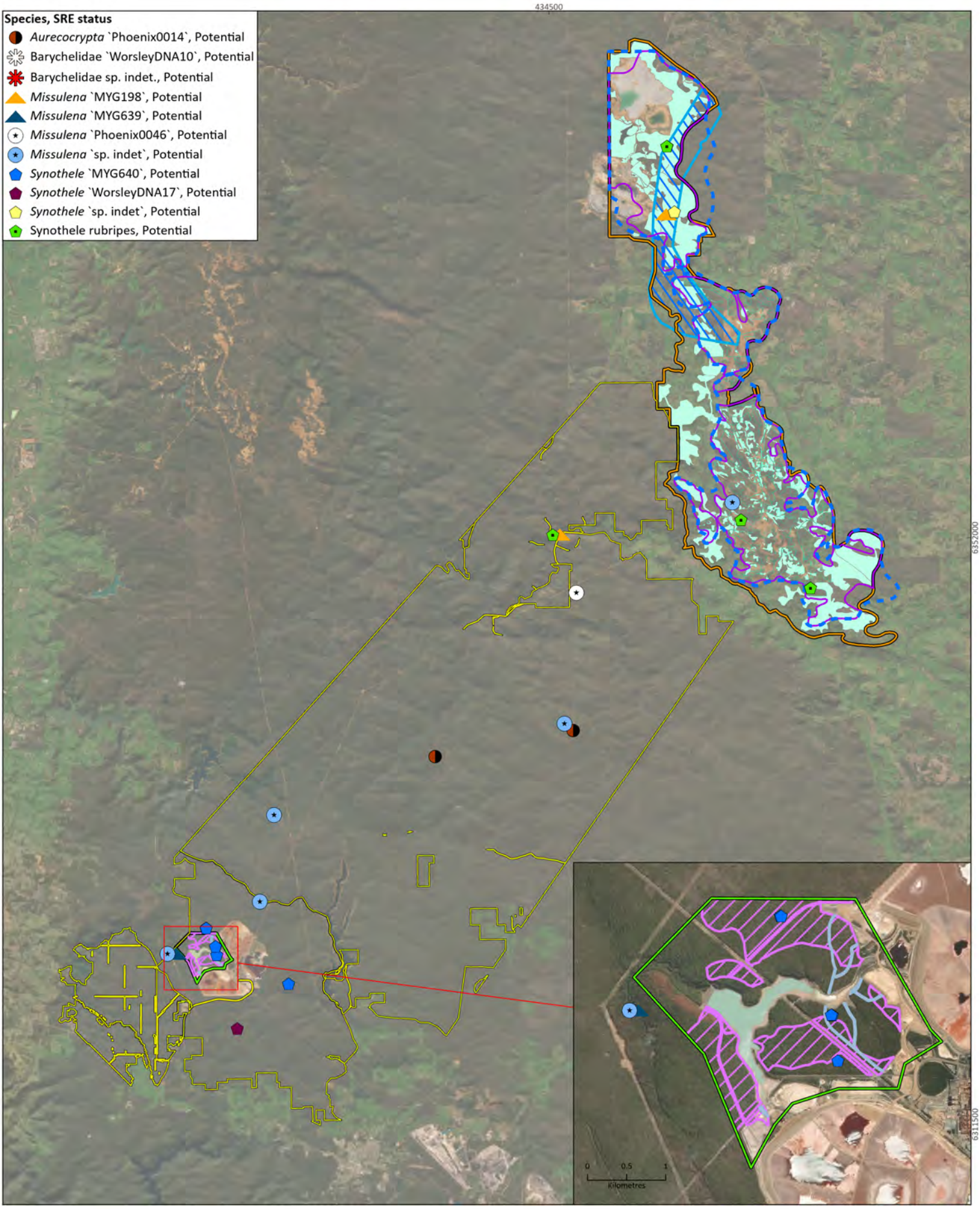
Regional study area
PBA Primary Bauxite Area 2005 ERMP MS719
Rehabilitation study area
PreExisting Approval Area
Worsley Mining Development Envelope (WMDE)
Bauxite Transport Corridor Development Envelope (BTC)
WMDE and BTC overlap area
WMDE IDF
CBME Proposed Maintenance Clearing Areas
CBME Indicative Footprint
Contingency Bauxite Mining Development Envelope (CBME)

Figure 6-1b

Records of SRE Mygalomohps (Family: Anamidae) from the PAA and survey

PHOENIX ENVIRONMENTAL SCIENCES



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Date	21/02/2023
Drawn by	IN
Map author	AJ

0 5 10
Kilometres

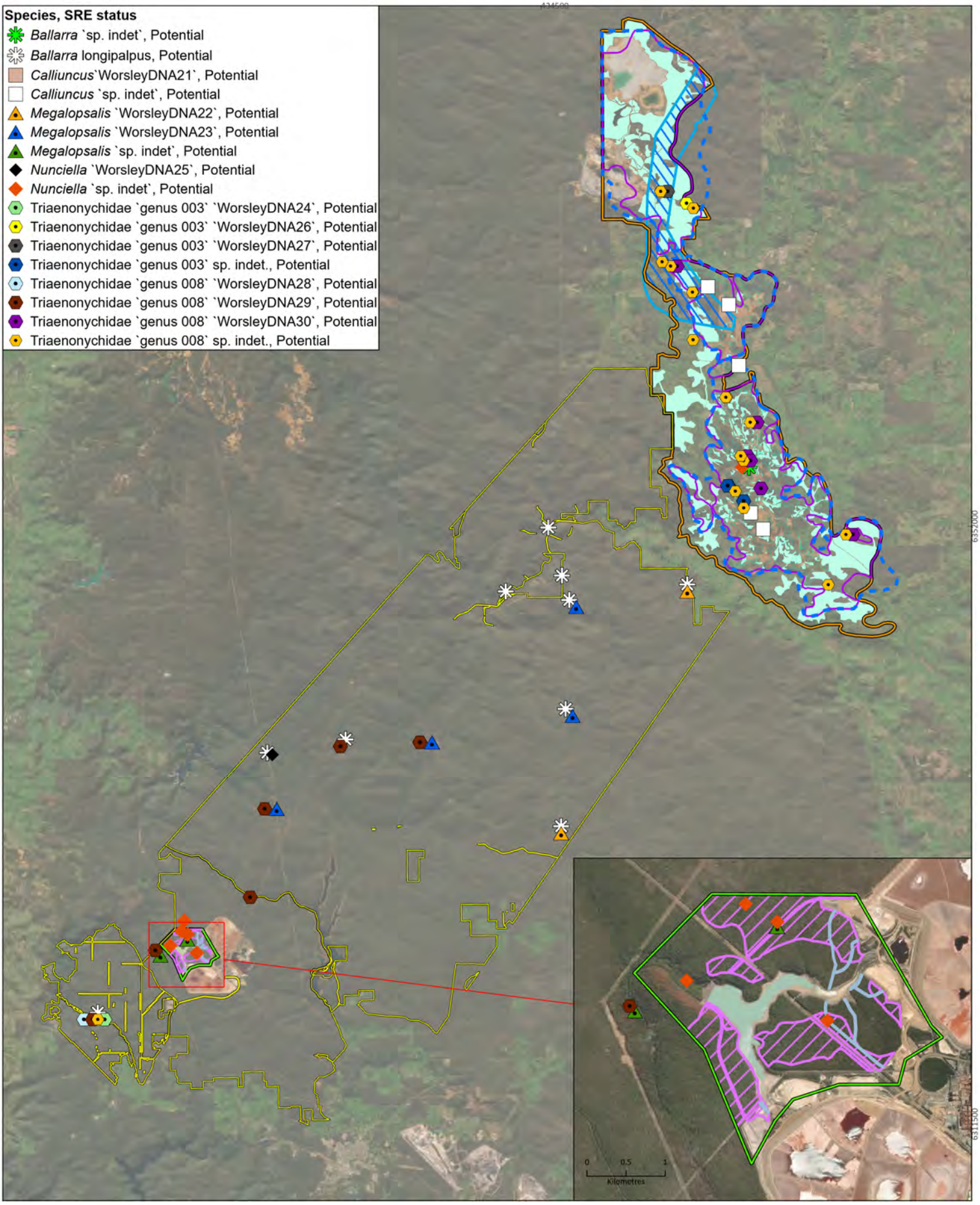
1:337,500 (at A4) GDA 1994 MGA Zone 50

- Regional study area
- PBA Primary Bauxite Area 2005 ERMP MS719
- Rehabilitation study area
- PreExisting Approval Area
- Worsley Mining Development Envelope (WMDE)
- Bauxite Transport Corridor Development Envelope (BTC)
- WMDE and BTC overlap area
- WMDE IDF
- CBME Proposed Maintenance Clearing Areas
- CBME Indicative Footprint
- Contingency Bauxite Mining Development Envelope (CBME)

Figure 6-1c

Records of SRE Mygalomohps (Family: Actinopodidae and Barychelidae) from the PAA and survey

PHOENIX ENVIRONMENTAL SCIENCES



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Project No	1331
Date	21/02/2023
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Map author	AJ

0 5 10
Kilometres

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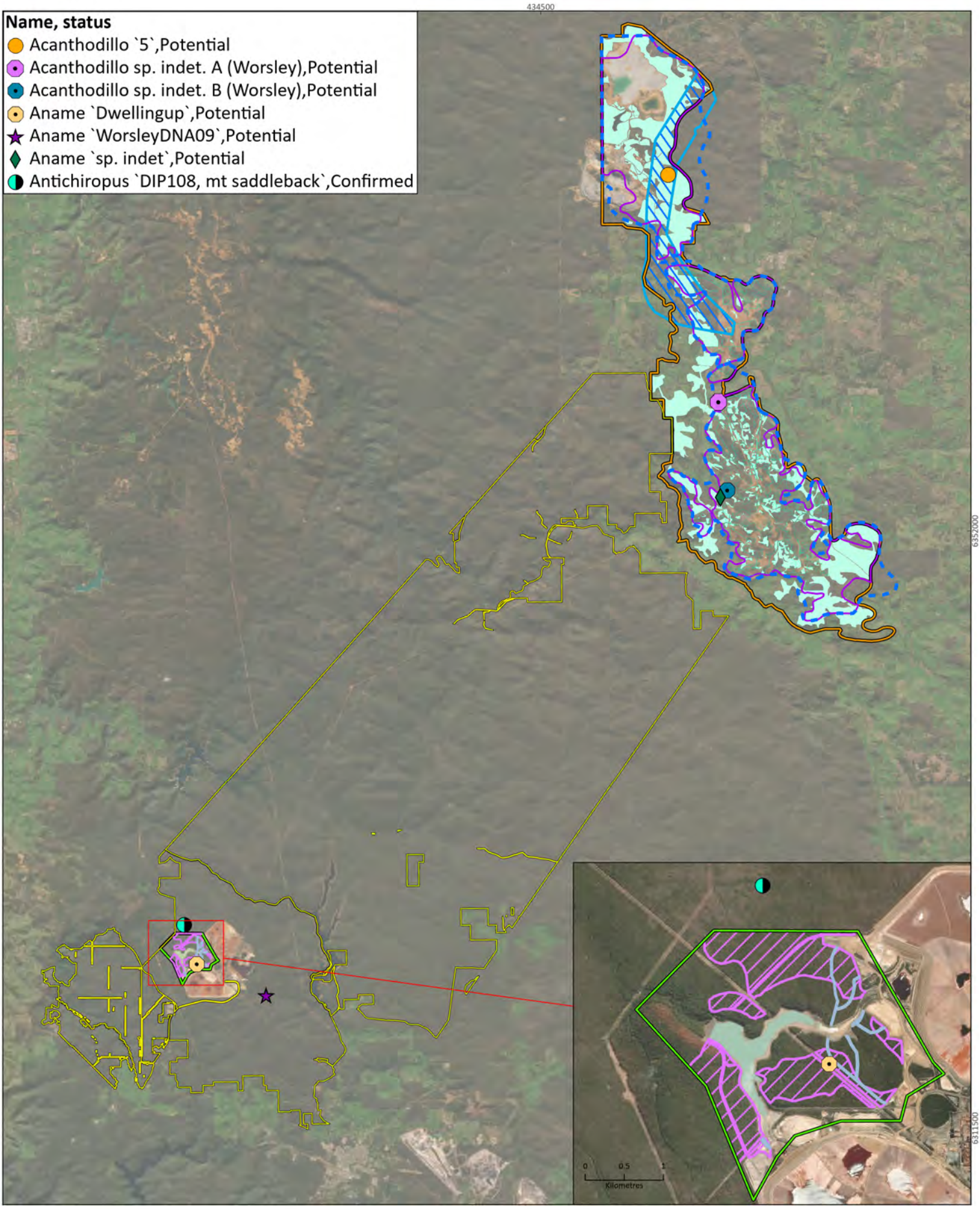
- Regional study area
- PBA Primary Bauxite Area 2005 ERMP MS719
- Rehabilitation study area
- PreExisting Approval Area
- Worsley Mining Development Envelope (WMDE)
- Bauxite Transport Corridor Development Envelope (BTC)
- WMDE and BTC overlap area
- WMDE IDF
- CBME Proposed Maintenance Clearing Areas
- CBME Indicative Footprint
- Contingency Bauxite Mining Development Envelope (CBME)

Figure 6-2

Records of SRE Opiliones from the PAA and survey

PHOENIX ENVIRONMENTAL SCIENCES



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0 5 10
Kilometres

1:331,550 (at A4) GDA 1994 MGA Zone 50

- Regional study area
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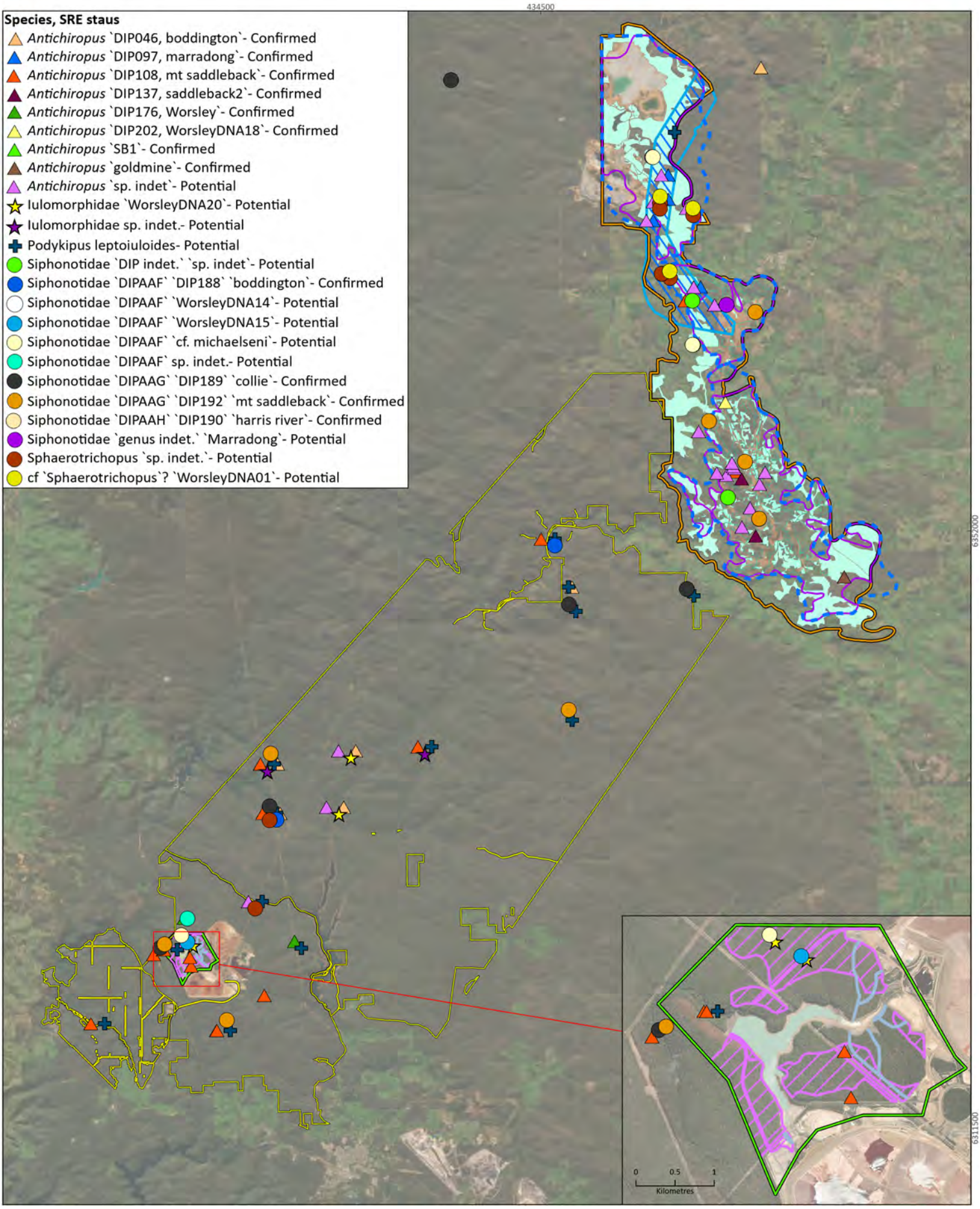
- Bauxite Transport Corridor Development Envelope (BTC)
- WMDE and BTC overlap area
- WMDE IDF
- CBME Proposed Maintenance Clearing Areas
- CBME Indicative Footprint
- Contingency Bauxite Mining Development Envelope (CBME)

Figure 6-3

Records of SRE Pseudoscorpions from the PAA and survey

PHOENIX ENVIRONMENTAL SCIENCES



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0 5 10
Kilometres

1:331,550 (at A4) GDA 1994 MGA Zone 50

- Regional study area
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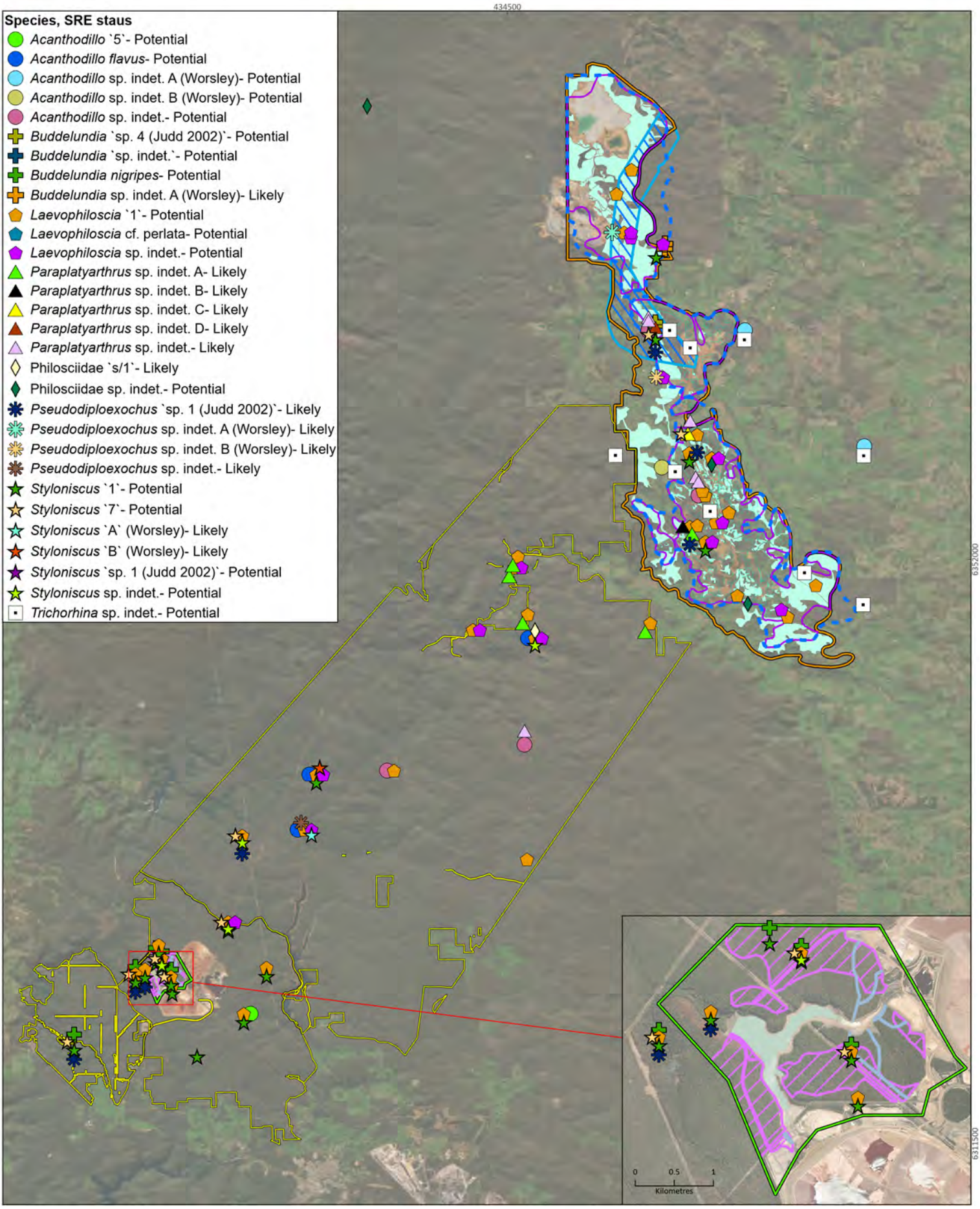
- WMDE and BTC overlap area
- WMDE IDF
- CBME Proposed Maintenance Clearing Areas
- CBME Indicative Footprint
- Contingency Bauxite Mining Development Envelope (CBME)

Figure 6-4

Records of SRE Millipides from the PAA and survey

PHOENIX ENVIRONMENTAL SCIENCES



South32 Ltd

Worsley Mine Expansion Project

Project No	1331
Date	21/02/2023
Drawn by	IN
Map author	AJ

0 5 10
Kilometres

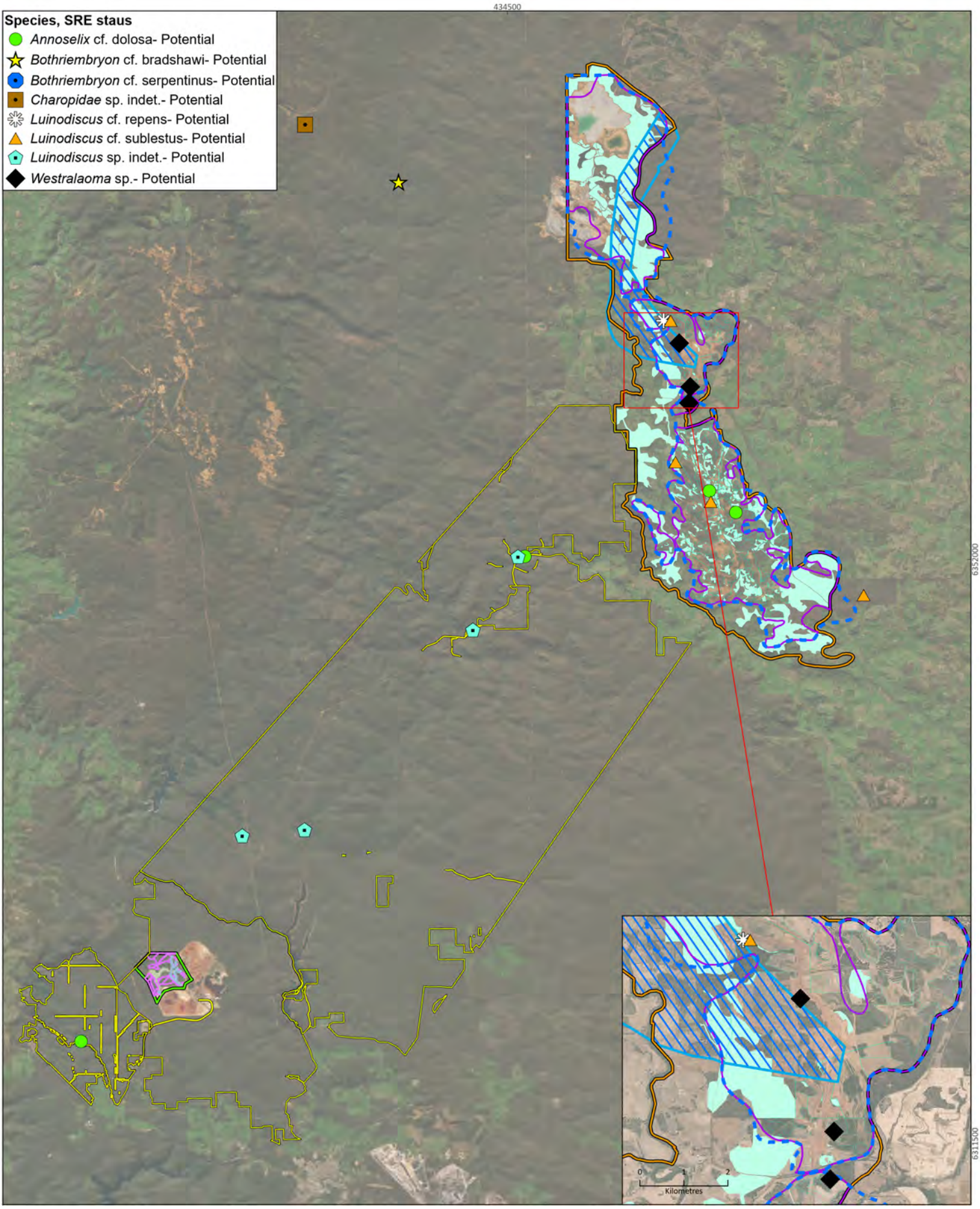
1:339,000 (at A4) GDA 1994 MGA Zone 50

- Regional study area
- PBA Primary Bauxite Area 2005 ERMP MS719
- Rehabilitation study area
- PreExisting Approval Area
- Worsley Mining Development Envelope (WMDE)
- Bauxite Transport Corridor Development Envelope (BTC)
- WMDE and BTC overlap area
- WMDE IDF
- CBME Proposed Maintenance Clearing Areas
- CBME Indicative Footprint
- Contingency Bauxite Mining Development Envelope (CBME)

Figure 6-5

Records of SRE Isopods from the PAA and survey

PHOENIX ENVIRONMENTAL SCIENCES



South32 Ltd

Worsley Mine Expansion Project

Project No	1331
Date	21/02/2023
Drawn by	IN
Map author	AJ

0 5 10
Kilometres

1:339,000 (at A4) GDA 1994 MGA Zone 50

- Regional study area
- PBA Primary Bauxite Area 2005 ERMP MS719
- Rehabilitation study area
- PreExisting Approval Area
- Worsley Mining Development Envelope (WMDE)
- Bauxite Transport Corridor Development Envelope (BTC)
- WMDE and BTC overlap area
- WMDE IDF
- CBME Proposed Maintenance Clearing Areas
- CBME Indicative Footprint
- Contingency Bauxite Mining Development Envelope (CBME)

Figure 6-6

Records of SRE Snails from the PAA and survey

PHOENIX ENVIRONMENTAL SCIENCES

6.2 SRE HABITATS

The study area (WME, regional and rehabilitation study areas) has a very high proportion of native vegetation cover (96.4%), with the majority of this located within the regional study area. Of the ten SRE habitats defined within the WME study area, seven were classified as having High PHR with habitat attributes that often give rise to specialisation or dependency in invertebrate fauna, particularly more mesic habitats on lower slopes and valley floors and isolated granite outcrops. These represented 6,624.8 ha (23.5%) of the study area.

Low potential SRE habitats also recorded many SRE taxa. The number of Confirmed, Likely and Potential SRE taxa recorded in each habitat type across the PAA and Huntly survey areas is shown in Figure 6-7. The data indicates that the most widespread habitat types (4 and 2) recorded the greatest number of SRE taxa, with habitat type 4 overwhelmingly recording the most SRE taxa. This may be a function of sample effort in this habitat type (having been the most sampled habitat type across the two studies) or a result of the habitat being incorrectly classed as Low potential SRE habitat (i.e., all habitats in fact represent High prospectivity SRE). The reason is difficult to determine.

In order to assist in identifying the reason, a range of continuous, numerical environmental variables are graphed against the number of SRE taxa and number of sites in each habitat, in Figure 6-8. The data in Figure 6-8 suggests that habitat complexity (vegetation cover, tree cover and leaf litter cover and depth) are collectively strong drivers of SRE richness. With total vegetation cover (%), tree cover (%) and litter depth (cm) found to account for 42.9%, 39%, 37.4% of the variation in the number of species per habitat type, respectively (Figure 6-8); obviously however, these three are confounding variables.

Notwithstanding the above, the graph also indicates that SRE diversity increases with sample effort. And indeed, the species accumulation curves (Figure 5-4 – Figure 5-9) suggests that additional sampling would likely uncover more SRE taxa.

Further it was documented in section 6.1 how distinct the SRE assemblages of the WMDE, CBME and Huntly survey areas are – with little to no overlap in taxa within the genera currently restricted to the IDF. This is largely true of all the groups reported here, with the exception of the harvestmen, which appear to be the group with the most taxa common to two or more study areas.

Collectively the data suggests that all habitats within the PAA and surrounds represent High prospectivity SRE habitat. While some habitats are more restricted in extent than others, this does not necessarily mean they contain a greater number of restricted species. Instead, the data suggests that the taxa are restricted latitudinally, i.e., there is a distinct SRE assemblage in the north at the Huntly survey area, then another south in the WMDE and lastly, but to a lesser extent, further south at the CBME at Collie, which shares a number of taxa with the WMDE. The regional study area, while supporting some overlap of species with the WMDE and/or the CBME, largely sustains its own different assemblage of SREs again.

Within each of the areas, habitat type does not appear to be the driver of the assemblage; that is, taxa are generally recorded from a range of habitats and environmental conditions within their range. While there is a gradation of taxa from north to south, taxa are not necessarily habitat constrained within their narrow respective distributions.

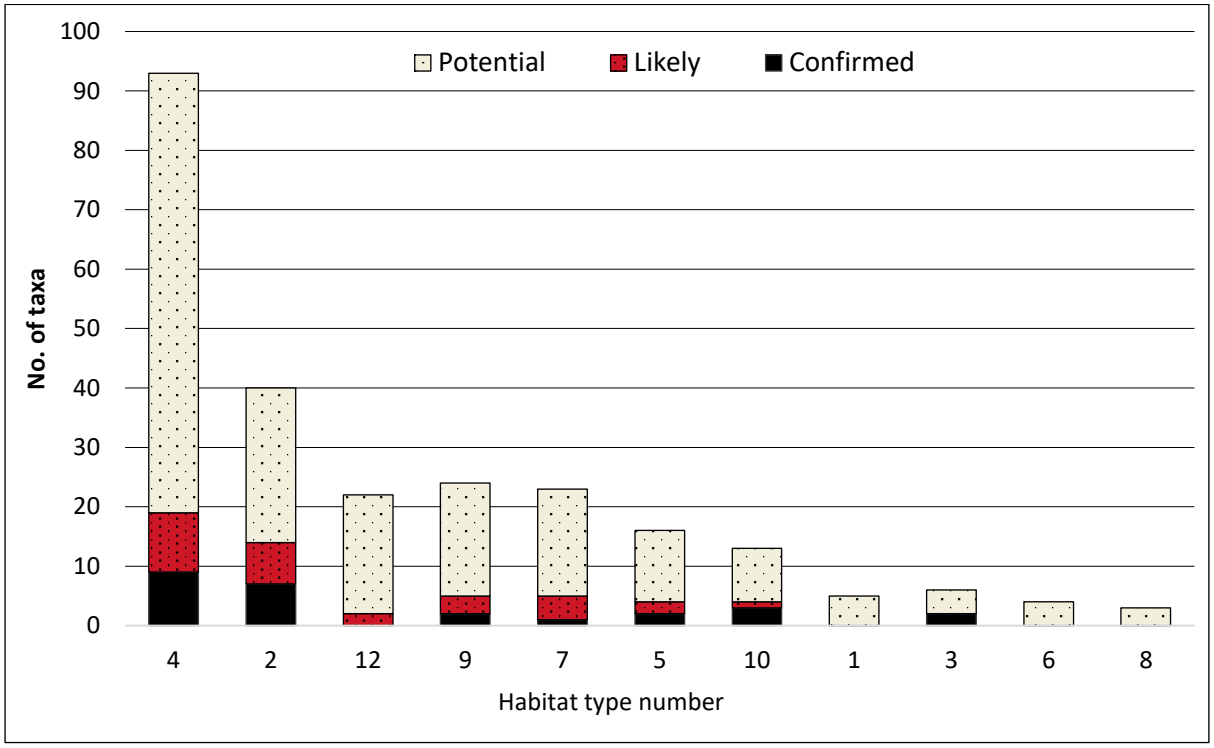


Figure 6-7 **The number of Confirmed, Likely and Potential SRE taxa recorded in each fauna habitat type**

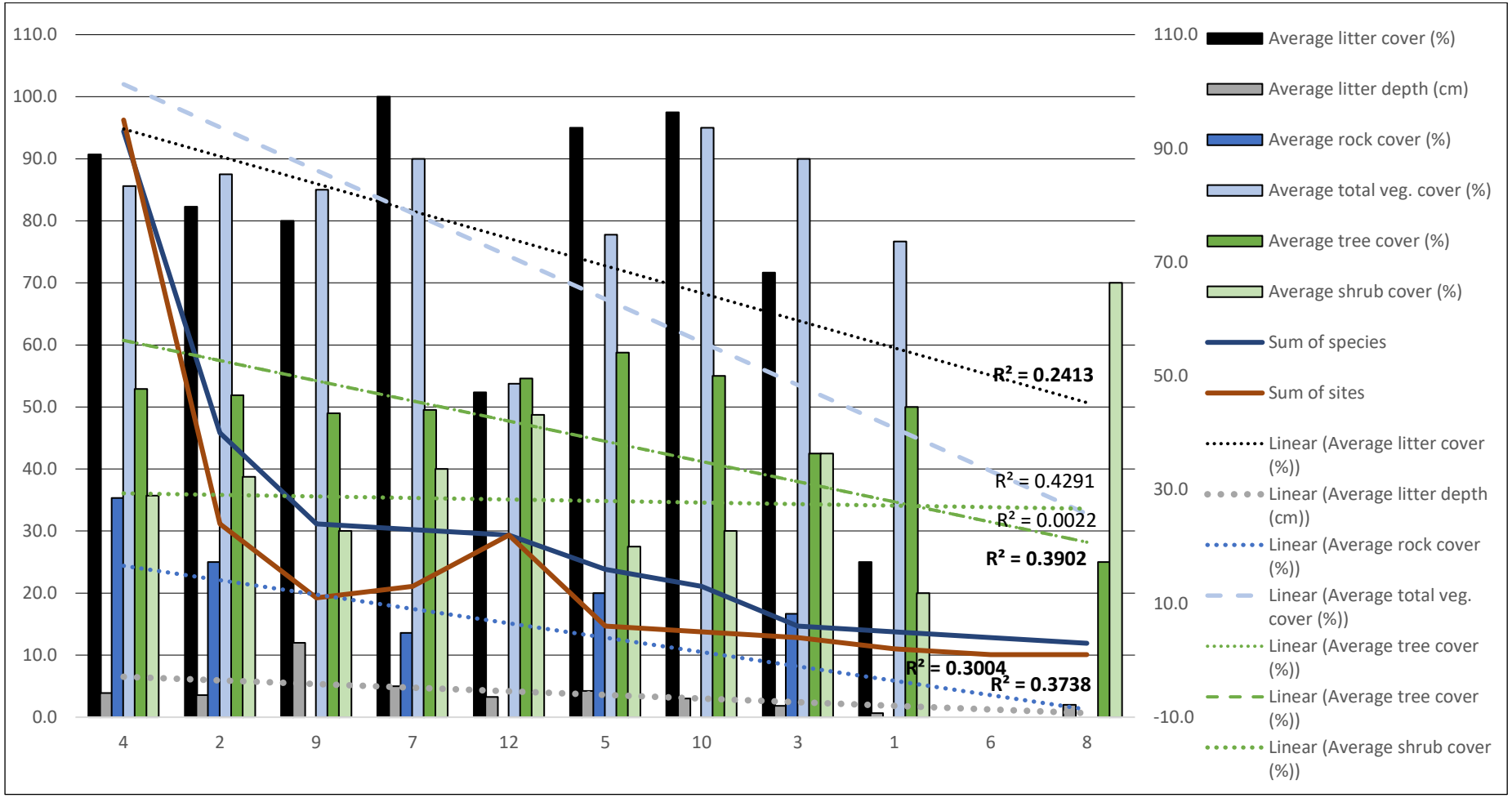


Figure 6-8 Species count, number of samples sites and continuous numerical environmental variables per habitat type

6.3 SURVEY COMPLETENESS

The surveys conducted for the Proposal are extensive in spatial extent and have occurred over four seasons and two years, and therefore represent the most comprehensive survey for SREs in the Northern Jarrah Forest to date, particularly within the context of EIA. However, as seen in section 0 and Phoenix (2021) the statistical analysis strongly suggests that more taxa remain undetected.

6.4 COMPARISON BETWEEN HUNTLY AND WORSLEY STUDIES

Comparisons between the study area and the Huntly survey (Phoenix 2021) revealed similar SRE invertebrate community structure but with mostly distinct SRE taxa (Table 6-4). The proportionate representation of the SRE groups within the PAA is remarkably similar to that of the Huntly survey (Phoenix 2021), where the SRE assemblage was also predominantly comprised of mygalomorphs, millipedes and isopods. A similar number of SRE species were recorded in each survey and a very similar proportion of taxa collected from SRE groups were classified as an SRE species (Table 6-4).

Of the SRE assemblage from the current survey and the Huntly survey (Phoenix 2021), 15 SREs were collected from both areas (Table 6-5). Overlapping taxa included several mygalomorphs and isopods, an opilione, a millipede and a land snail (Table 6-5). The overlapping species represent 15% of the SRE assemblage known from the WME study area and suggests many of the SREs may have narrow restricted geographical ranges.

Table 6-4 Comparison of PAA and Huntly (Phoenix 2021) studies

Element	Worsley	Huntly (Phoenix 2021)
Study area size (ha)	124,651 ha (29,360 (PAA, inclusive of the rehabilitation study area), 95,291 (Regional study area)	28,132 ha
Number of sites	47 sites in total 10 CBME (2019) 22 WMDE/BTC (2019) 15 reference (regional study area) (2020)	60 sites in total 28 MN-MA 22 H-MA 5 MN-CC 3 H-CC 1 MN-HR 1 H-HR
Number of taxa from SRE groups	143	117
Number of SRE taxa from the survey	Confirmed SREs: 9 Likely SREs: 14 Potential SREs: 84 Total SREs: 108	Confirmed SREs: 11 Likely SREs: 5 Potential SREs: 67 Total SREs: 83
% of taxa from SRE groups that are SREs	75.5%	73%
Number of families and genera	Families: 18	Families: 19

Element	Worsley	Huntly (Phoenix 2021)
	Genera: 29	Genera: 24
Number of taxa in each group	Mygalomorphs: 37 (32.1%) Opiliones: 15 (13.8%) Pseudoscorpions: 6 (5.5%) Scorpions: 0 Millipedes: 21 (19.3%) Isopods: 26 (23.9%) Land snails: 4 (3.7%)	Mygalomorphs: 35 (42.2%) Opiliones: 7 (8.4%) Pseudoscorpions: 2 (2.4%) Scorpions: 2 (2.4%) Millipedes: 16 (19.3%) Isopods: 16 (19.3%) Land snails: 5 (6.0%)
Number of native habitat types	9	8
Number of sites (rehabilitation survey)	8	12
Age of rehabilitation	5 YO (rehabilitated in 2015): 1 site 9 YO (rehabilitated in 2011): 1 site 13 YO (rehabilitated in 2007): 1 site 15 YO (rehabilitated in 2005): 1 site 18 YO (rehabilitated in 2002): 1 site 22 YO (rehabilitated in 1998): 1 site 27 YO (rehabilitated in 1993): 1 site 36 YO (rehabilitated in 1984): 1 site	5 YO (rehabilitated in 2015): 3 sites 10 YO (rehabilitated in 2010): 3 sites 20 YO (rehabilitated in 2000): 3 sites 30 YO (rehabilitated in 1990): 3 sites

Table 6-5 Common SRE taxa from the Huntly and Worsley studies

Family	Species	Comments
Actinopidae	*Missulena* 'MYG198'	Also recorded by Phoenix (Phoenix 2012a) and at Wungong Dam in 2010
Anamidae	*Aname* 'Phoenix0037'	Collected from several rehabilitation sites (Worsley and Huntly), and a baseline site (Huntly)
Anamidae	*Proshermacha* 'MYG485'	Appears relatively common within a restricted range
Anamidae	*Teyl* 'MYG355'	Only one other known record outside Huntly and Worsley
Idiopidae	*Eucyrtops* 'Phoenix0033'	Only known from the Huntly and Worsley surveys
Idiopidae	*Eucyrtops* 'WorsleyDNA06'	Only known from the Huntly and Worsley surveys
Siphonotidae	*Siphonotidae* 'DIPAAG' 'DIP189' 'collie'	Only known from the Huntly and Worsley surveys

Family	Species	Comments
Siphonotidae	*Siphonotidae `DIPAAG` `DIP192` `mt saddleback*	Only known from the Huntly and Worsley surveys
Siphonotidae	*Siphonotidae `DIPAAF` `DIP188` `boddington`*	Only known from the Huntly and Worsley surveys
Siphonotidae	*Siphonotidae `DIPAAF` `cf. michaelseni`*	Only known from the Huntly and Worsley surveys
Armadillidae	*Armadillo (Acanthodillo) flavus*	Recorded from other areas of the Jarrah Forest
Philosciidae	*Laevophiloscia* '1'	Commonly collected from both study areas and the rehabilitation sites
Styloniscidae	*Styloniscus* '1'	Commonly recorded from both study areas and the rehabilitation sites
Styloniscidae	*Styloniscus* '7'	Commonly recorded from both study areas
Bothriembryontidae	*Bothriembryon* cf. *bradshawi*	Recorded from Huntly and a rehabilitation site (Worsley)

6.5 SPECIES DISTRIBUTION

Many species recorded in the current survey and for Phoenix (2021) are new, and records for many previous taxa are also limited. Therefore, attempting to define the spatial extent (hectares) of many of the taxa reported here was not possible. Given the large scale of the dataset being analysed a single method was needed to describe distributional trends.

Rather than use spatial extent, the distance between known point locations for each individual taxon was used as a surrogate for spatial extent, taking into account that short-range endemism is nominally defined as species whose distribution is less than 100km x 100km in area. The mean and maximum distance between occurrences of members of each species was used to make inferences about the degree of short-range endemism in the assemblage, and in context to the scale of the Proposal.

A distance (km) matrix function was used on the full dataset for all 'SREs' recorded from this survey and the desktop data, where taxon name was used as both the input and target unique field, i.e. the function calculated the distance (km) between all point combinations. The resultant table was then filtered so as to include only data where the input and target species were the same, i.e. the distance between records of the same species. The data was then summarised (minimum, maximum, mean, median and standard deviation) for each species and plotted for the three most diverse groups, Mygalomorphae trap-door spiders (Figure 6-9), Millipedes (Figure 6-10) and Isopods (Figure 6-11).

The data displayed in Figure 6-9 for Mygalomorphae trap-door spiders shows that for almost half the recorded taxa the maximum distance between any two records of the same taxon is less than 25 km and less than 50 km for approximately two-thirds of the taxa. The data also shows that the distribution of 10 taxa are greater than the nominal 100 km for SREs.

For Millipedes (Figure 6-10) a remarkably similar pattern is evident, but is more pronounced. all individually recognised taxa have a maximum distance between any two records of less than 100 km; where almost 50% and 66% have a maximum distance between any two records of less than 25km and 50 km, respectively. *Antichiropus* 'sp. Indet.' (which represents specimens that could not be

placed into any of the distinguishable taxa and thus could be any one of those) was the only 'taxon' to record two indivduals at a distance greater than 100km. Millipedes in the area therefore display one of the more extreme forms of short-range endemism.

The observations for Isopods are also fairly similar, but short-range endemism appears the least pronounced of the three groups considered. Overall approximately 40% and 66% of taxa have a maximum distance between two records of <25 km and < 50 km, respectively. Seven taxa have a maximum distance between two records of 100 km or greater, which is the highest number of the taxa most likely not SREs in the three groups.

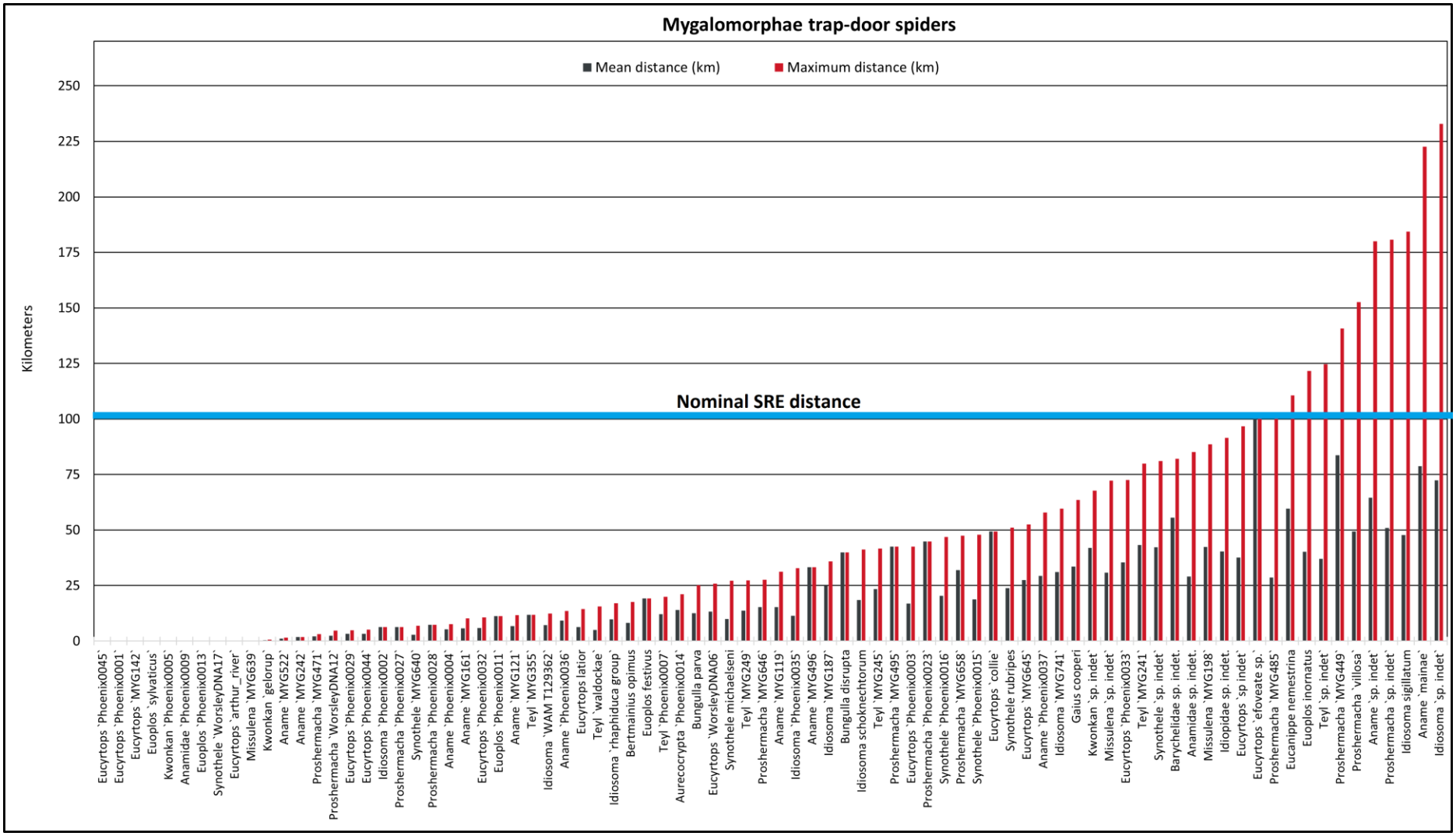


Figure 6-9 Mean and maximum distance (km) between records of each Mygalomorphae trap-door spider taxon

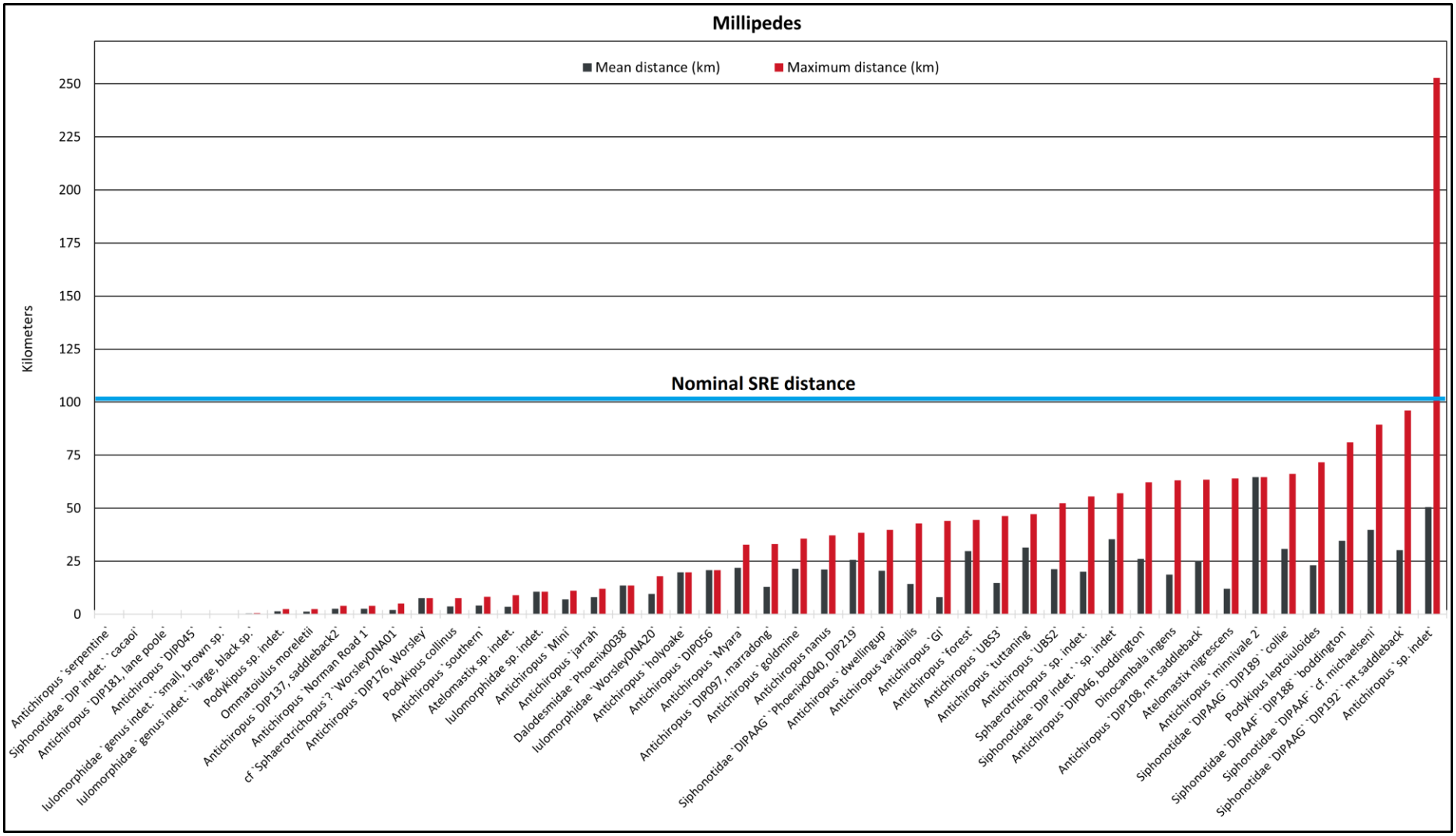


Figure 6-10 Mean and maximum distance (km) between records of each Millipede taxon

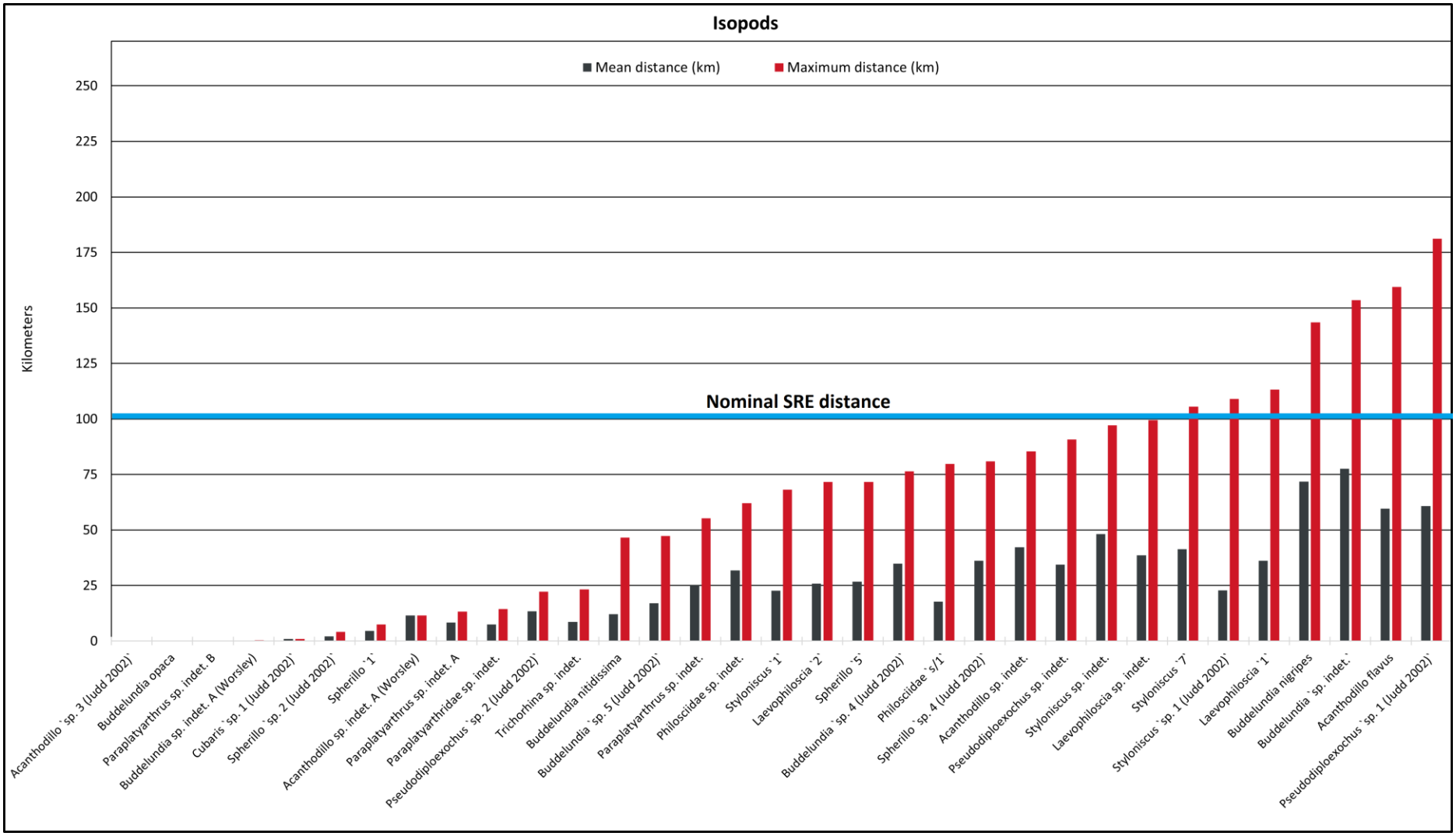


Figure 6-11 Mean and maximum distance (km) between records of each Isopod taxon

6.6 HABITAT REHABILITATION FOR SREs

Extensive research has been conducted into the success of bauxite mining rehabilitation in the Northern Jarrah Forest (Armstrong & Nichols 2000; Gardner & Stoneman no date; Kabay & Nichols 1979; Koch & Hobbs 2007; Lee *et al.* 2013; Nichols & Bamford 1985; Nichols & Nichols 2003; Seiser 2001), principally for Alcoa's nearby operations, and also into the effects of forestry activities (Calver & Wardell-Johnson 2004; Strehlow *et al.* 2002; Webala 2010; Webala *et al.* 2011), which occur in tandem with bauxite mining (as both Alcoa's and South32's mining leases largely occur within State Forest), including for invertebrates (Abbott *et al.* 2003; Brennan 2003; Brennan *et al.* 2003; Brennan *et al.* 2004; Farr *et al.* 2011; Kabay & Nichols 1979; Strehlow *et al.* 2002).

These studies have largely agreed that Alcoa's bauxite mining rehabilitation has been successful in restoring terrestrial vertebrate and invertebrate fauna and that the impacts of forestry activities are relatively short-lived. There are no such published studies concerning South32's rehabilitation success, certainly not for invertebrates.

To date, there have been no studies examining mining rehabilitation success in the context of SREs, which are essentially outcomes of the long and complex geological and climatic history of the Jarrah Forest (Wardell-Johnson & Horwitz 2000) and whose individuals are characterised by being found within refugial habitats, have poor powers of dispersal and low fecundity (EPA 2016c; Harvey 2002).

While Brennan (2003) did record a *Synothele* within rehabilitated area(s), it was not known whether or not this particular taxa was an SRE and he in fact cautioned that with respect to spiders, the successful re-colonisation of rehabilitated areas by Mygalomorphae trap-door spiders needed further research, i.e. there was little evidence of re-colonisation. The same can also be said for the remaining groups that typically comprise SREs in the southwest of WA.

This study is considered to represent the first in which the success of rehabilitation with respect to natural SRE re-colonisation has been analysed for the Northern Jarrah Forest. The rehabilitation data suggests current rehabilitation practices offer limited success for natural re-colonisation of SRE taxa because:

- no restricted SRE taxa were recorded from rehabilitation sites, i.e., all SRE taxa from rehabilitated sites were 'common' or 'widespread' SRE taxa with multiple records outside the rehabilitation sites
- rehabilitated ground appears to support the less cryptic taxa, 'generalist' taxa or taxa with greater powers of dispersal, compared with the many apparently restricted taxa collected from the uncleared/undisturbed sites within the PAA, regional study area and to the north-west at the Huntly and Myara Project areas (Phoenix 2021)
- there was a weak positive relationship ($R^2 = 0.25$) between the number of SREs at any site and rehabilitation age (Figure 5-3).

The data suggests therefore that the more 'common' SRE taxa can recolonise rehabilitation areas of their own accord, but that the more cryptic taxa do not return by themselves. Given the above and the unique habitat conditions that have given rise to short-range endemism in invertebrates and their unique biological characteristics, it is difficult to conclude that current bauxite mining rehabilitation practices (which are focussed on returning the more ubiquitous flora and mobile vertebrate fauna) will eventually see re-colonisation of cryptic SRE taxa.

This is particularly true for isolated patches of native vegetation, but less so where rehabilitation occurs adjacent to high quality remnant native vegetation. In isolated patches it is conceivable that pre-disturbance capture and release of cryptic SREs is the only viable mechanism for their return. Should such an option be pursued however, it is also questionable whether they would persist, given

they have evolved alongside the complex geological and climatic history of the Jarrah Forest and that habitat attributes they rely on (e.g., loamy (water holding) soils, deep litter accumulations, high canopy cover, large rotting logs etc) will likely not return for a long time, post-mining. Indeed, the data has shown that it took at least 15 years before more than four 'common' SREs were recorded and even at 41 years, while nine 'common' SREs were recorded, still no cryptic SREs were recorded (Figure 5-3).

Notwithstanding the above, given it is many years before suitable habitat conditions are restored, actively translocating cryptic taxa would necessarily involve maintaining live populations ready for translocation once favourable conditions are restored. This is almost certainly not a viable proposition for any private business to pursue and would need to be managed by a government organisation with secure long-term funding and focus.

6.7 CUMULATIVE IMPACT ASSESSMENT

The cumulative impact assessment provided below (Table 6-6; Table 6-7; Figure 6-12; Figure 6-13) is based on the vegetation dataset (Mattiske 2012) provided at the time of the original SRE survey (Phoenix 2012b) for the PBA and for this report (Mattiske 2020).

The data shows that prior to 2012, the PAA comprised 10,963.9 ha of cleared land and Rehabilitated land occupied 485.1 ha. By 2020 the area mapped as cleared (no SRE potential) within the PAA had increased to 13,186.1 ha, an increase of 2222,2 ha (Table 6-6; Figure 6-12).

The area of rehabilitated land increased 558% by 2020 to 3,190.5 ha, of which 616.7 ha (22.7%) is to be re-cleared under the current proposal. Rehabilitated land is may be considered Low potential SRE habitat (see section 6.6) depending on rehabilitation type and age. Currently, very little evidence exists to support the value of rehabilitation for SREs as widespread representatives from SRE groups only have been recorded in these habitats.

The area of additional remnant native vegetation to be cleared under the current Proposal is 6,776.6 ha (Table 6-6). Therefore, by the time mining finishes under the current Proposal the extent of cleared land within the PAA will be 19,962.7 ha which represents 1% of the Northern Jarrah Forest (JAF01). A proportion of the clearing within the Northern Jarrah Forest has been undertaken for agricultural and forestry purposes and thus was not undertaken by South32.

The cumulative change in habitat with respect to its potential to support SREs is shown in Table 6-6 and Figure 6-13. Due to mapping refinements in the Mattiske (2020) dataset the area of High potential SRE habitat increased from 2012 to 2020. The data indicates that as of January 2020 a total of 3,987.2 ha of habitat considered to have a High potential to support SREs remains within the PAA. Under the Proposal 1,292.1 ha of High potential SRE habitat will be cleared, leaving a total of 2,695 ha; which is a further reduction of 32%, within the PAA; which equates to 9.2% of the High potential SRE habitat remaining. That being said, Low potential habitat has recorded the most SRE taxa, including a number of the seven taxa only known from the IDF. Low potential remnant SRE habitat was reduced by a further 5,015.3 ha between 2012 and 2020 and a further 5,484.6 ha will be cleared under the Proposal which equates to 2,695 ha (29%) of Low potential remnant SRE habitat remaining. Thus, 8,898.4 ha (29% of the PAA), will remain following enactment of the Proposal

In terms of cumulative impact to individual SRE taxa up to six taxa from the PAA (see section 6.1), which includes a single species from the desktop review, *Aname* 'Dwellingup', are confined to within the IDF. Clearing in the last decade has not resulted in the complete loss of known habitat for any species detected during the previous surveys (Outback Ecology 2012; Phoenix 2012b), and known locations have not been significantly reduced either. Going forward however, within the bounds of the current state of knowledge, at least 14 species or morphospecies from the current survey will have their known distribution (as individual locations) reduced by at $\geq$ 25% and typically >50% with

implementation of the Proposal (Table 6-7); bearing in mind that just 21.1% of native vegetation will remain uncleared within the PAA and thus the reduction in distribution of most taxa is likely much greater, particularly given the apparent endemicity documented in section 6.5.

Table 6-6 Cumulative impact assessment calculations per fauna habitat type

	Fauna habitat	SRE habitat potential	Fauna habitats calculations 2012-2020				Proposal calculations		
			Area (ha) Mattiske 2012	Area (ha) Mattiske 2020	Area (ha) change 2012-2020	% Change	Proposed loss (ha) (IDF)	Area (ha) remaining in PAA (2020-proposed)	Area (%) remaining in PAA
1	Melaleuca woodlands/shrublands on seasonally wet or water-logged clays and clay loams on valley floors	H	134.4	134.6	0.2	0.2%	39.6	95.0	70.4%
2	Open Jarrah/Marri woodlands on sands, clay-loam or sandy-gravel on lower slopes and valley floors (1)	H	252.4	427.3	174.9	69.3%	210.3	217.0	50.8%
3	Heath/shrubland on shallow soils on granite or outcrops	H	191.5	171.2	-20.3	-10.6%	23.0	148.2	88.0%
4	Open forest of Jarrah/Marri on sandy-loam gravelly soils on mid-slopes and ridges	L	11,858.8	7,371.3	-4,487.5	-37.8%	4,576.0	2,795.3	61.4%
5	Open forest of Jarrah/Marri forest, seasonally moist, sandy gravels on slopes	H	26.9	26.9	0.0	0.0%	13.4	13.5	50.2%
6	Cleared land (including plantations, dams, and rehabilitation areas)	-	10,963.9	13,186.1	2,222.1	20.3%	2,151.3	11,034.8	n/a
7	Open forest to woodland of Jarrah/Marri on slopes and less undulating hills	L	2,149.5	1,621.7	-527.8	-24.6%	908.6	713.1	57.7%
8	Open woodland of Wandoo on clay and clay-loam soils on lower slopes	H	2,480.2	2,420.8	-59.5	-2.4%	782.0	1,638.8	68.5%
9	Open Eucalyptus woodlands (wet) on sands, clay-loam or sandy-gravel on lower slopes and valley floors	H	779.6	772.2	-7.4	-0.9%	223.8	548.4	71.3%
10	Open woodlands of Wandoo and Flooded Gum on seasonally wet or water-logged clays and clay loams on valley floors	H	34.2	34.2	0.0	0.0%	0.0	34.2	100.0%
12	Rehabilitation (post-mining rehabilitation using mostly native species)	L	485.1	3,190.5	2,705.5	557.8%	616.7	2,573.8	80.7%
		Total	**29,356.4**	**29,356.6**			**9,544.7**		

Fauna habitat	SRE habitat potential	Fauna habitats calculations 2012-2020				Proposal calculations		
		Area (ha) Mattiske 2012	Area (ha) Mattiske 2020	Area (ha) change 2012-2020	% Change	Proposed loss (ha) (IDF)	Area (ha) remaining in PAA (2020-proposed)	Area (%) remaining in PAA
Total native vegetation		**17,907.4**	**12,980.0**	**4,927.36**	**-20.0%**	**6,776.6**	**6,203.4**	**48%**
Total high potential SRE habitat		**3899.1**	**3,987.02**	**87.9**	**13.8%**	**1,292.1**	**2,695**	**67.6%**
Total low potential remnant SRE habitat		**14,008.3**	**8,993.0**	**-5,015.3**	**-35.8%**	**5,484.5**	**3,508.4**	**95%**
Total low potential SRE habitat		**14,493.4**	**12,183.5**	**-2,309.8**	**-15.9%**	**6,101.3**	**6,082.2**	**50%**

1 – these two figures do not add up to 100% due to extrapolations necessarily made for the <2012 and 2012-2020 vegetation datasets. But are accurate within 2.1% over the almost 30,000 ha PAA.

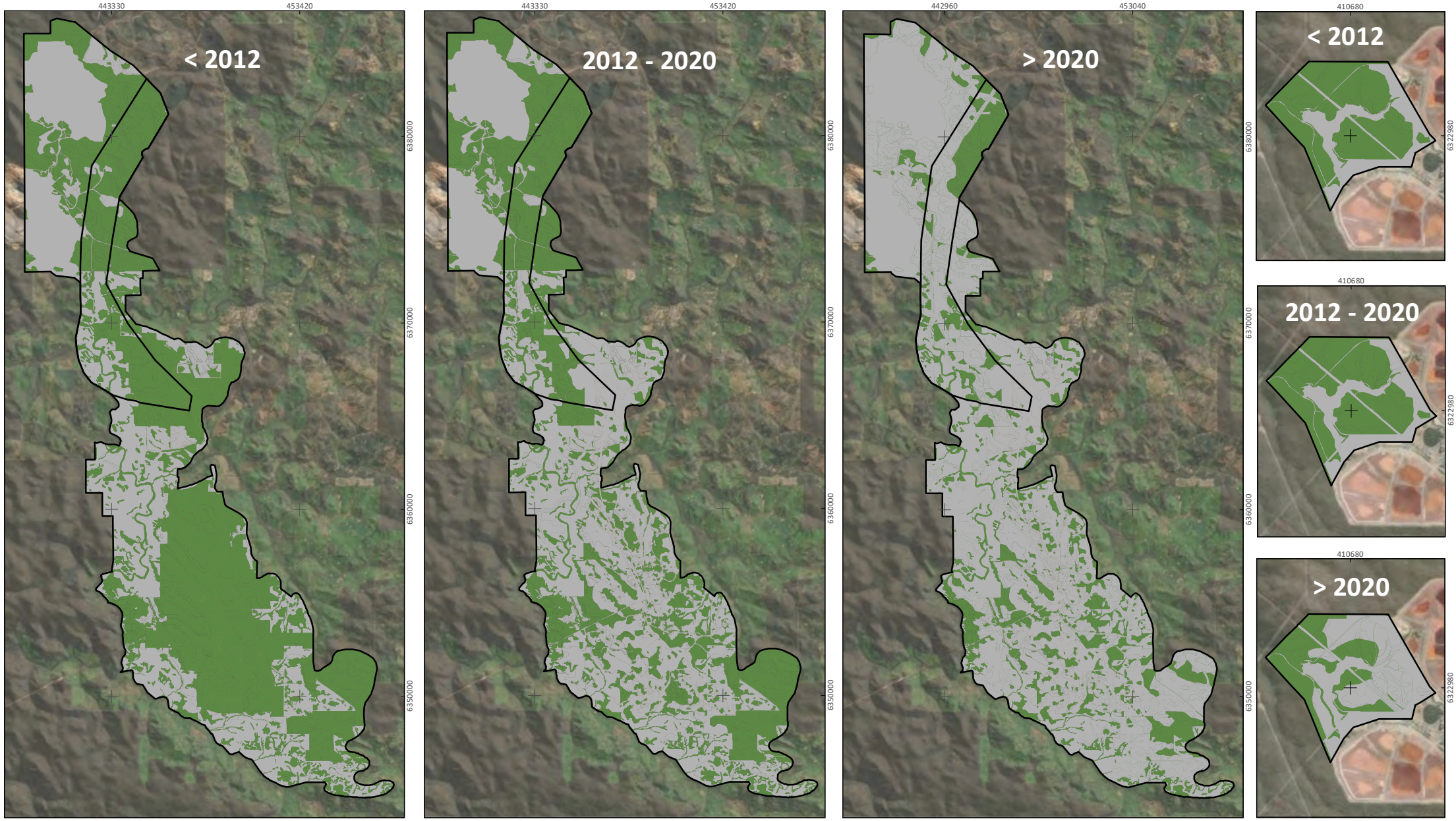
Table 6-7 Taxa from the IDF in which all or part of their known populations may be lost

Bold text indicates taxa whose known populations are at risk from the Project

Taxon	No. of sites within PAA IDF	Total no. of sites	Proportion of known popn. lost	Comments
Confirmed				
Antichiropus 'DIP097, Marradong) '	4	19	21.0%	Collected from the WMDE and at several sites north and west of the WMDE. Current known extent is 221 km^2
Antichiropus `DIP108, mt saddleback`	2	23	8.7%	Current known extent is 1,329 km2 from both CBME to WMDE and north-west of the WMDE
Likely				
***Buddelundia* sp. indet. A (Worsley)**	**1**	**2**	**50.0%**	**Known from two locations 670 m apart two similar habitat types: open eucalypt woodlands and open Wandoo woodlands within the WMDE**
Paraplatyarthrus sp. indet.	4	8	50.0%	An indeterminate taxon that could represent a widespread or previously collected species
***Paraplatyarthrus* sp. indet. D**	1	1	**100%**	**Known only from the WMDE IDF**
Pseudodiploexochus `1`	3	11	27.3%	Current known extent is 3,055 km^2 between both the CBME and WMDE
***Pseudodiploexochus* sp. indet. A (Worsley)**	1	1	100%	**Known only from the WMDE IDF**
Potential				
Acanthodillo sp. indet.	2	9	22.2%	An indeterminate taxon that could represent a widespread or previously collected species
***Aname* `Dwellingup`**	**1**	**1**	**100%**	**Known only from the WMDE IDF**
Aname `sp. indet`	4	10	40.0%	An indeterminate taxon that could represent a widespread or previously collected species
Antichiropus `sp. indet`	6	102	5.9%	An indeterminate taxon that could represent a widespread or previously collected species
***Austrochthonius* `austini`**	**1**	**2**	**50.0%**	**Collected from within the WMDE IDF and at a location not too far outside the IDF in 2011**
Beierolpium sp. indet.	1	8	12.5%	An indeterminate taxon that could represent a widespread or previously collected species
Buddelundia `sp. 4 (Judd 2002)`	2	12	16.7%	Other records of this species are from 50 km north so it is likely to be more widespread than records show
Buddelundia nigripes	4	14	28.6%	Other records of this species are from the SCP, therefore it is likely to be more widespread than records show

Taxon	No. of sites within PAA IDF	Total no. of sites	Proportion of known popn. lost	Comments
Calliuncus `WorsleyDNA21`	1	7	14.3%	Collected from the WMDE IDF and near the CBME
Eucyrtops `MYG645`	3	10	30.0%	Recorded from the WMDE and CBME IDFs and several locations in between so likely to me more widespread than records indicate
Eucyrtops `sp indet`	2	14	14.3%	An indeterminate taxon that could represent a widespread or previously collected species
***Eucyrtops* `WorsleyDNA06`**	**2**	**8**	**25.0%**	**Known only from the WMDE and from a few records just outside the WMDE**
Idiosoma `MYG187`	1	3	33.3%	Collected from within the WMDE IDF and either side of the WMDE so likely to me more widespread than records indicate
Idiosoma `MYG741`	2	5	40.0%	Collected from the CBME and WMDE, so likely to be more widespread than records indicate.
Idiosoma `sp. indet`	2	17	11.8%	An indeterminate taxon that could represent a widespread or previously collected species
Iulomorphidae `WorsleyDNA20`	1	5	20.0%	Collected from the WMDE and17 km NE.
Laevophiloscia `1`	8	209	3.8%	Collected from the CBME , WMDE and at many locations outside of the PAA, common
Laevophiloscia sp. indet.	2	24	8.3%	An indeterminate taxon that could represent a widespread or previously collected species
Megalopsalis `sp. indet`	1	12	8.3%	An indeterminate taxon that could represent a widespread or previously collected species
Nunciella `sp. indet`	2	9	22.2%	An indeterminate taxon that could represent a widespread or previously collected species
Philosciidae sp. indet.	1	9	11.1%	An indeterminate taxon that could represent a widespread or previously collected species
Podykipus leptoiuloides	1	14	7.1%	Collected from the CBME , WMDE and at many locations outside of the PAA, common with a known range of at least 511 km^2
Proshermacha `MYG658`	1	3	33.3%	Collected from the CBME, WMDE IDF and at one location in between so likely to me more widespread than records indicate
Proshermacha `sp. indet`	3	61	4.9%	An indeterminate taxon that could represent a widespread or previously collected species
Siphonotidae `DIP indet.` `sp. indet`	1	4	25.0%	An indeterminate taxon that could represent a widespread or previously collected species

Taxon	No. of sites within PAA IDF	Total no. of sites	Proportion of known popn. lost	Comments
Siphonotidae `DIPAAF` `WorsleyDNA14`	**1**	**1**	**100%**	**Known only from the WMDE IDF**
Siphonotidae `DIPAAF` `WorsleyDNA15`	**1**	**1**	**100%**	**Known only from the WMDE IDF**
cf `*Sphaerotrichopus*` `WorsleyDNA01`	**2**	**3**	**66.7%**	**Known only from the WMDE**
Sphaerotrichopus` sp. indet.	2	4	50.0%	An indeterminate taxon that could represent a widespread or previously collected species
Styloniscus `1`	4	79	5.0%	Collected from the CBME and WMDE and beyond, so likely to be more widespread than records indicate
Styloniscus `7`	3	15	20.0%	Collected from the CBME and WMDE and beyond, so likely to be more widespread than records indicate
Styloniscus sp. indet.	1	9	11.1%	An indeterminate taxon that could represent a widespread or previously collected species
***Synothele* `MYG640`**	**2**	**4**	**50.0%**	**Known only from the CBME and nearby outside of the PAA east of the CBME**
Synothele `sp. indet`	2	11	18.2%	An indeterminate taxon that could represent a widespread or previously collected species
Synothele rubripes	**2**	**5**	**40.0%**	**Collected from within the WMDE IDF and outside the PAA. No record of type specimen**
Teyl `MYG245`	1	4	25.0%	Collected from within the WMDE IDF and 30 km to the west so likely to me more widespread than records indicate
Teyl `sp. indet`	2	10	20.0%	An indeterminate taxon that could represent a widespread or previously collected species
Triaenonychidae `genus 003` sp. indet.	1	4	25.0%	An indeterminate taxon that could represent a widespread or previously collected species
Triaenonychidae `genus 003` `WorsleyDNA27`	**1**	**1**	**100%**	**Known only from the WMDE IDF**
Triaenonychidae `genus 008` `WorsleyDNA30`	2	6	33.3%	Known only from the WMDE, however 4 of the 6 sites are rehabilitation sites, suggesting this species favours disturbed sites
Triaenonychidae `genus 008` sp. indet.	7	45	15.6%	An indeterminate taxon that could represent a widespread or previously collected species



Western Australia

PERTH

South32 Ltd
Worsley Expansion Project

Project No.	1331	Drawn By	IN
Date	14/09/2021	Map Author	AJ

0 2.5 5 Kilometres (WMDE)

0 1 2 Kilometres (CBME)

1:267,000 (WMDE) 1:115,250 (CBME) GDA 1994 MGA Zone 50

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PAA

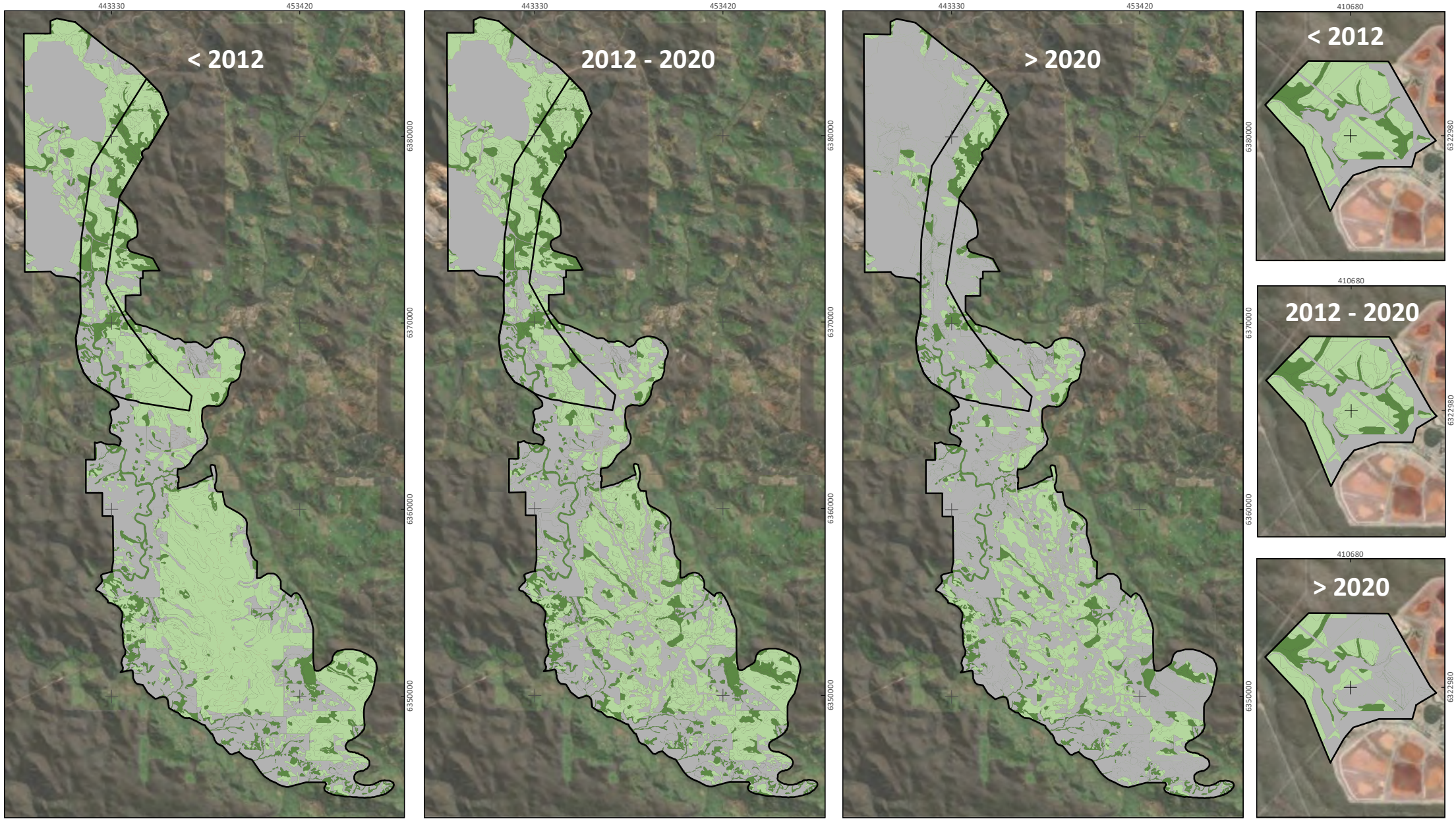
Native vegetation

Cleared

Figure 6–10

Cumulative change in native vegetation

PHOENIX ENVIRONMENTAL SCIENCES



Western Australia

PERTH

South32 Ltd
Worsley Expansion Project

Project No.	1331	Drawn By	IN
Date	14/09/2021	Map Author	AJ

0 2.5 5 Kilometres (WMDE)

0 1 2 Kilometres (CBME)

1:267,000 (WMDE) 1:114,500 (CBME) GDA 1994 MGA Zone 50

P:\GIS\Projects\Worsley\1331-WME-S32-TIN\Mapping\MapDocuments\Figures\1331_Fig6_11_CumulativeImpactHabitat_v4.mxd

- PAA
- High - potential SRE habitat
- Low - potential SRE habitat
- None - potential SRE habitat

Figure 6-11

Cumulative change in potential SRE habitat

PHOENIX ENVIRONMENTAL SCIENCES

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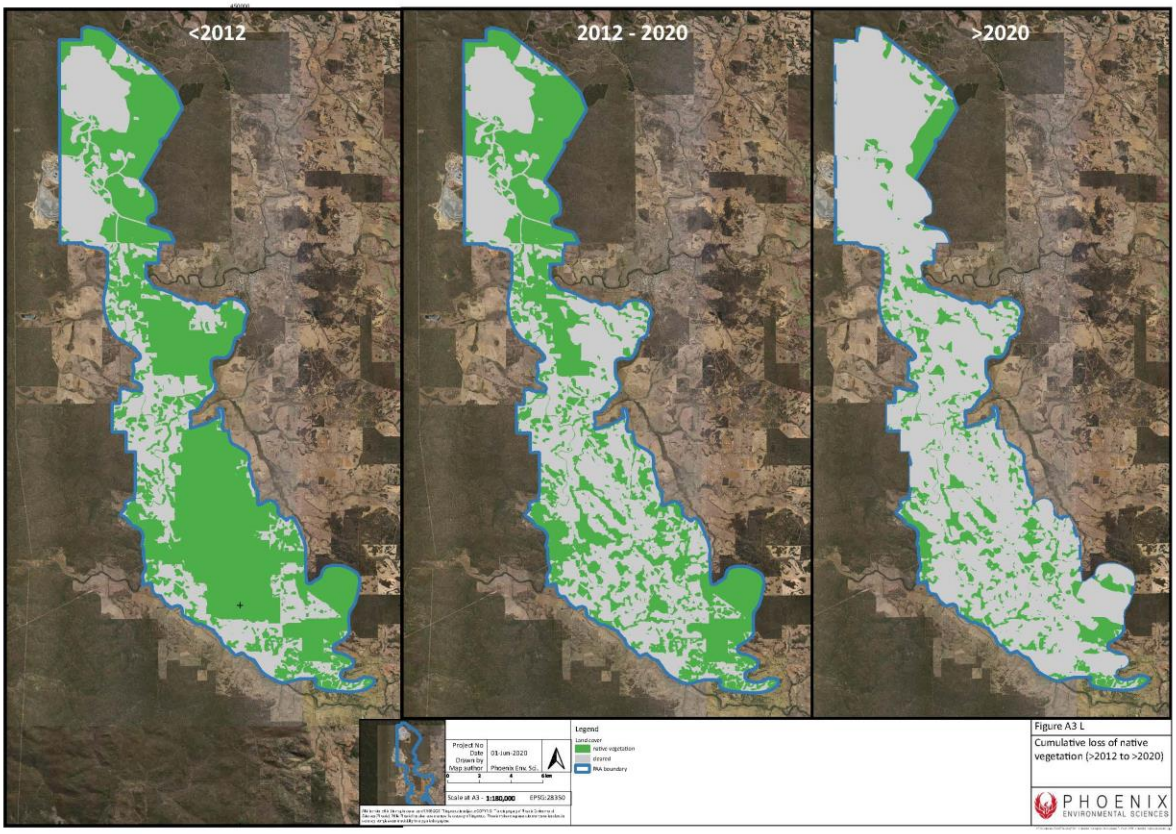

Figure 6-12 Cumulative change in native vegetation

Blank for map

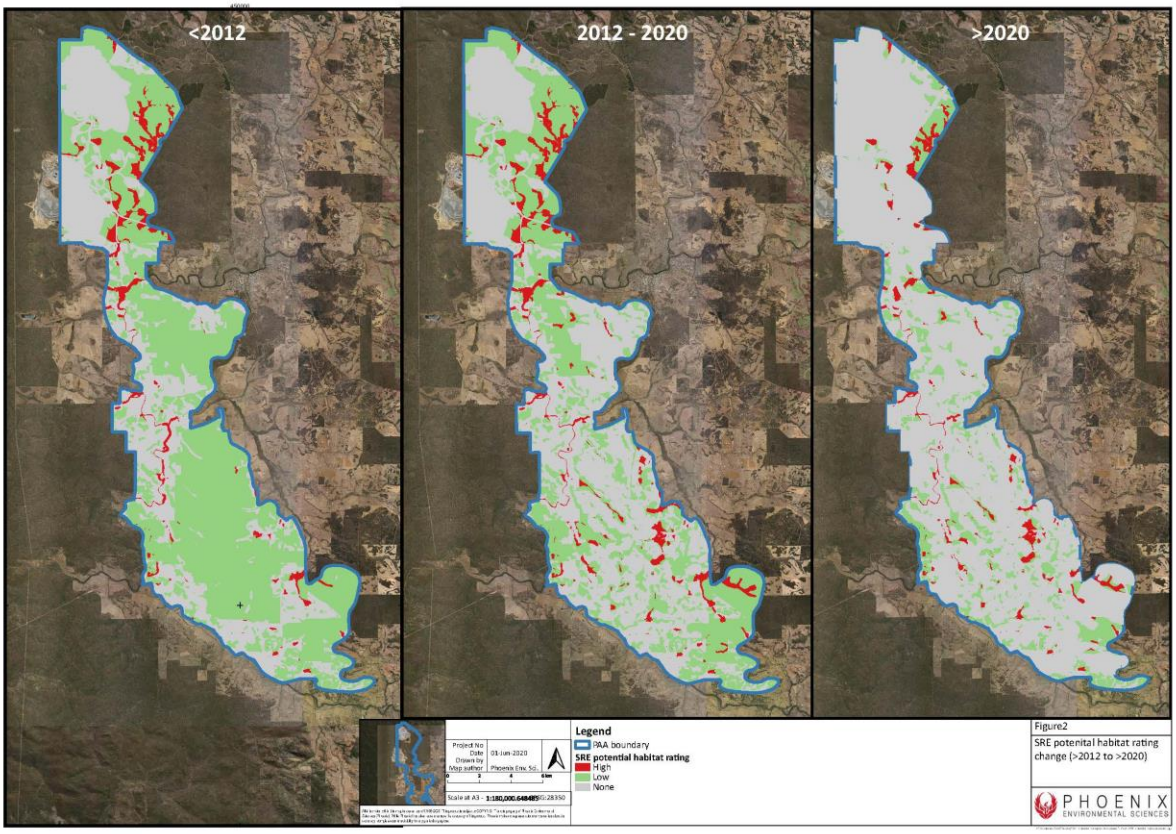

Figure 6-13 Cumulative change in potential SRE habitat

7 CONCLUSION

Despite the extensive data gathered, determining the risk the Proposal represents to SREs is difficult as numerous competing and contradictory trends and observations are evident. On the one hand:

- As the largest SRE survey of the Northern Jarrah Forest bioregion, the study has unveiled a diverse assemblage of taxa with a total of 141 taxa from field survey, comprising of 108 (77%) SRE taxa and 33 (23%) non-SRE taxa. Furthermore, many new and Potential SRE taxa were recorded.
- Following completion of additional regional sampling between the WMDE and CBME and for the Huntly Mine Expansion (Phoenix 2021) in 2020, substantial numbers of additional taxa were recorded.
- Accordingly, the species accumulation curves presented here and in Phoenix (2021) suggest for Mygalomorphae trap-door spiders, millipedes and isopods in particular, that additional taxa remain undetected despite extensive, repeated sampling.
- Collectively, the surveys indicate that short-range endemism in the invertebrate fauna in this area of the Northern Jarrah Forest is much greater than previously thought.
- Few taxa are common to both the CBME and WMDE/BTC (12%) and similarly, only 15% of the taxa from the PAA are common to the Huntly survey areas (which comprised two survey areas that also showed distinct assemblages), which are both less than 20 km apart. Collectively, this suggests a north-south and possibly east-west partitioning or gradation of SRE taxa, in the order of 20 km.
- Section 6.5 demonstrated that for the three most common classes, Mygalomorphae (trap-door spiders), Diplopoda (Millipedes) and Isopoda (slaters), the maximum distance between two species records was <20 km for approximately 50% of all recorded SRE taxa. Very few species have a distribution greater than 100 km.
- Only a fraction of the discrete disturbance areas proposed have been sampled as it is not practical to sample and characterise all areas over such a large area for all SRE invertebrate fauna.
- Surveys of eight rehabilitated areas within the WME and 12 within the area of the Huntly Mine, across a range of rehabilitation ages, has demonstrated successful re-colonisation of 'common' SRE taxa. Indeed much of the overlap between PAA and Huntly taxa were from rehabilitation sites and no new SRE taxa were recorded from rehabilitation sites and all being previously known taxa, which is in contrast to the other 'baseline' sites, which consistently recorded new taxa across the four sample seasons in 2019 and 2020 and previously in 2011/2012 (Phoenix 2012b).

Yet, on the other hand:

- Only six SREs are currently restricted to the PAA IDF, they were recorded from widespread habitats and habitats known from outside the PAA and IDF. As such, the data does not suggest that each is likely to be highly habitat-dependent with many members of each genus being recorded from different habitat types/vegetation units and sites with highly variable environmental conditions. Therefore, it is expected that the six species would be found to be more 'widespread' within their 'short-range' distribution, i.e., it is unlikely they are restricted to solely within the IDF.
- A risk-based approach to EIA for SREs using habitat analysis and biological surrogacy (EPA 2016c) found few high risk taxa:

Of the total count of all SRE taxa recorded to date from the PAA, 81 taxa are identified as low risk based on known habitat occurrence. This represents approximately 93% of the total count. Only six SRE taxa are identified as high risk based on their local restriction of recorded occurrence.

SREs were recorded from all sampled habitat types within the survey area and there is no evidence that particular habitat(s) have a greater propensity to support SREs. Indeed, the most common habitat recorded the greatest number of SRE taxa, and most taxa were recorded from multiple habitats.

The study effort has been substantial and has met the stated EPA expectation (EPA 2016c):

> "Where relevant to a formal assessment, the EPA seeks from the proponent sufficient information, through habitat assessment, sampling, and within the constraints of reasonably available knowledge, to assess the risk that the conservation status of a SRE taxon would be adversely affected as a result of the proposal."

And lastly, it is noted that a high diversity of SRE fauna has been documented, especially given the area has been subject to multiple and long-term disturbances from logging, agriculture and mining operations and significant rainfall declines in the area.

Analysis of the risk to SREs from the Proposal needs to be considered in the context of the EPA's objectives for SRE fauna, which are (EPA 2016c):

- **To ensure the protection of key habitats for SRE species** – all habitats appear to support a diversity of SRE taxa not previously recognised for the bioregion, although species do not appear to be constrained by habitat but instead simply have small ranges (typically <20 km), of which the governing factors or mechanisms are not known. Therefore determining whether this objective is met is difficult, but certainly areas of all fauna habitat sampled will be retained within the immediate surrounds of the IDF, which is important given the apparent small distributions of the majority of taxa recorded. The Proposal also offers to retain many protection zones within the PAA and will offset impacts with offering intact remnant vegetation land parcels in the Northern Jarrah Forest, although both the protection zones and offset properties have not been surveyed to date for SREs.
- **To maintain the distribution, abundance, and productivity of populations of SRE taxa** – the recorded taxa appear to have very small ranges for the most part (typically <20 km). Rehabilitation (based on the surveys reported here) does not appear to favour cryptic taxa and translocation is not considered a viable option. Therefore, the area of occupancy and likely the overall distribution (spatial extent) of some taxa will be reduced by the Proposal (and likely already has been reduced by historic clearing for agriculture and mining operations (undertaken by Worsley and Newmont within the Boddington area) and the native vegetation will become further fragmented as shown in Figure 6-12 and Figure 6-13. No determination can be made concerning the effects of the Proposal on the abundance or productivity of SRE fauna, suffice to say that SRE taxa are known to survive in relatively small remnants.
- **To ensure that the conservation status of SRE taxa is not adversely changed as a result of development proposals** – currently no Threatened or Priority taxa are known from the PAA IDF, but at least six SRE taxa recorded are potentially confined to the IDF. These are singleton records and thus no definitive determination can be made regarding these seven taxa specifically.

  However, given the almost completely distinct assemblages of the WMDE and CBME and, nearby Huntly survey area (including within the two Huntly survey areas), the apparent distribution of many taxa to <20 km north-south, the loss of habitat associated with historic Worsley operations (>5,000 ha between 2012-2020) and the Boddington Gold Mine

immediately to the north of the PAA, and the scale of the Proposal (which together will result in extensive habitat loss over an area ~20km north-south x 5 km east-west), the area of occupancy of all known SRE taxa within the PAA IDF has likely already been reduced, and will be further reduced by the Proposal. As such it would appear likely that numerous taxa, such as those from the *Aname* and *Antichiropus* genera (see section 6.1.4), would at least need to be considered for listing as Priority species, until such time as their distribution and habitat preferences are better understood.

SREs within the context of EIA in Western Australia are typically associated with mesic and isolated habitats, such as 'south-facing slopes', wetland margins, mountain tops, granite outcrops and rock piles. However, this work has demonstrated for the first time at scale, that within the Northern Jarrah Forest bioregion, short-range endemism is relatively extreme within various invertebrate groups (three in particular), is not confined to such habitats and is in fact, evident throughout all habitats even the most widely distributed habitats.

While the SRE taxa appear not to be limited by habitat type their distributions are very limited nonetheless, and the mechanisms by which this limitation is derived is not entirely understood. However, it is most likely a combination of biogeographical (e.g. soil and climate) and biological (e.g. powers of dispersal and fecundity) factors. If the patterns of distribution and speciation demonstrated here are shown to repeat throughout the Northern and Southern Jarrah Forest bioregions, then hundreds of many as yet recorded taxa of Mygalomorphae trap-door spider, Isopod and Millipede can be expected, in particular.

8 ACKNOWLEDGEMENTS

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Appendix 1 Survey site descriptions

Site details			
Site	**CBME001**	**Position (WGS84)**	-33.222896, 116.027629
Topography		**Soil texture**	sandy loam
Slope		**Rock type**	none
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	0.50	09 Apr 2019	09 Apr 2019
1	Litter sieve	2.00	09 Apr 2019	09 Apr 2019
1	Wet pitfall trap	6,901.50	09 Apr 2019	06 Jun 2019
2	Foraging	0.75	25 Sep 2019	25 Sep 2019
2	Litter sieve	1.00	25 Sep 2019	25 Sep 2019
2	Wet pitfall trap	5,280.00	25 Sep 2019	08 Nov 2019
1	Site description	0.00	09 Apr 2019	09 Apr 2019

Site description - visit 1 (09 Apr 2019)

Forest of Jarrah and Marri, tall shrubs with tall, mid and low mixed shrubs and Bracken Fern.

Habitat	forest		
Disturbance	none		
Vegetation condition	Excellent	**Fire age**	old (5-10 years)
Total veg. cover (%)	90	**Litter distribution**	even/continuous
Tree cover (%)	65	**Litter depth(cm)**	20
Shrub cover (%)	30	**Litter cover (%)**	90
Grass cover (%)	0		
Herb cover (%)	0		

Site details			
Site	**CBME002**	**Position (WGS84)**	-33.232964, 116.047712
Topography		**Soil texture**	sandy loam
Slope		**Rock type**	none
Soil colour	brown, grey	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	0.55	09 Apr 2019	09 Apr 2019
1	Litter sieve	2.20	09 Apr 2019	09 Apr 2019
1	Wet pitfall trap	6,938.17	09 Apr 2019	06 Jun 2019
2	Foraging	1.25	25 Sep 2019	25 Sep 2019
2	Litter sieve	1.00	25 Sep 2019	25 Sep 2019
2	Wet pitfall trap	4,224.00	25 Sep 2019	08 Nov 2019
1	Site description	0.00	09 Apr 2019	09 Apr 2019

Site description - visit 1 (09 Apr 2019)

Forest of Jarrah, Marri and *Eucalyptus* sp. over mid *Acacia* shrubs, including *Macrozamia*. Some mature trees, but much regrowth. Dense litter and stick debris, but few logs.

Habitat	woodland		
Disturbance	none		
Vegetation condition	Good	**Fire age**	moderate (>5 years)
Total veg. cover (%)	60	**Litter distribution**	even/continuous
Tree cover (%)	4	**Litter depth(cm)**	4
Shrub cover (%)	30	**Litter cover (%)**	70
Grass cover (%)	0		
Herb cover (%)	0		

Site details			
Site	**CBME003**	**Position (WGS84)**	-33.227662, 116.046871
Topography		**Soil texture**	sandy loam
Slope		**Rock type**	none
Soil colour	brown, yellow	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	1.00	09 Apr 2019	09 Apr 2019
1	Litter sieve	1.00	09 Apr 2019	09 Apr 2019
1	Wet pitfall trap	6,931.83	09 Apr 2019	06 Jun 2019
2	Foraging	1.00	25 Sep 2019	25 Sep 2019
2	Litter sieve	1.00	25 Sep 2019	25 Sep 2019
2	Wet pitfall trap	5,271.25	25 Sep 2019	08 Nov 2019
1	Site description	0.00	09 Apr 2019	09 Apr 2019

Site description - visit 1 (09 Apr 2019)

Forest of Jarrah and Marri over tall shrubs to 3m (grass trees over bracken fern) as well as low mixed shrubs. Lateritic pisolite soils. Dense litter and stick debris with abundant large logs. Has been historically logged, but numerous large and small regrowth trees.

Habitat	forest		
Disturbance	none		
Vegetation condition	Very Good	**Fire age**	moderate (>5 years)
Total veg. cover (%)	80	**Litter distribution**	even/continuous
Tree cover (%)	60	**Litter depth(cm)**	7
Shrub cover (%)	30	**Litter cover (%)**	70
Grass cover (%)	1		
Herb cover (%)	0.1		

Site details			
Site	**CBME004**	**Position (WGS84)**	-33.216233, 116.040126
Topography		**Soil texture**	sandy loam
Slope		**Rock type**	none
Soil colour	brown, yellow, grey	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	1.00	09 Apr 2019	09 Apr 2019
1	Litter sieve	1.00	09 Apr 2019	09 Apr 2019
1	Wet pitfall trap	6,926.58	09 Apr 2019	06 Jun 2019
2	Foraging	1.00	25 Sep 2019	25 Sep 2019
2	Litter sieve	1.00	25 Sep 2019	25 Sep 2019
2	Wet pitfall trap	5,280.00	25 Sep 2019	08 Nov 2019
1	Site description	0.00	09 Apr 2019	09 Apr 2019

Site description - visit 1 (09 Apr 2019)

Forest of Jarrah and Marri over *Banksia* and *Persoonia*, over tall shrubs, over grass trees and *Macrozamia*, over low shrubs. Dieback free. Plentiful, deep litter and stick and log debris.

Habitat	forest		
Disturbance	none		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	80	**Litter distribution**	even/continuous
Tree cover (%)	65	**Litter depth(cm)**	8
Shrub cover (%)	25	**Litter cover (%)**	80
Grass cover (%)	2		
Herb cover (%)	0.1		

Site details			
Site	**CBME005**	**Position (WGS84)**	-33.214138, 116.035808
Topography		**Soil texture**	sandy loam
Slope		**Rock type**	none
Soil colour	brown, yellow, grey	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	1.00	09 Apr 2019	09 Apr 2019
1	Litter sieve	1.00	09 Apr 2019	09 Apr 2019
1	Wet pitfall trap	6,923.42	09 Apr 2019	06 Jun 2019
2	Foraging	1.00	25 Sep 2019	25 Sep 2019
2	Litter sieve	1.00	25 Sep 2019	25 Sep 2019
2	Wet pitfall trap	5,250.00	25 Sep 2019	08 Nov 2019
1	Site description	0.00	09 Apr 2019	09 Apr 2019

Site description - visit 1 (09 Apr 2019)

Forest of regrowth Jarrah and Marri, over tall shrubs, over low mixed shrubs. Sparse *Macrozamia*. Probably not dieback free. Immediately up hill of drainage line. But not riparian. Good litter and stick and log debris.

Habitat	forest		
Disturbance	none		
Vegetation condition	Very Good	**Fire age**	moderate (>5 years)
Total veg. cover (%)	75	**Litter distribution**	even/continuous
Tree cover (%)	65	**Litter depth(cm)**	8
Shrub cover (%)	35	**Litter cover (%)**	75
Grass cover (%)	1		
Herb cover (%)	0.1		

Site details			
Site	**REF006**	**Position (WGS84)**	-33.251311, 116.100737
Topography		**Soil texture**	sandy clay
Slope		**Rock type**	none
Soil colour	brown, yellow, grey	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	1.00	10 Apr 2019	10 Apr 2019
1	Litter sieve	1.00	10 Apr 2019	10 Apr 2019
1	Wet pitfall trap	6,724.33	10 Apr 2019	05 Jun 2019
2	Foraging	1.00	26 Sep 2019	26 Sep 2019
2	Litter sieve	1.00	26 Sep 2019	26 Sep 2019
2	Wet pitfall trap	5,280.00	26 Sep 2019	09 Nov 2019
1	Site description	0.00	10 Apr 2019	10 Apr 2019

Site description - visit 1 (10 Apr 2019)

Woodland of Jarrah and Marri over dense shrubland of mid and low mixed species, including old *Xanthorrhoea* trees. In valley floor with minor creekline. Plentiful stick and log debris.

Habitat	woodland		
Disturbance	none		
Vegetation condition	Excellent	**Fire age**	relatively recent (1-5 years)
Total veg. cover (%)	95	**Litter distribution**	even/continuous
Tree cover (%)	30	**Litter depth(cm)**	9
Shrub cover (%)	65	**Litter cover (%)**	80
Grass cover (%)	10		
Herb cover (%)	1		

Site details			
Site	**REF007**	**Position (WGS84)**	-33.222633, 116.117971
Topography		**Soil texture**	sandy loam
Slope		**Rock type**	none
Soil colour	brown, yellow	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	1.00	10 Apr 2019	10 Apr 2019
1	Litter sieve	1.00	10 Apr 2019	10 Apr 2019
1	Wet pitfall trap	6,718.17	10 Apr 2019	05 Jun 2019
2	Foraging	1.00	26 Sep 2019	26 Sep 2019
2	Litter sieve	4,225.00	26 Sep 2019	09 Nov 2019
2	Wet pitfall trap	5,280.00	26 Sep 2019	09 Nov 2019
1	Site description	0.00	10 Apr 2019	10 Apr 2019

Site description - visit 1 (10 Apr 2019)

Woodland of Jarrah, Marri and Wandoo over mid shrubs and *Xanthorrhoea* trees. Mid-slope on broad valley. Probably burnt in spring 2018. Litter and stick debris therefore currently diminished, but logs plentiful. Old millipede carcass and trapdoor burrow evident. Substantial litter accumulaton observed from winter to spring.

Habitat	woodland		
Disturbance	none		
Vegetation condition	Very Good	**Fire age**	relatively recent (1-5 years)
Total veg. cover (%)	65	**Litter distribution**	
Tree cover (%)	45	**Litter depth(cm)**	2
Shrub cover (%)	30	**Litter cover (%)**	65
Grass cover (%)	2		
Herb cover (%)	0.1		

Site details			
Site	**REF008**	**Position (WGS84)**	-33.272524, 116.065741
Topography		**Soil texture**	sandy loam
Slope		**Rock type**	none
Soil colour	brown, yellow	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	1.00	10 Apr 2019	10 Apr 2019
1	Litter sieve	1.00	10 Apr 2019	10 Apr 2019
1	Wet pitfall trap	6,712.58	10 Apr 2019	05 Jun 2019
2	Foraging	1.00	26 Sep 2019	26 Sep 2019
2	Litter sieve	1.00	26 Sep 2019	26 Sep 2019
2	Wet pitfall trap	5,280.00	26 Sep 2019	09 Nov 2019
1	Site description	1,333.52	10 Apr 2019	05 Jun 2019

Site description - visit 1 (10 Apr 2019)

Woodland of Jarrah and Marri and some Wandoo over *Xanthorrhoea* trees and low mixed shrubs. Plentiful litter, stick and log debris.

Habitat	woodland		
Disturbance	none		
Vegetation condition	Excellent	**Fire age**	relatively recent (1-5 years)
Total veg. cover (%)	65	**Litter distribution**	even/continuous
Tree cover (%)	40	**Litter depth(cm)**	8
Shrub cover (%)	40	**Litter cover (%)**	70
Grass cover (%)	2		
Herb cover (%)	0.1		

Site details			
Site	**REF009**	**Position (WGS84)**	-33.225783, 116.020484
Topography		**Soil texture**	sand, peat
Slope		**Rock type**	none
Soil colour	brown, grey, black	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	1.00	10 Apr 2019	10 Apr 2019
1	Litter sieve	1.00	10 Apr 2019	10 Apr 2019
1	Wet pitfall trap	6,707.50	10 Apr 2019	05 Jun 2019
2	Foraging	1.00	26 Sep 2019	26 Sep 2019
2	Litter sieve	1.00	26 Sep 2019	26 Sep 2019
2	Wet pitfall trap	5,280.00	26 Sep 2019	09 Nov 2019
1	Site description	0.00	10 Apr 2019	10 Apr 2019

Site description - visit 1 (10 Apr 2019)

Forest of Marri and isolated Jarrah over tall *Acacia* shrubs to 5m over Bracken Fern and mixed low shrubs. Extremely deep litter (15cm) with plentiful stick and log debris. Peaty soils over sand. Fungus in peat. Quenda diggings common.

Habitat	forest		
Disturbance	none		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	90	**Litter distribution**	even/continuous
Tree cover (%)	70	**Litter depth(cm)**	15
Shrub cover (%)	25	**Litter cover (%)**	90
Grass cover (%)	0		
Herb cover (%)	1		

Site details			
Site	**REF010**	**Position (WGS84)**	-33.207819, 116.037956
Topography		**Soil texture**	sandy loam
Slope		**Rock type**	none
Soil colour	red-orange, brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	1.00	10 Apr 2019	10 Apr 2019
1	Litter sieve	1.00	10 Apr 2019	10 Apr 2019
1	Wet pitfall trap	6,702.83	10 Apr 2019	05 Jun 2019
2	Foraging	1.00	26 Sep 2019	26 Sep 2019
2	Litter sieve	4,225.00	26 Sep 2019	09 Nov 2019
2	Wet pitfall trap	5,280.00	26 Sep 2019	09 Nov 2019
1	Site description	0.00	10 Apr 2019	10 Apr 2019

Site description - visit 1 (10 Apr 2019)

Open woodland of Marri, *Allocasuarina* and Jarrah over *Xanthorrhoea*, over low shrubs. *Allocasuarina* leaf blanket across much of the area. Shallow pisolitic, laterite soils. Plentiful fallen logs. Heavily logged but in excellent condition.

Habitat	open woodland		
Disturbance	none		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	50	**Litter distribution**	even/continuous
Tree cover (%)	30	**Litter depth(cm)**	2
Shrub cover (%)	40	**Litter cover (%)**	2
Grass cover (%)	1		
Herb cover (%)	0.1		

Site details			
Site	**SD01**	**Position (WGS84)**	-32.725811, 116.357127
Topography		**Soil texture**	sandy loam
Slope		**Rock type**	none
Soil colour	red–brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	05 Nov 2019	05 Nov 2019

Site description - visit 1 (05 Nov 2019)

Shrubland on creekline with isolated trees, which are dying from changed hydrology from dam upstream. Probably infected with dieback and Armelaria. High SRE potential but under threat from hydrology change and disease.

Habitat	shrubland		
Disturbance	none		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	75	**Litter distribution**	even/continuous
Tree cover (%)	25	**Litter depth(cm)**	2
Shrub cover (%)	50	**Litter cover (%)**	20
Grass cover (%)	5		
Herb cover (%)	1		

Site details			
Site	**SD02**	**Position (WGS84)**	-32.71134, 116.399998
Topography		**Soil texture**	sandy loam
Slope		**Rock type**	none
Soil colour	brown, yellow	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	04 Nov 2019	04 Nov 2019

Site description - visit 1 (04 Nov 2019)			
Melaleuca scrubland with isolated flooded gum. High SRE potential.			
Habitat	shrubland		
Disturbance	none		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	65	**Litter distribution**	even/continuous
Tree cover (%)	55	**Litter depth(cm)**	1
Shrub cover (%)	20	**Litter cover (%)**	80
Grass cover (%)	5		
Herb cover (%)	1		

Site details			
Site	**SD03**	**Position (WGS84)**	-32.739566, 116.381885
Topography		**Soil texture**	clay loam
Slope		**Rock type**	none
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	04 Nov 2019	04 Nov 2019

Site description - visit 1 (04 Nov 2019)			
Seasonally inundated (perched) swamp of dense mixed low shrubs. High SRE potential.			
Habitat	shrubland		
Disturbance	none		
Vegetation condition	Pristine	**Fire age**	moderate (>5 years)
Total veg. cover (%)	85	**Litter distribution**	even/continuous
Tree cover (%)	5	**Litter depth(cm)**	0.5
Shrub cover (%)	85	**Litter cover (%)**	20
Grass cover (%)	0		
Herb cover (%)	0		

Site details			
Site	**SD04**	**Position (WGS84)**	-32.702578, 116.417477
Topography		**Soil texture**	sandy loam
Slope		**Rock type**	none
Soil colour	brown, grey	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	04 Nov 2019	04 Nov 2019

Site description - visit 1 (04 Nov 2019)

Woodland of Jarrah and Marri over parrot bush, *Xanthorrhoea* and low mixed shrubs. Lateritic. Low SRE potential.

Habitat	forest		
Disturbance	none		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	75	**Litter distribution**	even/continuous
Tree cover (%)	60	**Litter depth(cm)**	2
Shrub cover (%)	60	**Litter cover (%)**	30
Grass cover (%)	0.1		
Herb cover (%)	0.1		

Site details			
Site	**SD05**	**Position (WGS84)**	-32.753492, 116.419311
Topography		**Soil texture**	sandy loam
Slope		**Rock type**	none
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	05 Nov 2019	05 Nov 2019

Site description - visit 1 (05 Nov 2019)

Woodland of Jarrah-Marri-sheoak over low mixed shrubs and sedges. Low SRE potential. Has been logged.

Habitat	woodland		
Disturbance	none		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	50	**Litter distribution**	even/continuous
Tree cover (%)	25	**Litter depth(cm)**	2
Shrub cover (%)	30	**Litter cover (%)**	60
Grass cover (%)	1		
Herb cover (%)	0.1		

Site details			
Site	**SD06**	**Position (WGS84)**	-32.781151, 116.383168
Topography		**Soil texture**	clay loam
Slope		**Rock type**	none
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	05 Nov 2019	05 Nov 2019

Site description - visit 1 (05 Nov 2019)

Sedgeland. Isolated Wandoo and Flooded Gum over grass trees and mid *Melaleuca* shrubs over low *Melaleuca* sp. and sedges. High SRE potential.

Habitat	grassland		
Disturbance	none		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	90	**Litter distribution**	even/continuous
Tree cover (%)	20	**Litter depth(cm)**	0.5
Shrub cover (%)	40	**Litter cover (%)**	5
Grass cover (%)	70		
Herb cover (%)	0.1		

Site details			
Site	**SD07**	**Position (WGS84)**	-32.792484, 116.384215
Topography		**Soil texture**	clay loam
Slope		**Rock type**	none
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	04 Nov 2019	04 Nov 2019

Site description - visit 1 (04 Nov 2019)

Heavily degraded, perched wetland. Was once good SRE habitat.

Habitat	grassland		
Disturbance	grazing – high, historic clearing		
Vegetation condition	Degraded	**Fire age**	moderate (>5 years)
Total veg. cover (%)	0	**Litter distribution**	even/continuous
Tree cover (%)	0	**Litter depth(cm)**	0.25
Shrub cover (%)	0	**Litter cover (%)**	0
Grass cover (%)	100		
Herb cover (%)	0.1		

Site details			
Site	**SD08**	**Position (WGS84)**	-32.805173, 116.394404
Topography		**Soil texture**	sandy loam
Slope		**Rock type**	none
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	05 Nov 2019	05 Nov 2019

Site description - visit 1 (05 Nov 2019)			
Open woodland of Wandoo and Sheoak over parrot bush. Low SRE habitat.			
Habitat	open woodland		
Disturbance	grazing – low		
Vegetation condition	Very Good	**Fire age**	moderate (>5 years)
Total veg. cover (%)	65	**Litter distribution**	even/continuous
Tree cover (%)	50	**Litter depth(cm)**	2
Shrub cover (%)	20	**Litter cover (%)**	60
Grass cover (%)	5		
Herb cover (%)	0.1		

Site details			
Site	**SD09**	**Position (WGS84)**	-32.8023, 116.396195
Topography		**Soil texture**	clay loam
Slope		**Rock type**	none
Soil colour	brown, grey	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	05 Nov 2019	05 Nov 2019

Site description - visit 1 (05 Nov 2019)

Forest of *Melaleuca* paperbarks, over sedges. Degraded by cattle and pigs. High SRE potential.

Habitat	forest		
Disturbance	grazing – low, historic clearing		
Vegetation condition	Very Good	**Fire age**	moderate (>5 years)
Total veg. cover (%)	60	**Litter distribution**	even/continuous
Tree cover (%)	40	**Litter depth(cm)**	2
Shrub cover (%)	20	**Litter cover (%)**	35
Grass cover (%)	10		
Herb cover (%)	0.1		

Site details			
Site	**SD12**	**Position (WGS84)**	-32.781038, 116.407686
Topography		**Soil texture**	sandy loam
Slope		**Rock type**	none
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	04 Nov 2019	04 Nov 2019

Site description - visit 1 (04 Nov 2019)

Woodland of Sheoak, Jarrah and Marri over mixed low shrubs and sedges. Lateritic soils. Low SRE potential.

Habitat	woodland		
Disturbance	none		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	45	**Litter distribution**	even/continuous
Tree cover (%)	50	**Litter depth(cm)**	1
Shrub cover (%)	5	**Litter cover (%)**	60
Grass cover (%)	2		
Herb cover (%)	0.1		

Site details			
Site	**SD13**	**Position (WGS84)**	-32.780621, 116.377344
Topography		**Soil texture**	sandy loam
Slope		**Rock type**	none
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	05 Nov 2019	05 Nov 2019

Site description - visit 1 (05 Nov 2019)

Woodland of Jarrah, Marri and Sheoak over *Banksia* and *Persoonia*, over grass trees and *Xanthorrhea* over mixed low shrubs and sedges. Plentiful litter and log debris. Low SRE potential.

Habitat	woodland		
Disturbance	none		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	65	**Litter distribution**	even/continuous
Tree cover (%)	35	**Litter depth(cm)**	1
Shrub cover (%)	10	**Litter cover (%)**	50
Grass cover (%)	30		
Herb cover (%)	0.1		

Site details			
Site	**SD17**	**Position (WGS84)**	-32.777939, 116.393582
Topography		**Soil texture**	sandy loam
Slope		**Rock type**	none
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	04 Nov 2019	04 Nov 2019

Site description - visit 1 (04 Nov 2019)			
Woodland of Sheoak and Jarrah over mixed low shrubs and sedges. Low SRE potential.			
Habitat	woodland		
Disturbance	none		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	45	**Litter distribution**	even/continuous
Tree cover (%)	45	**Litter depth(cm)**	2
Shrub cover (%)	5	**Litter cover (%)**	60
Grass cover (%)	2		
Herb cover (%)	0.1		

Site details			
Site	**SD19**	**Position (WGS84)**	-32.715174, 116.406709
Topography		**Soil texture**	sandy loam
Slope		**Rock type**	none
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	04 Nov 2019	04 Nov 2019

Site description - visit 1 (04 Nov 2019)			
Open woodland of Jarrah and Marri. Lateritic Soils. Low SRE potential.			
Habitat	open woodland		
Disturbance	none		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	65	**Litter distribution**	even/continuous
Tree cover (%)	40	**Litter depth(cm)**	1.5
Shrub cover (%)	40	**Litter cover (%)**	50
Grass cover (%)	0.1		
Herb cover (%)	0.1		

Site details			
Site	**SD19a**	**Position (WGS84)**	-32.717346, 116.403217
Topography		**Soil texture**	clay loam
Slope		**Rock type**	none
Soil colour	brown, grey	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	04 Nov 2019	04 Nov 2019

Site description - visit 1 (04 Nov 2019)			
Open woodland of Wandoo, Jarrah and Marri on creekline. Low-moderate SRE potential.			
Habitat	open woodland		
Disturbance	none		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	60	**Litter distribution**	even/continuous
Tree cover (%)	30	**Litter depth(cm)**	1
Shrub cover (%)	50	**Litter cover (%)**	45
Grass cover (%)	5		
Herb cover (%)	0.1		

Site details			
Site	**SD20**	**Position (WGS84)**	-32.698026, 116.392818
Topography		**Soil texture**	sandy loam
Slope		**Rock type**	none
Soil colour	brown, grey	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	04 Nov 2019	04 Nov 2019

Site description - visit 1 (04 Nov 2019)

Forest of Jarrah and Marri. Some large Jarrah. Plentiful litter and logs. Low SRE potential.

Habitat	forest		
Disturbance	none		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	95	**Litter distribution**	even/continuous
Tree cover (%)	60	**Litter depth(cm)**	2
Shrub cover (%)	50	**Litter cover (%)**	50
Grass cover (%)	2		
Herb cover (%)	0.1		

Site details			
Site	**SD21**	**Position (WGS84)**	-32.728821, 116.344132
Topography		**Soil texture**	sandy loam
Slope		**Rock type**	none
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	05 Nov 2019	05 Nov 2019

Site description - visit 1 (05 Nov 2019)

Woodland of Jarrah, Marri over Sheoak, *Banksia* and *Persoonia*, over *Xanthorrhea* over low mixed shrubs. Plentiful log debris. Low SRE potential.

Habitat	woodland		
Disturbance	none		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	65	**Litter distribution**	even/continuous
Tree cover (%)	25	**Litter depth(cm)**	2
Shrub cover (%)	40	**Litter cover (%)**	45
Grass cover (%)	2		
Herb cover (%)	0.1		

Site details			
Site	**SD23**	**Position (WGS84)**	-32.824939, 116.415992
Topography		**Soil texture**	sandy loam
Slope		**Rock type**	none
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	05 Nov 2019	05 Nov 2019

Site description - visit 1 (05 Nov 2019)			
Woodland of Jarrah and Marri over mid and low shrubs. Plentiful litter and log debris. Low SRE potential.			
Habitat	woodland		
Disturbance	none		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	70	**Litter distribution**	even/continuous
Tree cover (%)	35	**Litter depth(cm)**	1.5
Shrub cover (%)	50	**Litter cover (%)**	40
Grass cover (%)	1		
Herb cover (%)	0.1		

Site details			
Site	**SD25**	**Position (WGS84)**	-32.839036, 116.412798
Topography		**Soil texture**	sandy loam
Slope		**Rock type**	none
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	05 Nov 2019	05 Nov 2019

Site description - visit 1 (05 Nov 2019)

Woodland of Jarrah and Marri over *Banksia* and *Persoonia* over Grass Trees and *Xanthorhea* over mixed low shrubs. Logged. Plentiful litter and log debris. Low SRE potential.

Habitat	woodland		
Disturbance	none		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	80	**Litter distribution**	even/continuous
Tree cover (%)	40	**Litter depth(cm)**	1
Shrub cover (%)	45	**Litter cover (%)**	30
Grass cover (%)	5		
Herb cover (%)	1		

Site details			
Site	**SD26**	**Position (WGS84)**	-32.851127, 116.418555
Topography		**Soil texture**	sandy loam
Slope		**Rock type**	none
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	05 Nov 2019	05 Nov 2019

Site description - visit 1 (05 Nov 2019)

Woodland of Jarrah and Marri over *Banksia* and parrot bush over grass trees and *Xanthorrhoea* over mixed low shrubs. Logged. Plentiful litter and log debris. Low SRE potential.

Habitat	woodland		
Disturbance	none		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	70	**Litter distribution**	even/continuous
Tree cover (%)	35	**Litter depth(cm)**	1
Shrub cover (%)	40	**Litter cover (%)**	25
Grass cover (%)	2		
Herb cover (%)	0.1		

Site details			
Site	**SD29**	**Position (WGS84)**	-32.909864, 116.446705
Topography		**Soil texture**	sandy loam
Slope		**Rock type**	none
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	06 Nov 2019	06 Nov 2019

Site description - visit 1 (06 Nov 2019)

Jarrah-woodland. Jarrah over *Banksia* and *Hakea* over grass trees and *Xanthorrhoea* over mixed low shrubs and sedges. Plentiful litter and log debris. Low SRE potential.

Habitat	woodland		
Disturbance	none		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	65	**Litter distribution**	even/continuous
Tree cover (%)	35	**Litter depth(cm)**	1.5
Shrub cover (%)	40	**Litter cover (%)**	25
Grass cover (%)	5		
Herb cover (%)	0.1		

Site details			
Site	**SD30**	**Position (WGS84)**	-32.915559, 116.462503
Topography		**Soil texture**	sandy loam
Slope		**Rock type**	none
Soil colour	brown, grey	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	05 Nov 2019	05 Nov 2019

Site description - visit 1 (05 Nov 2019)

Woodland of Wandoo over parrot bush and *Xanthorrhoea* and grass trees over mixed low shrubs. Logged. Plentiful litter and log debris. Low SRE potential.

Habitat	woodland		
Disturbance	none		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	65	**Litter distribution**	even/continuous
Tree cover (%)	30	**Litter depth(cm)**	2
Shrub cover (%)	35	**Litter cover (%)**	50
Grass cover (%)	2		
Herb cover (%)	0.1		

Site details			
Site	**SD31**	**Position (WGS84)**	-32.981255, 116.472458
Topography		**Soil texture**	gravel–alluvial, sandy loam, laterite
Slope		**Rock type**	none
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	07 Nov 2019	07 Nov 2019

Site description - visit 1 (07 Nov 2019)

Open forest to woodland of Jarrah and Marri over *Acacia* and grass trees over mixed low shrubs of *Astrolobium*, *Leucopogon* over mixed herb. Logs and leaf litter plentiful. SRE likelihood low.

Habitat	woodland		
Disturbance	current operations, historic clearing, vehicle tracks		
Vegetation condition	Very Good	**Fire age**	moderate (>5 years)
Total veg. cover (%)	75	**Litter distribution**	even/continuous
Tree cover (%)	70	**Litter depth(cm)**	1
Shrub cover (%)	30	**Litter cover (%)**	30
Grass cover (%)	3		
Herb cover (%)	1		

Site details			
Site	**SD32**	**Position (WGS84)**	,
Topography		**Soil texture**	clay loam, laterite
Slope		**Rock type**	none
Soil colour	red–brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	07 Nov 2019	07 Nov 2019

Site description - visit 1 (07 Nov 2019)

Wandoo woodland over *Acacia pulchella*, *Macrozamia reidelei* and other small shrubs over mixed herbs and introduced grasses. Leaf litter continuous. Some fallen logs and branches on clay loam lateritic soils on lower slopes. Low SRE likelihood.

Habitat	woodland		
Disturbance	grazing – medium, historic clearing, weed infestation		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	50	**Litter distribution**	even/continuous
Tree cover (%)	50	**Litter depth(cm)**	0
Shrub cover (%)	15	**Litter cover (%)**	0
Grass cover (%)	10		
Herb cover (%)	2		

Site details			
Site	**SD35**	**Position (WGS84)**	-32.933776, 116.471546
Topography		**Soil texture**	sandy loam
Slope		**Rock type**	none
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	05 Nov 2019	05 Nov 2019

Site description - visit 1 (05 Nov 2019)

Woodland of Jarrah, Marri and Wandoo over *Xanthorrhoea* over mixed low shrubs. Plentiful litter and log debris. Low SRE potential.

Habitat	woodland		
Disturbance	none		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	70	**Litter distribution**	even/continuous
Tree cover (%)	35	**Litter depth(cm)**	1
Shrub cover (%)	40	**Litter cover (%)**	60
Grass cover (%)	1		
Herb cover (%)	0.1		

Site details			
Site	**SD36**	**Position (WGS84)**	-32.943842, 116.477626
Topography		**Soil texture**	sand, clay loam, laterite
Slope		**Rock type**	none
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	07 Nov 2019	07 Nov 2019

Site description - visit 1 (07 Nov 2019)

Open woodland of Jarrah and Marri on sand, clay-loam or sandy-gravel on lower slopes and valley floors. Large fallen logs, continuous leaf litter. Likelihood of SRE low-moderate.

Habitat	open woodland		
Disturbance	evidence of feral animals, historic clearing		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	60	**Litter distribution**	even/continuous
Tree cover (%)	45	**Litter depth(cm)**	1.5
Shrub cover (%)	20	**Litter cover (%)**	40
Grass cover (%)	1		
Herb cover (%)	2		

Site details			
Site	**SD37**	**Position (WGS84)**	-32.891616, 116.450007
Topography		**Soil texture**	
Slope		**Rock type**	none
Soil colour	red–orange, brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	06 Nov 2019	06 Nov 2019

Site description - visit 1 (06 Nov 2019)

Woodland of Wandoo over parrot bush and grass trees over mixed mid and low shrubs. Plentiful litter and log debris. Low SRE potential.

Habitat	woodland		
Disturbance			
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	70	**Litter distribution**	even/continuous
Tree cover (%)	35	**Litter depth(cm)**	1.5
Shrub cover (%)	45	**Litter cover (%)**	35
Grass cover (%)	5		
Herb cover (%)	0.1		

Site details			
Site	**SD38**	**Position (WGS84)**	-32.939817, 116.423267
Topography		**Soil texture**	loam, clay loam, laterite
Slope		**Rock type**	none
Soil colour	red–brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	07 Nov 2019	07 Nov 2019

Site description - visit 1 (07 Nov 2019)

Woodland of Marri and Jarrah over *Acacia* and *Macrozamia* shrubs over other small shrubs and herbs with introduced grasses. Adjacent to open paddock farmland. Continuous leaf litter. Some fallen logs and branches.

Habitat	woodland		
Disturbance	grazing – medium, historic clearing, weed infestation		
Vegetation condition	Good	**Fire age**	moderate (>5 years)
Total veg. cover (%)	70	**Litter distribution**	even/continuous
Tree cover (%)	70	**Litter depth(cm)**	1
Shrub cover (%)	5	**Litter cover (%)**	60
Grass cover (%)	5		
Herb cover (%)	2		

Site details			
Site	**SD39**	**Position (WGS84)**	-32.964119, 116.484323
Topography		**Soil texture**	sandy loam, laterite
Slope		**Rock type**	none
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	07 Nov 2019	07 Nov 2019

Site description - visit 1 (07 Nov 2019)

Woodland of Jarrah-Marri over parrot bush, grass trees and *Macrozamia reidelei* over sedges, on brown sandy-loam lateritic soils. Continuous leaf litter large fallen trees and logs for fauna refuge. SRE likelihood low.

Habitat	woodland		
Disturbance	none		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	80	**Litter distribution**	even/continuous
Tree cover (%)	70	**Litter depth(cm)**	1
Shrub cover (%)	10	**Litter cover (%)**	40
Grass cover (%)	3		
Herb cover (%)	2		

Site details			
Site	**SD40**	**Position (WGS84)**	-32.905403, 116.441744
Topography		**Soil texture**	sandy clay
Slope		**Rock type**	none
Soil colour	red–orange, brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	06 Nov 2019	06 Nov 2019

Site description - visit 1 (06 Nov 2019)

Parrot bush shrubland with isolated Wandoo, Jarrah and Marri over mixed low shrubs and herbs. Low SRE potential.

Habitat	shrubland		
Disturbance	none		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	70	**Litter distribution**	even/continuous
Tree cover (%)	30	**Litter depth(cm)**	1
Shrub cover (%)	60	**Litter cover (%)**	35
Grass cover (%)	2		
Herb cover (%)	1		

Site details			
Site	**SD41**	**Position (WGS84)**	-32.920999, 116.42377
Topography		**Soil texture**	sandy loam
Slope		**Rock type**	ferrous - Ironstone
Soil colour	red–orange, brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	06 Nov 2019	06 Nov 2019

Site description - visit 1 (06 Nov 2019)

Woodland of Jarrah and Marri over grass trees and parrot bush and *Acacia pulchella* over mixed low shrubs. Plentiful litter and log debris. Low SRE potential.

Habitat	woodland		
Disturbance	none		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	80	**Litter distribution**	even/continuous
Tree cover (%)	30	**Litter depth(cm)**	0.5
Shrub cover (%)	60	**Litter cover (%)**	25
Grass cover (%)	1		
Herb cover (%)	0.1		

Site details			
Site	**SITE01**	**Position (WGS84)**	-32.960377, 116.423349
Topography		**Soil texture**	sandy loam
Slope		**Rock type**	none
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	1.45	07 Oct 2019	07 Oct 2019
1	Litter sieve	1.00	07 Oct 2019	07 Oct 2019
1	Site description	0.00	06 Nov 2019	06 Nov 2019
1	Wet pitfall trap	3,480.00	07 Oct 2019	05 Nov 2019

Site description - visit 1 (06 Nov 2019)

Woodland of Jarrah and Marri over *Banksia*, parrot bush and *Acacia* ssp. over grass trees, *Macrozamia reidelei* and low mixed shrubs, sedges and other grasses. Lots of fallen hollow logs, continuous leaf litter. Potential denning habitat for chuddich.

Habitat	woodland		
Disturbance	historic clearing, vehicle tracks		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	70	**Litter distribution**	even/continuous
Tree cover (%)	55	**Litter depth(cm)**	0
Shrub cover (%)	45	**Litter cover (%)**	0
Grass cover (%)	1		
Herb cover (%)	2		

Site details			
Site	**SITE02**	**Position (WGS84)**	-32.948554, 116.434468
Topography		**Soil texture**	gravel–alluvial, loam
Slope		**Rock type**	ferrous - Ironstone
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	1.00	07 Oct 2019	07 Oct 2019
1	Litter sieve	0.75	07 Oct 2019	07 Oct 2019
1	Site description	0.00	07 Oct 2019	07 Oct 2019
1	Wet pitfall trap	3,480.00	07 Oct 2019	05 Nov 2019

Site description - visit 1 (07 Oct 2019)

Woodland of Jarrah and Marri to 22m with casuarina in mid story. Diverse shrub understory dominated by grass trees, *Banksia*, *Acacia*, *Hibbertia*, and *Macrozamia.*

Habitat	woodland		
Disturbance	current operations, vehicle tracks		
Vegetation condition	Pristine	**Fire age**	moderate (>5 years)
Total veg. cover (%)	80	**Litter distribution**	even/continuous
Tree cover (%)	30	**Litter depth(cm)**	2
Shrub cover (%)	45	**Litter cover (%)**	50
Grass cover (%)	0		
Herb cover (%)	5		

Site details			
Site	**SITE03**	**Position (WGS84)**	-32.890989, 116.440267
Topography		**Soil texture**	gravel–alluvial, loam
Slope		**Rock type**	ferrous - Ironstone
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	2.00	07 Oct 2019	07 Oct 2019
1	Litter sieve	2.50	07 Oct 2019	07 Oct 2019
1	Site description	0.00	08 Oct 2019	08 Oct 2019
1	Wet pitfall trap	3,480.00	07 Oct 2019	05 Nov 2019

Site description - visit 1 (08 Oct 2019)

Jarrah woodland to 25m over mid story of scattered Bull Banksia to 6m, over dense understory dominated by *Banksia* and grass trees.

Habitat	woodland		
Disturbance	historic clearing, vehicle tracks		
Vegetation condition	Pristine	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	90	**Litter distribution**	even/continuous
Tree cover (%)	30	**Litter depth(cm)**	2
Shrub cover (%)	55	**Litter cover (%)**	45
Grass cover (%)	0		
Herb cover (%)	5		

Site details			
Site	**SITE04**	**Position (WGS84)**	-32.890361, 116.433462
Topography		**Soil texture**	gravel–alluvial, loam
Slope		**Rock type**	ferrous - Ironstone
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	1.50	08 Oct 2019	08 Oct 2019
1	Litter sieve	0.75	08 Oct 2019	08 Oct 2019
1	Site description	672.00	08 Oct 2019	05 Nov 2019
1	Wet pitfall trap	3,360.00	08 Oct 2019	05 Nov 2019

Site description - visit 1 (08 Oct 2019)

Jarrah woodland to 20m with mid story of smaller regrowth Jarrah, and *Banksia* to 8m over diverse understory dominated by *Banksia*, grass trees and Ericaceous shrubs.

Habitat	woodland		
Disturbance	historic clearing, vehicle tracks		
Vegetation condition	Pristine	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	75	**Litter distribution**	even/continuous
Tree cover (%)	25	**Litter depth(cm)**	1
Shrub cover (%)	45	**Litter cover (%)**	30
Grass cover (%)	0		
Herb cover (%)	5		

Site details			
Site	**SITE05**	**Position (WGS84)**	-32.960086, 116.403696
Topography		**Soil texture**	not recorded
Slope		**Rock type**	none
Soil colour	not recorded	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	08 Oct 2019	08 Oct 2019

Site description - visit 1 (08 Oct 2019)

Burnt. Not sampled.

Habitat	woodland		
Disturbance	evidence of feral animals, grazing – medium, historic clearing, vehicle tracks, weed infestation		
Vegetation condition	Excellent	**Fire age**	relatively recent (1-5 years)
Total veg. cover (%)	80	**Litter distribution**	even/continuous
Tree cover (%)	15	**Litter depth(cm)**	1
Shrub cover (%)	50	**Litter cover (%)**	25
Grass cover (%)	20		
Herb cover (%)	2		

Site details			
Site	**SITE06**	**Position (WGS84)**	-32.82846, 116.409803
Topography		**Soil texture**	gravel–alluvial
Slope		**Rock type**	ferrous - Ironstone
Soil colour	red–brown, brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	1.50	08 Oct 2019	08 Oct 2019
1	Litter sieve	0.75	08 Oct 2019	08 Oct 2019
1	Site description	0.00	08 Oct 2019	08 Oct 2019
1	Wet pitfall trap	3,361.25	08 Oct 2019	05 Nov 2019

Site description - visit 1 (08 Oct 2019)

Woodland of Jarrah and Marri to 28m with midstory of young Jarrah and Marri over diverse low shrubs and grass trees to 2.5m

Habitat	woodland		
Disturbance	historic clearing, vehicle tracks		
Vegetation condition	Pristine	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	90	**Litter distribution**	even/continuous
Tree cover (%)	35	**Litter depth(cm)**	1
Shrub cover (%)	50	**Litter cover (%)**	20
Grass cover (%)	0		
Herb cover (%)	5		

Site details			
Site	**SITE07**	**Position (WGS84)**	-32.826309, 116.409749
Topography		**Soil texture**	gravel–alluvial, loam
Slope		**Rock type**	ferrous - Ironstone
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Burrow excavation	0.25	08 Oct 2019	08 Oct 2019
1	Foraging	2.00	08 Oct 2019	08 Oct 2019
1	Litter sieve	0.50	08 Oct 2019	08 Oct 2019
1	Site description	0.00	08 Oct 2019	08 Oct 2019
1	Wet pitfall trap	3,361.25	08 Oct 2019	05 Nov 2019

Site description - visit 1 (08 Oct 2019)

Woodland of Jarrah , over *Allocasuarina* to 27m over midstory of bull Banksia and mid Casuarina to 7m, over sedges, grass trees, *Dianella* and other low mixed shrubs to 1.5 m.

Habitat	woodland		
Disturbance	historic clearing, vehicle tracks		
Vegetation condition	Pristine	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	75	**Litter distribution**	even/continuous
Tree cover (%)	25	**Litter depth(cm)**	0.5
Shrub cover (%)	10	**Litter cover (%)**	25
Grass cover (%)	0		
Herb cover (%)	35		

Site details			
Site	**SITE08**	**Position (WGS84)**	-32.725483, 116.392817
Topography		**Soil texture**	gravel–alluvial, loam
Slope		**Rock type**	ferrous - Ironstone
Soil colour	red–brown, brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	1.50	09 Oct 2019	09 Oct 2019
1	Litter sieve	0.50	09 Oct 2019	09 Oct 2019
1	Site description	0.00	09 Oct 2019	09 Oct 2019
1	Wet pitfall trap	3,240.00	09 Oct 2019	05 Nov 2019

Site description - visit 1 (09 Oct 2019)

Woodland of Jarrah and Marri with scattered Wandoo (to 28m). Mid story mostly small Jarrah and Marri. Understory includes scattered myrtaceous shrubs to 2m but dominated by low *Hibbertia* to 30 cm.

Habitat	woodland		
Disturbance	historic clearing		
Vegetation condition	Pristine	**Fire age**	moderate (>5 years)
Total veg. cover (%)	90	**Litter distribution**	even/continuous
Tree cover (%)	30	**Litter depth(cm)**	1
Shrub cover (%)	55	**Litter cover (%)**	30
Grass cover (%)	0		
Herb cover (%)	5		

Site details			
Site	**SITE09**	**Position (WGS84)**	-32.740557, 116.381593
Topography		**Soil texture**	gravel–alluvial, loam
Slope		**Rock type**	ferrous - Ironstone
Soil colour	red–brown, brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	1.50	09 Oct 2019	09 Oct 2019
1	Litter sieve	0.50	09 Oct 2019	09 Oct 2019
1	Site description	0.00	09 Oct 2019	09 Oct 2019
1	Wet pitfall trap	3,360.00	09 Oct 2019	06 Nov 2019

Site description - visit 1 (09 Oct 2019)

Woodland of Jarrah and Marri to 25m. Midstory of parrot bush to 6m. Understory of grass trees, *Macrozamia*, and low ericaceus shrubs. Uphill of a seasonally wet area.

Habitat	woodland		
Disturbance	historic clearing, vehicle tracks		
Vegetation condition		**Fire age**	moderate (>5 years)
Total veg. cover (%)	80	**Litter distribution**	even/continuous
Tree cover (%)	35	**Litter depth(cm)**	0
Shrub cover (%)	40	**Litter cover (%)**	0
Grass cover (%)	0		
Herb cover (%)	5		

Site details			
Site	**SITE10**	**Position (WGS84)**	-32.764643, 116.387116
Topography		**Soil texture**	gravel–alluvial, loam
Slope		**Rock type**	ferrous - Ironstone
Soil colour	red–brown, brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	1.20	09 Oct 2019	09 Oct 2019
1	Litter sieve	1.00	09 Oct 2019	09 Oct 2019
1	Site description	0.00	09 Oct 2019	09 Oct 2019
1	Wet pitfall trap	3,360.00	09 Oct 2019	06 Nov 2019

Site description - visit 1 (09 Oct 2019)

Woodland of Jarrah and Marri to 27m over midstory of smaller Jarrah and Marri over understory dominated by low ericaceus shrubs about 20 cm.

Habitat	woodland		
Disturbance	historic clearing, vehicle tracks, weed infestation		
Vegetation condition	Pristine	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	70	**Litter distribution**	even/continuous
Tree cover (%)	35	**Litter depth(cm)**	1
Shrub cover (%)	30	**Litter cover (%)**	30
Grass cover (%)	0		
Herb cover (%)	5		

Site details			
Site	**SITE11**	**Position (WGS84)**	-32.767936, 116.386944
Topography		**Soil texture**	loam, clay loam
Slope		**Rock type**	ferrous - Ironstone
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	1.50	09 Oct 2019	09 Oct 2019
1	Litter sieve	0.50	09 Oct 2019	09 Oct 2019
1	Site description	0.00	09 Oct 2019	09 Oct 2019
1	Wet pitfall trap	3,360.00	09 Oct 2019	06 Nov 2019

Site description - visit 1 (09 Oct 2019)

Open woodland of Wandoo and Flooded gum to 24m over dense midstory and understory dominated by *Melaleuca* ssp. over sedges.

Habitat	open woodland		
Disturbance	evidence of feral animals, historic clearing, vehicle tracks, weed infestation		
Vegetation condition	Pristine	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	90	**Litter distribution**	
Tree cover (%)	30	**Litter depth(cm)**	1
Shrub cover (%)	50	**Litter cover (%)**	25
Grass cover (%)	0		
Herb cover (%)	10		

Site details			
Site	**SITE12**	**Position (WGS84)**	-32.771994, 116.410851
Topography		**Soil texture**	gravel–alluvial, clay loam
Slope		**Rock type**	ferrous - Ironstone
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	1.50	10 Oct 2019	10 Oct 2019
1	Litter sieve	1.00	10 Oct 2019	10 Oct 2019
1	Site description	0.00	10 Oct 2019	10 Oct 2019
1	Wet pitfall trap	3,360.00	10 Oct 2019	07 Nov 2019

Site description - visit 1 (10 Oct 2019)

Woodland of Wandoo and Flooded Gum to 20m. Sparse midstory dominated by small Flooded Gum. Understory mostly small grasses and herbs, including weeds.

Habitat	woodland		
Disturbance	evidence of feral animals, weed infestation		
Vegetation condition	Good	**Fire age**	moderate (>5 years)
Total veg. cover (%)	90	**Litter distribution**	even/continuous
Tree cover (%)	40	**Litter depth(cm)**	0.5
Shrub cover (%)	5	**Litter cover (%)**	20
Grass cover (%)	25		
Herb cover (%)	20		

Site details			
Site	**SITE13**	**Position (WGS84)**	-32.775015, 116.410719
Topography		**Soil texture**	clay loam
Slope		**Rock type**	ferrous - Ironstone
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	1.50	10 Oct 2019	10 Oct 2019
1	Litter sieve	0.75	10 Oct 2019	10 Oct 2019
1	Site description	0.00	10 Oct 2019	10 Oct 2019
1	Wet pitfall trap	3,360.00	10 Oct 2019	07 Nov 2019

Site description - visit 1 (10 Oct 2019)

Open woodland of Wandoo and Jarrah over parrot bush and Macrozamia over mixed low shrubs and sedges.

Habitat	open woodland		
Disturbance	evidence of feral animals, historic clearing, revegetation, weed infestation		
Vegetation condition	Pristine	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	95	**Litter distribution**	even/continuous
Tree cover (%)	40	**Litter depth(cm)**	0
Shrub cover (%)	15	**Litter cover (%)**	0
Grass cover (%)	70		
Herb cover (%)	30		

Site description - visit 1 (10 Oct 2019)			
Open woodland of Wandoo and Jarrah over parrot bush and *Macrozamia* over mixed low shrubs and sedges.			
Habitat	open woodland		
Disturbance	evidence of feral animals, historic clearing, revegetation, weed infestation		
Vegetation condition	Pristine	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	95	**Litter distribution**	even/continuous
Tree cover (%)	40	**Litter depth(cm)**	1
Shrub cover (%)	15	**Litter cover (%)**	25
Grass cover (%)	70		
Herb cover (%)	30		

Site details			
Site	**SITE14**	**Position (WGS84)**	-32.807682, 116.387915
Topography		**Soil texture**	gravel–alluvial, sandy clay, clay loam
Slope		**Rock type**	none
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	1.50	10 Oct 2019	10 Oct 2019
1	Litter sieve	1.00	10 Oct 2019	10 Oct 2019
1	Site description	0.00	10 Oct 2019	10 Oct 2019
1	Wet pitfall trap	3,360.00	10 Oct 2019	07 Nov 2019

Site description - visit 1 (10 Oct 2019)

Woodland of Marri and Jarrah over, tall *Melaleuca* shrubs and dense, mixed mid and low shrubs.

Habitat	riparian zone		
Disturbance	grazing – medium, historic operations, livestock tracks, vehicle tracks, weed infestation		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	90	**Litter distribution**	even/continuous
Tree cover (%)	65	**Litter depth(cm)**	2
Shrub cover (%)	30	**Litter cover (%)**	25
Grass cover (%)	80		
Herb cover (%)	10		

Site details			
Site	**SITE15**	**Position (WGS84)**	-32.810332, 116.393743
Topography		**Soil texture**	gravel–alluvial, sandy loam, loam
Slope		**Rock type**	ferrous - Ironstone
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	0.50	10 Oct 2019	10 Oct 2019
1	Litter sieve	0.75	10 Oct 2019	10 Oct 2019
1	Site description	0.00	10 Oct 2019	10 Oct 2019
1	Wet pitfall trap	3,360.00	10 Oct 2019	07 Nov 2019

Site description - visit 1 (10 Oct 2019)

Open woodland of Sheoak and Jarrah over parrot bush (dense) over mixed low shrubs and sedges.

Habitat	open woodland		
Disturbance	historic clearing		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	90	**Litter distribution**	even/continuous
Tree cover (%)	60	**Litter depth(cm)**	1.5
Shrub cover (%)	35	**Litter cover (%)**	30
Grass cover (%)	5		
Herb cover (%)	20		

Site details			
Site	**SITE16**	**Position (WGS84)**	-32.855413, 116.410313
Topography		**Soil texture**	gravel–alluvial, sandy loam
Slope		**Rock type**	ferrous - Ironstone
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	0.50	10 Oct 2019	10 Oct 2019
1	Litter sieve	0.75	10 Oct 2019	10 Oct 2019
1	Site description	0.00	10 Oct 2019	10 Oct 2019
1	Wet pitfall trap	3,360.00	10 Oct 2019	07 Nov 2019

Site description - visit 1 (10 Oct 2019)

Woodland of Jarrah and Marri over tall *Banksia* and *Personia*, over mid and low mixed shrubs over sedges.

Habitat	open woodland		
Disturbance	evidence of feral animals, historic clearing, vehicle tracks		
Vegetation condition	Pristine	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	80	**Litter distribution**	even/continuous
Tree cover (%)	55	**Litter depth(cm)**	1
Shrub cover (%)	65	**Litter cover (%)**	30
Grass cover (%)	5		
Herb cover (%)	10		

Site details			
Site	**SITE17**	**Position (WGS84)**	-32.974481, 116.520134
Topography		**Soil texture**	sandy loam
Slope		**Rock type**	none
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	0.50	11 Oct 2019	11 Oct 2019
1	Litter sieve	0.50	11 Oct 2019	11 Oct 2019
1	Site description	0.00	11 Oct 2019	11 Oct 2019
1	Wet pitfall trap	3,240.00	11 Oct 2019	07 Nov 2019

Site description - visit 1 (11 Oct 2019)

Open woodland of Wandoo over mixed low shrubs. Plentiful debris.

Habitat	open woodland		
Disturbance	historic clearing		
Vegetation condition	Pristine	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	70	**Litter distribution**	even/continuous
Tree cover (%)	60	**Litter depth(cm)**	0.5
Shrub cover (%)	5	**Litter cover (%)**	25
Grass cover (%)	40		
Herb cover (%)	10		

Site details			
Site	**SITE18**	**Position (WGS84)**	-32.987541, 116.554436
Topography		**Soil texture**	sandy loam, clay loam
Slope		**Rock type**	none
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	1.50	11 Oct 2019	11 Oct 2019
1	Litter sieve	1.00	11 Oct 2019	11 Oct 2019
1	Site description	0.00	11 Oct 2019	11 Oct 2019
1	Wet pitfall trap	3,240.00	11 Oct 2019	07 Nov 2019

Site description - visit 1 (11 Oct 2019)

Open woodland of Wandoo over mid *Melaleuca* shrubs and mixed low shrubs.

Habitat	open woodland		
Disturbance	historic clearing		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	even/continuous
Tree cover (%)	40	**Litter depth(cm)**	1
Shrub cover (%)	50	**Litter cover (%)**	40
Grass cover (%)	70		
Herb cover (%)	15		

Site details			
Site	**SITE19**	**Position (WGS84)**	-32.985516, 116.527738
Topography		**Soil texture**	gravel–alluvial, sandy loam, clay loam
Slope		**Rock type**	none
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	0.50	11 Oct 2019	11 Oct 2019
1	Litter sieve	0.75	11 Oct 2019	11 Oct 2019
1	Site description	0.00	11 Oct 2019	11 Oct 2019
1	Wet pitfall trap	3,240.00	11 Oct 2019	07 Nov 2019

Site description - visit 1 (11 Oct 2019)

Woodland of Jarrah, Marri and Sheoak over low shrubs and sedges. Logged Plentiful leaf litter and debris.

Habitat	open woodland		
Disturbance	historic clearing		
Vegetation condition	Excellent	**Fire age**	long-unburnt (>10 years)
Total veg. cover (%)	100	**Litter distribution**	even/continuous
Tree cover (%)	40	**Litter depth(cm)**	1.5
Shrub cover (%)	30	**Litter cover (%)**	45
Grass cover (%)	50		
Herb cover (%)	40		

Site details			
Site	**SITE20**	**Position (WGS84)**	-33.005131, 116.506729
Topography		**Soil texture**	gravel–alluvial, sandy clay
Slope		**Rock type**	none
Soil colour	brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	1.00	11 Oct 2019	11 Oct 2019
1	Litter sieve	1.50	11 Oct 2019	11 Oct 2019
1	Site description	0.00	11 Oct 2019	11 Oct 2019
1	Wet pitfall trap	3,240.00	11 Oct 2019	11 Oct 2019

Site description - visit 1 (11 Oct 2019)

Woodland of Jarrah over *Banksia* and parrot bush over *Macrozamia* and low shrubs. Plentiful leaf litter and debris.

Habitat	open woodland		
Disturbance	evidence of feral animals, historic clearing		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	100	**Litter distribution**	even/continuous
Tree cover (%)	55	**Litter depth(cm)**	2
Shrub cover (%)	60	**Litter cover (%)**	30
Grass cover (%)	30		
Herb cover (%)	30		

Site details			
Site	**1331-RH001-20**	**Position (WGS84)**	-32.902403, 116.434414
Topography	hill slope	**Soil texture**	alluvial
Slope	negligible	**Rock type**	ferrous - Ironstone
Soil colour	black	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	0.00	02 Sep 2020	02 Sep 2020
1	Litter sieve	0.00	02 Sep 2020	02 Sep 2020
1	Site description	0.00	02 Sep 2020	02 Sep 2020
1	Wet pitfall trap	5,640.00	02 Sep 2020	19 Oct 2020
2	Foraging	-2,208.00	19 Oct 2020	03 Sep 2020
2	Litter sieve	-4,512.00	19 Oct 2020	02 Sep 2020

Site description - visit 1 (02 Sep 2020)

Rehabilitation area with wandoo to 8m over dense diverse shrubs in midstory and understory.

Habitat	open woodland on hill mid-slope		
Disturbance	revegetation		
Vegetation condition	Very Good	**Fire age**	moderate (>5 years)
Total veg. cover (%)	90	**Litter distribution**	under vegetation
Tree cover (%)	80	**Litter depth(cm)**	1
Shrub cover (%)	10	**Litter cover (%)**	40
Grass cover (%)	0		
Herb cover (%)	5		

Site details			
Site	**1331-RH002-20**	**Position (WGS84)**	-32.902403, 116.434414
Topography	hill slope	**Soil texture**	gravel–alluvial, clay loam
Slope	moderate	**Rock type**	ferrous - Ironstone
Soil colour	red–orange, brown	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	-432.00	02 Sep 2020	24 Aug 2020
1	Litter sieve	96.00	02 Sep 2020	03 Sep 2020
1	Site description	24.00	02 Sep 2020	03 Sep 2020
1	Wet pitfall trap	5,640.00	02 Sep 2020	19 Oct 2020
2	Foraging	-2,688.00	19 Oct 2020	24 Aug 2020
2	Litter sieve	-10,080.00	19 Oct 2020	06 Jul 2020

Site description - visit 1 (02 Sep 2020)

Rehabilitated area of Jarrah and *Allocasuarina* to 14m over dense diverse shrubs in midstory and understory.

Habitat	open woodland on moderate hill mid-slope		
Disturbance	revegetation		
Vegetation condition	Very Good	**Fire age**	moderate (>5 years)
Total veg. cover (%)	90	**Litter distribution**	even/continuous
Tree cover (%)	80	**Litter depth(cm)**	2
Shrub cover (%)	5	**Litter cover (%)**	70
Grass cover (%)	0		
Herb cover (%)	5		

Site details			
Site	**1331-RH003-20**	**Position (WGS84)**	-32.929092, 116.446097
Topography	hill slope	**Soil texture**	sandy clay, loam, laterite
Slope	gentle	**Rock type**	none
Soil colour	red–orange	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	-2,784.00	02 Sep 2020	06 Jul 2020
1	Litter sieve	-5,568.00	02 Sep 2020	06 Jul 2020
1	Site description	-1,392.00	02 Sep 2020	06 Jul 2020
1	Wet pitfall trap	5,640.00	02 Sep 2020	19 Oct 2020
2	Foraging	-2,688.00	19 Oct 2020	24 Aug 2020
2	Litter sieve	-10,080.00	19 Oct 2020	06 Jul 2020

Site description - visit 1 (02 Sep 2020)

Rehabilitated area of mixed open mid Eucalypt woodland over mixed shrubs and mixed sparse herbs.

Habitat	open woodland on gentle hill mid-slope		
Disturbance	revegetation		
Vegetation condition	Very Good	**Fire age**	moderate (>5 years)
Total veg. cover (%)	80	**Litter distribution**	even/continuous
Tree cover (%)	55	**Litter depth(cm)**	2
Shrub cover (%)	50	**Litter cover (%)**	40
Grass cover (%)	1		
Herb cover (%)	1		

Site details			
Site	**1331-RH004-20**	**Position (WGS84)**	-32.905715, 116.451031
Topography	hill slope	**Soil texture**	sandy clay, loam, laterite
Slope	negligible	**Rock type**	none
Soil colour	red–orange	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	-2,784.00	02 Sep 2020	06 Jul 2020
1	Litter sieve	-5,568.00	02 Sep 2020	06 Jul 2020
1	Site description	-1,392.00	02 Sep 2020	06 Jul 2020
1	Wet pitfall trap	5,640.00	02 Sep 2020	19 Oct 2020
2	Foraging	-2,688.00	19 Oct 2020	24 Aug 2020
2	Litter sieve	-5,376.00	19 Oct 2020	24 Aug 2020

Site description - visit 1 (02 Sep 2020)

Rehabilitated area of mixed Jarrah and Marri. Open woodland with *Allocasuarina, Banksia, Dryandra, Hakea* and *Acacia* shrubs over mixed low shrubs on sandy clay loam laterite.

Habitat	open woodland on plain		
Disturbance	evidence of feral animals, revegetation, vehicle tracks		
Vegetation condition	Very Good	**Fire age**	moderate (>5 years)
Total veg. cover (%)	85	**Litter distribution**	even/continuous
Tree cover (%)	40	**Litter depth(cm)**	3
Shrub cover (%)	55	**Litter cover (%)**	65
Grass cover (%)	0		
Herb cover (%)	1		

Site details			
Site	**1331-RH005-20**	**Position (WGS84)**	-32.939759, 116.463551
Topography	hill slope	**Soil texture**	sandy clay, loam, laterite
Slope	gentle	**Rock type**	none
Soil colour	red–orange	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	-2,832.00	03 Sep 2020	06 Jul 2020
1	Litter sieve	-5,664.00	03 Sep 2020	06 Jul 2020
1	Site description	-1,416.00	03 Sep 2020	06 Jul 2020
1	Wet pitfall trap	5,520.00	03 Sep 2020	19 Oct 2020
2	Foraging	-2,688.00	19 Oct 2020	24 Aug 2020
2	Litter sieve	-5,376.00	19 Oct 2020	24 Aug 2020

Site description - visit 1 (03 Sep 2020)

Rehabilitated area of Jarrah dominant woodland with scattered Wandoo over mixed low shrubs on sandy clay lateritic soil with continuous leaf litter, average 5cm deep.

Habitat	woodland on gentle hill mid-slope		
Disturbance	evidence of feral animals, revegetation, vehicle tracks		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	70	**Litter distribution**	even/continuous
Tree cover (%)	45	**Litter depth(cm)**	4
Shrub cover (%)	35	**Litter cover (%)**	90
Grass cover (%)	1		
Herb cover (%)	1		

Site details			
Site	**1331-RH006-20**	**Position (WGS84)**	-32.94596, 116.45358
Topography	hill slope	**Soil texture**	sandy clay, loam, laterite
Slope	gentle	**Rock type**	none
Soil colour	red–orange	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	-2,832.00	03 Sep 2020	06 Jul 2020
1	Litter sieve	-5,664.00	03 Sep 2020	06 Jul 2020
1	Site description	-1,416.00	03 Sep 2020	06 Jul 2020
1	Wet pitfall trap	5,520.00	03 Sep 2020	19 Oct 2020
2	Foraging	-2,688.00	19 Oct 2020	24 Aug 2020
2	Litter sieve	-5,376.00	19 Oct 2020	24 Aug 2020

Site description - visit 1 (03 Sep 2020)

Rehabilitated area of 4 year old *Acacia* and *Dryandra* mixed shrubland on sandy clay rocky laterite with negligible leaf litter.

Habitat	shrubland on gentle hill mid-slope		
Disturbance	evidence of feral animals, revegetation, vehicle tracks		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	95	**Litter distribution**	even/continuous
Tree cover (%)	1	**Litter depth(cm)**	0
Shrub cover (%)	90	**Litter cover (%)**	0
Grass cover (%)	0		
Herb cover (%)	1		

Site details			
Site	**1331-RH007-20**	**Position (WGS84)**	-32.99265, 116.477311
Topography	hill slope	**Soil texture**	sandy clay, loam, laterite
Slope	negligible	**Rock type**	none
Soil colour	red–orange	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	0.00	03 Sep 2020	03 Sep 2020
1	Litter sieve	0.00	03 Sep 2020	03 Sep 2020
1	Site description	-1,416.00	03 Sep 2020	06 Jul 2020
1	Wet pitfall trap	5,520.00	03 Sep 2020	19 Oct 2020
2	Foraging	0.00	19 Oct 2020	19 Oct 2020
2	Litter sieve	0.00	19 Oct 2020	19 Oct 2020

Site description - visit 1 (03 Sep 2020)

Rehabilitated area of *Dryandra, Banksia* and *Acacia* dominant tall shrubland with scattered Wandoo and Jarrah low trees.

Habitat	shrubland on plain		
Disturbance	evidence of feral animals, revegetation, vehicle tracks		
Vegetation condition	Very Good	**Fire age**	moderate (>5 years)
Total veg. cover (%)	45	**Litter distribution**	under vegetation
Tree cover (%)	5	**Litter depth(cm)**	1
Shrub cover (%)	40	**Litter cover (%)**	15
Grass cover (%)	1		
Herb cover (%)	0		

Site details			
Site	**1331-RH008-20**	**Position (WGS84)**	-32.991675, 116.469479
Topography	hill slope	**Soil texture**	sandy clay, loam, laterite
Slope	gentle	**Rock type**	none
Soil colour	red–orange	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Burrow excavation	-240.00	03 Sep 2020	24 Aug 2020
1	Foraging	-480.00	03 Sep 2020	24 Aug 2020
1	Litter sieve	-5,664.00	03 Sep 2020	06 Jul 2020
1	Site description	0.00	03 Sep 2020	03 Sep 2020
1	Wet pitfall trap	5,520.00	03 Sep 2020	19 Oct 2020
2	Burrow excavation	-2,520.00	19 Oct 2020	06 Jul 2020
2	Foraging	-5,040.00	19 Oct 2020	06 Jul 2020
2	Litter sieve	-5,376.00	19 Oct 2020	24 Aug 2020

Site description - visit 1 (03 Sep 2020)			
Rehabilitated area of tall dense shrubland with small Jarrah and Wandoo trees over mixed low shrubs.			
Habitat	shrubland on gentle hill mid-slope		
Disturbance	evidence of feral animals, revegetation, vehicle tracks		
Vegetation condition	Very Good	**Fire age**	moderate (>5 years)
Total veg. cover (%)	85	**Litter distribution**	even/continuous
Tree cover (%)	25	**Litter depth(cm)**	2
Shrub cover (%)	70	**Litter cover (%)**	55
Grass cover (%)	2		
Herb cover (%)	1		

Site details			
Site	**1331-SRE001-20**	**Position (WGS84)**	-32.973354, 116.304312
Topography	hill slope	**Soil texture**	sandy loam, laterite
Slope	moderate	**Rock type**	ferrous - Ironstone
Soil colour	brown, black	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	0.00	06 Jul 2020	06 Jul 2020
2	Foraging	2,352.00	06 Jul 2020	24 Aug 2020
2	Litter sieve	4,704.00	06 Jul 2020	06 Jul 2020
2	Wet pitfall trap	6,600.00	12 May 2020	06 Jul 2020
3	Burrow excavation	-1,176.00	24 Aug 2020	06 Jul 2020
3	Foraging	0.00	24 Aug 2020	24 Aug 2020
3	Litter sieve	-4,704.00	24 Aug 2020	06 Jul 2020
3	Wet pitfall trap	5,880.00	06 Jul 2020	24 Aug 2020
2	Wet pitfall trap	6,600.00	12 May 2020	06 Jul 2020

Site description - visit 1 (06 Jul 2020)

Wandoo woodland over shrubs of *Eucalyptus* and xantheraceae and *Zamia* shrubs over mixed herbs on loamy lateritc black soil with continuous leaf litter of 1-2 cm depth, with 5cm under some trees and vegetation.

Habitat	woodland		
Disturbance	vehicle tracks		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	60	**Litter distribution**	even/continuous
Tree cover (%)	50	**Litter depth(cm)**	2
Shrub cover (%)	20	**Litter cover (%)**	85
Grass cover (%)	0		
Herb cover (%)	5		

Site details			
Site	**1331-SRE002-20**	**Position (WGS84)**	-33.012205, 116.273182
Topography	hill slope	**Soil texture**	sandy loam, laterite
Slope	gentle	**Rock type**	ferrous - Ironstone
Soil colour	yellow, black	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Site description	1,176.00	06 Jul 2020	24 Aug 2020
2	Foraging	2,352.00	06 Jul 2020	06 Jul 2020
2	Litter sieve	4,704.00	06 Jul 2020	24 Aug 2020
3	Burrow excavation	0.00	24 Aug 2020	24 Aug 2020
3	Foraging	-2,352.00	24 Aug 2020	06 Jul 2020
3	Litter sieve	0.00	24 Aug 2020	24 Aug 2020
3	Wet pitfall trap	5,880.00	06 Jul 2020	24 Aug 2020

Site description - visit 1 (06 Jul 2020)

Jarrah woodland over dense *Acacia* thicket over mixed low shrubs of *Zamia,* xantheraceae and other over *Dryandra* and mixed herbs on yellow black lateritic loamy soil with continuous leaf litter 3-5 cm deep.

Habitat	woodland		
Disturbance	vehicle tracks		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	95	**Litter distribution**	even/continuous
Tree cover (%)	30	**Litter depth(cm)**	3
Shrub cover (%)	70	**Litter cover (%)**	100
Grass cover (%)	0		
Herb cover (%)	15		

Site details			
Site	**1331-SRE003-20**	**Position (WGS84)**	-33.008649, 116.404825
Topography	hill top	**Soil texture**	sandy loam, rocks, laterite
Slope	gentle	**Rock type**	none
Soil colour	yellow, black	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Burrow excavation	0.00	12 May 2020	12 May 2020
1	Site description	0.00	12 May 2020	12 May 2020
2	Foraging	0.00	06 Jul 2020	06 Jul 2020
2	Litter sieve	4,704.00	06 Jul 2020	24 Aug 2020
2	Wet pitfall trap	6,600.00	12 May 2020	06 Jul 2020
3	Burrow excavation	0.00	24 Aug 2020	24 Aug 2020
3	Foraging	0.00	24 Aug 2020	24 Aug 2020
3	Litter sieve	0.00	24 Aug 2020	24 Aug 2020
3	Wet pitfall trap	5,880.00	06 Jul 2020	24 Aug 2020

Site description - visit 1 (12 May 2020)

Jarrah woodland over Jarrah tall shrubs, over scattered *Banksia, Zamia,* xantheraceae and other myrtaceae shrubs over mixed very low shrubs and mixed herbs on black and yellow lateritic sandy loam and rock substrate.

Habitat	woodland		
Disturbance	vehicle tracks		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	75	**Litter distribution**	even/continuous
Tree cover (%)	40	**Litter depth(cm)**	1
Shrub cover (%)	35	**Litter cover (%)**	80
Grass cover (%)	0		
Herb cover (%)	15		

Site details			
Site	**1331-SRE004-20**	**Position (WGS84)**	-33.00272, 116.313986
Topography	hill slope	**Soil texture**	sandy loam, rocks, laterite
Slope	gentle	**Rock type**	none
Soil colour	yellow, black	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
2	Burrow excavation	0.00	06 Jul 2020	06 Jul 2020
2	Foraging	2,352.00	06 Jul 2020	24 Aug 2020
2	Litter sieve	4,704.00	06 Jul 2020	06 Jul 2020
2	Wet pitfall trap	12,480.00	12 May 2020	06 Jul 2020
3	Burrow excavation	0.00	24 Aug 2020	24 Aug 2020
3	Foraging	0.00	24 Aug 2020	24 Aug 2020
3	Litter sieve	-4,704.00	24 Aug 2020	06 Jul 2020
3	Site description	0.00	12 May 2020	12 May 2020

Site description - visit 3 (12 May 2020)

Jarrah/Marri woodland over shrubs/small mixed eucalypt, *Zamia* and other over mixed herbs on black loamy topsoil for 2 inches, with yellow rocky lateritic sandy loam beneath.

Habitat	woodland		
Disturbance	not recorded		
Vegetation condition	Excellent	**Fire age**	relatively recent (1-5 years)
Total veg. cover (%)	85	**Litter distribution**	even/continuous
Tree cover (%)	60	**Litter depth(cm)**	2
Shrub cover (%)	45	**Litter cover (%)**	95
Grass cover (%)	0		
Herb cover (%)	10		

Site details			
Site	**1331-SRE005-20**	**Position (WGS84)**	-32.966559, 116.306998
Topography	hill slope	**Soil texture**	sandy clay, loam, laterite
Slope	moderate	**Rock type**	none
Soil colour	yellow, black	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
2	Foraging	2,352.00	06 Jul 2020	06 Jul 2020
2	Litter sieve	4,704.00	06 Jul 2020	24 Aug 2020
2	Site description	0.00	12 May 2020	12 May 2020
2	Wet pitfall trap	6,600.00	12 May 2020	06 Jul 2020
3	Burrow excavation	0.00	24 Aug 2020	24 Aug 2020
3	Foraging	-2,352.00	24 Aug 2020	06 Jul 2020
3	Litter sieve	0.00	24 Aug 2020	24 Aug 2020
3	Wet pitfall trap	5,880.00	06 Jul 2020	24 Aug 2020

Site description - visit 2 (12 May 2020)			
Jarrah woodland over *Acacia* thicket. Moderate to mid slope towards creek.			
Habitat	woodland		
Disturbance	not recorded		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	100	**Litter distribution**	even/continuous
Tree cover (%)	80	**Litter depth(cm)**	5
Shrub cover (%)	70	**Litter cover (%)**	100
Grass cover (%)	0		
Herb cover (%)	2		

Site details			
Site	**1331-SRE006-20**	**Position (WGS84)**	-33.017666, 116.319191
Topography	hill top	**Soil texture**	sandy clay, loam, rocks, laterite
Slope	moderate	**Rock type**	granite - rocks
Soil colour	red–orange, black	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	0.00	12 May 2020	12 May 2020
2	Foraging	0.00	06 Jul 2020	06 Jul 2020
2	Litter sieve	4,704.00	06 Jul 2020	24 Aug 2020
2	Site description	0.00	12 May 2020	12 May 2020
2	Wet pitfall trap	6,600.00	12 May 2020	06 Jul 2020
3	Foraging	0.00	24 Aug 2020	24 Aug 2020
3	Litter sieve	0.00	24 Aug 2020	24 Aug 2020
3	Wet pitfall trap	5,880.00	06 Jul 2020	24 Aug 2020

Site description - visit 2 (12 May 2020)

Jarrah woodland over *Allocasurina* over *Banksia*, low Jarrah and other mixed myrtaceae over scattered herbs on granite boulder/outcropping with black orange-yellow substrate with continuous leaf litter 3-5 cm depth.

Habitat	woodland		
Disturbance	vehicle tracks		
Vegetation condition	Excellent	**Fire age**	relatively recent (1-5 years)
Total veg. cover (%)	90	**Litter distribution**	even/continuous
Tree cover (%)	40	**Litter depth(cm)**	3
Shrub cover (%)	75	**Litter cover (%)**	100
Grass cover (%)	0		
Herb cover (%)	2		

Site details			
Site	**1331-SRE007-20**	**Position (WGS84)**	-33.084185, 116.316018
Topography	hill slope	**Soil texture**	loam, laterite
Slope	negligible	**Rock type**	none
Soil colour	red–orange, black	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
2	Burrow excavation	0.00	06 Jul 2020	06 Jul 2020
2	Foraging	2,352.00	06 Jul 2020	24 Aug 2020
2	Litter sieve	4,704.00	06 Jul 2020	06 Jul 2020
2	Site description	0.00	12 May 2020	12 May 2020
2	Wet pitfall trap	6,600.00	12 May 2020	06 Jul 2020
3	Burrow excavation	0.00	24 Aug 2020	24 Aug 2020
3	Foraging	0.00	24 Aug 2020	24 Aug 2020
3	Litter sieve	-4,704.00	24 Aug 2020	06 Jul 2020
3	Wet pitfall trap	5,880.00	06 Jul 2020	24 Aug 2020

Site description - visit 2 (12 May 2020)

Jarrah woodland with scattered *Allocasurina* trees over *Acacia*, scattered *Zamia* over low mixed myrtaceae shrubs on orange black lateritic loamy soil with continuous leaf litter ranging from 2-5cm depth.

Habitat	woodland		
Disturbance	vehicle tracks		
Vegetation condition	Excellent	**Fire age**	relatively recent (1-5 years)
Total veg. cover (%)	70	**Litter distribution**	even/continuous
Tree cover (%)	50	**Litter depth(cm)**	5
Shrub cover (%)	50	**Litter cover (%)**	100
Grass cover (%)	0		
Herb cover (%)	2		

Site details			
Site	**1331-SRE008-20**	**Position (WGS84)**	-33.1562, 116.312184
Topography	undulating plain	**Soil texture**	sand, loam
Slope	negligible	**Rock type**	none
Soil colour	whitish	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
2	Foraging	2,352.00	06 Jul 2020	06 Jul 2020
2	Litter sieve	4,704.00	06 Jul 2020	24 Aug 2020
2	Site description	0.00	12 May 2020	12 May 2020
2	Wet pitfall trap	6,600.00	12 May 2020	06 Jul 2020
3	Burrow excavation	0.00	24 Aug 2020	24 Aug 2020
3	Foraging	0.00	24 Aug 2020	24 Aug 2020
3	Litter sieve	0.00	24 Aug 2020	24 Aug 2020
3	Wet pitfall trap	5,880.00	06 Jul 2020	24 Aug 2020

Site description - visit 2 (12 May 2020)

Jarrah woodland over scattered tall *Banksia* and *Allocasurina* over *Zamia*, xantheraceae, *Acacia* and mixed myrtaceae shrubs over scattered herbs, on white sandy topsoil above loamy subsoil, with continuous leaf litter 1-3 cm depth.

Habitat	woodland		
Disturbance	vehicle tracks		
Vegetation condition	Excellent	**Fire age**	relatively recent (1-5 years)
Total veg. cover (%)	75	**Litter distribution**	even/continuous
Tree cover (%)	35	**Litter depth(cm)**	2
Shrub cover (%)	60	**Litter cover (%)**	85
Grass cover (%)	0		
Herb cover (%)	1		

Site details			
Site	**1331-SRE009-20**	**Position (WGS84)**	-33.267627, 115.974373
Topography	hill slope	**Soil texture**	loam, clay loam, laterite
Slope	moderate	**Rock type**	none
Soil colour	black	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	4,992.00	12 May 2020	24 Aug 2020
2	Foraging	2,352.00	06 Jul 2020	24 Aug 2020
2	Litter sieve	4,704.00	06 Jul 2020	06 Jul 2020
2	Site description	0.00	12 May 2020	12 May 2020
2	Wet pitfall trap	6,600.00	12 May 2020	06 Jul 2020
3	Burrow excavation	0.00	24 Aug 2020	24 Aug 2020
3	Foraging	-2,352.00	24 Aug 2020	06 Jul 2020
3	Litter sieve	-4,704.00	24 Aug 2020	06 Jul 2020
3	Wet pitfall trap	5,880.00	06 Jul 2020	24 Aug 2020

Site description - visit 2 (12 May 2020)

Jarrah/Marri woodland over tall xantheraceae and other tall shrubs over mixed low shrubs on black loamy soils with continuous leaf litter from 5-8cm.

Habitat	woodland		
Disturbance	vehicle tracks		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	85	**Litter distribution**	even/continuous
Tree cover (%)	50	**Litter depth(cm)**	5
Shrub cover (%)	55	**Litter cover (%)**	100
Grass cover (%)	0		
Herb cover (%)	1		

Site details			
Site	**1331-SRE010-20**	**Position (WGS84)**	-33.193895, 116.089751
Topography	undulating plain	**Soil texture**	sandy loam
Slope	negligible	**Rock type**	none
Soil colour	yellow, black	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	0.00	12 May 2020	12 May 2020
2	Burrow excavation	0.00	06 Jul 2020	06 Jul 2020
2	Foraging	0.00	06 Jul 2020	06 Jul 2020
2	Litter sieve	4,704.00	06 Jul 2020	24 Aug 2020
2	Site description	0.00	12 May 2020	12 May 2020
2	Wet pitfall trap	6,600.00	12 May 2020	06 Jul 2020
3	Burrow excavation	0.00	24 Aug 2020	24 Aug 2020
3	Foraging	0.00	24 Aug 2020	24 Aug 2020
3	Litter sieve	0.00	24 Aug 2020	24 Aug 2020
3	Wet pitfall trap	5,880.00	06 Jul 2020	24 Aug 2020

Site description - visit 2 (12 May 2020)

Marri and *Melaleuca* woodland over xantheraceae, *Melaleuca* and other myrtaceae shrubs, over mixed low shrubs on black gold loamy soils with continuous deep 5cm leaf litter.

Habitat	woodland		
Disturbance	vehicle tracks		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	85	**Litter distribution**	even/continuous
Tree cover (%)	55	**Litter depth(cm)**	5
Shrub cover (%)	45	**Litter cover (%)**	100
Grass cover (%)	0		
Herb cover (%)	0		

Site details			
Site	**1331-SRE011-20**	**Position (WGS84)**	-33.140049, 116.10077
Topography	drainage line	**Soil texture**	loam
Slope	gentle	**Rock type**	none
Soil colour	yellow, black	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	4,992.00	12 May 2020	24 Aug 2020
2	Burrow excavation	1,176.00	06 Jul 2020	24 Aug 2020
2	Foraging	2,352.00	06 Jul 2020	24 Aug 2020
2	Litter sieve	4,704.00	06 Jul 2020	06 Jul 2020
2	Site description	0.00	12 May 2020	12 May 2020
2	Wet pitfall trap	6,600.00	12 May 2020	06 Jul 2020
3	Burrow excavation	0.00	24 Aug 2020	24 Aug 2020
3	Foraging	-2,352.00	24 Aug 2020	06 Jul 2020
3	Litter sieve	-4,704.00	24 Aug 2020	06 Jul 2020
3	Wet pitfall trap	5,880.00	06 Jul 2020	24 Aug 2020

Site description - visit 2 (12 May 2020)

Jarrah/Marri woodland over *Acacia,* xantheraceae, *Zamia* shrubs over mixed low myrtaceae shrubs.

Habitat	woodland		
Disturbance	vehicle tracks		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	80	**Litter distribution**	even/continuous
Tree cover (%)	55	**Litter depth(cm)**	5
Shrub cover (%)	55	**Litter cover (%)**	100
Grass cover (%)	0		
Herb cover (%)	0		

Site details			
Site	**1331-SRE012-20**	**Position (WGS84)**	-33.109514, 116.099357
Topography	drainage line	**Soil texture**	loam, clay loam
Slope	moderate	**Rock type**	granite - boulders, granite - outcropping
Soil colour	yellow, black	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
2	Foraging	2,352.00	06 Jul 2020	24 Aug 2020
2	Litter sieve	4,704.00	06 Jul 2020	06 Jul 2020
2	Site description	0.00	12 May 2020	12 May 2020
2	Wet pitfall trap	6,600.00	12 May 2020	06 Jul 2020
3	Foraging	0.00	24 Aug 2020	24 Aug 2020
3	Litter sieve	-4,704.00	24 Aug 2020	06 Jul 2020
3	Wet pitfall trap	5,880.00	06 Jul 2020	24 Aug 2020

Site description - visit 2 (12 May 2020)

Marri/Jarrah forest over ferns on deep continuous leaf litter. Black golden loamy soil amongst granite boulders, small rocks and outcropping along drainage line.

Habitat	forest		
Disturbance	evidence of feral animals, vehicle tracks		
Vegetation condition	Excellent	**Fire age**	not recorded
Total veg. cover (%)	98	**Litter distribution**	even/continuous
Tree cover (%)	80	**Litter depth(cm)**	5
Shrub cover (%)	85	**Litter cover (%)**	100
Grass cover (%)	0		
Herb cover (%)	0		

Site details			
Site	**1331-SRE013-20**	**Position (WGS84)**	-33.101876, 116.156135
Topography	hill slope	**Soil texture**	loam, laterite
Slope	gentle	**Rock type**	none
Soil colour	yellow, black	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
1	Foraging	0.00	12 May 2020	12 May 2020
2	Burrow excavation	0.00	06 Jul 2020	06 Jul 2020
2	Foraging	2,352.00	06 Jul 2020	24 Aug 2020
2	Litter sieve	4,704.00	06 Jul 2020	06 Jul 2020
2	Site description	0.00	12 May 2020	12 May 2020
2	Wet pitfall trap	6,600.00	12 May 2020	06 Jul 2020
3	Burrow excavation	0.00	24 Aug 2020	24 Aug 2020
3	Foraging	0.00	24 Aug 2020	24 Aug 2020
3	Litter sieve	-4,704.00	24 Aug 2020	06 Jul 2020
3	Wet pitfall trap	5,880.00	06 Jul 2020	24 Aug 2020

Site description - visit 2 (12 May 2020)

Marri/Jarrah forest over *Acacia* shrubland on black and gold loam with continuous leaf litter 3 cm deep. Fallen logs, medium sized with some larger hollows formed.

Habitat	forest		
Disturbance	vehicle tracks		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	80	**Litter distribution**	even/continuous
Tree cover (%)	55	**Litter depth(cm)**	3
Shrub cover (%)	30	**Litter cover (%)**	100
Grass cover (%)	1		
Herb cover (%)	0		

Site details			
Site	**1331-SRE014-20**	**Position (WGS84)**	-33.09978, 116.213881
Topography	undulating plain	**Soil texture**	sandy loam
Slope	negligible	**Rock type**	none
Soil colour	yellow, black	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
2	Burrow excavation	0.00	06 Jul 2020	06 Jul 2020
2	Foraging	0.00	06 Jul 2020	06 Jul 2020
2	Litter sieve	4,704.00	06 Jul 2020	06 Jul 2020
2	Site description	0.00	12 May 2020	12 May 2020
2	Wet pitfall trap	6,600.00	12 May 2020	06 Jul 2020
3	Burrow excavation	0.00	24 Aug 2020	24 Aug 2020
3	Foraging	0.00	24 Aug 2020	24 Aug 2020
3	Litter sieve	0.00	24 Aug 2020	24 Aug 2020
3	Wet pitfall trap	5,880.00	06 Jul 2020	24 Aug 2020

Site description - visit 2 (12 May 2020)

Marri woodland over *Banksia, Acacia*, xantheraceae and *Zamia* on black golden loamy soil with continuous leaf litter.

Habitat	woodland		
Disturbance	vehicle tracks		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	65	**Litter distribution**	even/continuous
Tree cover (%)	40	**Litter depth(cm)**	3
Shrub cover (%)	30	**Litter cover (%)**	100
Grass cover (%)	1		
Herb cover (%)	0		

Site details			
Site	**1331-SRE015-20**	**Position (WGS84)**	-33.136645, 116.147068
Topography	undulating plain	**Soil texture**	loam, laterite
Slope	gentle	**Rock type**	none
Soil colour	yellow, black	**Rock cover (%)**	0

Sample and effort summary

Visit	Sample method	Sample quant. (hrs)	Date start	Date stop
2	Foraging	4,704.00	06 Jul 2020	24 Aug 2020
2	Litter sieve	4,704.00	06 Jul 2020	24 Aug 2020
2	Site description	0.00	12 May 2020	12 May 2020
2	Wet pitfall trap	6,600.00	12 May 2020	06 Jul 2020
3	Burrow excavation	0.00	24 Aug 2020	24 Aug 2020
3	Foraging	0.00	24 Aug 2020	24 Aug 2020
3	Litter sieve	-4,704.00	24 Aug 2020	06 Jul 2020
3	Wet pitfall trap	5,880.00	06 Jul 2020	24 Aug 2020

Site description - visit 2 (12 May 2020)			
Jarrah/Marri forest on a flat to mid slope.			
Habitat	forest		
Disturbance	vehicle tracks		
Vegetation condition	Excellent	**Fire age**	moderate (>5 years)
Total veg. cover (%)	80	**Litter distribution**	even/continuous
Tree cover (%)	70	**Litter depth(cm)**	5
Shrub cover (%)	40	**Litter cover (%)**	100
Grass cover (%)	1		
Herb cover (%)	0		

Appendix 2 Survey sites from BBM and BGM SRE surveys

Site name	Site type	Season	Latitude	Longitude	Veg. code	SRE habitat status	Fauna habitat code	Location	Reference
Site 1	Pitfall trap	Spring 2011	-32.7662	116.3926	M	Low	4	PAA	Outback Ecology (2012)
Site 2	Pitfall trap	Spring 2011	-32.6896	116.3202	-	-	-	Outside PAA	Outback Ecology (2012)
Site 3	Pitfall trap	Spring 2011	-32.7473	116.3246	AX	High	9	Outside PAA	Outback Ecology (2012)
Site 4	Pitfall trap	Spring 2011	-32.7515	116.3932	Y	High	8	PAA	Outback Ecology (2012)
Site 5	Pitfall trap	Spring 2011	-32.7788	116.3304	S	Low	4	Outside PAA	Outback Ecology (2012)
Site 6	Pitfall trap	Spring 2011	-32.7159	116.3423	-	-	-	Outside PAA	Outback Ecology (2012)
Site 7	Pitfall trap	Spring 2011	-32.7159	116.3423	S	Low	4	Outside PAA	Outback Ecology (2012)
Site 8	Pitfall trap	Spring 2011	-32.7793	116.3824	A	High	1	PAA	Outback Ecology (2012)
Site 9	Pitfall trap	Spring 2011	-32.6498	116.3556	SP	Low	4	Outside PAA	Outback Ecology (2012)
Site 10	Pitfall trap	Spring 2011	-32.7563	116.4506	AY	High	9	Outside PAA	Outback Ecology (2012)
Site 11	Pitfall trap	Spring 2011	-32.6207	116.2928	-	-	-	Outside PAA	Outback Ecology (2012)
Site 12	Pitfall trap	Spring 2011	-32.6398	116.2899	-	-	-	Outside PAA	Outback Ecology (2012)
Site 13	Pitfall trap	Spring 2011	-32.7562	116.2918	-	-	-	Outside PAA	Outback Ecology (2012)
Site 14	Pitfall trap	Spring 2011	-32.6955	116.4260	PL - Ag	None	6	Outside PAA	Outback Ecology (2012)

Site name	Site type	Season	Latitude	Longitude	Veg. code	SRE habitat status	Fauna habitat code	Location	Reference
Site 15	Pitfall trap	Spring 2011	-32.6663	116.4393	A	High	1	Outside PAA	Outback Ecology (2012)
Site 16	Pitfall trap	Spring 2011	-32.6645	116.4191	Z	Low	7	Outside PAA	Outback Ecology (2012)
Site 17	Pitfall trap	Spring 2011	-32.6626	116.3921	MG	Low	4	Outside PAA	Outback Ecology (2012)
Site 18	Pitfall trap	Spring 2011	-32.6516	116.4291	PL - Ag	None	6	Outside PAA	Outback Ecology (2012)
Site 19	Pitfall trap	Spring 2011	-32.6655	116.4287	L	Low	9	Outside PAA	Outback Ecology (2012)
Site 20	Pitfall trap	Spring 2011	-32.6861	116.4530	M2	Low	4	Outside PAA	Outback Ecology (2012)
Site 21	Pitfall trap	Spring 2011	-32.7205	116.4296	Y	High	8	Outside PAA	Outback Ecology (2012)
Site 22	Pitfall trap	Spring 2011	-32.6246	116.3484		-		Outside PAA	Outback Ecology (2012)
Site 23	Pitfall trap	Spring 2011	-32.6337	116.4401	G2	High	3	Outside PAA	Outback Ecology (2012)
Site 24	Pitfall trap	Spring 2011	-32.7700	116.4590	AY	High	9	Outside PAA	Outback Ecology (2012)
Target 1	Targ. search	Spring 2011	-32.7656	116.4023	Y	High	8	PAA	Outback Ecology (2012)
Target 2	Targ. search	Spring 2011	-32.6318	116.4341	CL – Ag	None	6	Outside PAA	Outback Ecology (2012)
Target 3	Targ. search	Spring 2011	-32.7027	116.4570	YG	Low	8	Outside PAA	Outback Ecology (2012)
Target 4	Targ. search	Spring 2011	-32.6839	116.4209	CL - Ag	None	6	Outside PAA	Outback Ecology (2012)
Target 5	Targ. search	Spring 2011	-32.6392	116.4234	CL - Ag	None	6	Outside PAA	Outback Ecology (2012)

Site name	Site type	Season	Latitude	Longitude	Veg. code	SRE habitat status	Fauna habitat code	Location	Reference
Target 6	Targ. search	Spring 2011	-32.6426	116.4211	CL - Ag	None	6	Outside PAA	Outback Ecology (2012)
Target 7	Targ. search	Spring 2011	-32.6793	116.4578	Y	High	8	Outside PAA	Outback Ecology (2012)
985-01	Pitfall trap	Spring 2011, autumn 2012	-32.9331	116.444952	G3	Low	3	PAA	Phoenix (2012b)
985-02	Pitfall trap	Spring 2011, autumn 2012	-32.9082	116.419189	MG	Low	4	PAA	Phoenix (2012b)
985-03	Pitfall trap	Spring 2011, autumn 2012	-32.9681	116.454858	P	Low	4	PAA	Phoenix (2012b)
985-04	Pitfall trap	Spring 2011, autumn 2012	-32.8201	116.415654	M	Low	4	PAA	Phoenix (2012b)
985-06	Pitfall trap	Spring 2011, autumn 2012	-32.8262	116.470976	M	Low	4	Outside PAA	Phoenix (2012b)
985-08	Pitfall trap	Spring 2011, autumn 2012	-32.9717	116.514648	Y	High	8	Outside PAA	Phoenix (2012b)
985-09	Pitfall trap	Spring 2011, autumn 2012	-32.9919	116.558047	AY	High	9	Outside PAA	Phoenix (2012b)
1002-11	Pitfall trap	Spring 2011, autumn 2012	-32.9790	116.53122	M	Low	4	PAA	Phoenix (2012b)
1002-12	Pitfall trap	Spring 2011, autumn 2012	-32.9974	116.518525	M	Low	4	PAA	Phoenix (2012b)
1002-13	Pitfall trap	Spring 2011, autumn 2012	-32.8419	116.453296	M	Low	4	PAA	Phoenix (2012b)
1002-14	Pitfall trap	Spring 2011, autumn 2012	-32.8584	116.438719	Rehab	None -	6	PAA	Phoenix (2012b)
CBME001	Pitfall trap	Autumn, Winter, Spring 2019 (Sep &Nov)	-33.2229	116.0276	CQ	High	9	PAA	Phoenix (2020)
CBME002	Pitfall trap	Autumn, Winter, Spring 2019 (Sep &Nov)	-33.233	116.0477	Q	High	9	PAA	Phoenix (2020)
CBME003	Pitfall trap	Autumn, Winter, Spring 2019 (Sep & Nov)	-33.2277	116.0469	S	Low	4	PAA	Phoenix (2020)
CBME004	Pitfall trap	Autumn, Winter, Spring 2019 (Sep & Nov)	-33.2162	116.0401	ST	Low	4	PAA	Phoenix (2020)
CBME005	Pitfall trap	Autumn, Winter, Spring 2019 (Sep & Nov)	-33.2141	116.0358	Q	High	9	PAA	Phoenix (2020)
CBME006	Pitfall trap	Autumn, Winter, Spring 2019 (Sep & Nov)	-33.2513	116.1007	-	Low		Outside PAA	Phoenix (2020)
CBME007	Pitfall trap	Autumn, Winter, Spring 2019 (Sep & Nov)	-33.2226	116.118	-	Low		Outside PAA	Phoenix (2020)
CBME008	Pitfall trap	Autumn, Winter, Spring 2019 (Sep & Nov)	-33.2725	116.0657	-	Low		Outside PAA	Phoenix (2020)
CBME009	Pitfall trap	Autumn, Winter, Spring 2019 (Sep & Nov)	-33.2258	116.0205	-	High		Outside PAA	Phoenix (2020)
CBME010	Pitfall trap	Autumn, Winter, Spring 2019 (Sep & Nov)	-33.2078	116.038	-	High		Outside PAA	Phoenix (2020)

Site name	Site type	Season	Latitude	Longitude	Veg. code	SRE habitat status	Fauna habitat code	Location	Reference
WMDE01	Pitfall trap	Spring 2019 (Sep & Nov)	-32.9477	116.44	G3	High	3	PAA	Phoenix (2020)
WMDE02	Pitfall trap	Spring 2019 (Sep & Nov)	-32.9486	116.4345	P	Low	4	PAA	Phoenix (2020)
WMDE03	Pitfall trap	Spring 2019 (Sep & Nov)	-32.9580	116.446	H	Low	4	PAA	Phoenix (2020)
WMDE22	Pitfall trap	Spring 2019 (Sep & Nov)	-32.8910	116.4403	ST	Low	4	PAA	Phoenix (2020)
WMDE04	Pitfall trap	Spring 2019 (Sep & Nov)	-32.8904	116.4335	ST	Low	4	PAA	Phoenix (2020)
WMDE06	Pitfall trap	Spring 2019 (Sep & Nov)	-32.8285	116.4098	D	High	2	PAA	Phoenix (2020)
WMDE07	Pitfall trap	Spring 2019 (Sep & Nov)	-32.8263	116.4097	P	Low	4	PAA	Phoenix (2020)
WMDE08	Pitfall trap	Spring 2019 (Sep & Nov)	-32.7255	116.3928	G3	High	3	PAA	Phoenix (2020)
WMDE09	Pitfall trap	Spring 2019 (Sep & Nov)	-32.7406	116.3816	AY	High	9	PAA	Phoenix (2020)
WMDE10	Pitfall trap	Spring 2019 (Sep & Nov)	-32.7646	116.3871	M	Low	4	PAA	Phoenix (2020)
WMDE11	Pitfall trap	Spring 2019 (Sep & Nov)	-32.7679	116.3869	AY	High	9	PAA	Phoenix (2020)
WMDE12	Pitfall trap	Spring 2019 (Sep & Nov)	-32.772	116.4109	AX	High	9	Outside PAA	Phoenix (2020)
WMDE13	Pitfall trap	Spring 2019 (Sep & Nov)	-32.775	116.4107	M	Low	4	PAA	Phoenix (2020)
WMDE14	Pitfall trap	Spring 2019 (Sep & Nov)	-32.8077	116.3879	D	High	2	PAA	Phoenix (2020)
WMDE15	Pitfall trap	Spring 2019 (Sep & Nov)	-32.8103	116.3937	P	Low	4	PAA	Phoenix (2020)
WMDE16	Pitfall trap	Spring 2019 (Sep & Nov)	-32.8554	116.4103	Z	Low	7	PAA	Phoenix (2020)
WMDE17	Pitfall trap	Spring 2019 (Sep & Nov)	-32.9745	116.5201	A	High	1	PAA	Phoenix (2020)
WMDE18	Pitfall trap	Spring 2019 (Sep & Nov)	-32.9875	116.5544	AY	High	9	PAA	Phoenix (2020)
WMDE19	Pitfall trap	Spring 2019 (Sep & Nov)	-32.9855	116.5277	P	Low	4	PAA	Phoenix (2020)
WMDE20	Pitfall trap	Spring 2019 (Sep & Nov)	-33.0005	116.4971	H1	Low	7	PAA	Phoenix (2020)
WMDE21	Pitfall trap	Spring 2019 (Sep & Nov)	-33.0051	116.5067	D	High	2	PAA	Phoenix (2020)

Appendix 3 Species list for the WMDE

Species	SRE status	1	2	3	4	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Araneomorphae																						
Karaops 'sp. indet'	W																					
Selenopidae sp. indet.	W											●										
Harvestmen																						
Ballarra longipalpis	P																					
Calliuncus `WorsleyDNA21`	P			●												●					●	
Calliuncus 'sp. indet'	P																					
Megalopsalis `WorsleyDNA22`	P																					
Megalopsalis `WorsleyDNA23`	P																					
Megalopsalis sp. indet.	P																					
Nunciella `WorsleyDNA25`	P																					
Nunciella 'sp. indet'	P																					
Triaenonychidae `genus 003` `WorsleyDNA24`	P																					
Triaenonychidae `genus 003` `WorsleyDNA26`	P											●										
Triaenonychidae `genus 003` `WorsleyDNA27`	P									●												
Triaenonychidae 'genus 003' 'sp. indet'	P		●	●																		
Triaenonychidae `genus 008` `WorsleyDNA28`	P																					
Triaenonychidae `genus 008` `WorsleyDNA29`	P																					
Triaenonychidae `genus 008` `WorsleyDNA30`	P														●		●					
Triaenonychidae 'genus 008' 'sp. indet'	P	●		●	●		●			●			●	●								
Land snails																						
Annoselix cf. dolosa	P																					
Bothriembryon cf. *bradshawi*	P																					
Charopidae 'sp. indet'	P																					
Luinodiscus sp. indet.	P																					
Millipedes																						
Antichiropus 'DIP097, Marradong'	CF							●														

Species	SRE status	1	2	3	4	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Antichiropus 'DIP046, boddington'	CF																					
Antichiropus 'DIP108, mt saddleback'	CF					●																
Antichiropus 'sp. indet'	P																					
Antichiropus variabilis	W		●	●		●	●		●		●	●			●			●			●	
Antichiropus 'DIP176, Worsley'	CF																					
Antichiropus 'DIP202, WorsleyDNA18'	P				●																	
Atelomastix nigrescens	W														●							
Atelomastix sp. indet.	W																					
cf *Sphaerotrichopus*' 'sp. indet'	P													●								
cf *Sphaerotrichopus*' 'WorsleyDNA01'	P									●		●			●							
Iulomorphidae sp. indet.	P																					
Iulomorphidae `WorsleyDNA20`	P																					
Ommatoiulus moreleti	W					●	●								●							
Podykipus collinus	W																					
Podykipus leptoiuloides	W							●														
Podykipus 'sp. indet'	W																					
Siphonotidae 'DIPAAF' 'cf. michaelseni'	P								●							●						
Siphonotidae 'DIPAAF' 'DIP188' 'boddington'	CF																					
Siphonotidae 'DIPAAF' 'sp. indet'	P																					
Siphonotidae 'DIPAAF' WorsleyDNA14'	P					●																
Siphonotidae 'DIPAAF' 'WorsleyDNA15'	P																					
Siphonotidae 'DIPAAG' 'DIP189' 'collie'	CF																					
Siphonotidae 'DIPAAG' 'DIP192' 'mt saddleback'	CF																					
Siphonotidae 'DIPAAH' 'DIP190' 'harris river'	CF																					
Mygalomorphae																						
Aname 'MYG010'	W										●											
Aname 'Phoenix0037'	P																					
Aname 'sp. indet'	P						●															

Species	SRE status	1	2	3	4	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Aname 'WorsleyDNA09'	P																					
Anamidae 'Phoenix0022'	P																					
Anamidae 'sp. indet'	P																					
Aurecocrypta 'Phoenix0014'	P																					
Barychelidae 'sp. indet'	P																					
Barychelidae 'WorsleyDNA10'	P																					
Eucyrtops 'collie'	P																					
Eucyrtops 'MYG645'	P	●	●														●		●			
Eucyrtops 'Phoenix0001'	P																					
Eucyrtops 'Phoenix0018'	P																					
Eucyrtops 'Phoenix0033'	P																					
Eucyrtops 'Phoenix0043'	P																					
Eucyrtops 'Phoenix0044'	P																					
Eucyrtops 'Phoenix0045'	P																					
Eucyrtops 'WorsleyDNA06'	P								●	●		●	●									
Euoplos inornatus	P3 & P																					
Euoplos 'Phoenix0013'	P																					
Idiommata blackwalli	W																					
Idiopidae 'sp. indet'	P																					
Idiosoma jarrah	W																			●		
Idiosoma 'Phoenix0002'	P																					
Idiosoma 'rhaphiduca group'	W																					
Idiosoma ' MYG741, WorsleyDNA05'	P		●			●				●							●					
Eucanippe nemestrina	P			●																		
Missulena 'MYG198'	P										●											
Missulena 'MYG639'	P																					
Missulena 'Phoenix0046'	P																					
Missulena 'sp. indet'	P																					

Species	SRE status	1	2	3	4	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Bungulla 'WorsleyDNA11'	P																					
Proshermacha 'MYG485'	P																					
Proshermacha 'MYG646'	P																					
Proshermacha 'MYG658'	P																					
Proshermacha 'sp. indet'	P						●															
Proshermacha 'WorsleyDNA12'	P																					
Synothele michaelseni	W																					
Synothele 'MYG640'	P																					
Synothele rubripes	P			●				●												●		
Synothele 'WorsleyDNA17'	P																					
Teyl 'Phoenix0017'	P																					
Pseudoscorpions																						
Austrochthonius 'grandis'	W												●			●						
Austrochthonius muchmorei	W																					
Austrochthonius 'PSE188'	W		●	●	●				●							●	●		●	●	●	
Austrochthonius sp. indet.	W							●													●	
Beierolpium bornemisszai	W		●					●							●							
Beierolpium `WorsleyDNA18`	P				●																	
Beierolpium `WorsleyDNA19`	P		●																			
Beierolpium 'sp. indet'	P		●		●																	
Chernetidae 'boddington'	W																					
Chernetidae 'sp. indet'	W																					
Euryolpium 'sp. indet'	P																					
Indolpium sp. indet.	P		●																			
Lagynochthonius australicus	W																					
Oratemnus curtus	W						●	●											●			
Oratemnus 'sp. indet'	W					●																
Protochelifer 'boddington'	W																					

Species	SRE status	1	2	3	4	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Protochelifer 'sp. indet'	W																					
Pseudotyrannochthonius 'Harms sp. Darling Range 2'	W	●					●						●			●			●			●
Pseudotyrannochthonius 'sp. indet'	P																					
Scorpions																						
Cercophonius sulcatus	W								●					●							●	
Lychas 'austroccidentalis'	W											●										
Urodacus novaehollandiae	W					●				●	●											●1
Isopods																						
Acanthodillo '5'	P																					
Acanthodillo 'sp. indet'	P						●															
Armadillo flavus	P																					
Buddelundia '04'	P					●	●		●													
Buddelundia nigripes	P																					
Buddelundia nitidissima	W	●	●	●			●		●		●				●		●	●			●	
Buddelundia 'sp. indet'	P														●							
Buddelundia 'sp. indet. A'	L											●	●									
Laevophiloscia 'cf. perlata'	P																					
Laevophiloscia '1'	P	●	●	●				●	●	●									●		●	●
Laevophiloscia '2'	W	●		●				●		●		●	●	●							●	
Laevophiloscia sp. indet.	P		●	●						●	●	●				●				●		
Paraplatyarthrus 'sp. indet'	L					●	●															●
Paraplatyarthrus 'sp. indet. A'	L	●																				
Paraplatyarthrus 'sp. indet. B'	L		●																			
Paraplatyarthrus 'sp. indet. C'	L				●																	
Paraplatyarthrus 'sp. indet. D'	L					●																
Philosciidae 's'	L																					
Philosciidae sp. indet.	P																					
Pseudodiploexochus '1'	L		1			1																1

Species	SRE status	1	2	3	4	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Pseudodiploexochus 'sp. indet'	L																					
Pseudodiploexochus 'sp. indet. A'	L									●												
Pseudodiploexochus 'sp. indet. B'	L															●						
Spherillo '5'	W	●	●	●	●	●	●	●	●	●	●	●		●	●		●	●	●		●	●
Styloniscus '1'	P			●			●						●									
Styloniscus '7'	P				●	●																
Styloniscus 'A' (Worsley)	L																					
Styloniscus 'B' (Worsley)	L																					
Styloniscus sp. indet.	P																					
Velvet worms																						
Occiperipatoides gilesii	W								●													
Total		**8**	**14**	**13**	**7**	**13**	**13**	**9**	**10**	**11**	**7**	**9**	**8**	**5**	**9**	**7**	**6**	**3**	**6**	**4**	**9**	**6**

Appendix 4 Species list in the CBME

Species	SRE status	1	2	3	4	5	6	7	8	9	10
Araneomorphae											
Karaops 'sp. indet'	W										
Selenopidae sp. indet.	W										
Harvestmen											
Ballarra longipalpis	P										
Calliuncus `WorsleyDNA21`	P										•
Calliuncus 'sp. indet'	P						•				
Megalopsalis `WorsleyDNA22`	P										
Megalopsalis `WorsleyDNA23`	P										
Megalopsalis sp. indet.	P				•					•	
Nunciella`WorsleyDNA25`											
Nunciella 'sp. indet'	P	•		•	•	•				•	•
Triaenonychidae `genus 003` `WorsleyDNA24`	P										
Triaenonychidae `genus 003` `WorsleyDNA26`	P										
Triaenonychidae `genus 003` `WorsleyDNA27`	P										
Triaenonychidae 'genus 003' 'sp. indet'	P										
Triaenonychidae `genus 008` `WorsleyDNA28`	P										
Triaenonychidae `genus 008` `WorsleyDNA29`	P										
Triaenonychidae `genus 008` `WorsleyDNA30`	P									•	
Triaenonychidae 'genus 008' 'sp. indet'	P										
Land snails											
Annoselix cf. dolosa	P										
Bothriembryon cf. *bradshawi*	P										
Charopidae 'sp. indet'	P										
Luinodiscus sp. indet.	P										
Millipedes											
Antichiropus 'DIP097, Marradong	CF										

Species	SRE status	1	2	3	4	5	6	7	8	9	10
Antichiropus 'DIP046 boddington'	CF										
Antichiropus 'DIP108, mt saddleback'	CF	●	●	●			●		●	●	
Antichiropus 'sp. indet'	P										
Antichiropus variabilis	W										
Antichiropus 'DIP176, Worsley'	CF							●			
Antichiropus 'DIP202, WorsleyDNA18'	P										
Atelomastix nigrescens	W	●	●	●	●	●	●	●	●	●	●
Atelomastix sp. indet.	W	●	●	●	●	●	●	●	●	●	●
cf *Sphaerotrichopus*' 'sp. indet'	P										
cf *Sphaerotrichopus*' 'WorsleyDNA01'	P										
Iulomorphidae sp. indet.	P	●			●	●					
Iulomorphidae `WorsleyDNA20`	P										
Ommatoiulus moreleti	W										
Podykipus collinus	W		●	●	●	●		●			
Podykipus leptoiuloides	P	●						●	●		
Podykipus 'sp. indet'	W	●		●		●				●	
Siphonotidae 'DIPAAF' 'cf. michaelseni'	W					●					
Siphonotidae 'DIPAAF' 'DIP188' 'boddington'	CF										
Siphonotidae 'DIPAAF' 'sp. indet'	P										●
Siphonotidae 'DIPAAF' WorsleyDNA14'	P										
Siphonotidae 'DIPAAF' 'WorsleyDNA15'	P				●						
Siphonotidae 'DIPAAG' 'DIP189' 'collie'	CF		●						●	●	
Siphonotidae 'DIPAAG' 'DIP192' 'mt saddleback'	CF										
Siphonotidae 'DIPAAH' 'DIP190' 'harris river'	CF										
Mygalomorphae											
Aname 'MYG010'	W										
Aname 'Phoenix0037'	P										
Aname 'sp. indet'	P										

Species	SRE status	1	2	3	4	5	6	7	8	9	10
Aname 'WorsleyDNA09'	P								•		
Anamidae 'Phoenix0022'	P										
Anamidae 'sp. indet'	P										
Aurecocrypta 'Phoenix0014'	P										
Barychelidae 'sp. indet'	P										
Barychelidae 'WorsleyDNA10'	P								•		
Eucyrtops 'collie'	P										
Eucyrtops 'MYG645'	P		•	•	•			•			
Eucyrtops 'Phoenix0001'	P										
Eucyrtops 'Phoenix0018'	P										
Eucyrtops 'Phoenix0033'	P										
Eucyrtops 'Phoenix0043'	P										
Eucyrtops 'Phoenix0044'	P										
Eucyrtops 'Phoenix0045'	P										
Eucyrtops 'WorsleyDNA06'	P										
Euoplos inornatus	P3 & P										
Euoplos 'Phoenix0013'	P										
Idiommata blackwalli	W										
Idiopidae 'sp. indet'	P										
Idiosoma jarrah	W										
Idiosoma 'Phoenix0002'	P										
Idiosoma 'rhaphiduca group'	W										
Idiosoma 'MYG741'	P					•					
Eucanippe nemestrina	P										
Missulena 'MYG198'	P										
Missulena 'MYG639'	P									•	
Missulena 'Phoenix0046'	P										
Missulena 'sp. indet'	P										

Species	SRE status	1	2	3	4	5	6	7	8	9	10
Bungulla 'WorsleyDNA11'	P	●									
Proshermacha 'MYG485'	P		●								
Proshermacha 'MYG646'	P	●									
Proshermacha 'MYG658 '	P				●						
Proshermacha 'sp. indet'	P										
Proshermacha 'WorsleyDNA12'	P		●						●		
Synothele michaelseni	W										
Synothele 'MYG640'	P		●	●	●		●				
Synothele rubripes	P										
Synothele 'WorsleyDNA17'	P								●		
Teyl 'Phoenix0017'	P										
Pseudoscorpions											
Austrochthonius 'grandis'	W										
Austrochthonius muchmorei	W					●					●
Austrochthonius 'PSE188'	W	●	●					●	●		
Austrochthonius sp. indet.	W					●					
Beierolpium bornemisszai	W		●			●		●			
Beierolpium `WorsleyDNA18`	P										
Beierolpium `WorsleyDNA19`	P										
Beierolpium 'sp. indet'	P			●							
Chernetidae 'boddington'	W										
Chernetidae 'sp. indet'	W		●								
Euryolpium 'sp. indet'	P						●				
Indolpium sp. indet.	P										
Lagynochthonius australicus	W	●	●	●	●	●				●	●
Oratemnus curtus	W		●								
Oratemnus 'sp. indet'	W										
Protochelifer 'boddington'	W										

Species	SRE status	1	2	3	4	5	6	7	8	9	10
Protochelifer 'sp. indet'	W	●									
Pseudotyrannochthonius 'Harms sp. Darling Range 2'	W						●		●		
Pseudotyrannochthonius 'sp. indet'	P										●
Scorpions											
Cercophonius sulcatus	W		●			●	●	●		●	
Lychas 'austroccidentalis'	W										
Urodacus novaehollandiae	W										
Isopods											
Acanthodillo '5'	P						●				
Acanthodillo 'sp. indet'	P										
Armadillo flavus	P										
Buddelundia '04'	P										
Buddelundia nigripes	P			●	●	●				●	
Buddelundia nitidissima	W										
Buddelundia 'sp. indet'	P										
Buddelundia 'sp. indet. A'	L										
Laevophiloscia 'cf. perlata'	P										
Laevophiloscia '1'	P	●	●	●	●		●	●		●	●
Laevophiloscia '2'	W	●	●	●	●	●	●	●	●	●	●
Laevophiloscia sp. indet.	P										
Paraplatyarthrus 'sp. indet'	L						●				
Paraplatyarthrus 'sp. indet. A'	L										
Paraplatyarthrus 'sp. indet. B'	L										
Paraplatyarthrus 'sp. indet. C'	L										
Paraplatyarthrus 'sp. indet. D'	L										
Philosciidae 's'	L										
Philosciidae sp. indet.	P										
Pseudodiploexochus '1'	L	●			●					●	

Species	SRE status	1	2	3	4	5	6	7	8	9	10
Pseudodiploexochus 'sp. indet'	L										
Pseudodiploexochus 'sp. indet. A'	L										
Pseudodiploexochus 'sp. indet. B'	L										
Spherillo '5'	W						●	●	●		●
Styloniscus '1'	P	●	●	●	●	●	●	●	●	●	●
Styloniscus '7'	P			●	●	●				●	
Styloniscus `A` (Worsley)	L										
Styloniscus 'B' (Worsley)	L										
Styloniscus sp. indet.	P				●						
Velvet worms											
Occiperipatoides gilesii	W										
Total		**17**	**18**	**15**	**17**	**17**	**14**	**13**	**14**	**16**	**12**

Appendix 5 Species list in the regional survey

Species	SRE status	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Araneomorphae																
Karaops 'sp. indet'	W			•					•							
Selenopidae sp. indet.	W															
Harvestmen																
Ballarra longipalpis	P	•	•	•	•		•	•	•	•			•	•		
Calliuncus `WorsleyDNA21`	P										•	•	•			
Calliuncus 'sp. indet'	P													•		
Megalopsalis `WorsleyDNA22`	P			•					•							
Megalopsalis `WorsleyDNA23`	P						•	•				•			•	
Megalopsalis sp. indet.	P			•			•	•	•			•			•	
Nunciella `WorsleyDNA25`	P												•			
Nunciella 'sp. indet'	P									•			•			
Triaenonychidae `genus 003` `WorsleyDNA24`	P									•						
Triaenonychidae `genus 003` `WorsleyDNA26`	P															
Triaenonychidae 'genus 003' 'sp. indet'	P									•						
Triaenonychidae `genus 003` `WorsleyDNA27`	P															
Triaenonychidae `genus 008` `WorsleyDNA28`	P									•						
Triaenonychidae `genus 008` `WorsleyDNA29`	P									•	•	•		•	•	
Triaenonychidae `genus 008` `WorsleyDNA30`	P															
Triaenonychidae 'genus 008' 'sp. indet'	P									•						
Land snails																
Annoselix cf. dolosa	P									•						
Bothriembryon cf. *bradshawi*	P															
Charopidae 'sp. indet'	P					•					•					

Species	SRE status	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Luinodiscus sp. indet.	P		•			•						•				•
Millipedes																
Antichiropus 'DIP097, Marradong	CF															
Antichiropus 'DIP046, boddington'	CF	•			•							•	•	•		•
Antichiropus 'DIP108, mt saddleback'	CF	•								•	•	•	•	•	•	•
Antichiropus 'sp. indet'	P										•		•	•		•
Antichiropus variabilis	W	•		•	•	•	•								•	
Antichiropus 'DIP176, Worsley'	CF															
Antichiropus 'DIP202, WorsleyDNA18'	P															
Atelomastix nigrescens	W						•			•	•	•	•	•	•	•
Atelomastix sp. indet.	W															
cf *Sphaerotrichopus*' 'sp. indet'	P										•	•				
cf *Sphaerotrichopus*' 'WorsleyDNA01'	P															
Iulomorphidae sp. indet.	P												•		•	
Iulomorphidae `WorsleyDNA20`	P													•		•
Ommatoiulus moreleti	W															
Podykipus collinus	W															
Podykipus leptoiuloides	P	•		•	•		•	•		•	•	•	•		•	
Podykipus 'sp. indet'	W						•									
Siphonotidae 'DIPAAF' 'cf. michaelseni'	P															
Siphonotidae 'DIPAAF' 'DIP188' 'boddington'	CF	•										•				
Siphonotidae 'DIPAAF' 'sp. indet'	P															
Siphonotidae 'DIPAAF' WorsleyDNA14'	P															
Siphonotidae 'DIPAAF' 'WorsleyDNA15'	P															
Siphonotidae 'DIPAAG' 'DIP189' 'collie'	CF			•			•					•				

Species	SRE status	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Siphonotidae 'DIPAAG' 'DIP192' 'mt saddleback'	CF							•					•			
Siphonotidae 'DIPAAH' 'DIP190' 'harris river'	CF						•									
Mygalomorphae																
Aname 'MYG010'	W															
Aname 'Phoenix0037'	P															
Aname 'sp. indet'	P			•												
Aname 'WorsleyDNA09'	P															
Anamidae 'Phoenix0022'	P									•						
Anamidae 'sp. indet'	P		•												•	
Aurecocrypta 'Phoenix0014'	P							•				•			•	
Barychelidae 'sp. indet'	P							•								
Barychelidae 'WorsleyDNA10'	P															
Eucyrtops 'collie'	P			•						•						
Eucyrtops 'MYG645'	P															
Eucyrtops 'Phoenix0001'	P														•	
Eucyrtops 'Phoenix0018'	P															
Eucyrtops 'Phoenix0033'	P											•		•		
Eucyrtops 'Phoenix0043'	P								•							
Eucyrtops 'Phoenix0044'	P	•	•		•											
Eucyrtops 'Phoenix0045'	P			•												
Eucyrtops 'WorsleyDNA06'	P															
Euoplos inornatus	P3 & P					•										
Euoplos 'Phoenix0013'	P						•									
Idiommata blackwalli	W															
Idiopidae 'sp. indet'	P		•	•	•			•				•				

Species	SRE status	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Idiosoma jarrah	W															
Idiosoma 'Phoenix0002'	P							•								
Idiosoma 'rhaphiduca group'	W				•			•	•							
Idiosoma 'MYG741'	P															
Eucanippe nemestrina	P															
Missulena 'MYG198'	P					•										
Missulena 'MYG639'	P															
Missulena 'Phoenix0046'	P				•											
Missulena 'sp. indet'	P							•			•	•				
Bungulla 'WorsleyDNA11'	P															
Proshermacha 'MYG485'	P			•												
Proshermacha 'MYG646'	P								•		•			•		
Proshermacha 'MYG658'	P															
Proshermacha 'sp. indet'	P		•							•					•	
Proshermacha 'WorsleyDNA12'	P															
Synothele michaelseni	W		•		•	•						•			•	
Synothele 'MYG640'	P															
Synothele rubripes	P					•										
Synothele 'WorsleyDNA17'	P															
Teyl 'Phoenix0017'	P				•											
Pseudoscorpions																
Austrochthonius 'grandis'	W															
Austrochthonius muchmorei	W						•		•					•		•
Austrochthonius 'PSE188'	W				•											
Austrochthonius sp. indet.	W	•		•		•	•	•		•				•		

Species	SRE status	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Beierolpium bornemisszai	W															
Beierolpium `WorsleyDNA18`	P															
Beierolpium `WorsleyDNA19`	P															
Beierolpium 'sp. indet'	P															
Chernetidae 'boddington'	W	•														
Chernetidae 'sp. indet'	W															
Euryolpium 'sp. indet'	P															
Indolpium sp. indet.	P															
Lagynochthonius australicus	W															•
Oratemnus curtus	**W**															
Oratemnus 'sp. indet'	**W**															
Protochelifer 'boddington'	**W**			•							•	•		•	•	
Protochelifer 'sp. indet'	**W**			•						•					•	
Pseudotyrannochthonius 'Harms sp. Darling Range 2'	**W**	•								•		•		•		
Pseudotyrannochthonius 'sp. indet'	**P**															
Scorpions																
Cercophonius sulcatus	**W**		•			•			•	•		•		•	•	
Lychas 'austroccidentalis'	**W**								•	•		•				
Urodacus novaehollandiae	**W**															
Isopods																
Acanthodillo '5'	**P**															
Acanthodillo 'sp. indet'	**P**							•							•	
Armadillo flavus	P						•							•		•
Buddelundia '04'	P															
Buddelundia nigripes	P									•						

Species	SRE status	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Buddelundia nitidissima	W						●	●	●							
Buddelundia 'sp. indet'	P	●														
Buddelundia 'sp. indet. A'	L															
Laevophiloscia '1'	P	●	●	●	●	●	●		●		●	●		●	●	●
Laevophiloscia '2'	W		●		●	●			●	●	●	●	●	●	●	●
Laevophiloscia 'cf. perlata'	P					●										
Laevophiloscia sp. indet.	P	●	●			●	●				●			●		●
Paraplatyarthrus 'sp. indet'	L							●								
Paraplatyarthrus 'sp. indet. A'	L	●		●	●	●										
Paraplatyarthrus 'sp. indet. B'	L															
Paraplatyarthrus 'sp. indet. C'	L															
Paraplatyarthrus 'sp. indet. D'	L															
Philosciidae 's'	L				●		●									
Philosciidae sp. indet.	P															
Pseudodiploexochus '1'	L									●		●				
Pseudodiploexochus 'sp. indet'	L													●		●
Pseudodiploexochus 'sp. indet. A'	L															
Pseudodiploexochus 'sp. indet. B'	L															
Spherillo '5'	W						●	●		●	●			●	●	●
Styloniscus '1'	P									●	●			●		
Styloniscus '7'	P									●	●	●				
Styloniscus 'A' (Worsley)	L															●
Styloniscus 'B' (Worsley)	L													●		
Styloniscus sp. indet.	P						●				●	●		●		●
Velvet worms																

Species	SRE status	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Occiperipatoides gilesii	W						•						•			
Total		14	11	16	15	13	22	15	12	23	18	26	13	24	19	15

Appendix 6 Species list in the rehabilitation survey

Species	SRE status	1	2	3	4	5	6	7	8
Araneomorphae									
Karaops 'sp. indet'	W								
Selenopidae sp. indet.	W								
Harvestmen									
Ballarra longipalpis	P								
Calliuncus 'sp. indet'	P								
Calliuncus `WorsleyDNA21`	P								
Megalopsalis sp. indet.	P								
Megalopsalis 'WorsleyDNA22'	P								
Megalopsalis 'WorsleyDNA23'	P								
Nunciella 'WorsleyDNA25'	P								
Nunciella 'sp. indet'	P								
Triaenonychidae `genus 003` `WorsleyDNA24`	P								
Triaenonychidae `genus 003` `WorsleyDNA26`	P								
Triaenonychidae 'genus 003' 'sp. indet'	P								
Triaenonychidae `genus 003` `WorsleyDNA27`	P								
Triaenonychidae `genus 008` `WorsleyDNA28`	P								
Triaenonychidae `genus 008` `WorsleyDNA29`	P								
Triaenonychidae `genus 008` `WorsleyDNA30`	P		●	●	●		●		
Triaenonychidae 'genus 008' 'sp. indet'	P		●	●	●				
Land snails									
Annoselix cf. dolosa	P		●			●			
Bothriembryon cf. *bradshawi*	P				●				
Charopidae 'sp. indet'	P								
Luinodiscus sp. indet.	P								
Millipedes									
Antichiropus 'DIP097, Marradong	CF								

Species	SRE status	1	2	3	4	5	6	7	8
Antichiropus 'DIP046 boddington'	CF								
Antichiropus 'DIP108, mt saddleback '	CF								
Antichiropus 'sp. indet'	P								
Antichiropus variabilis	W	●		●	●	●	●	●	●
Antichiropus 'DIP176, Worsley'	CF								
Antichiropus 'DIP 202, WorsleyDNA18'	P								
Atelomastix nigrescens	W								
Atelomastix sp. indet.	W								
cf *Sphaerotrichopus* 'sp. indet'	P								
cf *Sphaerotrichopus*' 'WorsleyDNA01'	P								
Iulomorphidae `WorsleyDNA20`	P								
Iulomorphidae sp. indet.	P								
Ommatoiulus moreleti	W								
Podykipus collinus	W								
Podykipus leptoiuloides	P								
Podykipus 'sp. indet'	W								
Siphonotidae 'DIPAAF' 'cf. michaelseni'	P								
Siphonotidae 'DIPAAF' 'DIP188' 'boddington'	CF								
Siphonotidae 'DIPAAF' 'sp. indet'	P								
Siphonotidae 'DIPAAF' WorsleyDNA14'	P								
Siphonotidae 'DIPAAF' 'WorsleyDNA15'	P								
Siphonotidae 'DIPAAG' 'DIP189' 'collie'	CF								
Siphonotidae 'DIPAAG' 'DIP192' 'mt saddleback'	CF								
Siphonotidae 'DIPAAH' 'DIP190' 'harris river'	CF								
Mygalomorphae									
Aname 'MYG010'	W								
Aname 'Phoenix0037'	P	●			●				
Aname 'sp. indet'	P								

Species	SRE status	1	2	3	4	5	6	7	8
Aname 'WorsleyDNA09'	P								
Anamidae 'Phoenix0022'	P								
Anamidae 'sp. indet'	P								
Aurecocrypta 'Phoenix0014'	P								
Barychelidae 'sp. indet'	P								
Barychelidae 'WorsleyDNA10'	P								
Bungulla 'WorsleyDNA11'	P								
Eucanippe nemestrina	P								
Eucyrtops 'collie'	P								
Eucyrtops 'MYG645'	P								
Eucyrtops 'Phoenix0001'	P								
Eucyrtops 'Phoenix0018'	P								
Eucyrtops 'Phoenix0033'	P								
Eucyrtops 'Phoenix0043'	P								
Eucyrtops 'Phoenix0044'	P								
Eucyrtops 'Phoenix0045'	P								
Eucyrtops 'WorsleyDNA06'	P								
Euoplos inornatus	P3 & P								
Euoplos 'Phoenix0013'	P								
Idiommata blackwalli	W		•						
Idiopidae 'sp. indet'	P								
Idiosoma jarrah	W								
Idiosoma 'Phoenix0002'	P								
Idiosoma 'rhaphiduca group'	W								
Idiosoma 'MYG741'	P								
Missulena 'MYG198'	P								
Missulena 'MYG639'	P								
Missulena 'Phoenix0046'	P								

Species	SRE status	1	2	3	4	5	6	7	8
Missulena 'sp. indet'	P								
Proshermacha 'MYG485'	P					•			•
Proshermacha 'MYG646'	P								
Proshermacha 'MYG658'	P								
Proshermacha 'sp. indet'	P								
Proshermacha 'WorsleyDNA12'	P								
Synothele michaelseni	W								
Synothele 'MYG640'	P								
Synothele rubripes	P								
Synothele 'WorsleyDNA17'	P								
Teyl 'Phoenix0017'	P								
Pseudoscorpions									
Austrochthonius 'grandis'	W								
Austrochthonius muchmorei	W								
Austrochthonius 'PSE188'	W								
Austrochthonius sp. indet.	W								
Beierolpium `WorsleyDNA18`	P								
Beierolpium `WorsleyDNA19`	P								
Beierolpium bornemisszai	W								
Beierolpium 'sp. indet'	P								
Chernetidae 'boddington'	W								
Chernetidae 'sp. indet'	W								
Euryolpium 'sp. indet'	P								
Indolpium sp. indet.	P								
Lagynochthonius australicus	W								
Oratemnus curtus	W								
Oratemnus 'sp. indet'	W								
Protochelifer 'boddington'	W								

Species	SRE status	1	2	3	4	5	6	7	8
Protochelifer 'sp. indet'	W								
Pseudotyrannochthonius 'Harms sp. Darling Range 2'	W								
Pseudotyrannochthonius 'sp. indet'	P								
Scorpions									
Cercophonius sulcatus	W				●	●			
Lychas 'austroccidentalis'	W								
Urodacus novaehollandiae	W								
Isopods									
Acanthodillo '5'	P								
Acanthodillo 'sp. indet'	P			●					
Armadillo flavus	P								
Buddelundia '04'	P								
Buddelundia nigripes	P								
Buddelundia nitidissima	W		●	●	●	●	●	●	●
Buddelundia 'sp. indet'	P								
Buddelundia 'sp. indet. A'	L								
Laevophiloscia '1'	P	●	●	●	●	●	●		●
Laevophiloscia '2'	W			●	●			●	●
Laevophiloscia cf. perlata	P								
Laevophiloscia sp. indet.	P				●		●		
Paraplatyarthrus 'sp. indet'	L		●	●					
Paraplatyarthrus 'sp. indet. A'	L								
Paraplatyarthrus 'sp. indet. B'	L								
Paraplatyarthrus 'sp. indet. C'	L								
Paraplatyarthrus 'sp. indet. D'	L								
Philosciidae 's'	L								
Philosciidae sp. indet.	P				●			●	●
Pseudodiploexochus '1'	L								

Species	SRE status	1	2	3	4	5	6	7	8
Pseudodiploexochus 'sp. indet'	L								
Pseudodiploexochus 'sp. indet. A'	L								
Pseudodiploexochus 'sp. indet. B'	L								
Spherillo '5'	W	●	●	●	●				●
Styloniscus '1'	P	●							
Styloniscus '7'	P								
Styloniscus `A` (Worsley)	L								
Styloniscus 'B' (Worsley)	L								
Styloniscus sp. indet.	P								
Velvet worms									
Occiperipatoides gilesii	W								
Total		**5**	**8**	**8**	**12**	**6**	**7**	**4**	**7**