



Mt Cattlin Project

Level 1 Survey for Short-Range
Endemic Invertebrates

Prepared for:

Galaxy Resources Limited

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Final Report

Short-Range Endemics | Subterranean Fauna

Waterbirds | Wetlands

Mt Cattlin Project

Level 1 Survey for Short-Range Endemic Invertebrates

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EXECUTIVE SUMMARY

Galaxy Resources Limited operates the Mt Cattlin Project, 2 km north of Ravensthorpe, in southwestern Australia. Galaxy proposes to expand existing operations by developing open cut pits to the east and southeast of existing facilities (The Proposal). The potential environmental impacts of this expansion to short range endemic (SRE) invertebrate species are being assessed.

This report provides a Level 1 assessment of the threat presented by the Proposal to SRE invertebrate fauna. The specific aims of the assessment are:

- To review previous records of SREs in the vicinity of the Proposal;
- To examine vegetation, geological and landform information to determine to prospectivity of habitat at Mt Cattlin for SRE species;
- To confirm, through field survey in January 2018, the desktop-based conclusions regarding the likelihood of potential or confirmed SREs and listed invertebrate species occurring; and
- To assess the level of threat to SRE species posed by the mine expansion.

The area of proposed mine expansion, and the immediately adjacent area, comprise subdued hills covered by remnant York gum woodland and shrubland intersected by Cattlin Creek and minor drainage lines. There are minor variations in the woodland that appear related to changes in topography, with some areas hosting tall or medium woodland, or open to closed understorey. There was a large amount of leaf litter and logs. There were no steep gullies, rocky outcrops or breakaways. The woodlands represent a 'low' suitability habitat for SRE species. Because of its wide distribution, it is likely that a high proportion of species from SRE Groups found in this habitat type will be widespread.

Approximately 98 species from SRE Groups have been recorded in a search area of 100 km by 100 km around Mt Cattlin. Up to four of these species could be considered as Confirmed SREs and 43 as Potential SREs although there is evidence suggesting 12 species are probably not SREs. Three listed species have been recorded in the search area but in locations suggesting they will not occur at Mt Cattlin.

Ten sites at Mt Cattlin were sampled by hand foraging and soil/litter collecting in January 2018 during a reconnaissance survey of SRE Groups. Sampling occurred in all prospective microhabitats at each site, such as moist and dry leaf litter accumulations, around tree logs, under tree bark and in grass clumps. An additional seven sites were sampled opportunistically. Habitat at the sites sampled was assessed according to five criteria: the availability of moisture; soil structure; geological diversity; vegetation type; and extent of shade or shelter.

At least 34 species belonging to SRE Groups were recorded during the reconnaissance survey. Thirteen species was classed as 'Unlikely' SREs, 20 as Not SREs and one as unknown (a symphylan of the genus *Hanseniella*). There were no Confirmed or Potential SRE species. No listed species was recorded.

SRE habitats at the Proposal are widespread and have low prospectivity for SRE species. Together with the small extent of the proposed mine expansion, the low richness of species in SRE Groups and the lack of species meeting the criteria to be listed as SREs, it is considered the widespread habitat in the proposed expansion area makes it unlikely the conservation of any SRE species will be threatened.

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1. INTRODUCTION

Galaxy Resources Limited operates the Mt Cattlin Project, 2 km north of Ravensthorpe, in southwestern Australia (Figure 1). Galaxy proposes to expand existing open cut pits and develop others to the east and southeast of existing facilities and environmental impacts of this expansion are being assessed.

This report provides a Level 1 assessment of the threat presented by the proposed pit expansion East of Floater Road, to short range endemic (SRE) invertebrate fauna. The reasons for assessment is that the construction and operation of open cut pits, diversion of Cattlin Creek, and other associated infrastructure will permanently remove native vegetation and has the potential to adversely impact SRE species occurring in the vicinity. The area of the proposed pit expansion includes remnant York gum woodland and mallee scrub and shrublands north of Ravensthorpe township. The biologically rich Ravensthorpe Range lies to the north-east and the fauna of the proposed expansion area is likely to be similar to that of the Range. As pointed out by Markey *et al.* (2012), the Range is not protected in nature reserves and the only formal protection of its flora and fauna is provided by two small reserves of similar size and distance from the Range as the expansion area.

The Level 1 assessment consists of a desktop review and reconnaissance field survey for SREs in and around the Proposal. The specific aims of the assessment are:

- To review previous records of SREs in the vicinity of the Proposal;
- To examine vegetation, geological and landform information to determine to prospectivity of habitat at the Proposal for SRE species;
- To confirm through field survey in January 2018 the desktop-based conclusions regarding the likelihood of potential or confirmed SREs and listed invertebrate species occurring; and
- To assess the level of threat to SRE species posed by the mine expansion.

2. BACKGROUND

2.1. Proposal Description

Current operations at the Mt Cattlin mine involve open pit mining of pegmatite ore to produce lithium and tantalum. The existing mine pit is located south of the Old Newdegate Road and west of Floater Road (sometimes called Old Newdegate Road; Figure 2).

Expansion of the mine will involve some deepening of the highlighted areas in Dowling Pit and a 18.2 ha extension eastwards across Old Newdegate Road. There will also be an additional 24.1 ha mine pit to the south of Dowling on the eastern side of Floater Road.

Cattlin Creek currently flows through the area of the proposed pit expansion and will require diversion. Options are still being considered but it is most likely the creek will be diverted east of the new pit areas to re-join its original course to the south-east.

3. FRAMEWORK

3.1. Conservation Framework

The small ranges of SRE invertebrates, combined with their poor dispersal capacities, slow growth and low fecundity, make them particularly vulnerable to habitat loss or disturbance (Harvey 2002; Ponder and Colgan 2002). Consequently, SRE invertebrates form a category of species considered by the EPA in environmental impact assessments. The process used is outlined in *Environmental Factor Guideline: Terrestrial Fauna* (EPA 2016a) and supporting technical guidance relating to SREs is provided by *Sampling of Short Range Endemic Invertebrate Fauna* (EPA 2016b). The latter provides a theoretical framework for SRE assessment and guidance on standards and methods of survey required to collect appropriate data.

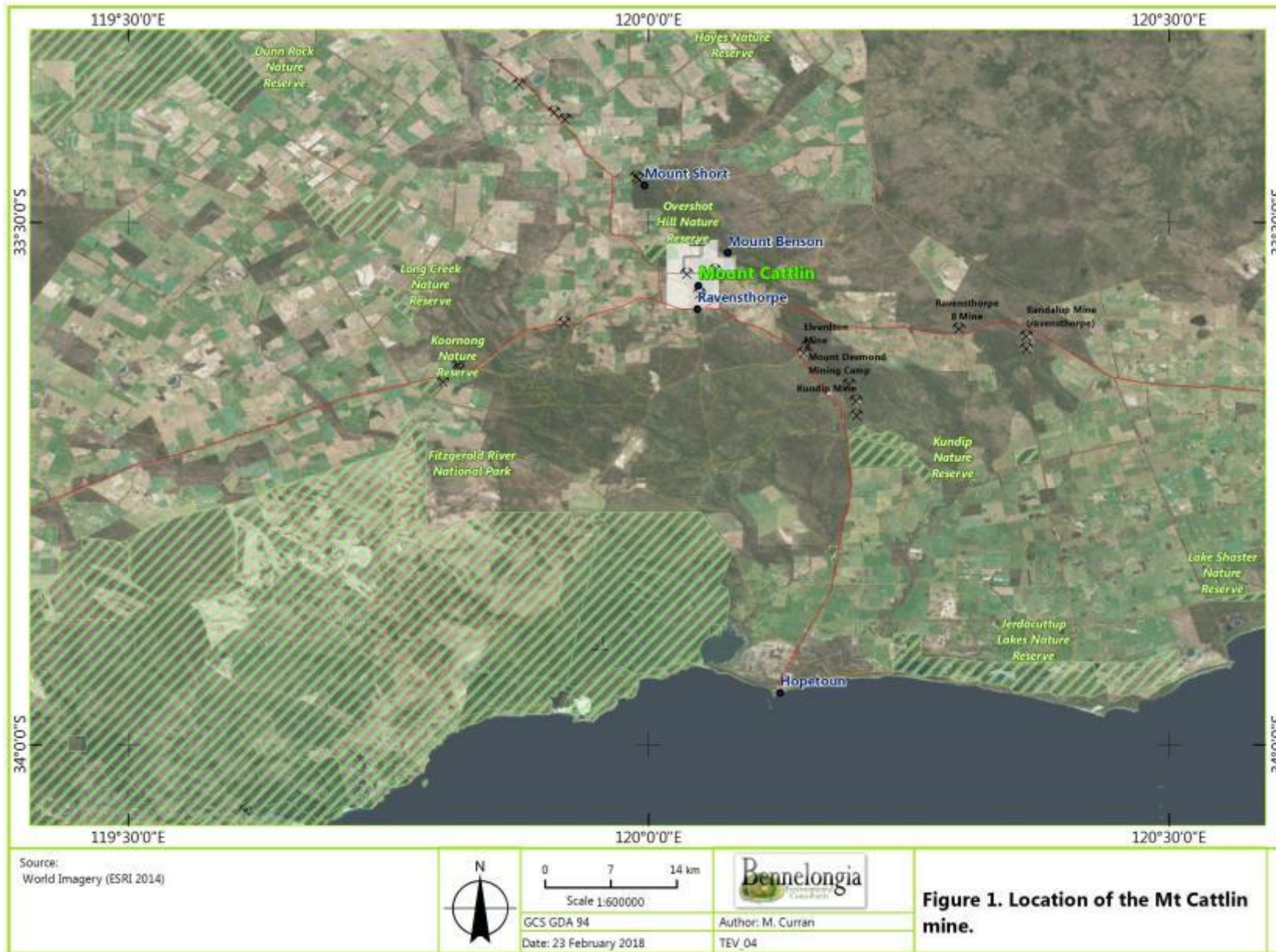


Figure 1. Location of Mt Cattlin.



Figure 2. Proposed development at Mt Cattlin and SRE Survey Sites.

More generally, state and federal conservation legislation provide a framework for species (and biological community) conservation that includes the listing of species and communities to protect them. At the state level, the *Wildlife Conservation 1950* and *Biodiversity Conservation Act 2016* provide for the listing of species as Threatened by the Minister via the Department of Biodiversity, Conservation and Attractions (DBCA). Species are listed if they are under identifiable threat of extinction, are rare, or otherwise in need of special protection. Possibly threatened species that do not meet survey criteria or other requirements for being listed as Threatened may be listed by DBCA as Priority species. At the federal level, species may be listed as Threatened under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

In addition to protecting individual species, ecological communities may be listed as in need of special protection at both the state and federal levels. At the state level, the Minister may informally list a biological community as a Threatened Ecological Community (TEC) if the community is presumed to be totally destroyed or at risk of becoming totally destroyed. Ecological communities with insufficient information available to be considered as TECs, or which are rare but not currently threatened, may be listed as a Priority Ecological Communities (PECs) by DBCA. However, no community is currently listed as a TEC or PEC on the basis of SRE fauna.

3.2. SRE Framework

Impact assessment for SREs in Western Australia focuses on up to 10 taxonomic groups (the SRE Groups) that are known to contain high proportions of SRE species. These are land snails (Gastropoda), millipedes (Diplopoda), centipedes (Chilopoda), pseudoscorpions (Pseudoscorpiones), scorpions (Scorpiones), spiders (Mygalomorphae, Selenopidae and Micropholcommatidae), harvestmen (Opiliones), slaters (Isopoda), velvet worms (Onychophora) and earthworms (Megadrilacea). Although confined to mesic habitats in Western Australia, velvet worms and earthworms are confined to mesic southwestern habitats and may possibly occur at Ravensthorpe.

Many species belonging to SRE Groups in fact have ranges greater than 10,000 km², such as the large number of habitat generalist scorpions (Smith 1995). Focus on SREs is essentially a screening process when assessing the likely impacts of a project on invertebrates, whereby assessment is restricted to a manageable number of species that have a relatively high probability of being affected by the Proposal. A major challenge when using this screening process, however, is determining whether species belonging to a SRE group actually have ranges <10,000 km² and, additionally, may be threatened by the Proposal.

Most SRE species are likely to have occurrences beyond the vicinity of the Proposal being assessed but loss of a population occurring in the Proposal area will nevertheless have conservation implications for the species concerned because it has few populations and all are small. In a few cases, however, SREs may be threatened because their entire range falls within an area of disturbance. In this case the level of threat to the SRE species very clearly depends on the relationship between its range and the spatial extent of the Proposal footprint. In some cases it is difficult to determine the likely range of the SRE species by sampling and factors such as the spatial extent of the habitat in which the SRE species was collected, the size of the development envelope and the ranges of congeneric species are useful indicators of the likely threat to the species posed by Proposal.

3.2.1. Classifying SRE species

For the purpose of initially screening species in SRE Groups to identify potential SRE species, a five-tier classification scheme was used, similar to that employed by the Western Australian Museum:

Confirmed SREs are species with a well surveyed range of <10,000 km².

Potential SREs are species with imperfectly understood ranges because sampling has been patchy. In some cases, the uncertainty about range is compounded by an incomplete taxonomic framework.

Unlikely SRE species includes potentially new species that do not possess the traits of a SRE species (i.e. biological or habitat factors). For example, this subcategory may include species recorded during a survey from one or more habitat types that have low prospectivity for SREs or species possessing very few morphological features typical of SREs.

Not SRE species have a known range of >10,000 km². The taxonomy of such species should be well understood, so as not to include the ranges of multiple closely related species in the range estimate.

Unknown taxa are usually higher-level identifications (possibly due to immature specimens) or identifications of species complexes where there have been recent revisions that make it unclear what species was originally collected.

4. DESKTOP REVIEW

4.1. Regional Context

Mt Cattlin is located within the Fitzgerald subregion of the South Coast Natural Resources Management (SC) Region, which extends from Walpole to Cape Arid and includes the Fitzgerald River National Park, Stirling Range and Peak Charles. The SC Region belongs to the South West Botanical Province, one of 35 world biodiversity hotspots based on its endemism and degree of threat to vascular plants and vertebrates (Myers *et al.* 2000). The Fitzgerald subregion is characterised by myrtaceous and proteaceous scrub and mallee heaths on sandplain overlying Eocene sediments and is rich in plant endemics (Comer *et al.* 2001). The subregion has variable relief, comprising subdued relief on the sandplains of the coastal region, punctuated with metamorphosed granite and quartzite ranges both inland and on the coastal plain (Comer *et al.* 2001). Eucalypt woodlands occur in gullies and alluvial foot-slopes whilst herbfields and heaths carpet the abrupt granite tors and quartzite ranges that rise from the plain (Comer *et al.* 2001). The region is dominated by duplex soils and deep and shallow sands on the plains and dissected areas and by shallow sandy soils on the mountain ranges.

4.2. SRE Fauna of the South Coast

The SC Region supports diverse communities of SRE fauna (Framenau *et al.* 2008). A study of the SRE Groups of the SC Region from 2006 to 2007 recorded 174 species, of which 113 were considered to be SREs. There are several concentrations of SRE Group species in Karri forest, isolated granite outcrops and mountain peaks. A comparatively smaller number of invertebrate species in SRE groups were recorded in the Ravensthorpe Range that lies 4 km north-east of Mt Cattlin and the fauna of this area is likely to be similar to that of the Range. As pointed out by Markey *et al.* (2012), the Range is not protected in nature reserves and the only formal protection of its flora and fauna is provided by two small reserves (with similar size and distance from the Range as the mine expansion area). The reserves are Overshot Hill Nature Reserve and Kundip Nature Reserve.

4.2.1. Previously Recorded Species

Records of listed species and species belonging to SRE Groups were compiled from museum databases for a search area of approximately 100 km by 100 km surrounding Mt Cattlin (defined by 29.886°S, 119.559°E and 30.812°S, 120.627°E; Appendix 1). Published research papers, available environmental reports and online resources such as the Atlas of Living Australia (ALA 2018) and the Australian Faunal Directory (ABRS 2009) were also reviewed. Higher-order identifications were not included in the final list of recorded species unless they belonged to taxonomic units that were otherwise not recorded. Omitted higher order records are provided as Appendix 2.

Approximately 98 species from SRE Groups have been recorded in the search area, although there are higher-order animals of groups not represented by these species that comprise an additional 26 species and five taxa that appear conspecific with described species. A single introduced species of isopod,

Armadillidium vulgare, is also present in the search area. The number of species is approximate as some listed taxa are very likely to be conspecific or polytypic. About 44 of the recorded species are described, while most are unpublished manuscript names, morphospecies and higher-order identifications. The SRE Groups recorded were spiders (Araneae – Araneomorphae and Mygalomorphae), pseudoscorpions, scorpions, centipedes, millipedes, land snails and slaters. A summary of species recorded in the search area is given in Table 1 and the complete list of species is shown in Appendix 1.

Linear ranges of the 98 species occurring the search area were calculated, based on all available information, and 47 have ranges of less than 100 km. Twenty-six of these are singletons and are known from only one location, 20 have known ranges less than 25 km and one has a range of 83 km. The latter is unlikely to be a SRE.

Of the 47 species, the millipede *Atelomastix lengae*, which is also listed as Vulnerable by DBCA, is considered to be a SRE. Other millipedes, *Atelomastix gibsoni*, *Antichiropus* `DIP077` and *Antichiropus* `FNP`, are possibly also true SREs as they belong to groups with a high number of SRE taxa. The remaining other 43 species were classed as potential SREs for the purposes of this report, although 12 are known from multiple habitats, suggesting they are not SREs.

Table 1. Previous records of invertebrate species from SRE Groups in the vicinity of the Proposal.

Taxonomy (no. of families)	Described Species	Morpho-Species	Conspecific Taxa	Higher Order Taxa	Richness	Less than 100 km	Greater than 100 km
Arthropoda							
Chelicerata							
Araneae (5)	10	34		8	52	34	10
Opiliones (2)	2			1	3		2
Pseudoscorpiones (9)	10	5		5	20	2	13
Scorpiones (3)	4	1	1	2	8	1	4
Crustacea							
Isopoda (3)		5		1	6	5	
Myriapoda							
Chilopoda							
Geophilida (1)				1	1		
Lithobiomorpha (2)	1			1	2		1
Scolopendrida (1)	5				5		5
Scutigermorpha (1)				1	1		
Diplopoda							
Polydesmida (1)	3	2			5	2	3
Polyxenida (2)	1			1	2		1
Polyzoniida (1)				1	1		
Spirostreptida (1)	3	1			4	3	1
Symphyla							
Cephalostigmata (1)		1			1		1
Mollusca							
Stylommatophora (5)	10		4	1	15		10
Total	49	49	5	23	126	47	51

4.2.2. Listed Invertebrate Species in the Search Area

Three listed invertebrate species are known to occur within the search area. The millipede *Atelomastix lengae* is listed as Vulnerable (Schedule 3). *Atelomastix lengae* is known from a single location in a unburnt gully of the Eyre Range (FRNP). The planthopper *Budginmaya eulae* (family Flatidae) is listed as Priority 1 (P1) species. It is symbiotic with the ant *Camponotus terebrans* and was discovered within a single ant nest under a rock on Bandalup Hill (Fletcher and Moir 2009). *Budginmaya eulae* is only known from the type locality, which is 33 km east-southeast of Mt Cattlin in mallee heath on duplex clayey sand habitat. The land snail *Bothriembryon bradshawi* is listed as P3 and has a linear range of over 230 km, with one record on the eastern shore of the Culham Inlet (just west of Hopetoun; in the search area) and two records northwest and southwest of the Stirling Range National Park (Tambellup and Porongorup).

All three species are highly unlikely to occur at Mt Cattlin and, in the event they do occur they are known to occur outside the Proposal.

4.2.3. Implications of Desktop Review

The high number of species identified in the desktop review process reflect the high richness of the South Coast region. As concluded by Framenau *et al.* (2008), the diversity in the South Coast is focussed in key habitats: Karri forest, isolated granite outcrops and mountain peaks and ranges. The results from the search area confirm this view. The remnant York gum woodland and mallee scrub and shrublands present at the Proposal do not appear to be highly prospective for SREs and the habitat is common throughout the search area, although somewhat fragmented. These two factors, together with the absence of many records of SRE taxa from the Mt Cattlin area, suggest that mine expansion is unlikely to significantly impact on SRE fauna. However, it was concluded that a reconnaissance field survey should be carried out to confirm this view. The reconnaissance survey checked whether prospective SRE habitat was present (both through SRE sampling and ground-truthing of previous SRE habitat mapping from photos).

5. PILOT SURVEY METHODS

A single-phase field study of SRE invertebrate fauna was undertaken between 15 and 19 January 2018. The aims of the survey were to:

1. Characterise the fauna belonging to SRE Groups in the development envelope;
2. Provide further information on the potential SRE habitats of the development envelope and its surrounds; and
3. Assess the SRE status of species in the SRE Groups and the likelihood of their confinement to disturbance areas at the Proposal.

The survey approach and methods used were based on *Technical Guidance: Sampling of Short Range Endemic Invertebrate Fauna* (EPA 2016b). The survey was designed to target all SRE Groups, although earthworms (Megadrilacea) and velvet worms (Onychophora) are infrequently collected close to the 400 mm isohyet (Blakemore 2000; Reid 2002).

Survey was conducted within and immediately adjacent the area of the proposed mine expansion. No regional survey was conducted because SRE surveys have been conducted in the region, including the nearby Ravensthorpe Ranges (Framenau *et al.* 2008), and at nearby mines like Kundip, Trilogy and Ravensthorpe Nickel (see Bennelongia 2017; Biota 2004, 2005). Conditions were mostly very dry except for some light rainfall on the morning of the 18 January.

5.1. Field and Laboratory Methods

A total of 10 sites were sampled with five in the Proposal area (i.e. impact) and five in adjacent reference areas, plus opportunistic collections were made at seven additional locations during the concurrent stygofauna survey (Bennelongia 2018) and recent vertebrate fauna survey (Ninox and BIOSTAT 2018; Figure 2). Some opportunistic sites fell within areas currently disturbed by previous mining or agriculture (called 'Historic Impact' below). A detailed description of all sample sites, including coordinates, landforms, vegetation, litter and sample effort, is given in Appendices 3 and 4. Photographs were taken of each site and are compiled as Appendix 5. Bennelongia survey staff were Michael Curran and Anton Mittra, with several snails provided by Eddy Cannella of Biostat.

Sampling at the ten sites comprised hand foraging, cup trapping and soil and litter samples. Between one and a half and two hours were spent at each of the 10 sites. Much of the time was spent searching for burrows of mygalomorph spiders, which were then excavated and preserved at site, or excavating soil around the base of *Eucalyptus* trees searching for other species. A leaf blower was used to clear litter at all sites for at least 15 minutes to facilitate the search for burrows. Scorpions were collected over two nights at six sites using ultraviolet ("black") light torches; 20 to 35 minutes were spent at each site

using this method. No cup traps were set as no entrances of scorpions were observed, although animals were collected from burrows located during the UV spotlighting. Two mixed soil and leaf litter samples were taken from representative microhabitats at the 10 sites and retained in calico bags. Each sample was placed in two tullgren funnels in the Bennelongia laboratory for 72 hours to extract animals from the sample.

Small species, such as pseudoscorpions, were extracted from dry leaf litter using a soil sieve (12 sites), or were found by excavating around the base of eucalyptus trees so as to prise bark off the tree (12 sites). The soil excavation and eucalyptus bark peeling also yielded centipedes and slaters.

Sampling occurred in all prospective microhabitats at each site, such as moist and dry leaf litter accumulations, around tree logs, under tree bark and in grass clumps. All sites were sampled once, except for the sites re-visited for UV spotlighting.

Animals collected in the field and from Tullgren funnels were preserved directly in 100% ethanol and stored below 4°C for at least four days where possible. All animals were identified morphologically by Michael Curran using dissecting and compound microscopes and the available taxonomic literature, unpublished keys, and reference collections.

Habitat Assessment

Habitats were assessed according to five criteria: the availability of moisture; soil structure; geological diversity; vegetation type; and extent of shade or shelter. The emphasis was on identifying 'relict' habitats (e.g. sheltered, moist for millipedes) and those that may contain specialist species (e.g. rocky outcrops for selenopid spiders). The extent of these habitat types beyond the development envelope, external habitat connectivity and the presence of habitat isolates that might restrict dispersal of SRE fauna were evaluated using broad-scale vegetation mapping (Beard *et al.* 2013).

Survey Limitations

EPA (2016b) recommends SRE sampling in southwestern Australia should occur in winter (May to August) because usually cryptic groups such as land snails and velvet worms are active and there is enhanced activity of male mygalomorph spiders. This survey was conducted in summer and conditions at the site were very dry, albeit with a small amount of rainfall late in the trip. Moisture dependent groups such as millipedes (except the family Polyxenida) were not collected.

5.2. Survey Results

5.2.1. Habitats

The area of proposed mine expansion, and the immediately adjacent area, comprise subdued hills covered by remnant York gum woodland and shrubland intersected by Cattlin Creek and minor drainage lines. There are minor variations in the woodland that appear related to changes in topography, with some areas hosting tall or medium woodland, or open to closed understorey. There was a large amount of leaf litter and logs. There were no steep gullies, rocky outcrops or breakaways.

The woodlands represent a 'low' suitability habitat for SRE species. Because of its wide distribution, it is likely that a high proportion of species from SRE Groups found in this habitat type will be widespread. There are few, if any patches of microhabitat within the broader woodland category that could restrict species ranges.

5.2.2. Invertebrates

At least 34 species belonging to SRE Groups were recorded during the survey (Table 2). Thirteen species was classed as 'Unlikely' SREs, 20 as Not SREs and one as unknown (a symphylan of the genus *Hanseniella*). There were no Confirmed or Potential SRE species.

Table 2. The invertebrate taxa from SRE Groups collected in the 2018 survey and their SRE status.

PI, Proposed Impact; HI, Historic Impact; Ref, Reference. Higher order, non-native invasive and aquatic taxa are highlighted grey.

Higher Taxonomy	LowestID	PI	HI	Ref	SRE Status	Distribution / Linear Range (km)
Arthropoda						
Chelicerata						
Pseudoscorpiones						
Atemnidae	<i>Oratemnus curtus</i>	13		2	Not SRE	Southwest
Cheliferidae	<i>Protochelifer</i> sp. B01	31		5	Unlikely	1.5
Chthoniidae	<i>Lagynochthonius australicus</i>	1			Not SRE	Southwest
Garypinidae	<i>Amblyolpium</i> sp. B02	16		2	Unlikely	1.8 (but probably the widespread species 'WA1')
Olpiidae	<i>Beierolpium</i> 8/4 sp. B16			1	Unlikely	34.6
Araneae						
Actinopodidae	<i>Missulena</i> sp. B12	3		1	Unlikely	1.1
	<i>Missulena</i> sp.	1			n/a	n/a (see Appendix 6)
Barychelidae	<i>Synothele</i> sp. B15 (<i>rastelloides</i> group)	3		5	Unlikely	33.8
Ctenizidae	<i>Conothele</i> sp. B11	2			Unlikely	0.4
Idiopidae	<i>Eucyrtops</i> sp. B08	5		9	Unlikely	26.4
	<i>Idiosoma</i> sp. B25	2		6	Unlikely	31.7
	<i>Idiosoma</i> sp. B40			2	Unlikely	32.6
	<i>Idiosoma</i> sp. B42			3	Unlikely	32.0
Nemesiidae	<i>Aname</i> sp. B29 (<i>mainae</i> group)	5	1		Not SRE	35.1
	<i>Chenistonia</i> sp. B01 (<i>tepperi</i> group)			1		<i>C. tepperi</i> is widespread but is currently under revision
Scorpiones						
Bothriuridae	<i>Cercophonius sulcatus</i>	2		2	Not SRE	Southwest
Buthidae	<i>Isometroides vescus</i>			2	Not SRE	Australia
Urodacidae	<i>Urodacus novaehollandiae</i>	4		10	Not SRE	Australia
Crustacea						
Isopoda						
Armadillidae	<i>Acanthodillo</i> sp. B19	13		2	Unlikely	35.9
	<i>Acanthodillo</i> sp. B21	1			Unlikely	26.2
	<i>Armadillidium vulgare</i>	19	15	30	n/a	Non-native invasive
Philosciidae	<i>Laevophiloscia</i> sp. B38	9		20	Not SRE	35.6
Myriapoda						
Chilopoda						
Geophilida						
Mecistocephalidae	<i>Mecistocephalus</i> sp. B09 (<i>tahitiensis</i>)	10		13	Unlikely	34.5
Scolopendrida						
Cryptopidae	<i>Cryptops australis</i>	3		1	Not SRE	Australia
Scolopendridae	<i>Cormocephalus michaelsoni</i>	3		7	Not SRE	Australia
	<i>Cormocephalus rubriceps</i>			2	Not SRE	Australia
	<i>Cormocephalus similis</i>			1	Not SRE	Australia
	<i>Otostigmus</i> sp. B02			1	Not SRE	Genus across Australia
Diplopoda						
Polyxenidae	<i>Unixenus attemsi</i>	1		2	Not SRE	Australia
Synxenidae	<i>Phryssonotus novaehollandiae</i>	64		58	Not SRE	Australia
Symphyla						
Scutigereidae	<i>Hanseniella</i> `slender hirsute form`	98		6	Unknown	n/a (see Appendix 6)
Mollusca						
Heterobranchia						
Lymnaeidae	<i>Austropeplea lessoni</i>	2			n/a	Aquatic
Stylommatophora						
Bothriembryontidae	<i>Bothriembryon balteolus</i>	47		61	Not SRE	103
	<i>Bothriembryon dux</i>	18		22	Not SRE	190
Helicidae	<i>Theba pisana</i>				n/a	Non-native invasive
Punctidae	<i>Westralaoma experta</i>				Not SRE	Goldfields and Southwest
Pupillidae	<i>Gastrocopta bannertonensis</i>				Not SRE	Australia
	<i>Pupoides myoporinae</i>				Not SRE	Across southern Australia
Caenogastropoda						
Pomatiopsidae	<i>Coxiella striatula</i>	4			n/a	Aquatic

Mygalomorph spiders were most diverse group collected with nine species, followed by centipedes (6), snails (5), pseudoscorpions (5), isopods (3), scorpions (3), polxyenid millipedes (2) and symphylans (1). The two aquatic snails and two non-native species (White Italian Snail and an isopod) are Listed in Table 2 but are not included in any analyses. Exemplar photos of animals are provided in Appendix 5 and the detailed records of all species collected during the survey are in Appendix 6.

No listed species was recorded during survey.

6. CONCLUSION

No listed invertebrates, confirmed or potential SREs were recorded at Mt Cattlin. Thirty-four species were recorded during the survey. The richness of SRE Groups was quite low and almost all species collected are widespread or known from elsewhere in the search area (outside the proposed mine expansion). The few species known only from the expansion area are not likely to be SRE species and are likely to occur in surrounding woodland.

SRE habitats at the Proposal are widespread and have low prospectivity for SRE species. Together with the small extent of the proposed mine expansion, the low richness of species in SRE Groups and the lack of species meeting the criteria to be listed as SREs, it is considered that the widespread habitat in the proposed disturbance area makes it unlikely that the Proposal will affect the conservation status of any SRE species in the local region.

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Appendix 1. Previous records of species from SRE Groups in the search area and Proposal.

Historic impact is defined as sites disturbed via mining or agriculture with the area surveyed in 2018. Similarly, 'Adjacent Proposal' is equivalent to the reference area sampled by the 2018 survey.

Higher Taxonomy	LowestID	SRE Status	Linear Range (km)	Known from Proposal	Known from Historic Impact	Adjacent Proposal	Search Area
Arthropoda							
Chelicerata							
Arachnida							
Pseudoscorpiones							
Atemnidae	Oratemnus sp.	Not SRE	n/a				11
Cheliferidae	Protochelifer `PSE083`	Potential	0.0				1
Chernetidae	Haplochernes sp.	Not SRE	n/a				1
	Nesidiochernes australicus	Not SRE	> 100				13
Chthoniidae	Austrochthonius `duchaci`	Not SRE	> 100				136
	Austrochthonius `similis`	Not SRE	> 100				3
	Austrochthonius muchmorei	Not SRE	> 100				15
	Lagynochthonius australicus	Not SRE	> 100			2	22
Garypidae	Synsphyronus `PSE001`	Potential	1.2				2
	Synsphyronus callus	Not SRE	> 100				38
	Synsphyronus francesae	Not SRE	> 100				2
	Synsphyronus lathrius	Not SRE	> 100				19
	Synsphyronus mimulus	Not SRE	> 100				27
Garypinidae	Amblyolpium sp. WA1	Not SRE	> 100			4	
	Protogarypinus giganteus	Not SRE	> 100				18
Geogarypidae	Geogarypus taylori	Not SRE	> 100				9
Olpiidae	Austrohorus sp.	Not SRE	> 100				1
	Beierolpium sp.	Not SRE	n/a				2
Tridenchthoniidae	Dithella sp.	Not SRE	n/a				1
Araneae							
Actinopodidae	Missulena `MYG041`	Potential	0.0				1
	Missulena `MYG289-DNA`	Potential	0.0				2
	Missulena granulosa	Not SRE	> 100				1
	Missulena hoggi	Not SRE	> 100				1
	Missulena occatoria	Not SRE	> 100				2
Barychelidae	Aureococrypta sp.	Not SRE	> 100		1		
	Idiommata blackwalli	Not SRE	> 100				2
	Synothele `pseudidiommata`	Potential	> 100				1
	Synothele rastelloides s.l.	Not SRE	> 100				2
Ctenizidae	Conothele `MYG059`	Potential	> 100				2
Idiopidae	Arbanitini `Biota sp. C`	Potential	11.6				17
	Arbanitini `Biota sp. D`	Potential	1.8				6

Higher Taxonomy	LowestID	SRE Status	Linear Range (km)	Known from Proposal	Known from Historic Impact	Adjacent Proposal	Search Area
	Arbanitini `Biota sp. E`	Potential	0.0				4
	Blakistonia `MYG451`	Potential	1.4				1
	Blakistonia sp. (Eucanippe Biota sp. B)	Potential	0.0				1
	Eucanippe bifida	Not SRE	> 100				14
	Eucyrtops `MYG141`	Potential	> 100				2
	Euoplos sp.	Not SRE	n/a				4
	Gaius villosus	Not SRE	> 100				1
	Idiosoma `Biota sp. D`	Potential	> 100				4
	Idiosoma `Biota sp. E`	Potential	0.0				5
	Idiosoma `MYG075`	Potential	1.4				1
	Idiosoma `rhapsiduca group`	Not SRE	n/a				7
	Idiosoma `twig-lining sp.`	Not SRE	n/a				2
	Idiosoma rhapsiduca	Not SRE	> 100				1
	Idiosoma sp. 1	Potential	> 100				2
	Idiosoma sp. B22	Potential	0.0				6
	Idiosoma sp. B25	Potential	6.9				5
	Idiosoma sp. B42 (Anidiops sp. B24)	Potential	14.7				1
Nemesiidae	`Proshermacha` `MYG346`	Potential	13.6			1	16
	`Proshermacha` `MYG349`	Potential	14.8				5
	`Proshermacha` sp.	Not SRE	n/a			1	29
	Aname `Biota sp. B`	Potential	0.0				1
	Aname `Biota sp. F`	Potential	0.0				2
	Aname `Biota sp. I`	Potential	0.0				1
	Aname `kwonkoides spp. group.`	Not SRE	n/a				4
	Aname mainae	Not SRE	> 100				11
	Aname sp. B28	Potential	> 100				3
	Aname sp. B29 (mainae group)	Potential	5.4				20
	Chenistonia `MYG348`	Potential	12.4				8
	Chenistonia `MYG349`	Potential	23.3				1
	Chenistonia `tepperi group`	Not SRE	n/a				1
	Chenistonia tepperi	Not SRE	> 100				9
	Kwonkan sp. nov.	Potential	> 100				1
	Merredinia `MYG454-DNA`	Potential	0.0				1
	Pseudoteyl `Biota sp. F`	Potential	0.0				1
	Teyl `Fitzgerald sp. 1`	Potential	0.0				1
	Teyl `MYG192`	Potential	0.0				1
	Teyl `MYG440`	Potential	0.0				1
	Teyl `MYG455`	Potential	0.0				2
	Teyl `MYG456`	Potential	0.0				1
	Yilgarnia sp.	Not SRE	n/a				1
Opiliones							

Higher Taxonomy	LowestID	SRE Status	Linear Range (km)	Known from Proposal	Known from Historic Impact	Adjacent Proposal	Search Area
Neopilionidae	Ballarra longipalpus	Not SRE	> 100				1
	Megalopsalis tanisphyros	Not SRE	> 100				4
Triaenonychidae	Nunciella sp.	Not SRE	> 100				17
	Scorpiones						
Bothriuridae	Cercophonius sulcatus	Not SRE	> 100			1	9
Buthidae	Isometroides sp.	Not SRE	> 100	1			7
	Isometrus sp.	Not SRE	n/a			1	
Urodacidae	Lychas `austroccidentalis` ms	Widespread	82.7	2		1	26
	Lychas jonesae	Not SRE	> 100			1	
	Urodacus `?twotone-spiny`	Not SRE	n/a				1
Urodacidae	Urodacus armatus s.l.	Not SRE	> 100				1
	Urodacus novaehollandiae	Not SRE	> 100			4	41
	Crustacea						
Isopoda							
Armadiillidae	Acanthodillo sp. B20	Potential	8.5				2
	Buddelundia `22`	Potential	0.0				4
	Pseudodiploexochus sp. B02	Potential	0.5				3
Philosciidae	Philosciidae sp. B39	Potential	0.7				4
	Philosciidae sp. B40	Potential	0.9				42
Sphaeromatidae	Sphaeromatidae sp.	Not SRE	n/a				5
Myriapoda							
Chilopoda							
Geophilida							
Mecistocephalidae	Mecistocephalus sp.	Not SRE	n/a				1
Lithobiomorpha							
Henicopidae	Henicops dentatus	Not SRE	> 100				1
Lithobiidae	Lithobiidae sp.	Not SRE	n/a				1
Scolopendrida							
Scolopendridae	Cormocephalus hartmeyer	Not SRE	> 100				5
	Cormocephalus michaelsoni	Not SRE	> 100				5
	Cormocephalus strigosus	Not SRE	> 100				3
	Cormocephalus turneri	Not SRE	> 100				3
	Scolopendra laeta	Not SRE	> 100				4
Scutigeromorpha							
Scutigeridae	Parascutigera sp.	Not SRE	n/a				4
Diplopoda							
Polydesmida							
Paradoxosomatidae	Antichiropus `DIP077`	Potential	0.0				5
	Antichiropus `FNP`	Potential	20.4				13
	Antichiropus cuspis	Not SRE	> 100			5	83
	Antichiropus exclamatus	Not SRE	> 100				7

Higher Taxonomy	LowestID	SRE Status	Linear Range (km)	Known from Proposal	Known from Historic Impact	Adjacent Proposal	Search Area
	Antichiropus laticlavus	Not SRE	> 100				8
Polyxenida							
Polyxenidae	Polyxenida sp.	Not SRE	n/a			15	30
Synxenidae	Phryssonotus novaehollandiae	Not SRE	> 100				1
Polyzoniida	Polyzoniida sp.	Not SRE	n/a				1
Spirostreptida							
Iulomorpha	Atelomastix gibsoni	Potential	12.0				554
	Atelomastix lengae	Potential	16.0				13
	Atelomastix psittacina	Not SRE	> 100				356
	Podykipus `East Mt Barren`	Potential	16.0				34
Symphyla							
Cephalostigmata							
Scutigere	Hanseniella `slender hirsute form`	Not SRE	> 100				6
Mollusca							
Stylommatophora							
Bothriembryontidae	Bothriembryon balteolus	Not SRE	> 100				8
	Bothriembryon bradshawi	Not SRE	> 100				2
	Bothriembryon cf. richeanus	Not SRE	n/a				1
	Bothriembryon dux	Not SRE	> 100		8	9	264
	Bothriembryon kingii	Not SRE	> 100				49
	Bothriembryon melo	Not SRE	> 100				29
Helicidae	Theba pisana	Not SRE	n/a				6
Punctidae	Insullaoma cf. predicta	Not SRE	n/a				1
	Paralaoma caputspinulae	Not SRE	> 100				2
	Westralaoma cf. aprica	Not SRE	n/a	1		1	
	Westralaoma cf. expicta	Not SRE	n/a	19	5	34	
Pupillidae	Gastrocopta bannertonensis	Not SRE	> 100			2	
	Gastrocopta margaretae	Not SRE	> 100	2		22	5
	Pupilla (Gibbulinopsis) australis	Not SRE	> 100			35	40
	Pupoides adelaidae	Not SRE	> 100			5	52
Succineidae	Succinea sp.	Not SRE	n/a				67

Appendix 2. Higher order identifications omitted from the final desktop review species list.

Higher Taxonomy	LowestID	Known from Proposal	Known from Historic Impact	Adjacent Proposal	Search Area
Arthropoda					
Chelicerata					
Arachnida					
Pseudoscorpiones					
Cheliferidae	Protochelifer sp.			2	52
Chernetidae	Chernetidae sp.			1	
	Nesidiochernes sp.				5
Chthoniidae	Austrochthonius sp.				6
	Lagynochthonius sp.				4
Garypidae	Synsphyronus sp.				8
Garypinidae	Amblyolpium sp.			1	
Olpiidae	Olpiidae sp.				1
Araneae					
Actinopodidae	Missulena sp.				8
Barychelidae	?Synothele sp.				3
	Barychelidae sp.				5
	Idiommata cf. blackwalli				1
	Idiommata sp.				2
	Synothele sp.				11
Idiopidae	Arbanitini sp.				7
	Eucyrtops sp.				5
	Idiosoma sp.			1	38
	Idiosoma sp. nov.				1
Nemesiidae	Aname sp.			3	13
	Aname sp. nov.				1
	Aname/Merredinia sp.				1
	Anaminae sp.				1
	Chenistonia sp.				15
	Chenistonia sp. nov.				1
	Kwonkan sp.				2
	Merredinia sp.	1			
	Pseudoteyl sp.				2
	Teyl sp.			1	5
	Teyl sp. nov.				1
Opiliones					
Neopilionidae	Megalopsalis sp.				1
	Neopilionidae sp.				5
Scorpiones	Scorpiones sp.				1
Bothriuridae	Cercophonius sp.				7
Buthidae	Buthidae sp.				2
	Lychas sp.				9
Urodacidae	Urodacus ?novaehollandiae			1	14
	Urodacus sp.				36
	Urodacus sp. 1				4
Crustacea					
Isopoda					
Armadillidae	Armadillidae sp.				1
	Buddelundia sp.				2
Philosciidae	Laevophiloscia sp.				29
Myriapoda	Myriapoda sp.	1	2	5	
Chilopoda					
Scolopendrida					
Scolopendridae	Cormocephalus sp.				1
Scutigromorpha					
Scutigridae	?Parascutigera sp.				1
	?Prothereura sp.				1
Diplopoda					
Polydesmida					
Paradoxosomatidae	Antichiropus sp.				8
	Paradoxosomatidae sp.				2

Higher Taxonomy	LowestID	Known from Proposal	Known from Historic Impact	Adjacent Proposal	Search Area
Polyxenida					
Synxenidae	Synxenidae sp.				37
Spirostreptida					
Iulomorphidae	Atelomastix ?psittacina				3
	Atelomastix sp.				23
	Podykipus sp.				7
Mollusca					
Stylommatophora					
Bothriembryontidae	?Bothriembryon sp.			2	1
	Bothriembryon aff. balteolus	2		13	
	Bothriembryon cf. balteolus				4
	Bothriembryon cf. kingii				13
	Bothriembryon sp.				62
	Bothriembryon sp. nov.			16	521
Punctidae	cf. Westralaoma sp.				1
	Paralaoma cf. caputspinulae				8
	Westralaoma sp.	3		12	
Pupillidae	Gastrocopta cf. margaretae				5
	Pupilla (Gibbulinopsis) cf. australis			3	
	Pupoides cf. adalaidae			3	

Appendix 3. Site details and sampling effort.

Sites and samples

Effort Type	Field Code	Latitude	Longitude	Site Type	Visit Date	Collector(s)	Cup Traps	Forage	Log Turn	Rock Turn	Litter Sieve	Leaf Blow	Soil & Litter Bags	UV (times)
Forage and litter	Site 01	-33.55649411	120.0564926	Control	15/01/2018	M.K. Curran, A.J. Mittra	-	Y	Y	Y	Y	Y	2	16 th 20:00 to 20:35
Forage and litter	Site 02	-33.5561821	120.0400166	Control	16/01/2018	M.K. Curran, A.J. Mittra	-	Y	Y	Y	Y	Y	2	16 th 20:40 to 21:00
Forage and litter	Site 03	-33.56336865	120.0431629	Impact	16/01/2018	M.K. Curran, A.J. Mittra	-	Y	Y	Y	Y	Y	2	17 th 19:45 to 20:15
Forage and litter	Site 04	-33.55392378	120.0290999	Control	16/01/2018	M.K. Curran, A.J. Mittra	-	Y	Y	-	Y	Y	2	
Forage and litter	Site 05	-33.56368969	120.0410859	Impact	17/01/2018	M.K. Curran, A.J. Mittra	-	Y	Y	Y	Y	Y	2	17 th 20:20 to 20:45
Forage and litter	Site 06	-33.568431	120.0479957	Control	18/01/2018	M.K. Curran, A.J. Mittra	-	Y	Y	Y	Y	Y	2	
Forage and litter	Site 07	-33.57109644	120.0518029	Control	18/01/2018	M.K. Curran, A.J. Mittra	-	Y	Y	Y	Y	Y	2	
Forage and litter	Site 08	-33.56202848	120.0386385	Impact	18/01/2018	M.K. Curran, A.J. Mittra	-	Y	Y	Y	Y	Y	2	17 th 20:50 to 21:20
Forage and litter	Site 09	-33.56161387	120.042628	Impact	18/01/2018	M.K. Curran, A.J. Mittra	-	Y	Y	Y	Y	Y	2	
Forage and litter	Site 10	-33.56440164	120.0455934	Impact	18/01/2018	M.K. Curran, A.J. Mittra	-	Y	Y	-	Y	Y	2	
Opportunistic forage	WTD01	-33.5618133	120.0383558	Impact	15/01/2018	M.K. Curran, A.J. Mittra	-	Opp.	-	-	-	-	-	-
Opportunistic forage	WTD02	-33.56171017	120.0419918	Impact	15/01/2018	M.K. Curran, A.J. Mittra	-	Opp.	-	-	-	-	-	-
Opportunistic forage	WTD13	-33.5677144	120.0413279	Control	15/01/2018	M.K. Curran, A.J. Mittra	-	Opp.	-	-	-	-	-	-
Opportunistic forage	MB06	-33.55757739	120.029993	Impact	16/01/2018	M.K. Curran, A.J. Mittra	-	Opp.	-	-	-	-	-	-
Opportunistic forage	Fuel bowser	-33.56009444	120.0208667	Impact	17/01/2018	M.K. Curran, A.J. Mittra	-	Opp.	-	-	-	-	-	-
Opportunistic forage	EddySnail1	-33.56194111	120.048235	Control	18/12/2017	E. Cannella	-	Opp.	-	-	-	-	-	-
Opportunistic forage	EddySnail2	-33.56183	120.0486169	Control	18/12/2017	E. Cannella	-	Opp.	-	-	-	-	-	-

Habitat Descriptions

Field Code	Landform	Description	Slope	Aspect	Soil	Shade	Leaf Litter Cover (%)			Habitat	
			Angle		Group	Cover (%)	<1 cm	1-5 cm	>5 cm	Logs	Rocks
Site 1	Creek and flat	Salty creek with Melaleuca fringe shifting quickly to tall Eucalyptus woodland. Lots of granite rocks, litter, logs. Very dry.	W & E	Gentle	Fine	40	89	7.5	3.5	Many	Many
Site 2	Hill	Tall closed Eucalyptus woodland. Very little to no understorey, lots of wood piles, scattered rocks, rubble piles from road works. Very gently south inclined slope. Very dry.	S	Gentle	Fine	37.5	77.5	20	2.5	Many	Few
Site 3	Hill	Analogous to Site 02 except on the top of a gentle hill. Also some chenopods and acacia. Closed Eucalyptus woodland over scattered acacia shrubs. Lots of litter and logs.	-	Gentle	Fine	40	63.5	32.5	4	Many	Few
Site 4	Hill	Close Eucalyptus woodland over grasses and scattered herbs and shrubs	SE	Gentle	Fine	27.5	24.5	75	0.5	Many	None
Site 5	Hill and creek	Gentle southwest facing closed Eucalyptus woodland over closed shrublands (acacia and others) with stones moving to granite boulders along steep creek bank	SW	Gentle	Fine	15	74	25	1	Many	Many
Site 6	Hill	Closed tall Eucalyptus woodland on medium slope over closed acacia shrubland and grasses. Lots of deep litter around large eucalypts and plenty of fallen logs. A few scattered rocks.	S	Moderate	Fine	30	36	60	4	Many	Few
Site 7	Hill and creek	Cattlin Creek. Closed Eucalyptus woodland over closed mixed acacia shrubland. Clayey soils. Many exposed cobblestones in creek. Inclined banks.	ESE	Moderate	Fine	45	59.5	37.5	3	Many	Many
Site 8	Flat and creek	Analogous to Site 5 except without a steep bank	-	Flat	Fine	22.5	82	15	3	Many	Many
Site 9	Hill	Closed low Eucalyptus woodland over prostrate mixed shrub layer. Many logs. Rises from a minor drainage line to a small hill. Many vines. Scattered rocks.	S	Gentle	Fine	20	74	25	1	Many	Few
Site 10	Flat	Tall Eucalyptus woodland over herbs and patches of acacia shrubs	-	Flat	Fine	25	63.5	35	1.5	Few	None
WTD01	Hill	Closed Eucalyptus woodland	-	Flat	Fine	-	-	-	-	-	-
WTD02	Hill	Closed Eucalyptus woodland	S	Gentle	Fine	-	-	-	-	-	-
WTD13	Flat	Closed Eucalyptus woodland	-	Flat	Fine	-	-	-	-	-	-
MB06	Flat	Farmland	-	Flat	-	-	-	-	-	-	-
Fuel bowser	Flat	In front of bowser	-	-	-	-	-	-	-	-	-
EddySnail1	Hill	Eucalyptus woodland	-	Flat	Fine	-	-	-	-	-	-
EddySnail2	Hill	Eucalyptus woodland	-	Flat	Fine	-	-	-	-	-	-

Appendix 4. Representative photos of sampling sites.

Site 1



Site 2



Site 3



Site 4



Site 5



Site 6



Site 7



Site 8



Site 9



Site 10



Appendix 5. Exemplar photos of SRE taxa collected during the survey.

Idiosoma burrow



Idiosoma burrow



Urodacus novaehollandiae



Isometroides vescus



Bothriembryon dux



Bothriembryon balteolus



***Conothele* sp. B11**



***Conothele* sp. B11**



***Aname* sp. B29**



***Synothele* sp. B09 (*rastelloides*)**



***Anidiops* sp. B13**



Cormocephalus



***Idiosoma* sp. B25**



***Idiosoma* spiderlings**



Appendix 6. Detailed list of species collected during the 2018 survey of the Proposal.

Higher Taxonomy	LowestID	Animals			Locations			Habitat Types	Species Notes
		PI	HI	Ref	PI	HI	Ref		
Arthropoda									
Chelicerata									
Pseudoscorpiones									
Atemnidae	<i>Oratemnus curtus</i>	13		2	Sites 03, 05, 08, 10		Site 01		
Cheliferidae	<i>Protochelifer</i> sp. B01	31		5	Sites 08, 09		Site 04	Records of this genus throughout search area, likely conspecific	
Chthoniidae	<i>Lagynochthonius australicus</i>	1			Site 09			Surface chthoniid pseudoscorpion found across the Southwest (Jarrah Forrest, Margaret River, Hopetoun, FRNP)	
Garypinidae	<i>Amblyolpium</i> sp. B02	16		2	Sites 03, 05, 08, 09, 10		Site 01	Records of this genus throughout search area and bears a close resemblance to A. sp. WA1 (north of Proposal at the Ravensthorpe Ranges)	
Olpiidae	<i>Beierolpium</i> 8/4 sp. B16			1			Site 02	Records of this genus throughout search area, likely conspecific	
Araneae									
Actinopodidae	<i>Missulena</i> sp. B12	3		1	Sites 08, 09		Site 06	M. sp. B11 is likely conspecific with the two, widespread species, M. granulosa and M. occatoria, recorded in the immediate vicinity	
	<i>Missulena</i> sp.	1			Site 05			Inactive burrow, likely M. sp. B12	
Barychelidae	<i>Synothele</i> sp. B15 (<i>rastelloides</i> group)	3		5	Sites 03, 09, 10		Sites 04, 06	S. rastelloides occurs throughout the Goldfields and Southwest and molecular data currently shows mOTUs on ranges and hills that are probably SREs and wide spread mOTUs elsewhere	
Ctenizidae	<i>Conothele</i> sp. B11	2			Sites 05, 10			First record in search area. There is a poor morphological taxonomic framework for <i>Conothele</i> and current museum species comprise both widespread and SRE taxa	
Idiopidae	<i>Eucyrtops</i> sp. B08	5		9	Sites 09, 10		Sites 01, 04, 06, 07	Various habitat types and records 26 km east indicate this is probably not a SRE	
	<i>Idiosoma</i> sp. B25	2		6	Sites 05, 10		Sites 06, 07	Idiosoma is a highly diverse genus. Various habitat types and records 32 km east indicate this species is probably not a SRE	
	<i>Idiosoma</i> sp. B40			2			Site 01	Various habitat types and records 33 km east indicate this species is probably not a SRE	
	<i>Idiosoma</i> sp. B42			3			Site 01	Various habitat types and records 32 km east indicate this species is probably not a SRE	
Nemesiidae	<i>Aname</i> sp. B29 (<i>mainae</i> group)	5	1		Sites 05, 08, 10	Fuel bowser		A. sp. B29 falls within the A. mainae species that is currently under revision and may comprise multiple species. It is a large, robust species and its collection from multiple habitats over 35 km indicates it should not be a SRE	
	<i>Chenistonia</i> sp. B01 (<i>tepperi</i> group)			1			Site 06	Although C. sp. B01 is a juvenile it appears to falls within the C. tepperi species that is currently under revision and may comprise multiple species. Currently C. tepperi is not regarded as a SRE	
Scorpiones									
Bothriuridae	<i>Cercophonius sulcatus</i>	2		2	Site 03		Sites 02, 06	Widespread bothriurid scorpion	
Buthidae	<i>Isometroides vescus</i>			2			Sites 01, 02	Widespread buthid scorpion	
Urodacidae	<i>Urodacus novaehollandiae</i>	4		10	Sites 03, 05, 08		Sites 01, 02	Widespread urodacid scorpion	
Crustacea									
Isopoda									

		Animals			Locations			Habitat	Species
Armadillidae	<i>Acanthodillo</i> sp. B19	13	2	Sites 03, 09, 10		Site 04		Found in multiple habitats over 36 km	
	<i>Acanthodillo</i> sp. B21	1		Site 10				Found in multiple habitats over 26 km	
	<i>Armadillidium vulgare</i>	19	15	30	Sites 05, 08, 09, 10; WTD13	MB05, MB06	Sites 02, 04, 06, 07; WTD30	Invasive slater	
Philosciidae	<i>Laevophiloscia</i> sp. B38	9	20	Sites 08, 09		Sites 02, 04, 07; WTD30		Strongly pigmented, robust and active species present in multiple habitats	
Myriapoda									
Chilopoda									
Geophilida									
Mecistocephalidae	<i>Mecistocephalus</i> sp. B09 (<i>tahitiensis</i>)	10	13	Sites 03, 08, 09, 10		Sites 01, 02, 06, 07		Currently one species in WA, <i>M. tahitiensis</i> , and variation in pores on the abdominal coxa across WA indicate there may be multiple species	
Scolopendrida									
Cryptopidae	<i>Cryptops australis</i>	3	1	Site 03		Site 06		Widespread blind centipede	
Scolopendridae	<i>Cormocephalus sulcatus</i>	3	7	Sites 05, 08, 10		Sites 01, 02, 06		Widespread scolopendrid centipede	
	<i>Cormocephalus rubriceps</i>		2			Site 02		Widespread scolopendrid centipede	
	<i>Cormocephalus similis</i>		1			Site 02		Widespread scolopendrid centipede	
	<i>Otostigmus</i> sp. B02		1			Site 06		Scolopendrid centipede	
Diplopoda									
Polyxenidae	<i>Unixenus attemsi</i>	1	2	Site 09		Sites 01, 04		Common pincushion millipede	
Synxenidae	<i>Phryssonotus novaehollandiae</i>	64	58	Sites 03, 05, 08, 09, 10		Sites 04, 06, 07		Common pincushion millipede	
Symphyla									
Scutigrellidae	<i>Hansenella</i> `slender hirsute form`	98	6	Sites 03, 09, 10		Sites 02, 07		No taxonomic framework	
Mollusca									
Heterobranchia									
Lymnaeidae	<i>Austropeplea lessoni</i>	2		Site 03				Australia	
Stylommatophora									
Bothriembryontidae	<i>Bothriembryon balteolus</i>	47	61	Sites 03, 05, 08, 09, 10; WTD01, WTD02, WTD13		Sites 01, 02, 04, 06, 07		Present in high abundance throughout the Proposal area and search area	
	<i>Bothriembryon dux</i>	18	22	Sites 03, 05, 09, 10; WTD02		Sites 01, 02; EddySnail1, 2		Present in high abundance throughout the Proposal area and search area	
Helicidae	<i>Theba pisana</i>	3	1	Site 03	MB06			White Garden Snail, White Italian Snail. This species is highly abundant throughout the disturbed farming areas surrounding the mine	
Punctidae	<i>Westralaoma experta</i>	13	6	Sites 03, 05, 08, 09, 10		Sites 01, 02, 07		Widespread micro-snail	
Pupillidae	<i>Gastrocopta bannertonensis</i>	6	1	Sites 03, 05, 10		Site 04		Widespread micro-snail	
	<i>Pupoides myoporinae</i>	5	1	Sites 03, 09		Site 06		Widespread micro-snail	
Caenogastropoda									
Pomatiopsidae	<i>Coxiella striatula</i>	4		Sites 03, 05				Along the coast from Shark Bay (WA) to Victoria	