Basic Vertebrate Fauna Assessment

Moolyella Exploration Project, Pilbara

Prepared for: Lithium1 Pty Ltd (SunMirror AG)

Version 1. April, 2022

RECORD OF DISTRIBUTION

No. of copies	Report File Name	Report Status	Date	Prepared for:	Initials
Electronic	2021-0174-002-GT V1 FINAL.DOCX	DRAFT	19 April 2022	Geonomik Pty Ltd	GT
Electronic	2021-0174-002-GT V1 FINAL.DOCX	FINAL	21 April 2022	Lithium1 Pty Ltd (SunMirror AG)	GT

Suggested Citation: Terrestrial Ecosystems 2022 *Basic Vertebrate Fauna Assessment for the Moolyella Exploration Project, Pilbara*, Unpublished report for Lithium1 Pty Ltd (SunMirror AG), Perth.

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EXECUTIVE SUMMARY

Lithium 1 (SunMirror AG) Pty Ltd (Lithium 1) is intending to further explore three project areas in the larger Moolyella project area in the Pilbara. Terrestrial Ecosystems has undertaken a preliminary site investigation to ascertain fauna habitats, which are as follows:

- flat plains vegetated with sparse shrubs and spinifex;
- granite outcrops vegetated with spinifex;
- ephemeral creeklines;
- floodplains most vegetated with spinifex;
- dams and flooded areas; and
- disturbed areas and roadways.

A desktop assessment and site inspection indicated that there are multiple conservation significant species (i.e. *Pezoporus occidentalis*, *Dasyurus hallucatus*, *Rostratula australis*, *Falco hypoleucos*, *Macrotis lagotis*, *Liasis olivaceus barroni*, *Rhinonicteris aurantia*, *Macroderma gigas*, *Dasycercus blythi*, *Falco peregrinus*, *Leggadina lakedownensis*, *Sminthopsis longicaudata*, *Pseudomys chapmani* and *Lagorchestes conspicillatus*) potentially in the three project areas.

Exploration drilling is unlikely to significantly impact on any of these species unless the drilling program is near the activity area of one of these terrestrial species or it will disturb bats in a cave or adit. An inspection of each exploration drilling site by a suitably qualified zoologist immediately prior to the drilling program should be sufficient to determine if there will be a significant impact and what mitigation is required to avoid or minimise this impact to an acceptable level. This approach should be discussed with the appropriate environmental regulators prior to commencing the drilling program.

When the intended mining and disturbance area(s) are demarcated, then a Targeted survey should be planned and implemented for conservation significant species potentially found in the project areas.

1. INTRODUCTION

1.1 BACKGROUND

Lithium 1 is intending to further explore the Moolyella project area in the Pilbara. There are three project areas all within 5km of Marble Bar (Figure 1).

Terrestrial Ecosystems was asked to undertake a preliminary site assessment and to prepare a report that outlines the potential vertebrate fauna issues should Lithium 1 intend to proceed with exploration and mining in one of more of these tenements.

1.2 PROJECT OBJECTIVES AND SCOPE OF WORKS

Terrestrial Ecosystems was commissioned by Lithium 1 to undertake a Basic vertebrate fauna risk assessment to identify vertebrate fauna issues in the project area. This assessment is compatible with Environment Protection Authority (EPA) (2020) requirements for such an assessment as discussed in its *Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment*.

A Basic vertebrate fauna risk assessment involves undertaking a desktop review and site inspection. The objectives of this fauna risk assessment were to:

- provide an indication of the vertebrate fauna assemblage (reptile, amphibians, small mammal and bird) on and in the vicinity of the project area;
- identify the presence and/or potential risks of impacting on species of conservation significance that are present or likely to be present in the project area;
- assess the potential impact and environmental risks associated with the proposed development on the fauna assemblage;
- determine if any additional surveys are required to assess the potential impact on fauna assemblages in the project area, in particular, impacts on species of conservation significance; and
- make recommendations that mitigate or minimise potential impacts on resident fauna.

To achieve these objectives, Terrestrial Ecosystems has:

- reviewed Terrestrial Ecosystems fauna survey database [which includes data from the Atlas of Living Australia and Western Australian Museum (WAM)] to identify potential vertebrate fauna within the area;
- reviewed the Department of Biodiversity, Conservation and Attractions Threatened and Priority species as recorded in NatureMap that are likely to be in the area;
- searched the Commonwealth government's on-line MNES database to identify fauna species of national environmental significance that are protected under the *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act 1999*) potentially occurring in the area;
- reviewed previous fauna surveys conducted in the region;
- undertaken a site investigation to identify available fauna habitat types and condition;
- undertaken an assessment of the potential risks to the fauna associated with clearing additional areas of native vegetation;
- provided a discussion of the likelihood of *EPBC Act 1999* and Western Australian (WA) *Biodiversity Conservation Act 2016* listed species being present in the project area; and
- provided management recommendations to mitigate and minimise potential impacts on the fauna in the project area.

2. EXISTING ENVIRONMENT

2.1 PROJECT AREA

The Moolyella project area up to 6km west and 2km south of the Marble Bar town site in the Shire of Nullagine. Three areas were assessed; site 5 which is the most westerly is 284.3ha, site 6 which is on the west side of the Marble Bar town site is 970.6ha and site 7 which is south of the town site is 263.9ha.

The Moolyella project area is located on Marble Bar station. Station cattle feed mostly around the ephemeral creeks and the better vegetated areas along the Maitland River and its tributaries. Site 6 includes a large dam on Spinaway Creek and there are other smaller dams on other sections of the creek that were presumably established to facilitate historical tin mining or are the result of abandoned mining pits.

There are station and old mining tracks throughout the project area.

2.2 TOPOGRAPHY

The Moolyella project area is in the Pilbara IBRA subregion; PIL1 Chichester. The PIL1 Chichester subregion area is 9,044,560ha (Kendrick and McKenzie 2002). The Pilbara region comprises a significant proportion of the ancient continental shield of Western Australia, consisting of both Proterozoic and Archaean rocks. The latter constitutes the Pilbara Block, overlain by Proterozoic rock deposited in the Hamersley and Bangemall Basins. The Hamersley Basin occupies most of the southern part of the Pilbara Block and can be divided into three stratigraphical groups; the Fortescue, Hamersley and Turee Creek (Beard 1975, Jarvis 1979). The Chichester Plateau consists of mainly basalts, including siltstone, mudstone, shale, dolomite and jaspilite; forming a watershed between numerous rivers flowing north (e.g. De Grey, Oakover, Nullagine, Shaw, Yule and Sherlock) mostly through the Abydos Plain to the coast, and the Fortescue's drainage on the southern side. The Nullagine River is about 15km west of the project area and flows to the north.

2.3 VEGETATION

Plains in the PIL1 Chichester IBRA subregion support a shrub steppe characterised by *Acacia inaequilatera* over *Triodia wiseana* (formerly *Triodia pungens*) hummock grasslands, while *Eucalyptus leucophloia* tree steppes occur on ranges (Kendrick and McKenzie 2002).

2.4 CLIMATE

The Pilbara bioregion experiences an arid-tropical climate with hot summers from October to April and mild winters from May to September (Gentilli 1972). Rainfall in the Pilbara is variable and recordings are highest at stations in and around the Hamersley Ranges, which have altitudes of up to 900m AHD (Beard 1975).

Chart 1 shows the average mean monthly maximum and minimum temperatures and rainfall for Marble Bar, the closest weather station. Temperatures are highest in November - February. The Pilbara receives most of its annual rainfall between December and March (Chart 1). This rain is usually the result of moist tropical storms and decaying cyclones originating in the north-west or Kimberley, producing sporadic and drenching thunderstorms. Summer daily maximum temperatures may reach as high as the low 50's^{o}C, while mean winter maximum is around 27°C (ranging from 14-35°C). Light frosts occasionally occur during July and August.

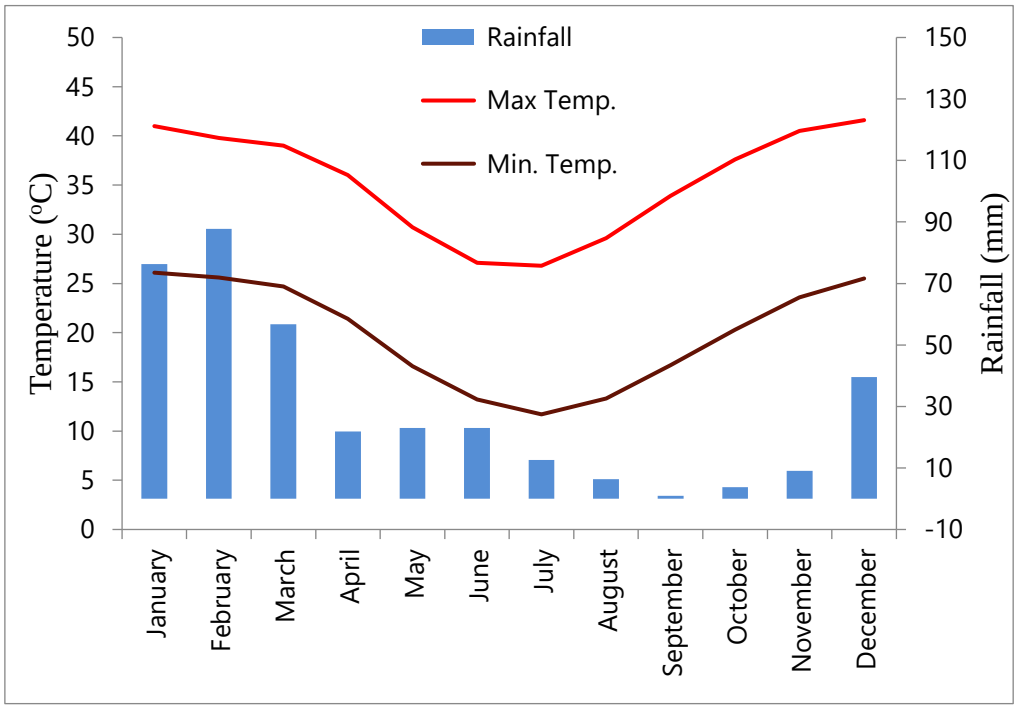

Chart 1. Month minimum and maximum temperatures and rainfall for Marble Bar (taken from BOM March 2022)

2.5 LAND USE

The dominant land use is grazing on native pasture.

2.6 VERTEBARTE FAUNA CONTEXT FOR THE PROJECT AREA

The fish, frogs, reptiles, mammals and birds in the Chichester IBRA subregion have been surveyed on numerous occasions for a variety of purposes. Surveys in the vicinity of the project area and which have been reviewed for this assessment include:

- Bat Call WA (2017) *Atlas Iron Limited Corunna Downs Project, Pilbara WA, May to June 2017. Echolocation Survey of Bat Activity at caves CO-CA-01 and CO-CA-03*, Unpublished Report for Stantec, Perth.
- Bat Call WA (2018) *Atlas Iron Limited, Corunna Downs cave CO-CA-03 Pilbara leaf-nosed bat roost census, November 2017*, Unpublished report for Atlas Iron Limited, Perth.
- Biologic (2019a) *Warrawoona Gold Project: 2019 Significant Species Survey*, Unpublished report for Calidus Resources Limited, Perth.
- Biologic (2019b) *Warrawoona Gold Project: Conservation Significant Bat Species Impact Assessment*, Unpublished report for Calidus Resources Ltd, Perth.
- Biologic (2019c) *Warrawoona Targeted Bat Assessment - April 2019*, Unpublished report for Calidus Resources Ltd, Perth.
- Biologic (2021) *Sanjiv Ridge Stage 2 Development Area Consolidated Terrestrial Fauna Report Biologic Environmental Survey*, Unpublished report for Atlas Iron Pty Ltd, Perth.
- Dunlop, J., Rayner, K. and Morris, K. (2016) *Pilbara Northern Quoll Research Program: Annual report 2014-2015*, Unpublished report for the Department of Parks and Wildlife, Perth.
- Gibson, L.A. and McKenzie, N.L. (2012) Environmental associations of small ground-dwelling mammals in the Pilbara region, Western Australia, *Records of the Western Australian Museum*, Supplement No. 78, 91-122.

- Johnstone, R.E., Burbidge, A.H. and Darnell, J.C. (2013) Birds of the Pilbara region, including seas and offshore islands, Western Australia: distribution, status and historical changes, *Records of the Western Australian Museum*, Supplement No. 78, 341-441.
- MWH (2016) *Corunna Downs Project: Terrestrial Vertebrate Fauna Survey*, Unpublished report for Atlas Iron Ltd, Perth.
- MWH (2016) *Corunna Downs Project: Terrestrial Vertebrate Fauna Survey*, Unpublished report for Atlas Iron Ltd, Perth.
- Pilbara Biological Survey Doughty, P., Rolfe, J.K., Burbidge, A.H., Pearson, D.J. and Kendrick, P.G. (2011) Herpetological assemblages of the Pilbara biogeographic region, Western Australia: ecological associations, biogeographic patterns and conservation, *Records of the Western Australian Museum*, Supplement No. 78, 315-341.
- Stantec (2018) *Corunna Downs Project: Terrestrial Vertebrate Fauna Survey*, Unpublished report for Atlas Iron Ltd, Perth.
- Stantec (2018) *Corunna Downs Project: Terrestrial Vertebrate Fauna Survey*, Unpublished report for Atlas Iron Ltd, Perth.

The most relevant of these surveys are to Corunna Downs project which is approximately 35km to the south-west of the project area, the Warrawoona project area which is approximately 15km south of the project area and the previous Department of Parks and Wildlife's survey of the Pilbara that had some survey sites in the surrounding areas.

2.7 METHODOLOGY

A review of the *EPBC Act 1999* list of protected species taken from its online matters of environmental significance (MNES) database was undertaken to identify species of conservation interest to the Commonwealth Government (Appendix A). In addition, a desktop search of the Terrestrial Ecosystems' fauna survey database was used to develop an appreciation of the vertebrate fauna assemblages in the relevant section of the bioregion in the vicinity of the Moolyella project area. The DBCA threatened and priority species database was searched via the records in NatureMap.

Other more general texts were also used to provide supplementary information on vertebrates in the bioregion, including Tyler et al. (2000) for frogs; Storr et al. (1983, 1990, 1999, 2002) for reptiles; Johnstone and Storr (1998, 2004) for birds; and Van Dyck and Strahan (2008) for mammals.

Collectively these sources of information were used to create lists of species expected to utilise the project area and broader bioregion. It should be noted that these lists will include species that have been recorded in the general region but are possibly vagrants and they will not generally be found in the project area due to a lack of suitable habitat (e.g. shore birds). Vagrants can be recorded almost anywhere. Many of the fish, bird, mammal, reptile and amphibian species have specific habitat requirements that may be present in the general area but not in the specific survey area. Also, the ecology of many of these species is often not well understood and it can sometimes be difficult to indicate those species whose specific habitat requirements are not present in the survey area. As a consequence, many species will be included in the lists produced from database searches but will not be present in the actual project area.

Site reconnaissance visit was undertaken by Dr Scott Thompson on 16 February 2022 to assess variations in habitat types, the presence of habitat that would support conservation significant species, access and habitat condition.

Table 1. Fauna assessment limitations and constraints

Possible limitations	Constraint (yes/no); significant, moderate or negligible	Comment
Competency and experience of the consultant carrying out this assessment	No	The environmental scientists that undertook the site assessment, drafted and reviewed this report are familiar with the vertebrate fauna of this bioregion.
Scope	No	All aspects of the scope of works have been addressed.
Proportion of fauna identified, recorded and/or collected	No	Not applicable.
Accuracy of previous survey work	Yes, negligible	Terrestrial Ecosystems has reported fauna survey data recorded by various authors but is not able to vouch for the accuracy of this work. It is acknowledged that the taxonomy of Western Australian vertebrates is continually being revised and the nomenclature of some of the species listed in the appendices may have changed since publication by the authors.
Sources of information	Yes, negligible	Vertebrate fauna information was available from on-line databases and unpublished and published reports of surveys conducted in the bioregion in a variety of habitat types. Many of these surveys employed a low level of trapping effort which significantly impacts on the capacity of these data to represent the fauna assemblages in the areas surveyed.
Proportion of the task achieved	No	All tasks for this preliminary site assessment were completed.
Timing/weather/ season/ cycle	N/A	Weather was fine during the site visit.
Disturbances which affected results of the survey	No	Disturbance areas throughout the project area have been factored into this assessment.
Intensity of survey effort	N/A	
Completeness	No	All aspects of this assessment have been completed.
Resources	No	Adequate resources were available.
Remoteness and/or access problems	No	Access was limited due to a lack of tracks and the available time for the site assessment.
Availability of contextual information on the region	Yes, moderate	Fauna survey data are available for adjacent areas.

3. RESULTS

3.1 FAUNA HABITATS

The Moolyella project area incorporates three land systems: Rocklea, Capricorn and River (Van Vreeswyk et al. 2004). The Rocklea system is characterised as basalt hills, lower slopes and minor stony plains supporting hard spinifex grasslands. The Capricorn land system is characterised as hills and ridges of sandstone and dolomite supporting shrubby hard and soft spinifex. The River land system is characterised as active floodplains and major rivers supporting grassy eucalypt woodlands, tussock grasslands and soft spinifex.

Based on the preliminary site assessment, fauna habitats within the project area are;

- flat plains vegetated with sparse shrubs and spinifex;
- granite outcrops vegetated with spinifex;
- ephemeral creeklines;
- floodplains most vegetated with spinifex;
- dams and flooded areas; and
- disturbed areas and roadways.

Plates 1-14 provide a visual indication of the variety of fauna habitat types in the project area.

Plate 1. Spinifex plains

Plate 2. Spinifex plains

Plate 3. Ephemeral creeklines

Plate 4. Ephemeral creeklines

Plate 5. Floodplains

Plate 6. Floodplains

Plate 7. Granite outcrops

Plate 8. Granite outcrops

Plate 9. Dams and flooded areas

Plate 10. Dams and flooded areas

Plate 11. Disturbed areas

Plate 12. Disturbed areas

Plate 13. Disturbed areas

Plate 14. Disturbed areas

3.1.1 Water birds

The project area includes numerous dammed water storage areas that are historical tin mining pits or constructed dams to support the mining infrastructure and processing operations. These dams support a variety of water birds and will almost certainly be used by migratory species as part of their period in Australia each year. If these dams and waterways are to be impacted, then a waterbird survey will need to be undertaken in the appropriate season(s).

3.2 BIOREGIONAL VERTEBRATE FAUNA

Appendix B provides a summary of the fauna survey data that are available in the vicinity of the project area. There are appreciable differences in the recorded fauna assemblages within and among fauna surveys shown in Appendix B. These differences are partially due to the low survey effort often deployed and they also reflect variations in soils and vegetation as well as temporal variations in the fauna assemblages.

Tables 2-6 provide a list of vertebrate species potentially found in the vicinity of the project area that have been compiled based on the fauna survey report results shown in Appendix B.

Table 2. Fish potentially found in the vicinity of the project area

Family	Species	Common name
Melanotaeniidae	*Melanotaenia australis*	Western Rainbowfish
Clupeidae	*Nematalosa erebi*	Bony Bream
Terapontidae	*Leiopotherapon unicolor*	Spangled Perch
Plotosidae	*Neosilurus hyrtlii*	Hyrtl's Catfish

Table 3. Birds potentially found in the vicinity of the project area

Family	Species	Common Name
Columbidae	*Phaps chalcoptera*	Common Bronzewing
	Ocyphaps lophotes	Crested Pigeon
	Geophaps plumifera	Spinifex Pigeon
	Geopelia cuneata	Diamond Dove
	Geopelia placida	Peaceful Dove
Cuculidae	*Chrysococcyx basalis*	Horsfield's Bronze-Cuckoo
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar
Burhinidae	*Burhinus grallarius*	Bush Stone-curlew
Charadriidae	*Elseyornis melanops*	Black-fronted Dotterel
Otididae	*Ardeotis australis*	Australian Bustard
Accipitridae	*Elanus axillaris*	Black-shouldered Kite
	Aquila audax	Wedge-tailed Eagle
	Circus assimilis	Spotted Harrier
	Accipiter cirrocephalus	Collared Sparrowhawk
	Milvus migrans	Black Kite
	Haliastur sphenurus	Whistling Kite
Tytonidae	*Tyto alba*	Barn Owl
Cuculidae	*Heteroscenes pallidus*	Pallid Cuckoo
Strigidae	*Ninox novaeseelandiae*	Morepork
Alcedinidae	*Dacelo leachii*	Blue-winged Kookaburra
	Todiramphus pyrrhopygius	Red-backed Kingfisher
	Todiramphus sanctus	Sacred Kingfisher
Meropidae	*Merops ornatus*	Rainbow Bee-eater
Falconidae	*Falco cenchroides*	Nankeen Kestrel
	Falco berigora	Brown Falcon
Megaluridae	*Poodytes carteri*	Spinifexbird
Cacatuidae	*Eolophus roseicapilla*	Galah
	Cacatua sanguinea	Little Corella
	Nymphicus hollandicus	Cockatiel
Psittacidae	*Barnardius zonarius*	Australian Ringneck
Psittaculidae	*Melopsittacus undulatus*	Budgerigar
Ptilonorhynchidae	*Chlamydera guttata*	Western Bowerbird
Climacteridae	*Climacteris melanurus*	Black-tailed Treecreeper
Maluridae	*Amytornis whitei*	Pilbara Grasswren
	Amytornis striatus	Striated Grasswren
	Malurus assimilis	Purple-backed Fairywren
	Malurus lamberti	Variegated Fairywren
	Malurus leucopterus	White-winged Fairywren
Meliphagidae	*Manorina flavigula*	Yellow-throated Miner
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater
	Gavicalis virescens	Singing Honeyeater
	Ptilotula penicillata	White-plumed Honeyeater
	Ptilotula keartlandi	Grey-headed Honeyeater
	Ptilotula plumula	Grey-fronted Honeyeater
	Epthianura tricolor	Crimson Chat
	Sugomel nigrum	Black Honeyeater
	Lichmera indistincta	Brown Honeyeater
	Melithreptus gularis	Black-chinned Honeyeater
Pardalotidae	*Pardalotus rubricatus*	Red-browed Pardalote
Acanthizidae	*Smicrornis brevirostris*	Weebill
Pomatostomidae	*Pomatostomus temporalis*	Grey-crowned Babbler
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckooshrike
	Lalage tricolor	White-winged Triller

Family	Species	Common Name
Oreoicidae	*Oreoica gutturalis*	Crested Bellbird
Pachycephalidae	*Colluricincla harmonica*	Grey Shrikethrush
	Pachycephala rufiventris	Rufous Whistler
Artamidae	*Artamus leucorynchus*	White-breasted Woodswallow
	Artamus personatus	Masked Woodswallow
	Artamus cinereus	Black-faced Woodswallow
	Artamus minor	Little Woodswallow
	Cracticus nigrogularis	Pied Butcherbird
	Gymnorhina tibicen	Australian Magpie
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail
Monarchidae	*Grallina cyanoleuca*	Magpie-lark

Family	Species	Common Name
Corvidae	*Corvus orru*	Torresian Crow
	Corvus bennetti	Little Crow
Alaudidae	*Mirafra javanica*	Australasian Bushlark
Acrocephalidae	*Acrocephalus australis*	Australian Reed Warbler
Locustellidae	*Poodytes gramineus*	Little Grassbird
	Cincloramphus mathewsi	Rufous Songlark
Hirundinidae	*Petrochelidon ariel*	Fairy Martin
	Petrochelidon nigricans	Tree Martin
Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird
Estrildidae	*Emblema pictum*	Painted Finch
	Taeniopygia guttata	Zebra Finch
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit

Table 4. Amphibians potentially found in the vicinity of the project area

Family	Species	Common Name
Limnodynastidae	*Notaden nichollsi*	Desert Spadefoot
	Platyplectrum spenceri	Spencer's Burrowing Frog
Myobatrachidae	*Uperoleia saxatilis*	Pilbara Toadlet

Family	Species	Common Name
Pelodryadidae	*Cyclorana maini*	Main's Frog
	Litoria rubella	Desert Tree Frog
Limnodynastidae	*Notaden nichollsi*	Desert Spadefoot

Table 5. Mammals potentially found in the vicinity of the project area

Family	Species	Common Name
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna
Bovidae	*Bos taurus*	Cow
Camelidae	*Camelus dromedarius*	Dromedary
Canidae	*Canis lupus*	Dingo
Felidae	*Felis catus*	Cat
Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheath-tail Bat
	Taphozous georgianus	Common Sheathtail Bat
	Taphozous hilli	Hill's Sheathtail Bat
Hipposideridae	*Rhinonicteris aurantia*	Pilbara Leaf-nosed Bat
Megadermatidae	*Macroderma gigas*	Ghost Bat
Molossidae	*Chaerephon jobensis*	Northern Freetail Bat

Family	Species	Common Name
	Mormopterus lumsdenae	
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat
	Scotorepens greyii	Little Broad-nosed Bat
	Vespadelus finlaysoni	Finlayson's Cave Bat
Dasyuridae	*Planigale sp.*	Planigale sp.
	Dasycercus blythi	Brush-tailed Mulgara
	Dasykaluta rosamondae	Kaluta
	Dasyurus hallucatus	Northern Quoll
	Ningaui timealeyi	Pilbara Ningaui
	Planigale ingrami	Long-tailed Planigale
	Pseudantechinus roryi	Rory Cooper's False Antechinus

Family	Species	Common Name
	Pseudantechinus woolleyae	Woolley's False Antechinus
	Sminthopsis longicaudata	Long-tailed Dunnart
	Sminthopsis macroura	Stripe-faced Dunnart
Macropodidae	*Lagorchestes conspicillatus*	Spectacled Hare-wallaby
	Osphranter robustus	Euro
	Osphranter rufus	Red Kangaroo
	Petrogale rothschildi	Rothschilds Rock Wallaby

Family	Species	Common Name
Thylacomyidae	*Macrotis lagotis*	Bilby
Muridae	*Mus musculus*	House Mouse
	Pseudomys chapmani	Western Pebble-mound Mouse
	Pseudomys delicatulus	Delicate Mouse
	Pseudomys desertor	Desert Mouse
	Pseudomys hermannsburgensis	Sandy Inland Mouse
	Zyzomys argurus	Common Rock-rat

Table 6. Reptiles potentially found in the vicinity of the project area

Family	Species	Common Name
Agamidae	*Ctenophorus caudicinctus*	Ring-tailed Dragon
	Ctenophorus isolepis	Central Military Dragon
	Ctenophorus nuchalis	Central Netted Dragon
	Ctenophorus reticulatus	Western Netted Dragon
	Diporiphora bilineata	Two-lined Dragon
	Gowidon longirostris	Long-nosed Dragon
	Pogona minor	Western Bearded Dragon
Carphodactylidae	*Nephrurus levis*	Three-lined Knob-tail
	Nephrurus wheeleri	Banded Knob-tail
Diplodactylidae	*Diplodactylus conspicillatus*	Fat-tailed Gecko
	Diplodactylus laevis	Desert Fat-tailed Gecko
	Diplodactylus savagei	Yellow-spotted Pilbara Gecko
	Lucasium stenodactylum	Crowned Gecko
	Lucasium wombeyi	Wombey's Ground Gecko
	Oedura marmorata	Marbled Velvet Gecko
	Rhynchoedura ornata	Beaked Gecko
	Strophurus elderi	Jewelled Gecko
Elapidae	*Acanthophis wellsi*	Pilbara Death Adder
	Brachyurophis approximans	North-western Shovel-nosed Snake
	Brachyurophis semifasciata	Half-girdled Snake
	Demansia psammophis	Yellow-faced Whipsnake

Family	Species	Common Name
	Demansia rufescens	Rufous Whipsnake
	Furina ornata	Orange-naped Snake
	Suta monachus	Hooded Snake
	Pseudechis australis	Mulga Snake
	Pseudonaja mengdeni	Western Brown Snake
	Pseudonaja modesta	Ringed Brown Snake
	Suta fasciata	Rosen's Snake
	Vermicella snelli	Pilbara Bandy Bandy
Gekkonidae	*Gehyra pilbara*	Pilbara Dtella
	Gehyra punctata	Spotted Dtella
	Gehyra variegata	Variegated Gehyra
	Hemidactylus frenatus	Asian House Gecko
	Heteronotia binoei	Bynoe's Gecko
	Heteronotia spelea	Desert Cave Gecko
Pygopodidae	*Delma butleri*	Unbanded Delma
	Delma elegans	Pilbara Delma
	Delma nasuta	Sharp-snouted Delma
	Delma pax	Peace Delma
	Delma tincta	Excitable Delma
	Lialis burtonis	Burton's Legless Lizard
	Pygopus nigriceps	Western Hooded Scaly-foot

Family	Species	Common Name
Pythonidae	*Antaresia perthensis*	Pygmy Python
	Antaresia stimsoni	Stimson's Python
	Liasis olivaceus	Olive Python
Scincidae	*Carlia munda*	Shaded-litter Rainbow-skink
	Carlia triacantha	Desert Rainbow-skink
	Ctenotus duricola	Eastern Pilbara Lined Ctenotus
	Ctenotus grandis	Grand Ctenotus
	Ctenotus helenae	Clay-soil Ctenotus
	Ctenotus inornatus	Bar-shouldered Ctenotus
	Ctenotus leonhardii	Leonhardi's Ctenotus
	Ctenotus rubicundus	Ruddy Ctenotus
	Ctenotus rutilans	Rusty-shouldered Ctenotus
	Ctenotus saxatilis	Rock Ctenotus
	Cyclodomorphus melanops	Spinifex Slender Blue-tongue
	Egernia epsisolus	Eastern Pilbara Spiny-tailed Skink
	Egernia formosa	Goldfields Crevice Skink
	Lerista bipes	North-western Sandslider
	Lerista jacksoni	Jackson's Slider
	Lerista muelleri	Wood Mulch-slider
	Lerista verhmens	Three-fingered Pilbara Slider
	Menetia greyii	Common Dwarf Skink
	Menetia surda	Western Dwarf Skink
	Morethia ruficauda	Lined Fire-tailed Skink
	Notoscincus ornatus	Ornate Soil-crevice Skink
	Proablepharus reginae	Western Soil-crevice Skink
	Tiliqua multifasciata	Central Blue-tongue
Typhlopidae	*Anilios ammodytes*	Ammodyte Blind Snake
	Anilios grypus	Long-beaked Blind Snake
	Anilios hamatus	Pale-headed Blind Snake
	Anilios pilbarensis	Pilbara Blind Snake
Varanidae	*Varanus acanthurus*	Spiny-tailed Monitor
	Varanus brevicauda	Short-tailed Pygmy Monitor
	Varanus eremius	Pygmy Desert Monitor
	Varanus giganteus	Perentie
	Varanus panoptes	Yellow-spotted Monitor
	Varanus tristis	Black-headed Monitor

3.3 CONSERVATION SIGNIFICANT FAUNA

Conservation significant fauna are protected by the Commonwealth *EPBC Act 1999*, and this list includes species covered by international treaties such as the Japan-Australia Migratory Bird Agreement (JAMBA) and China-Australia Migratory Bird Agreement (CAMBA) and the Western Australia (WA) *BC Act 2016*. The *BC Act 2016* provides for the publishing of the *Wildlife Conservation (Specially Protected Fauna) Notice* that lists species under multiple categories. In addition, DBCA maintains a list of fauna that require monitoring under four priorities based on the current knowledge of their distribution, abundance and threatening processes. The *EPBC Act 1999* and *BC Act 2016* imply legislative requirements for the management of anthropogenic impacts to minimise the effects of disturbances on species and their habitats. Priority species have no statutory protection, other than the DBCA wishes to monitor potential impacts on these species. Environmental consultants and proponents of developments are encouraged to avoid and minimise impacts on these species. Definitions of the significant fauna under the *BC Act 2016* are provided in Appendix C.

The fauna species that have special status in either State or Commonwealth government legislation or are on the DBCA Priority species list and are potentially present in the vicinity of the project area are listed in Table 7. Many of the migratory shorebirds and waders will periodically visit the project area and could be impacted if

the inundated historical mining pits or dams are disturbed. These species will be similarly impacted so have been consolidated into one group, however, when more project details are available, separate assessments for each species will be undertaken.

There is a low possibility of one species listed under the *EPBC Act* and two species listed under the *BC Act* being present in the project area. There is a low possibility that two species listed on the DBCA's Priority Fauna List that potentially occur in the project area. The following is an assessment of the likelihood of each of the species listed in being found in the project area.

Table 7. Species that are potentially found in the vicinity of the project area and that are listed as being of conservation significance under State or Commonwealth government legislation or with DBCA

Species	Status under the BC Act and DBCA Priority species list	Status under the EPBC Act	Comment on potential for conservation significant species to be present
Night Parrot *Pezoporus occidentalis*	Critical endangered	Endangered	Low possibility that it is present because of an absence of suitable habitat
Northern Quoll *Dasyurus hallucatus*	Endangered	Endangered	Likely in the rocky outcropping areas
Australian Painted Snipe *Rostratula australis*	Endangered	Endangered	This species could potentially be recorded in the dams and wetland areas
Grey Falcon *Falco hypoleucos*	Vulnerable	Vulnerable	May infrequently be seen in the project area
Bilby *Macrotis lagotis*	Vulnerable	Vulnerable	Some of the habitat in the project area is suitable for this species
Pilbara Olive Python *Liasis olivaceus barroni*	Vulnerable	Vulnerable	Possible in the rocky areas near water
Pilbara Leaf-nosed Bat *Rhinonicteris aurantia*	Vulnerable	Vulnerable	Recorded nearby so possibly utilises the project area
Ghost Bat *Macroderma gigas*	Vulnerable	Vulnerable	Recorded nearby so possibly utilises the project area
Brush-tailed Mulgara *Dasycercus blythi*	P4		Some of the habitat in the project area is suitable for this species
Peregrine Falcon *Falco peregrinus*	OS		May infrequently be seen in the project area
Northern Short-tailed Mouse *Leggadina lakedownensis*	P4		Possibly in the project area
Long-tailed Dunnart *Sminthopsis longicaudata*	P4		Possibly in the project area
Pebble-mound Mouse *Pseudomys chapmani*	P4		Possibly in the project area
Spectacled Hare-wallaby *Lagorchestes conspicillatus*	P4		Possibly in the project area

Results of the *EPBC Act 1999* protected matters database search is provided in Appendix A.

Night Parrot (*Pezoporus occidentalis*) - Critically Endangered under the *BC Act 2016* and Endangered under the *EPBC Act 1999*

The Night Parrot is a small, arid-adapted, nocturnal, ground-feeding parrot (Johnstone and Storr 1998, Threatened Species Scientific Committee 2016). Its length is 22-25cm with a body mass of approximately 104g (Threatened Species Scientific Committee 2016), although it was suggested that they were semi-nomadic, the Night Parrots in south-western Queensland appear to be sedentary (Murphy 2015).

The Night Parrot was probably originally distributed over much of semi-arid and arid Australia (Garnett et al. 1993, Threatened Species Scientific Committee 2016). Records in north-west and western Queensland in the early 1990-2000s were in a broad cross section of the habitats available (Garnett et al. 1993, Cupitt and Cupitt 2008, Boles et al. 2016). There have been recent sightings in the Pilbara in 1980, 2005 and 2017, central WA in 1979, north-eastern South Australia in 1979, western Queensland (including Pullen-Pullen-Mt Windsor-Diamantina population) in 1980, 1990, 1993, 2006 and 2013-17 (Davis and Metcalf 2008, Garnett et al. 2011, Charalambous 2016, Pickrell 2016, AG staff 2017, Palaszxzuk and Miles 2017, Rykers 2017, AG staff 2018), Pilbara in 2017 (Jones 2017) and the northern Goldfields (Jackett et al. 2017). Garnett et al. (2011) suggested that there were between 50-250 mature individuals in less than 5% of its previous range.

Wilson's (1937) summary of observations provided information on the early records of Night Parrots' preferred habitat and breeding sites. Recent information indicates its preferred habitat appears to be in *Triodia* grasslands, chenopod shrublands, shrubby samphire and floristically diverse habitats dominated by large-seeded species (Threatened Species Scientific Committee 2016, McCarthy 2017, Murphy et al. 2017b, Horton et al. 2021). At Pullen Pullen Reserve it nests in large, more or less ring-shaped *Triodia*, and the nest consists of a tunnel (25-30^{o} and 0^{o} to the ground; 20-33cm long) through an apron of dead spinifex leaves that leads to a chamber under a live hummock, with a shallow depression (3-4cm) excavated into the gravelly/sandy soil (Murphy et al. 2017a). In the northern Goldfields the nest was again in a spinifex hummock, it was circular, with an excavated depression (~1.5-2.0cm) in sandy substrate (Hamilton et al. 2017, Jackett et al. 2017). The entrance tunnel was 62cm long, and was downward sloping (27^{o}) with the entrance 28cm above the ground (Hamilton et al. 2017). It has clutches of two to four sub-elliptical, white eggs with a lustrous appearance (Murphy et al. 2017a). Breeding followed significant rains in March for the observations in Pullen-Pullen Reserve and in April in the northern Goldfields (Hamilton et al. 2017, Murphy et al. 2017a), but it is thought that breeding generally occurs between April and October (Murphy et al. 2017a).

Murphy et al. (2017b) placed a GPS tag on Night Parrots and reported that the two birds called at dusk from their diurnal roosts among spinifex hummocks and then flew to more floristically diverse habitats dominated by large-seeded, prolifically seeding species to feed.

The project is in the DBCA's (Department of Parks and Wildlife 2017) medium priority survey area for the Night Parrots (Plate 15). There is a substantial quantity of spinifex in the project area, however, there is no ring-forming mature spinifex which was described as the preferred habitat for Night Parrots (Department of Parks and Wildlife 2017) in the project area. It is therefore improbable that Night Parrots are present in the project area.

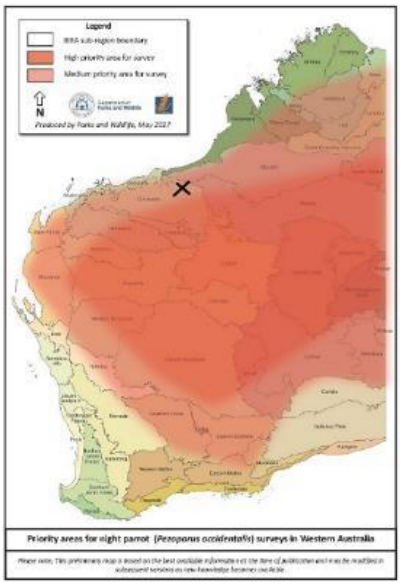

Plate 15. DBCA's priority areas for Night Parrots

Northern Quoll (*Dasyurus hallucatus*) - Endangered under the *EPBC Act 1999* and *BC Act 2016*

The Northern Quoll is found in east and north Queensland, northern parts of the Northern Territory, the Kimberley and the Pilbara. In the Northern Territory, and to a lesser extent in north-eastern Australia, Northern Quoll populations have declined significantly due to their predation on Cane Toads (Hernandez-Santin et al. 2019). Oakwood (2008) suggested that they were most abundant in broken country, rocky areas and open eucalypt forest within 150km of the coast.

Oakwood (2008) reported males weigh between 400-900g and females between 300-500g, however, recent captures in the Pilbara indicate that males can be up to 1.8kg and females up to 1.16kg (Rapallo 2010). The Northern Quolls' diet consists mostly of invertebrates, but they also eat small reptiles and soft fruits. It is thought that most males in savannah areas die after breeding (Braithwaite and Griffiths 1994, Oakwood 2000), but in captivity, if breeding activity is restricted, males will live to breed in subsequent years which is the same for part of the population in the Pilbara (Hernandez-Santin et al. 2019). Many females also die after raising their first litter, but about a quarter survive to produce a litter in the second year. In rocky areas, Braithwaite and Griffiths (1994) reported the Northern Quoll living for 2-3 years, whereas in savannah areas they rarely live beyond the first mating. Mating occurs in winter, with young being carried by the female for 8-10 weeks after birth, after which the young stay with their mother until they are able to fend for themselves.

Northern Quoll are reported to den in hollow tree trunks but will use other spaces such as rock crevices and openings in old termite mounds. In the Pilbara, the geographic distribution of Northern Quolls is considered fragmented and with its numbers in decline.

Northern Quolls have been caught in the Corunna Downs project area (MWH 2016, Stantec 2018), which is south of the project area and there is habitat suitable for Northern Quolls in the project area, so it is likely that they are present.

Australian Painted Snipe (*Rostratula australis*) - Endangered under the *EPBC Act 1999* and *BC Act 2016*

The Australian Painted Snipe is a migratory wading bird that is found in shallow ephemeral and permanent freshwater wetlands such as lakes, swamps, claypans, saltmarshes, dams often where these is good cover of grasses, rushes, reeds and low shrubs (Threatened Species Scientific Committee 2013).

This species could utilise the wetlands in the project area.

Grey Falcon (*Falco hypoleucos*) – Vulnerable under the *BC Act 2016* and *EPBC Act 1999*

This is Australia's rarest falcon, and it is mostly found in areas of less than 500mm rainfall north of latitude 26°S in Western Australia (Mullin et al. 2019, Threatened Species Scientific Committee 2020). It is mostly found in timbered lowland plains, particularly *Acacia* shrublands that are crossed by tree-lined water courses (Threatened Species Scientific Committee 2020), however, this species has been observed in treeless areas and frequents tussock grassland and open woodland (Threatened Species Scientific Committee 2020).

This species was not seen during the site visits or recorded in other environmental surveys in the region, but the Atlas of Living Australia has multiple records of this species near the project area. The Grey Falcon is therefore potentially in the project area.

Brush-tailed Mulgara (*Dasycercus blythi*) – Priority 4 with DBCA

Woolley (2005) has recently recognised two species of 'Mulgara'; *Dasycercus blythi* and *D. cristicauda*. *Dasycercus blythi* has a non-crested tail, two upper premolars and six nipples; *D. cristicauda* has a crested tail, three upper premolars and eight nipples. Both species have a wide and overlapping distribution in arid Australia. Woolley (2005) suggested the common names for these two species be Brush-tailed Mulgara for *D. blythi* and Crest-tailed Mulgara for *D. cristicauda*. These two species are sympatric in places, but probably utilise different parts of the habitat on a local scale when they are recorded in the same area. Currently, there are insufficient data to separate the spatial ecology, burrows and reproductive biology of these two species. Information that follows is based on what is known for 'Mulgara' without distinguishing between the species.

The reported distribution of Mulgara includes much of the inland spinifex covered sandy desert and spinifex vegetated areas in the Pilbara and northern goldfields. Within these areas their distribution is patchy, and it is most frequently confined to mature spinifex dominated habitat (Gibson and Cole 1992, Masters 1998, Masters et al. 2003, Thompson and Thompson 2008a). In some areas, their relative abundance is positively associated with rainfall in the previous 12 to 24 months (Gibson and Cole 1992, Masters 1998, Dickman et al. 2001, Letnic and Dickman 2005) and recent burning of the spinifex does not seem to be sufficient to shift Mulgara out of an area (Thompson and Thompson 2007). Significant population fluctuations appear to be a characteristic of the ecology of Mulgara (Manson 1994, Barrick Plutonic Gold Mine 2006). For example, Pearson (2003-04) reported significant fluctuations at Mt Keith with 99 being caught in 2001 and only 33 being caught in 2002 in a repeated survey. Mulgara are generally sedentary in contrast with some other small dasyurids and have high site fidelity and a low propensity for dispersal once a home range has been established (Masters 1998, Dickman et al. 2001).

The geographic distribution of Mulgara in the Pilbara has not been clearly delineated, but it is highly probable that the Crest-tailed Mulgara is not present and that all the Pilbara records are Brush-tailed Mulgara. The sandy plains vegetated in spinifex or low shrubs that are present in the project area provide suitable habitat for the Brush-tailed Mulgara, so it is potentially present in the project area.

Bilby *(Macrotis lagotis)* - Vulnerable under the *EPBC Act 1999* and *BC Act 2016*

This nocturnal, medium sized, omnivorous, burrow dwelling marsupial was once widespread in Australian arid and semi-arid areas. Its geographical distribution has now contracted to a few small populations in southern Northern Territory, south-eastern Queensland, Sandy Deserts of Western Australia and the Pilbara. Bilby distribution is now largely restricted to the inland sandy deserts in two broad habitat types; mulga woodlands with lateritic red earth and spinifex grassland with high fire frequency, again with the red earth (Johnson 1989, Southgate 1990). It is possible that they are much more wide-spread in the Pilbara than the government conservation agencies believe (see Pavey 2006 for current geographic range) because of a lack of survey effort in the region. There are recovery programs in Queensland and South Australia where Bilbies have been contained inside a predator proof fence and are being encouraged to breed.

Males can grow to 2.5kg, but females are smaller with a maximum weight of around 1.1kg (Johnson 2008). They have a diet of insects, seeds, bulbs, fruit and fungi and often leave a characteristic excavation of up to 10cm deep with the soil scattered in all directions or a 'pot-hole' in the ground (Thompson and Thompson 2008b).

Bilbies reintroduced to a protective environment have a home range of about 0.18km^2 for females and 3.16km^2 for males (Moseby and O'Donnell 2003). In captivity, adults reach sexual maturity at about six months but continue to grow in size until about 18 months of age. Litters comprise one to three young and females continue to breed beyond the age of four years (Southgate et al. 2000).

Bilbies typically can use two to three burrows each night (Lavery and Kirkpatrick 1997) and live in small groups of two to four individuals. Bilbies dig a burrow system that may be up to 3m long and 2m deep. Burrows can have a single or multiple entrances and can be located at the base of vegetation, termite mounds or rocks (Thompson and Thompson 2008b). They shelter in a burrow during the day and emerge well after dark to forage. In the Channel Country of Queensland, Lavery and Kirkpatrick (1997) reported that fewer than half of the burrows located were in frequent use, and daily burrow use in a typical burrow aggregation ranged from one-third to two-thirds over a 45-day observation period. A new burrow was dug in each aggregation within 10 months.

Bilbies intensively forage in an area of about 10ha around multiple burrows in the Pilbara (Thompson and Thompson 2008b). They will shift burrows and foraging areas when resources are depleted. In the Pilbara, most burrows and diggings are located on red sandy soils in a spinifex meadow with occasional trees, however, they have also been recorded in open burnt habitat (Thompson and Thompson 2008b). They are susceptible, particularly juveniles, to predation in disturbed environments, and vulnerable to vehicle collisions at night. Because they live in small groups and their population is highly fragmented and dispersed in the Pilbara, the loss of a few individuals is of conservation significance.

Parts of the habitat in the project area provide suitable habitat for Bilbies. They have also been recorded near Nullagine so are potentially present in the project area.

Pilbara Olive Python (*Liasis olivaceus barroni*) - Vulnerable under the *EPBC Act 1999* and *BC Act 2016*

Kendrick (2001) reported this species as common and wide-spread in the Pilbara and one that should not be listed as threatened or declining. Pilbara Olive Pythons are found throughout the Pilbara and north as far as the Gregory Range. They are most often seen at night and are generally found around rocky areas, rocky outcrops and cliffs, particularly in the vicinity of watercourses and water holes, but they also shelter in logs, flood debris, caves, tree hollows and thick vegetation (Burbidge 2004, Pearson 2007). They are generally opportunistically sighted and even species-specific searches in the right conditions often fail to detect their presence when they are in the area.

Clearing vegetation and other ground disturbing activities are likely to impact on this species, as they are unable to move away quickly enough. Being killed by vehicles on the roads and tracks at night is the most likely threat if it is present in the project area.

Stantec (2018) recorded the Pilbara Olive Python in the Corunna Downs project area, Biologic (2019a) recorded it in the Warrawoona Gold project area, and there is suitable habitat for it in the project area. The Pilbara Olive Python is therefore probably present in the project area.

Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*) - Vulnerable under the *EPBC Act 1999* and *BC Act 2016*

Armstrong (2001) reported populations of *R. aurantia* around Marble Bar, Nullagine, Hillside Station, Soansville, Tom Price, Paraburdoo, Red Hill, Millstream, Fortescue and the Barlee Range. Armstrong (2001) suggested that its geographic distribution was divided into three distinct areas: mines of the eastern Pilbara – George Ranges, Hamersley Ranges in small colonies, and in the Gascoyne Ranges (Armstrong 2001). More recently, McKenzie

and Bullen (2009) indicated that *R. aurantia* was more common than previously reported despite detectability constraints caused by their cryptic calls.

Armstrong (2001) reported microhabitat conditions in two caves occupied by *R. aurantia* in the Barlee Ranges as having ambient temperatures of 22-28°C in winter and 25-34°C in spring and humidity varied appreciably from 26-94% in winter and 11-74% in summer.

The Pilbara Leaf-nosed Bat was recorded by Stantec (2018) and MHW (2016) in the Corunna Downs project area (Bat Call WA 2017, 2018) and Biologic (2019a, c) recorded it in the Warrawoona Gold project area. Although no potentially suitable caves or adits were investigated during the two-day site assessment, it is probable that the Pilbara Leaf-nosed Bat is present in the project area.

Ghost Bat (*Macroderma gigas*) – Vulnerable under the *EPBC Act 1999* and the *WA BC Act 2016*

This is Australia's only carnivorous bat, eating large insects, frogs, lizards, small birds and mammals. Tideman et al. (1985) reported that Ghost Bats in the Northern Territory foraged, on average, 1.9km from their day roost, with a mean size of foraging area of 61ha. Their hunting behaviour utilised vantage points to detect prey with their eyes and ears, rather than echolocation. These vantage points were changed about every 15min during foraging periods, with a mean distance of 360m between them. The Ghost Bat is an obligate troglodyte, and its survival is dependent on finding natural roosts in caves, crevices, deep overhangs and artificial roosts such as abandoned mines. Each population appears to have a regionally centralised maternity site and only 10 such sites were known to exist in the mid-1990s (Worthington-Wilmer et al. 1994). Populations are known to disperse in the non-breeding (dry) season (Toop 1985).

Armstrong and Anstee (2000), in their summary of the geographic distribution of *M. gigas* in the Pilbara, reported that they had been present in the Abydos Plain, Chichester Plateau, Gascoyne Ranges, George Ranges, Hamersley Plateau and Oakover Valley. However, more recently McKenzie and Bullen (2009) reported them as being more common in the Pilbara than had previously thought despite detectability constraints caused by its cryptic call.

Its preferred habitat in the Hamersley Ranges was caves beneath bluffs of low rounded hills composed of Marra Mamba geology and granite rock piles in the eastern Pilbara (Armstrong and Anstee 2000). Armstrong and Anstee (2000) reported that while the Marra Mamba iron formation was a good predictor of the occurrence of *M. gigas* in the Hamersley Range, essentially any cave beneath a bluff with sufficient depth could be considered a potential roost. Disused mine shafts are also used by Ghost Bats as roosting sites.

The Ghost Bat was recorded by Stantec (2018) and MHW (2016) in the Corunna Downs project area and Biologic (Biologic 2019a, c) recorded it in the Warrawoona Gold project area. Although no potentially suitable caves or adits were investigated during the two-day site assessment, it is probable that the Ghost Bat is present in the project area.

Peregrine Falcon (*Falco peregrinus*) – Classified as other specially protected under the *WA BC Act 2016*

Johnstone and Storr (1998) reported the Peregrine Falcon as being widespread including on some off-shore islands, but was absent from most deserts. They went on to suggest it was mainly seen about cliffs along coasts, rivers and ranges and wooded watercourses and lakes, but Terrestrial Ecosystems has seen them in a variety of other habitats.

Peregrine Falcons have been recorded in this area, so it could potentially be in the project area.

Ground disturbance activities on a localised scale are unlikely to significantly impact on the Peregrine Falcon, however, should nesting sites be detected during fauna assessments, then these should be protected while they are being used for breeding purposes.

Northern Short-tailed Mouse (*Leggadina lakedownensis*) – Priority 4 with DBCA

Reid (2008) indicated that the Northern Short-tailed Mouse predominantly occurs in the central arid areas of Australia, including southern Northern Territory, northern South Australia and eastern Queensland. Reid (2008) reported that little is known of the biology and abundance of this species.

There are multiple records of the Northern Short-tailed Mouse in the Atlas of Living Australia near the project area, so it is potentially in the project area.

Long-tailed Dunnart (*Sminthopsis longicaudata*) - Priority 4 with DBCA

Burbidge et al. (2008) recorded the geographic distribution of the Long-tailed Dunnart to include the Pilbara, the Great Victoria Desert and into north-eastern South Australia and south-western Northern Territory. McKenzie et al. (2000) caught a number during their Carnarvon Basin regional survey, extending its geographic distribution in a westerly direction. Terrestrial Ecosystems' fauna database has a record of them being caught in IBRA subregions PIL1 and PIL3.

Burbidge et al. (2008) recorded individuals being caught on plateaus of boulders and stones near breakaways and scree slopes, vegetated with mulga and spinifex. There are no records of this species being caught in nearby fauna surveys.

Gibson and McKenzie (2012) recorded the Long-tailed Dunnart in the Pilbara Biological Survey in an adjacent area (i.e. Site NW12), and there are multiple records in the Atlas of Living Australia nearby, so it is potentially in the project area.

Pebble-mound Mouse (*Pseudomys chapmani*) - Priority 4 with DBCA

Start (2008) recorded the Pebble-mound Mouse as endemic to the Pilbara of Western Australia. Terrestrial Ecosystems' fauna survey database has records of mounds and mice in the vicinity of the project area, and the habitat on the scree slopes is suitable, so they could be present in the project area.

Pebble-mound Mice mounds appear to be abundant in the Pilbara, but only a small percentage appear active. Ground disturbing activities, most notably vegetation clearing, will destroy mounds and presumably any mice living in these mounds.

Stantec (2018) and MWH (2016) recorded the Pebble-mound Mouse in the Corunna Downs project area, and there are multiple records of its occurrence nearby in the Atlas of Living Australia, so it is potentially in the project area.

Spectacled Hare-wallaby (*Lagorchestes conspicillatus*) - Priority 4 with DBCA

The mainland subspecies of the Spectacled Hare-wallaby lives in tropical spinifex grasslands in the Pilbara (Burbidge and Johnson 1995), as it sheltered under large hummocks. This is typically a solitary mammal but can be seen feeding in small mobs. The population in the Pilbara has been in rapid decline.

Ingleby (1991) reported the Pilbara population included Marble Bar, so it could be recorded in the project area.

Fork-tailed Swift (*Apus pacificus*) - Migratory under the *EPBC Act 1999*

The Fork-tailed Swift breeds in north-east and mid-east Asia and winters in Australia and south New Guinea (Johnstone and Storr 1998). They arrive in the Kimberley in late September and in the Pilbara in November and the south-west in December, leaving late in April. Johnstone and Storr (1998) reported them as common in the Kimberley and uncommon to moderately common along the north-west, west and south-east coasts and scarce elsewhere. They are often seen in large flocks and can be attracted to thunderstorms or cyclonic events.

As this is an aerial migratory species that very seldom comes to the ground, ground disturbance activities on a localised scale are unlikely to significantly impact on Fork-tailed Swifts.

4. DISCUSSION

4.1 ADEQUACY OF AVAILABLE VERTEBRATE FAUNA DATA

The EPA's (2020) *Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment* indicated that the level of fauna assessment should be determined considering the following criteria:

- level of existing regional knowledge;
- type and comprehensiveness of recent local surveys;
- degree of existing disturbance or fragmentation at the regional scale;
- extent, distribution and significance of habitats;
- significance of species likely to be present;
- sensitivity of the environment to the proposed activities; and
- scale and nature of impact.

There are inadequate data about the possible presence of most of the conservation significant species potentially found in the project area do determine potential impacts.

The EPA and DMIRS appear to seldom be interested in the generic vertebrate fauna assemblage, so a Detailed vertebrate fauna survey probably is not required for an exploration drilling program or even a mining program. Targeted surveys for conservation significant species may be required when further details on the proposed exploration program are available.

4.1.1 Potential impacts associated with exploration drilling

Lithium 1 is intending to undertake exploration drilling in the three project areas. An exploratory drilling program is unlikely to significantly impact of terrestrial species unless the drilling area is near the activity area of a conservation significant species, and in most cases the animals will move into an adjacent area with little impact.

Arboreal bats are unlikely to be significantly impacted unless a roost site is disturbed, and roost sites are caves or adits. If exploration drilling is at least 50m from the entrance of a cave or adit and the drilling activity is limited to a couple of days, then impacts are unlikely to be significant.

If exploration is to occur adjacent to the wetland areas, then the waterbirds will almost certainly move to less disturbed areas, so any impacts will be low.

It is recommended that an inspection of each of the proposed access track and exploration drilling sites and is undertaken prior to drilling activity by a suitably experienced zoologist is undertaken to identify if any conservation significant species will be potentially impacted.

4.1.2 Impacts associated with mining

If areas within the three project areas are to be mined, then it is possible that this activity could potentially impact on one or more of the following species:

- Night Parrot (*Pezoporus occidentalis*);
- Northern Quoll (*Dasyurus hallucatus*);
- Australian Painted Snipe (*Rostratula australis*);
- Grey Falcon (*Falco hypoleucos*);
- Bilby (*Macrotis lagotis*);

- Pilbara Olive Python (*Liasis olivaceus barroni*);
- Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*);
- Ghost Bat (*Macroderma gigas*);
- Brush-tailed Mulgara (Dasycercus blythi);
- Peregrine Falcon (*Falco peregrinus*);
- Northern Short-tailed Mouse (*Leggadina lakedownensis*);
- Long-tailed Dunnart (*Sminthopsis longicaudata*);
- Pebble-mound Mouse (*Pseudomys chapmani*); and
- Spectacled Hare-wallaby (*Lagorchestes conspicillatus*).

There would be a significant cost to undertake a targeted fauna survey of the three project areas for all of these conservation significant species. It therefore seems prudent to refine the project area before a targeted or detailed survey is undertaken. It is presumed that the exploration drilling, and any subsequent infill drilling program will define the location of the resource and potential disturbance area(s).

5. SUMMARY AND CONCLUSIONS

There are multiple conservation significant species (i.e. *Pezoporus occidentalis*, *Dasyurus hallucatus*, *Rostratula australis*, *Falco hypoleucos*, *Macrotis lagotis*, *Liasis olivaceus barroni*, *Rhinonicteris aurantia*, *Macroderma gigas*, Dasycercus blythi, *Falco peregrinus*, *Leggadina lakedownensis*, *Sminthopsis longicaudata*, *Pseudomys chapmani* and *Lagorchestes conspicillatus)* potentially in the three project areas.

Exploration drilling is unlikely to significantly impact on any of these species unless the drilling program is near the activity area of one of these terrestrial species or it will disturb bats in a cave or adit. An inspection of each exploration drilling site and proposed access track by a suitably qualified zoologist immediately prior to the drilling program should be sufficient to determine if there will be a significant impact and what mitigation is required to avoid or minimise this impact to an acceptable level.

When the intended mining and disturbance area(s) are demarcated, then a Targeted survey should be planned and implemented for conservation significant species potentially found in the project areas.

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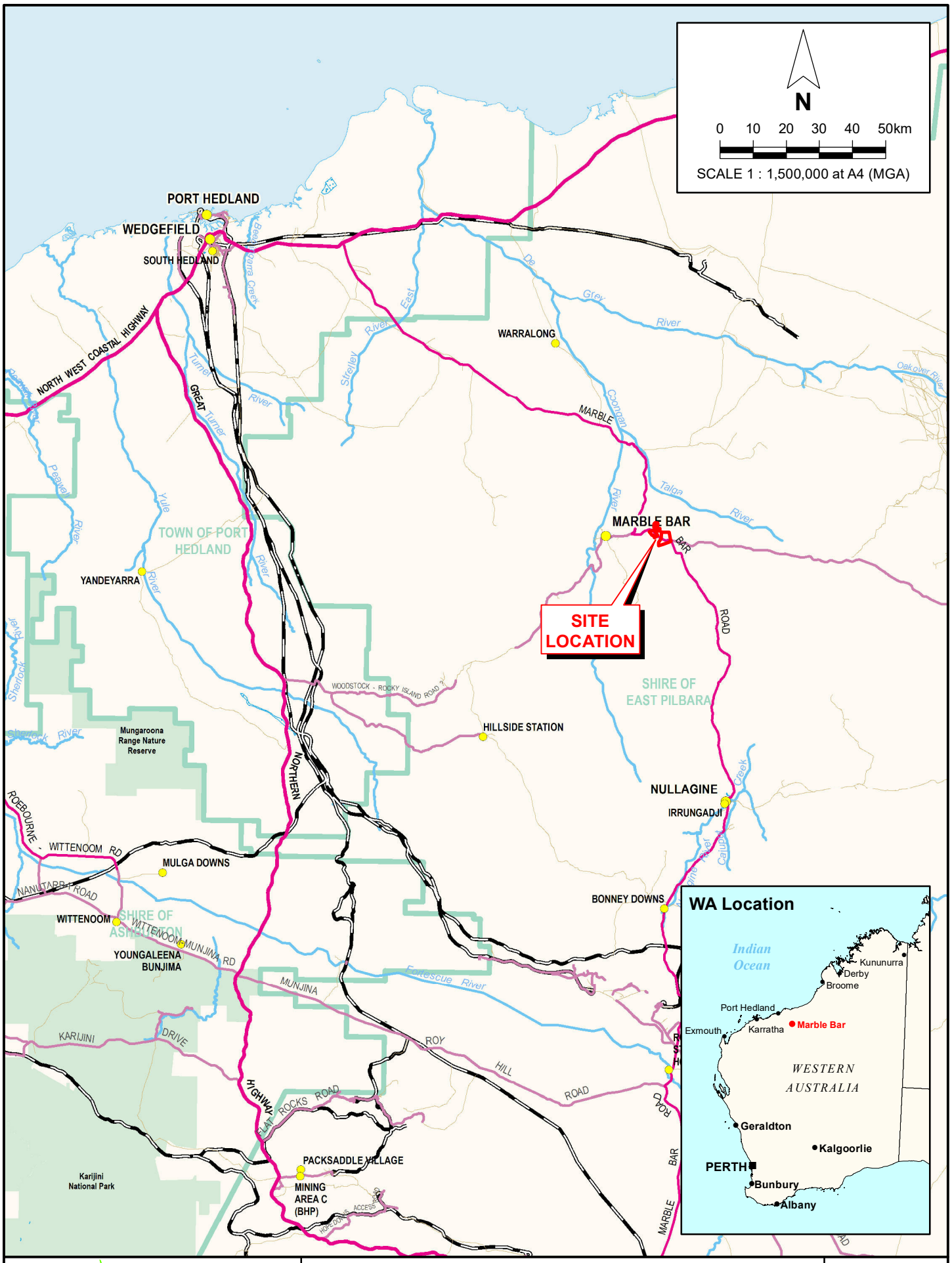
Figures

Basic Vertebrate Fauna Assessment
Moolyella Exploration Project, Pilbara



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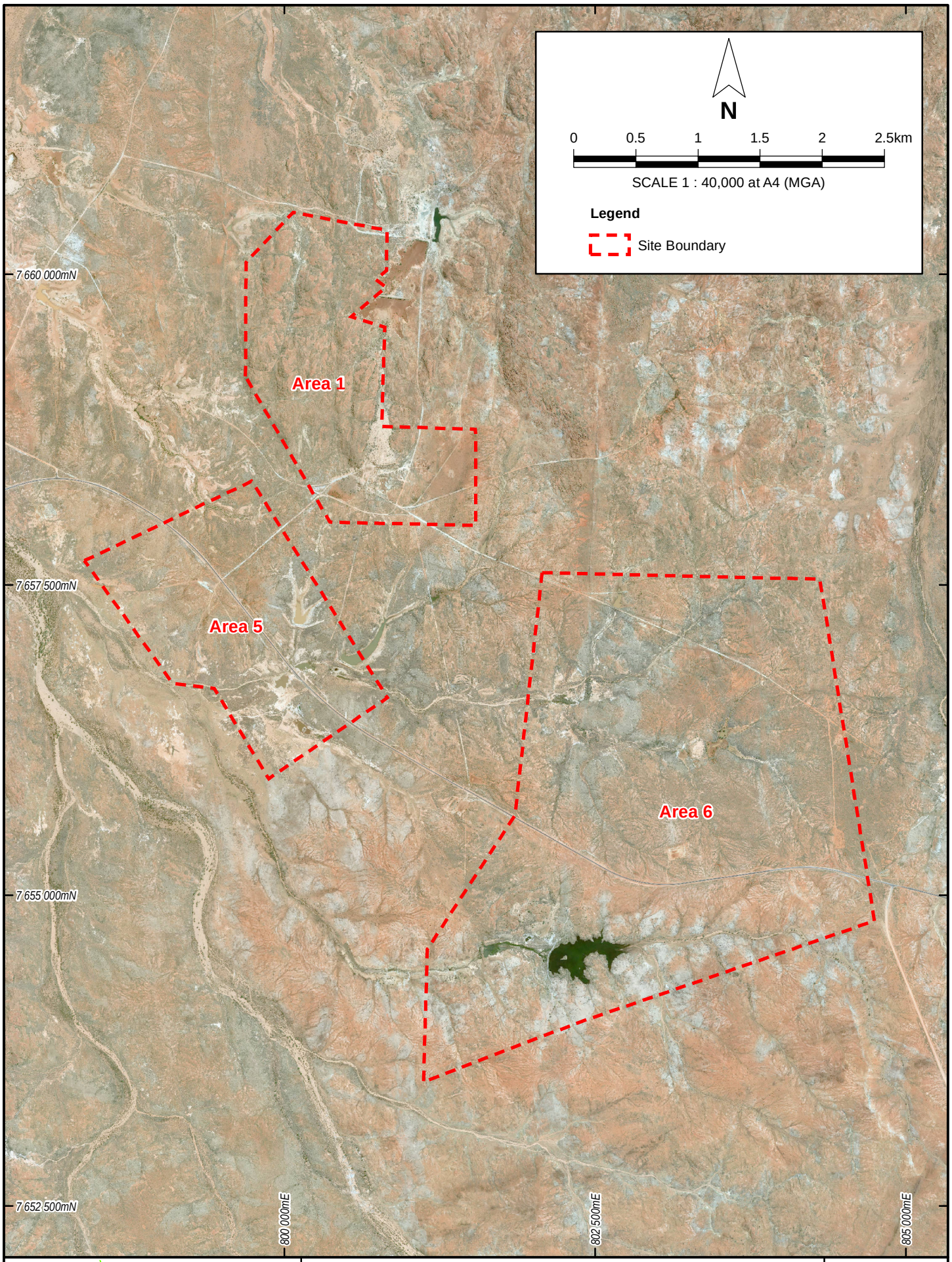
TERRESTRIAL ECOSYSTEMS

Geonomik Pty LtdB
BASIC VERTEBRATE FAUNA ASSESSMENT
MOOLYELLA EXPLORATION PROJECT, PILBARA

Figure 1

PROJECT AREAS IN REGIONAL CONTEXT

Drawn: G. Thompson | Date: 23 Mar 2022 | Job: 2021-0174



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TERRESTRIAL ECOSYSTEMS

Geonomik Pty LtdB
BASIC VERTEBRATE FAUNA ASSESSMENT
MOOLYELLA EXPLORATION PROJECT, PILBARA

Figure 2

PROJECT AREAS

Drawn: G. Thompson | Date: 23 Mar 2022 | Job: 2021-0174

Appendix A.

Results of the *EPBC Act* Protected Matters Search

Basic Vertebrate Fauna Assessment
Moolyella Exploration Project, Pilbara

Australian Government
Department of Agriculture, Water and the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 04-Mar-2022

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	10
Listed Migratory Species:	12

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	6
Commonwealth Heritage Places:	None
Listed Marine Species:	17
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	1
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	6
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Status of Conservation Dependent and Extinct are not MNES under the EPBC Act. Number is the current name ID.		
Scientific Name	Threatened Category	Presence Text
BIRD		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
MAMMAL		
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Breeding known to occur within area
Macrotis lagotis Greater Bilby [282]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Rhinonicteris aurantia (Pilbara form)		
Pilbara Leaf-nosed Bat [82790]	Vulnerable	Roosting known to occur within area
REPTILE		
Liasis olivaceus barroni		
Olive Python (Pilbara subspecies) [66699]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundo rustica		
Barn Swallow [662]		Species or species habitat may occur within area
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
[Charadrius veredus](#)		
Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
[Glareola maldivarum](#)		
Oriental Pratincole [840]		Species or species habitat may occur within area
[Numenius madagascariensis](#)		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
[Pandion haliaetus](#)		
Osprey [952]		Species or species habitat known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State
Unknown	
Commonwealth Land - [52239]	WA
Commonwealth Land - [50351]	WA
Commonwealth Land - [51948]	WA
Commonwealth Land - [50358]	WA
Commonwealth Land - [51056]	WA
Commonwealth Land - [50328]	WA

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text
Bird		
[Actitis hypoleucos](#)		
Common Sandpiper [59309]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area overfly marine area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area overfly marine area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area overfly marine area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area overfly marine area

Extra Information

State and Territory Reserves [Resource Information]

Protected Area Name	Reserve Type	State
Meenthena Station	NRS Addition - Gazettal in Progress	WA

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Marble Bar Road (M030) Coongan Gorge Realignment, WA	2017/7880	Controlled Action	Post-Approval
Spinifex Ridge Molybdenum Project	2006/3104	Controlled Action	Post-Approval
Warrawoona Gold Project, Pilbara Region, WA	2019/8584	Controlled Action	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Development of the Cundaline and Callawa iron ore deposits	2008/4235	Not Controlled Action	Completed
Goldsworthy Extension Project	2005/2280	Not Controlled Action	Completed
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Appendix B.

Vertebrate Fauna Recorded in Biological Surveys in the Region

Basic Vertebrate Fauna Assessment
Moolyella Exploration Project, Pilbara

B.1 VERTEBRATE FAUNA ASSESSMENTS

		Surveys	A	B								C									
Family	Species	Common name		PHYC04	NW07	PHYC05	NW08	NW11	NW12	NW10	NW09	MBE01	Site F	Site G	Site C	Site H	Site M	Site K	Site N	Site D	Site I	Site L
Fish																						
Melanotaeniidae	*Melanotaenia australis*	Western Rainbowfish	X																			
Clupeidae	*Nematalosa erebi*	Bony Bream	X																			
Terapontidae	*Leiopotherapon unicolor*	Spangled Perch	X																			
Plotosidae	*Neosilurus hyrtlii*	Hyrtl's Catfish	X																			
Amphibians																						
Limnodynastidae	*Notaden nichollsi*	Desert Spadefoot	X																			
	Platyplectrum spenceri	Spencer's Burrowing Frog	X	3																		
Myobatrachidae	*Uperoleia saxatilis*	Pilbara Toadlet	X																			
Pelodryadidae	*Cyclorana maini*	Main's Frog	X										5	13								
	Litoria rubella	Desert Tree Frog	X											3								
Reptiles																						
Agamidae	*Ctenophorus caudicinctus*	Ring-tailed Dragon	X	3	1	7	1	2	1	1			2		5	2	5	1				
	Ctenophorus isolepis	Central Military Dragon											1	1					1			
	Ctenophorus nuchalis	Central Netted Dragon	X					2											1			
	Ctenophorus reticulatus	Western Netted Dragon			1																	
	Diporiphora bilineata	Two-lined Dragon	X																			
	Gowidon longirostris	Long-nosed Dragon		2		1	1						1	16								
	Pogona minor	Western Bearded Dragon	X																			
Carphodactylidae	*Nephrurus levis*	Three-lined Knob-tail	X	1																		
	Nephrurus wheeleri	Banded Knob-tail	X																			
Diplodactylidae	*Diplodactylus conspicillatus*	Fat-tailed Gecko												2					4			
	Diplodactylus laevis	Desert Fat-tailed Gecko	X	2		3		1		1	1											
	Diplodactylus savagei	Yellow-spotted Pilbara Gecko	X		1	1							2									
	Lucasium stenodactylum	Crowned Gecko	X											1	4	6				2		
	Lucasium wombeyi	Wombey's Ground Gecko	X			1	2								2	1				1		
	Oedura marmorata	Marbled Velvet Gecko																			2	
	Rhynchoedura ornata	Beaked Gecko	X							1	1								1			
	Strophurus elderi	Jewelled Gecko	X										4							1	1	
Elapidae	*Acanthophis wellsi*	Pilbara Death Adder	X			1																

		Surveys	A	B									C									
Family	Species	Common name		PHYC04	NW07	PHYC05	NW08	NW11	NW12	NW10	NW09	MBE01	Site F	Site G	Site C	Site H	Site M	Site K	Site N	Site D	Site I	Site L
	Brachyurophis approximans	North-western Shovel-nosed Snake												4		1	1					
	Brachyurophis semifasciata	Half-girdled Snake	X																			
	Demansia psammophis	Yellow-faced Whipsnake	X											1		1						
	Demansia rufescens	Rufous Whipsnake	X										3	1	1					1	1	
	Furina ornata	Orange-naped Snake	X		1										1	1			1			
	Suta monachus	Hooded Snake																			1	
	Pseudechis australis	Mulga Snake	X										1									
	Pseudonaja mengdeni	Western Brown Snake	X																			
	Pseudonaja modesta	Ringed Brown Snake	X																			
	Suta fasciata	Rosen's Snake	X											1								
	Vermicella snelli	Pilbara Bandy Bandy	X											2	1							
Gekkonidae	*Gehyra pilbara*	Pilbara Dtella	X				1	1														
	Gehyra punctata	Spotted Dtella	X				1		2						1		1	1			1	
	Gehyra variegata	Variegated Gehyra	X											8			3	1			1	11
	Hemidactylus frenatus	Asian House Gecko							1													
	Heteronotia binoei	Bynoe's Gecko	X	1	8	1	2	1	1				2	5	7		1	1	5		1	7
	Heteronotia spelea	Desert Cave Gecko	X												10						2	
Pygopodidae	*Delma butleri*	Unbanded Delma											1	2							2	
	Delma elegans	Pilbara Delma	X												1							
	Delma nasuta	Sharp-snouted Delma	X										4	1	1					6	1	
	Delma pax	Peace Delma	X	2		1								8							1	
	Delma tincta	Excitable Delma	X										1	1	1					1		
	Lialis burtonis	Burton's Legless Lizard	X										2	2								
	Pygopus nigriceps	Western Hooded Scaly-foot												1								
Pythonidae	*Antaresia perthensis*	Pygmy Python	X										1									
	Antaresia stimsoni	Stimson's Python	X																			
	Liasis olivaceus	Olive Python	X																			
Scincidae	*Carlia munda*	Shaded-litter Rainbow-skink	X	1			1	1		2				7								
	Carlia triacantha	Desert Rainbow-skink														2						
	Ctenotus duricola	Eastern Pilbara Lined Ctenotus	X																			
	Ctenotus grandis	Grand Ctenotus	X			2		1	2				5				1	4	5			
	Ctenotus helenae	Clay-soil Ctenotus	X				1	2		2												
	Ctenotus inornatus	Bar-shouldered Ctenotus											3						1			1

		Surveys	A	B									C									
Family	Species	Common name		PHYC04	NW07	PHYC05	NW08	NW11	NW12	NW10	NW09	MBE01	Site F	Site G	Site C	Site H	Site M	Site K	Site N	Site D	Site I	Site L
	Ctenotus leonhardii	Leonhardi's Ctenotus											31	21	18	12	2	5		5	20	1
	Ctenotus pantherinus	Leopard Ctenotus	X					1	2						2							
	Ctenotus rubicundus	Ruddy Ctenotus	X										25		4			6	6			
	Ctenotus rutilans	Rusty-shouldered Ctenotus													1						3	
	Ctenotus saxatilis	Rock Ctenotus	X		3	1	1	2	4			2										
	Cyclodomorphus melanops	Spinifex Slender Blue-tongue	X		1	1						1										
	Egernia epsisolus	Eastern Pilbara Spiny-tailed Skink	X				X															
	Egernia formosa	Goldfields Crevice Skink													2						1	
	Lerista bipes	North-western Sandslider	X	7		2							3						8			
	Lerista jacksoni	Jackson's Slider	X	2								1			1							
	Lerista muelleri	Wood Mulch-slider	X		1					1												
	Lerista verhmens	Three-fingered Pilbara Slider	X				1															
	Menetia greyii	Common Dwarf Skink	X	1						2			2		1							1
	Menetia surda	Western Dwarf Skink	X		2	2	1															
	Morethia ruficauda	Lined Fire-tailed Skink	X				1	1	1	1			1	5	2			3		1	4	
	Notoscincus ornatus	Ornate Soil-crevice Skink	X					1	1	2								2			1	
	Proablepharus reginae	Western Soil-crevice Skink								1	1											
	Tiliqua multifasciata	Central Blue-tongue	X		1								12	1		2		1			3	
Typhlopidae	*Anilios ammodytes*	Ammodyte Blind Snake		1	1	1	2	2	1				1	4			1				2	2
	Anilios grypus	Long-beaked Blind Snake	X			1	2	1					1	3		1	2			2	2	
	Anilios hamatus	Pale-headed Blind Snake												1								
	Anilios pilbarensis	Pilbara Blind Snake						1														
Varanidae	*Varanus acanthurus*	Spiny-tailed Monitor	X				1		1				10	8	11	9				5	13	
	Varanus brevicauda	Short-tailed Pygmy Monitor	X					1	2				1									
	Varanus eremius	Pygmy Desert Monitor											3									
	Varanus giganteus	Perentie														1						
	Varanus panoptes	Yellow-spotted Monitor												1								
	Varanus tristis	Black-headed Monitor											1	9		1						
Birds																						
Columbidae	*Phaps chalcoptera*	Common Bronzewing														2						1
	Ocyphaps lophotes	Crested Pigeon		X				X	X				1	5	1		2	2	5		1	
	Geophaps plumifera	Spinifex Pigeon		X		X	X	X	X				5	14	8	3	15	7		5	5	
	Geopelia cuneata	Diamond Dove		X	X	X		X	X				15	17		2				1	7	

		Surveys	A	B									C									
Family	Species	Common name		PHYC04	NW07	PHYC05	NW08	NW11	NW12	NW10	NW09	MBE01	Site F	Site G	Site C	Site H	Site M	Site K	Site N	Site D	Site I	Site L
	Geopelia placida	Peaceful Dove		X															2			14
Cuculidae	*Chrysococcyx basalis*	Horsfield's Bronze-Cuckoo		X					X				4								1	
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar														1						1
Burhinidae	*Burhinus grallarius*	Bush Stone-curlew		X																		
Charadriidae	*Elseyornis melanops*	Black-fronted Dotterel		X																		
Otididae	*Ardeotis australis*	Australian Bustard																				2
Accipitridae	*Elanus axillaris*	Black-shouldered Kite																			1	
	Aquila audax	Wedge-tailed Eagle																			1	
	Circus assimilis	Spotted Harrier																1				
	Accipiter cirrocephalus	Collared Sparrowhawk																				1
	Milvus migrans	Black Kite															1					
	Haliastur sphenurus	Whistling Kite											1			1						5
Tytonidae	*Tyto alba*	Barn Owl														1						
Cuculidae	*Heteroscenes pallidus*	Pallid Cuckoo		X									1	5								
Strigidae	*Ninox novaeseelandiae*	Morepork		X									1	4					1			
Alcedinidae	*Dacelo leachii*	Blue-winged Kookaburra		X									2	5								3
	Todiramphus pyrrhopygius	Red-backed Kingfisher		X									6	5								1
	Todiramphus sanctus	Sacred Kingfisher		X																		
Meropidae	*Merops ornatus*	Rainbow Bee-eater		X									31	51	12	2					3	43
Falconidae	*Falco cenchroides*	Nankeen Kestrel							X						1	3	1		1		4	1
	Falco berigora	Brown Falcon		X		X	X							4			2	1	1		1	
Megaluridae	*Poodytes carteri*	Spinifexbird	X		X	X		X	X				4	2	12	20		1	3	7	7	
Cacatuidae	*Eolophus roseicapilla*	Galah		X	X								9	8				6	2			9
	Cacatua sanguinea	Little Corella		X	X	X	X						5									22
	Nymphicus hollandicus	Cockatiel		X		X																
Psittacidae	*Barnardius zonarius*	Australian Ringneck		X										11								4
Psittaculidae	*Melopsittacus undulatus*	Budgerigar		X		X	X	X	X				2	1		3					3	
Ptilonorhynchidae	*Chlamydera guttata*	Western Bowerbird	X												4							
Climacteridae	*Climacteris melanurus*	Black-tailed Treecreeper	X	X										21								
Maluridae	*Amytornis whitei*	Pilbara Grasswren	X																			
	Amytornis striatus	Striated Grasswren													2	10				6		
	Malurus assimilis	Purple-backed Fairywren		X		X							9	9		7				1		
	Malurus lamberti	Variegated Fairywren	X																			
	Malurus leucopterus	White-winged Fairywren	X					X														

		Surveys	A	B									C									
Family	Species	Common name		PHYC04	NW07	PHYC05	NW08	NW11	NW12	NW10	NW09	MBE01	Site F	Site G	Site C	Site H	Site M	Site K	Site N	Site D	Site I	Site L
Meliphagidae	*Manorina flavigula*	Yellow-throated Miner	X	X	X	X			X				9	1		1	7	2	3		6	3
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater			X																	
	Gavicalis virescens	Singing Honeyeater	X	X	X	X	X	X	X				4	2		1					2	
	Ptilotula penicillata	White-plumed Honeyeater	X	X		X							28	66								86
	Ptilotula keartlandi	Grey-headed Honeyeater	X	X	X	X	X		X				34	2	61	58	2	18	2	21	22	17
	Ptilotula plumula	Grey-fronted Honeyeater											4			2						8
	Epthianura tricolor	Crimson Chat			X			X														
	Sugomel nigrum	Black Honeyeater	X																			
	Lichmera indistincta	Brown Honeyeater	X	X	X	X							1	2								9
	Melithreptus gularis	Black-chinned Honeyeater		X									6	2		8				2		
Pardalotidae	*Pardalotus rubricatus*	Red-browed Pardalote	X	X		X							4	3	1	4				2	4	
Acanthizidae	*Smicrornis brevirostris*	Weebill			X									1		2					17	12
Pomatostomidae	*Pomatostomus temporalis*	Grey-crowned Babbler	X	X		X							5	16								12
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckooshrike	X	X	X	X	X		X				3	6	1	2	3			5	14	3
	Lalage tricolor	White-winged Triller	X	X		X								4								
Oreoicidae	*Oreoica gutturalis*	Crested Bellbird	X						X													
Pachycephalidae	*Colluricincla harmonica*	Grey Shrikethrush	X		X									1	31	10				7	1	2
	Pachycephala rufiventris	Rufous Whistler			X		X							2		2						2
Artamidae	*Artamus leucorynchus*	White-breasted Woodswallow	X																			
	Artamus personatus	Masked Woodswallow			X			X														
	Artamus cinereus	Black-faced Woodswallow	X	X	X	X	X		X				3	2	3							
	Artamus minor	Little Woodswallow	X	X										3	14			2			10	
	Cracticus nigrogularis	Pied Butcherbird	X	X	X	X							5	8	5	10		1	1	1	7	
	Gymnorhina tibicen	Australian Magpie	X	X																		
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail	X	X	X	X							2	2		3					10	
Monarchidae	*Grallina cyanoleuca*	Magpie-lark	X	X	X								1	5							1	10
Corvidae	*Corvus orru*	Torresian Crow	X	X	X	X							14	8		1	2	1		5	1	
	Corvus bennetti	Little Crow	X				X						3									
Alaudidae	*Mirafra javanica*	Australasian Bushlark	X																			
Acrocephalidae	*Acrocephalus australis*	Australian Reed Warbler	X																			
Locustellidae	*Poodytes gramineus*	Little Grassbird	X																			
	Cincloramphus mathewsi	Rufous Songlark											12									
Hirundinidae	*Petrochelidon ariel*	Fairy Martin	X																			
	Petrochelidon nigricans	Tree Martin	X		X																	

		Surveys	A	B								C									
Family	Species	Common name		PHYC04	NW07	PHYC05	NW08	NW11	NW12	NW10	NW09	MBE01	Site F	Site G	Site C	Site H	Site M	Site K	Site N	Site D	Site I	Site L
Dicaeidae	*Dicaeum hirundinaceum*	Mistletoebird		X	X																	
Estrildidae	*Emblema pictum*	Painted Finch	X	X		X	X	X	X				43	38	43	30	41	8	63	37	7	
	Taeniopygia guttata	Zebra Finch	X	X	X	X	X	X	X				85	152		4	4	7	16	11		14
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit	X	X		X		X	X				8	1		1						
Mammals																						
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna	X												2							1
Bovidae	*Bos taurus*	Cow											3	3				1	20			20
Camelidae	*Camelus dromedarius*	Dromedary													1				1			
Canidae	*Canis lupus*	Dingo												1					1			
Felidae	*Felis catus*	Cat	X																1			1
Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheath-tail Bat																		1		
	Taphozous georgianus	Common Sheathtail Bat	X										1	1	2	2	1	1	1	2	2	1
	Taphozous hilli	Hill's Sheathtail Bat	X																			
Hipposideridae	*Rhinonicteris aurantia*	Pilbara Leaf-nosed Bat	X										2	2	3	2		2	2		2	
Megadermatidae	*Macroderma gigas*	Ghost Bat	X																			
Molossidae	*Chaerephon jobensis*	Northern Freetail Bat											1	2				1	1	2		1
	Mormopterus lumsdenae													1								
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat											1	2	2		1		1	2	1	1
	Scotorepens greyii	Little Broad-nosed Bat	X										1	2		1		1	1			1
	Vespadelus finlaysoni	Finlayson's Cave Bat	X										1	2	2	1	1	1	1	2	2	1
Dasyuridae	*Planigale sp.*	Planigale sp.		1	1		7	2	2													
	Dasycercus blythi	Brush-tailed Mulgara	X																			
	Dasykaluta rosamondae	Kaluta	X			1	1		1	1									1			
	Dasyurus hallucatus	Northern Quoll	X												2		14		2			2
	Ningaui timealeyi	Pilbara Ningaui	X		3	23	4	3	7				2		2				1	2	5	
	Planigale ingrami	Long-tailed Planigale												3		6					6	
	Pseudantechinus roryi	Rory Cooper's False Antechinus	X																			
	Pseudantechinus woolleyae	Woolley's False Antechinus	X						1								1					
	Sminthopsis longicaudata	Long-tailed Dunnart	X						1													
	Sminthopsis macroura	Stripe-faced Dunnart	X																			
Macropodidae	*Lagorchestes conspicillatus*	Spectacled Hare-wallaby	X																			
	Osphranter robustus	Euro	X										3	3	2	1	4	6	20	3	1	5
	Osphranter rufus	Red Kangaroo	X																			

		Surveys	A	B								C									
Family	Species	Common name		PHYC04	NW07	PHYC05	NW08	NW11	NW12	NW10	NW09	MBE01	Site F	Site G	Site C	Site H	Site M	Site K	Site N	Site D	Site I	Site L
	Petrogale rothschildi	Rothschilds Rock Wallaby	X												1	1						
Thylacomyidae	*Macrotis lagotis*	Bilby	X																			
Muridae	*Mus musculus*	House Mouse	X	3		1								2								
	Pseudomys chapmani	Western Pebble-mound Mouse	X															8		2		
	Pseudomys delicatulus	Delicate Mouse	X	3																		1
	Pseudomys desertor	Desert Mouse	X		2	3	1			3									2			
	Pseudomys hermannsburgensis	Sandy Inland Mouse	X			2		1						10					6			
	Zyzomys argurus	Common Rock-rat	X											1	8	10	5					

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C MWH (2016) *Corunna Downs Project: Terrestrial Vertebrate Fauna Survey*, Unpublished report for Atlas Iron Ltd, Perth.

B.2 VERTEBRATE FAUNA ASSESSMENTS

		Surveys	A												B	C					D	
Family	Species	Common name	Site F	Site G	Site C	Site H	Site M	Site K	Site N	Site D	Site I	Site L	Opportunitic	Site E	Unknown	Klondyke	WAR_GB01	WAR_NQ03	WAR_NQ05	Muccan	Yarrie
Amphibians																						
Pelodryadidae	*Cyclorana maini*	Main's Frog	5	13											X						
	Litoria rubella	Desert Tree Frog		3											X						
Reptiles																						
Agamidae	*Ctenophorus caudicinctus*	Ring-tailed Dragon	2		5	2	5	1													
	Ctenophorus isolepis	Central Military Dragon	1	1					1												
	Ctenophorus nuchalis	Central Netted Dragon							1												
Diplodactylidae	*Diplodactylus bilybara*	Western Fat-tailed Gecko		2																	
	Diplodactylus conspicillatus	Fat-tailed Gecko							4												
	Diplodactylus savagei	Yellow-spotted Pilbara Gecko	2																		
	Lucasium stenodactylum	Crowned Gecko		1	4	6				2											
	Lucasium wombeyi	Wombey's Ground Gecko			2	1				1											
	Oedura marmorata	Marbled Velvet Gecko									2										
	Rhynchoedura ornata	Beaked Gecko							1												
	Strophurus elderi	Jewelled Gecko	4							1	1										
Elapidae	*Brachyurophis approximans*	North-western Shovel-nosed Snake		4		1	1														
	Demansia psammophis	Yellow-faced Whipsnake		1		1															
	Demansia rufescens	Rufous Whipsnake	3	1	1					1	1										
	Furina ornata	Orange-naped Snake			1	1			1												
	Suta monachus	Hooded Snake									1										
	Pseudechis australis	Mulga Snake	1																		
	Suta fasciata	Rosen's Snake		1																	
	Vermicella snelli	Pilbara Bandy Bandy		2	1																
Gekkonidae	*Gehyra punctata*	Spotted Dtella			1		1	1			1										
	Gehyra variegata	Variegated Gehyra		8			3	1			1	11									
	Heteronotia binoei	Bynoe's Gecko	2	5	7		1	1	5		1	7									
	Heteronotia spelea	Desert Cave Gecko			10						2										
Pygopodidae	*Delma butleri*	Unbanded Delma	1	2							2										

		Surveys	A												B	C					D	
Family	Species	Common name	Site F	Site G	Site C	Site H	Site M	Site K	Site N	Site D	Site I	Site L	Opportunitic	Site E	Unknown	Klondyke	WAR_GB01	WAR_NQ03	WAR_NQ05	Muccan	Yarrie
	Delma elegans	Pilbara Delma			1																
	Delma nasuta	Sharp-snouted Delma	4	1	1					6	1										
	Delma pax	Peace Delma		8							1										
	Delma tincta	Excitable Delma	1	1	1					1											
	Lialis burtonis	Burton's Legless Lizard	2	2																	
	Pygopus nigriceps	Western Hooded Scaly-foot		1																	
Pythonidae	*Antaresia perthensis*	Pygmy Python	1																		
	Liasis olivaceus	Olive Python											3			1					
Scincidae	*Carlia munda*	Shaded-litter Rainbow-skink		7																	
	Carlia triacantha	Desert Rainbow-skink				2															
	Ctenotus duricola	Eastern Pilbara Lined Ctenotus	5				1	4	5												
	Ctenotus grandis	Grand Ctenotus	3						1			1									
	Ctenotus inornatus	Bar-shouldered Ctenotus	31	21	18	12	2	5		5	20	1									
	Ctenotus leonhardii	Leonhardi's Ctenotus			2																
	Ctenotus pantherinus	Leopard Ctenotus	25		4			6	6												
	Ctenotus rubicundus	Ruddy Ctenotus			1						3										
	Egernia formosa	Goldfields Crevice Skink			2						1										
	Lerista bipes	North-western Sandslider	3						8												
	Lerista jacksoni	Jackson's Slider			1																
	Menetia greyii	Common Dwarf Skink	2		1							1									
	Morethia ruficauda	Lined Fire-tailed Skink	1	5	2			3		1	4										
	Notoscincus ornatus	Ornate Soil-crevice Skink						2			1	1									
	Tiliqua multifasciata	Central Blue-tongue	12	1		2		1			3										
Typhlopidae	*Anilios ammodytes*	Ammodyte Blind Snake	1	4			1				2	2									
	Anilios grypus	Long-beaked Blind Snake	1	3		1	2				2										
	Anilios hamatus	Pale-headed Blind Snake		1																	
Varanidae	*Varanus acanthurus*	Spiny-tailed Monitor	10	8	11	9				5	13										
	Varanus brevicauda	Short-tailed Pygmy Monitor	1																		
	Varanus eremius	Pygmy Desert Monitor	3																		
	Varanus giganteus	Perentie				1															
	Varanus panoptes	Yellow-spotted Monitor		1																	
	Varanus tristis	Black-headed Monitor	1	9		1															

		Surveys	A												B	C					D	
Family	Species	Common name	Site F	Site G	Site C	Site H	Site M	Site K	Site N	Site D	Site I	Site L	Opportunitic	Site E	Unknown	Klondyke	WAR_GB01	WAR_NQ03	WAR_NQ05	Muccan	Yarrie
Birds																					
Columbidae	*Phaps chalcoptera*	Common Bronzewing				2						1									
	Ocyphaps lophotes	Crested Pigeon	1	5	1		2	2	5		1										
	Geophaps plumifera	Spinifex Pigeon	5	14	8	3	15	7		5	5										
	Geopelia cuneata	Diamond Dove	15	17		2				1	7										
	Geopelia placida	Peaceful Dove							2			14									
Cuculidae	*Chrysococcyx basalis*	Horsfield's Bronze-Cuckoo	4		1																
	Chrysococcyx osculans	Black-eared Cuckoo													X						
	Cacomantis pallidus	Pallid Cuckoo	1	5																	
Aegothelidae	*Aegotheles cristatus*	Australian Owlet-nightjar				1						1			X						
Caprimulgidae	*Eurostopodus argus*	Spotted Nightjar													X						
Otididae	*Ardeotis australis*	Australian Bustard										2									
Accipitridae	*Elanus axillaris*	Black-shouldered Kite									1										
	Aquila audax	Wedge-tailed Eagle									1										
	Circus assimilis	Spotted Harrier						1													
	Accipiter cirrocephalus	Collared Sparrowhawk										1									
	Milvus migrans	Black Kite					1														
	Haliastur sphenurus	Whistling Kite	1			1						5									
Tytonidae	*Tyto alba*	Barn Owl				1															
Strigidae	*Ninox boobook*	Southern Boobook	1	4					1												
Alcedinidae	*Dacelo leachii*	Blue-winged Kookaburra	2	5								3									
	Todiramphus pyrrhopygius	Red-backed Kingfisher	6	5								1									
Meropidae	*Merops ornatus*	Rainbow Bee-eater	22	38	7	1					2	37			X						
Falconidae	*Falco cenchroides*	Nankeen Kestrel			1	3	1		1		4										
	Falco berigora	Brown Falcon		4			2	1	1		1										
Megaluridae	*Poodytes carteri*	Spinifexbird	4	2	12	20		1	3	7	7				X						
Cacatuidae	*Eolophus roseicapilla*	Galah	9	8				6	2			9			X						
	Cacatua sanguinea	Little Corella	5									22									
Psittacidae	*Barnardius zonarius*	Australian Ringneck		11								4									
Psittaculidae	*Melopsittacus undulatus*	Budgerigar	2	1		3					3										
Ptilonorhynchidae	*Chlamydera guttata*	Western Bowerbird			4																
Climacteridae	*Climacteris melanurus*	Black-tailed Treecreeper										12									

		Surveys	A												B	C					D	
Family	Species	Common name	Site F	Site G	Site C	Site H	Site M	Site K	Site N	Site D	Site I	Site L	Opportunitic	Site E	Unknown	Klondyke	WAR_GB01	WAR_NQ03	WAR_NQ05	Muccan	Yarrie
Maluridae	*Amytornis whitei*	Pilbara Grasswren			2	10				6											
	Malurus assimilis	Purple-backed Fairywren	9	9		7				1											
Meliphagidae	*Manorina flavigula*	Yellow-throated Miner	9	1		1	7	2	3		6	3			X						
	Gavicalis virescens	Singing Honeyeater	4	2		1					2										
	Ptilotula penicillata	White-plumed Honeyeater	28	66								86									
	Ptilotula keartlandi	Grey-headed Honeyeater	34	2	61	58	2	18	2	21	22	17			X						
	Ptilotula plumula	Grey-fronted Honeyeater	4			2						8									
	Lichmera indistincta	Brown Honeyeater	1	2								9			X						
	Melithreptus gularis	Black-chinned Honeyeater	6	2		8				2											
Pardalotidae	*Pardalotus rubricatus*	Red-browed Pardalote	4	3	1	4				2	4										
Acanthizidae	*Smicrornis brevirostris*	Weebill		1		2					17	12			X						
Pomatostomidae	*Pomatostomus temporalis*	Grey-crowned Babbler	5	16								12									
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckooshrike	3	14	2	5	1		3	3	1										
Oreoicidae	*Oreoica gutturalis*	Crested Bellbird									1										
Pachycephalidae	*Colluricincla harmonica*	Grey Shrikethrush		1	31	10				7	1	2									
	Pachycephala rufiventris	Rufous Whistler		2		2						2									
Artamidae	*Artamus cinereus*	Black-faced Woodswallow	3	2	3																
	Artamus minor	Little Woodswallow		3	14			2			10										
	Cracticus nigrogularis	Pied Butcherbird	5	8	5	10		1	1	1	7				X						
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail	2	2		3					10										
Monarchidae	*Grallina cyanoleuca*	Magpie-lark	1	5							1	10									
Mammal																					
Corvidae	*Corvus orru*	Torresian Crow	14	8		1	2	1		5	1										
	Corvus bennetti	Little Crow	3																		
Locustellidae	*Cincloramphus mathewsi*	Rufous Songlark	12																		
Estrildidae	*Emblema pictum*	Painted Finch	43	38	43	30	41	8	63	37	7				X						
	Taeniopygia guttata	Zebra Finch	85	152		4	4	7	16	11		14									
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit	8	1		1															
Mammal																					
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna			2							1								X	
Bovidae	*Bos taurus*	Cow	3	3				2	20			20								X	

		Surveys	A												B	C					D	
Family	Species	Common name	Site F	Site G	Site C	Site H	Site M	Site K	Site N	Site D	Site I	Site L	Opportunitic	Site E	Unknown	Klondyke	WAR_GB01	WAR_NQ03	WAR_NQ05	Muccan	Yarrie
Camelidae	*Camelus dromedarius*	Dromedary			1				1												
Canidae	*Canis lupus*	Dingo		1					1											X	
Felidae	*Felis catus*	Cat							1			1									
Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheath-tail Bat								X		X									
	Taphozous georgianus	Common Sheathtail Bat	X	X	X	X	X	X	X	X	X	X		X	X						
	Taphozous hilli	Hill's Sheathtail Bat													X						
Hipposideridae	*Rhinonicteris aurantia*	Pilbara Leaf-nosed Bat	X	X	X	X		X	X		X										
Megadermatidae	*Macroderma gigas*	Ghost Bat											X								
Molossidae	*Chaerephon jobensis*	Northern Freetail Bat	X	X				X	X	X		X			X						
	Mormopterus lumsdenae	Northern Free-tail Bat		X																	
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat	X	X	X		X		X	X	X	X		X	X						
	Scotorepens greyii	Little Broad-nosed Bat	X	X		X		X	X			X		X	X						
	Vespadelus finlaysoni	Finlayson's Cave Bat	X	X	X	X	X	X	X	X	X	X		X	X						
Dasyuridae	*Pseudantechinus sp.*	False Antechinus Sp.																		X	
	Dasycercus blythi	Brush-tailed Mulgara															X				
	Dasykaluta rosamondae	Kaluta							1												
	Dasyurus hallucatus	Northern Quoll			1		7		1			1	X					X	X		
	Ningaui timealeyi	Pilbara Ningaui	2		2				1	2	5										
	Planigale ingrami	Long-tailed Planigale		3		6					6										
	Pseudantechinus woolleyae	Woolley's False Antechinus					1														
Macropodidae	*Osphranter robustus*	Euro	3	3	2	1	4	6	20	3	1	5									
	Petrogale rothschildi	Rothschilds Rock Wallaby			1	1														X	X
Muridae	*Mus musculus*	House Mouse		2																	
	Pseudomys chapmani	Western Pebble-mound Mouse						2		1											
	Pseudomys delicatulus	Delicate Mouse										1									
	Pseudomys desertor	Desert Mouse							2												
	Pseudomys hermannsburgensis	Sandy Inland Mouse		10					6												
	Zyzomys argurus	Common Rock-rat		1	8	10	5														

A Stantec (2018) *Corunna Downs Project: Terrestrial Vertebrate Fauna Survey*, Unpublished report for Atlas Iron Ltd, Perth.

B Biologic (2021) *Sanjiv Ridge Stage 2 Development Area Consolidated Terrestrial Fauna Report Biologic Environmental Survey*, Unpublished report for Atlas Iron Pty Ltd, Perth.

C Biologic (2019a) *Warrawoona Gold Project: 2019 Significant Species Survey*, Unpublished report for Calidus Resources Limited, Perth.

D Dunlop, J., Rayner, K. and Morris, K. (2016) *Pilbara Northern Quoll Research Program: Annual report 2014-2015*, Unpublished report for the Department of Parks and Wildlife, Perth.

B.3 VERTEBRATE FAUNA ASSESSMENTS

Source report	Species	*Taphozous georgianus*	*Rhinonicteris aurantia*	*Macroderma gigas*	*Chaerephon jobensis*	*Chalinolobus gouldii*	*Nyctophilus geoffroyi*	*Scotorepens greyii*	*Vespadelus finlaysoni*	*Dasyurus hallucatus*
	Common Names	Common Sheathtail Bat	Pilbara Leaf-nosed Bat	Ghost Bat	Northern Freetail Bat	Gould's Wattled Bat	Lesser Long-eared Bat	Little Broad-nosed Bat	Finlayson's Cave Bat	Northern Quoll
	Sites									
A	Camp		1							
	CO-CA-01		6	3						
	CO-CA-06		1	1						
	CO-CA-15		1	2						
	CO-CA-17		1	1						
	20140303 SM210		1							
	CO-CA-02		1							
	CO-CA-03		2							
	CO-CA-04		1							
	CO-CA-05		1							
	CO-CA-07		1							
	CO-CA-09		1							
	CO-CA-10		1							
	CO-CA-11		1							
	CO-CA-12		1							
	CO-CA-13		1							
	CO-CA-16		1							
	CO-CA-18		1							
	CO-WS-01		1							
	CO-WS-02		1							
	CO-WS-03		1							
	CO-WS-04		1							
	CO-WS-05		1							
	CO-WS-06		1							
	CO-WS-07		1							
	CO-CA-08			1						
	NQ-TR-01									1
	NQ-MC-01									9

Source report	Species	*Taphozous georgianus*	*Rhinonicteris aurantia*	*Macroderma gigas*	*Chaerephon jobensis*	*Chalinolobus gouldii*	*Nyctophilus geoffroyi*	*Scotorepens greyii*	*Vespadelus finlaysoni*	*Dasyurus hallucatus*
	Common Names	Common Sheathtail Bat	Pilbara Leaf-nosed Bat	Ghost Bat	Northern Freetail Bat	Gould's Wattled Bat	Lesser Long-eared Bat	Little Broad-nosed Bat	Finlayson's Cave Bat	Northern Quoll
	Sites									
	NQ-MC-02									5
	NQ-MC-03									1
	NQ-MC-07									1
	CO-CA-01	X	X	2					X	
	CO-CA-06	X	X	X					X	
	CO-CA-08	X		X					X	
	CO-CA-15	X	X	X					X	
	CO-CA-17	X	X	X					X	
	CO-CA-02	X	X						X	
	CO-CA-03	X	X						X	
	CO-CA-05	X	X						X	
	CO-CA-07	X	X						X	
	CO-CA-09	X	X						X	
	CO-CA-10	X	X						X	
	CO-CA-12	X	X						X	
	CO-CA-13	X	X						X	
	CO-CA-16	X	X						X	
B	CO-CA-18	X	X						X	
	CO-WS-01	X	X			X			X	
	CO-WS-03	X	X			X		X	X	
	CO-WS-04	X	X		X			X	X	
	CO-WS-05	X	X			X		X	X	
	CO-WS-06	X	X						X	
	CO-WS-07	X	X			X		X		
	Site 20140224 SM209	X	X		X	X		X	X	
	Site 20140303 SM210	X	X			X	X	X	X	
	CO-CA-14	X							X	
	CO-CA-11		X							
	CO-WS-02		X						X	
	NQ-TR-01									1

Source report	Species	*Taphozous georgianus*	*Rhinonicteris aurantia*	*Macroderma gigas*	*Chaerephon jobensis*	*Chalinolobus gouldii*	*Nyctophilus geoffroyi*	*Scotorepens greyii*	*Vespadelus finlaysoni*	*Dasyurus hallucatus*
	Common Names	Common Sheathtail Bat	Pilbara Leaf-nosed Bat	Ghost Bat	Northern Freetail Bat	Gould's Wattled Bat	Lesser Long-eared Bat	Little Broad-nosed Bat	Finlayson's Cave Bat	Northern Quoll
	Sites									
	NQ-MC-01									9
	NQ-MC-02									5
	NQ-MC-03									1
	NQ-MC-07									1
C	CO-CA-03	X	X						X	
D	CO-CA-01		X							
	CO-CA-03		X							
E	Copenhagen EBAE		X							
	Bow Bells South 46DE		X	X						
	Warrawoona Rd South F452		X	X						
	Centre Klondyke F784		X	X						
	Klondyke East Road 9C43		X	X						
	Klondyke East 234B		X	X						
	Klondyke North East 1288		X	X						
	Comet Mine 5A34			X						
	Klondyke Queen F6F5			X						
F	Klondyke Queen		X	X						
	Bow Bells South		X	X						
	Comet		X							
	Copenhagen		X							
	Creek line near Gift mine		X							
	Criterion		X	X						
	Dawson City		X	X						

Source report	Species	*Taphozous georgianus*	*Rhinonicteris aurantia*	*Macroderma gigas*	*Chaerephon jobensis*	*Chalinolobus gouldii*	*Nyctophilus geoffroyi*	*Scotorepens greyii*	*Vespadelus finlaysoni*	*Dasyurus hallucatus*
	Common Names	Common Sheathtail Bat	Pilbara Leaf-nosed Bat	Ghost Bat	Northern Freetail Bat	Gould's Wattled Bat	Lesser Long-eared Bat	Little Broad-nosed Bat	Finlayson's Cave Bat	Northern Quoll
	Sites									
	Eastern Creek Line		X							
	Klondyke Boulder		X	X						
	Trump		X	X						

A MWH (2016) *Corunna Downs Project: Terrestrial Vertebrate Fauna Survey*, Unpublished report for Atlas Iron Ltd, Perth.

B Stantec (2018) *Corunna Downs Project: Terrestrial Vertebrate Fauna Survey*, Unpublished report for Atlas Iron Ltd, Perth.

C Bat Call WA (2018) *Atlas Iron Limited, Corunna Downs cave CO-CA-03 Pilbara leaf-nosed bat roost census, November 2017*, Unpublished report for Atlas Iron Limited, Perth.

D Bat Call WA (2017) *Atlas Iron Limited Corunna Downs Project, Pilbara WA, May to June 2017. Echolocation Survey of Bat Activity at caves CO-CA-01 and CO-CA-03*, Unpublished Report for Stantec, Perth.

E Biologic (2019b) *Warrawoona Gold Project: Conservation Significant Bat Species Impact Assessment*, Unpublished report for Calidus Resources Ltd, Perth.

F Biologic (2019c) *Warrawoona Targeted Bat Assessment - April 2019*, Unpublished report for Calidus Resources Ltd, Perth.

Appendix C.

Definitions of Significant Fauna under the WA *Biodiversity Conservation Act 2016* and Priority Species

Basic Vertebrate Fauna Assessment
Moolyella Exploration Project, Pilbara

ATTACHMENT C
DEFINITIONS OF SIGNIFICANT FAUNA UNDER THE WA BIODIVERSITY CONSERVATION ACT 2016

Threatened, Extinct and Specially Protected fauna or flora[1] are species[2] which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such. 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 *Biodiversity Conservation Act 2016*. Categories of Threatened, Extinct and Specially Protected fauna and flora are:

T Threatened Species

Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016* (BC Act).

Threatened fauna is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for Threatened Fauna.

Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the *Wildlife Conservation (Rare Flora) Notice 2018* for Threatened Flora.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

CR Critically endangered species

Threatened species considered to be "*facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for critically endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for critically endangered flora.

[1] The definition of flora includes algae, fungi and lichens

[2] Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).

EN Endangered species

Threatened species considered to be "*facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for endangered flora.

VU Vulnerable species

Threatened species considered to be "*facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for vulnerable fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for vulnerable flora.

Extinct Species

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

EX Extinct species

Species where "*there is no reasonable doubt that the last member of the species has died*", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).

Published as presumed extinct under schedule 4 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for extinct fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for extinct flora.

EW Extinct in the wild species

Species that "*is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form*", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).

Currently there are no threatened fauna or threatened flora species listed as extinct in the pwild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

Specially Protected Species

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.

MI Migratory birds protected under an international agreement

Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).

Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.

Published as migratory birds protected under an international agreement under schedule 5 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

CD Species of special conservation interest (conservation dependant fauna)

Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).

Published as conservation dependent fauna under schedule 6 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

OS Other specially protected species

Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Published as other specially protected fauna under schedule 7 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

P Priority species

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations

P1 Priority 1: Poorly-known species

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

P2 Priority 2: Poorly-known species

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

P3 Priority 3: Poorly-known species

Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

P4 Priority 4: Rare, Near Threatened and other species in need of monitoring

(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.

(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.

(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.


DETECTION DOG