

Vertebrate Fauna Assessment



Medcalf Vanadium Mining Project Proposed Haul Road

Audalia Resources Limited

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Version 4

On behalf of:

Audalia Resources Ltd
c/- Botanica Consulting
PO Box 2027
BOULDER WA 6432
T: 08 9093 0024
F: 08 9093 1381

Prepared by:

Greg Harewood
Zoologist
PO Box 755
BUNBURY WA 6231
M: 0402 141 197
E: gharewood@iinet.net.au

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Acronyms/Abbreviations:

ALA: Atlas of Living Australia www.ala.org.au

BA: Birdlife Australia (Formerly RAOU, Birds Australia).

BC Act: Biodiversity Conservation Act 2016. WA Government.

°C: Degrees Celsius.

CALM: Department of Conservation and Land Management (now DBCA), WA Government.

CAMBA: China Australia Migratory Bird Agreement 1998.

CBD: Central Business District.

DBCA: Department of Biodiversity, Conservation and Attractions (formerly DPaW, DEC, CALM, DoE), WA Government

DBH: Diametre at Breast Height – tree measurement.

DEC: Department of Environment and Conservation (now DBCA), WA Government.

DEH: Department of Environment and Heritage (now DotEE), Australian Government.

DEP: Department of Environment Protection (now DER), WA Government.

DER: Department of Environment Regulation (now DWER), WA Government.

DEWHA: Department of the Environment, Water, Heritage and the Arts (now DotEE), Australian Government

DMP: Department of Mines and Petroleum (formerly DoIR), WA Government.

DoE: Department of Environment (now DER/DBCA), WA Government.

DoP: Department of Planning, WA Government.

DotE: Department of the Environment (now DotEE), Australian Government.

DotEE: Department of the Environment and Energy (formerly SEWPaC, DWEHA, DEH & DotE), Australian Government.

DoIR: Department of Industry and Resources (now DMP), WA Government.

DoW: Department of Water (now DWER), WA Government.

DPaW: Department of Parks and Wildlife (now DBCA), WA Government.

DWER: Department of Water and Environmental Regulation (formed by the amalgamation of OEPA, DoW and DER), WA Government.

EP Act: *Environmental Protection Act 1986*, WA Government.

EPA: Environmental Protection Authority, WA Government.

EPBC Act: *Environment Protection and Biodiversity Conservation Act 1999*, Australian Government.

ha: Hectare (10,000 square metres).

IBRA: Interim Biogeographic Regionalisation for Australia.

IUCN: International Union for the Conservation of Nature and Natural Resources – commonly known as the World Conservation Union.

JAMBA: Japan Australia Migratory Bird Agreement 1981.

km: Kilometre.

m: Metre.

mm: Millimetre.

P: Priority - DBCA fauna conservation ranking.

POS: Public Open Space.

RAOU: Royal Australia Ornithologist Union.

ROKAMBA: Republic of Korea-Australia Migratory Bird Agreement 2007.

S: Schedule - *Western Australian Wildlife Conservation Act (1950)* Threatened Fauna Category.

SEWPaC: Department of Sustainability, Environment, Water, Population and Communities (now DotEE), Australian Government. **SSC:** Species Survival Commission, International.

WA: Western Australia.

WAM: Western Australian Museum, WA Government.

WAPC: Western Australian Planning Commission, WA Government.

BC Act: *Biodiversity Conservation Act 2016*, WA Government.

SUMMARY

This report details the results of a fauna assessment of Audalia Resources Limited (Audalia) Medcalf Vanadium Mining Project's proposed haul road (referred to as the 'survey area'). The survey area is located approximately 50km south-west of Norseman, and extends approximately 73km west from the Coolgardie-Esperance Highway to the proposed mine site. The survey area covers about 17,480 ha (Figures 1 and 2) and includes the likely haul road alignment (and associated borrow pits) and a one km buffer either side.

The assessment was undertaken for the purposes of delineating and characterising the fauna habitats and faunal assemblages present in the survey area and to identify potential impacts. The assessment has included a field reconnaissance survey and a literature review carried out to comply with relevant EPA guidance statements.

The broad scale terrestrial fauna habitats within the survey area presented below are based primarily on landforms identified by Botanica (2017) with further often subtle subdivisions possible using vegetation structure. The extent of the identified broad scale fauna habitats within the survey area are shown in Figure 4.

- Closed Depressions - Low samphire shrubland over low open forbland on playa/bare playa. Total Area = ~209 ha (~0.6%).
- Clay-Loam Plains - Eucalypt woodlands or Mallee woodlands over shrublands. Total Area = ~13,599 ha (~77.8%).
- Granite Outcrops - Heathland over sparse tussock grassland on granite outcrops. Total Area = ~265 ha (~1.5%).
- Hillslopes - Eucalypt woodlands or Mallee woodlands over shrublands or shrublands. Total Area = ~349ha (~2.0%).
- Sand-Loam Plains - Eucalypt woodlands or shrublands. Total Area = ~3,058 ha (~17.5%).

Vertebrate fauna observations (including bats identified from recordings and camera trap results) are listed in Appendix B. A total of 51 native fauna species were observed (or positively identified from foraging evidence, scats, tracks, skeletons, calls or photographs) within the survey area during the field reconnaissance survey (or on camera traps between April and September 2017). Four introduced species were also recorded.

With respect to native vertebrate fauna, 27 mammals (including nine bat species), 119 bird, 65 reptile and twelve frog species have previously been recorded in the general area, some of which have the potential to occur in or utilise at times, the survey area.

One listed threatened and one priority vertebrate fauna species were recorded during the field reconnaissance survey carried out in April 2017, these being the malleefowl (*Leipoa ocellata*) (listed as Vulnerable under the *BC Act* and *EPBC Act*) and the central long-eared bat (*Nyctophilus major tor*) (listed as Priority 3 by DBCA).

Based on habitat preferences, previous survey results from nearby areas and currently documented distributions it has been concluded that one additional specially protected vertebrate fauna species (the peregrine falcon) may at times be present. One common migratory species (rainbow bee-eater) is also considered likely to occur during seasonal migration periods. Three DBCA priority species may also occur or utilise sections of the survey area at times (i.e. Lake Cronin snake, western rosella (inland ssp), western brush wallaby), given the existence of some areas of apparently suitable habitat.

Using information currently available it would appear that impacts would be unlikely to alter the status of any one species in the general area despite the potential localised loss of some habitat. A review of the possible impacts on fauna, in particular those of conservation significance in addition to the possible need for further, more detailed survey work to determine the actual status of some species (e.g. malleefowl) in actual impact areas (i.e. clearing footprint) should be undertaken when planning has progressed to a point where more informed decisions and comments can be made.

A series of generalised fauna management recommendations aimed at minimising potential impacts are provided for guidance during future development planning and if considered reasonable and practical should be made a priority for implementation during site development and operation.

1. INTRODUCTION

This report details the results of a fauna assessment of Audalia Resources Limited (Audalia) Medcalf Vanadium Mining Project's proposed haul road (referred to as the 'survey area'). The survey area is located approximately 50km south-west of Norseman, and extends approximately 73km west from the Coolgardie-Esperance Highway to the proposed mine site. The survey area covers about 17,480 ha and includes the likely haul road alignment (and associated borrow pits) and a one km buffer either side (Figures 1 and 2).

Information obtained as part of this fauna assessment report will be used in conjunction with other environmental investigations to guide project planning. It is anticipated that the information presented will also be used by regulatory authorities to assess the potential impact of the proposal on fauna and fauna habitats at the site during the project evaluation and approval process.

2. SCOPE OF WORKS

The scope of works was defined as:

1. Carry out a Level 1 Fauna Survey (in compliance with EPA Guidance statement 56 (EPA 2016c);
2. Identify fauna of conservation significance (particularly state and federally listed threatened, migratory and priority fauna species) present or potentially present within the survey area; and
3. Identify potential development constraints relating to impacts on fauna and fauna habitats.

3. METHODS

3.1 SITE SURVEYS

Daytime reconnaissance surveys of the haul road survey area were carried out on the 19 to 21 April 2017 inclusive by Greg Harewood (Zoologist). Observations made by the botanical survey team (Botanica Consulting) have also been incorporated into the assessment. A map of all GPS tracks traversed in relation to the fauna habitats identified is provided in Figure 5.

3.1.1 General Fauna Habitat Assessment

Vegetation and landform units identified during the flora and vegetation survey, carried out by Botanica Consulting (2017) have been used to define broad fauna habitat types across the survey area. This information has been supplemented with observations made during the daytime reconnaissance surveys.

The main aim of the habitat assessment was to determine if it was likely that any species of conservation significance would be utilising the areas that maybe impacted as a consequence of the proposal proceeding. The habitat information obtained was also used to aid in finalising the overall potential fauna list.

As part of the literature review, available information on the habitat requirements of the species of conservation significance listed as possibly occurring in the area was researched. During the field survey the habitats within the survey area were assessed and specific elements identified, if present, to determine the likelihood of listed threatened species utilising the area and its significance to them.

3.1.2 Fauna Observations

Opportunistic observations of fauna species were made during the field survey work which involved a series of transects across/along the defined survey areas while searching microhabitats such as logs, rocks, leaf litter and observations of bird species with binoculars. Secondary evidence of a species presence such as tracks, scats, skeletal remains, foraging evidence or calls were also noted if observed/heard.

Acoustic bat call recordings were undertaken for one night on the 20 April 2017 using a Wildlife Acoustics SM2+ Bat Detector. Three motion sensing cameras (Ltl Acorn 5210A) were also deployed during the April 2017 survey period and retrieved in September 2017. The bat recording and camera trap locations are shown in Figure 3.

3.2 POTENTIAL VERTEBRATE FAUNA INVENTORY

3.2.1 Database Searches

Searches of the following databases were undertaken to aid in the compilation of a list of vertebrate fauna potentially occurring within the survey area:

- DBCA's NatureMap Database (combined data from DBCA, ALA, WAM, BA and consultant's reports) (DBCA 2020); and
- DotEE's Protected matters search tool (DotEE 2020).

It should be noted that these lists are based on records compiled from a broader area than the survey area and therefore may include species that would only ever occur as vagrants in the area under investigation due to a lack of suitable habitat or the presence of only marginal habitat. The databases also often included very old records and in some cases the species in question have become locally or regionally extinct.

Information from these sources should therefore be taken as indicative only and local knowledge and information needs also to be taken into consideration when determining what actual species may be present within the specific area being investigated.

3.2.2 Previous Fauna Surveys in the Area

Fauna surveys, assessments and reviews have been undertaken in nearby areas in the past, though not all are publicly available and could not be referenced. The most significant of those available have been used as the primary reference material for compiling the potential fauna assemblage for the general area. Those reports referred to included, but were not limited to:

- Biota Environmental Sciences (Biota) (2006a). Forrestania Fauna Survey – Fauna and Fauna Assemblages Report. Unpublished report for Western Areas NL.
- Biota Environmental Sciences (Biota) (2006b). Forrestania Water Disposal Pipeline Survey – Fauna and Faunal Assemblages Report. Unpublished report for Western Areas NL.
- Biota Environmental Sciences (Biota) (2007a). Forrestania Monitoring Survey, Flying Fox Phases III and IV. Unpublished report for Western Areas NL.
- Biota Environmental Sciences (Biota) (2007b). Diggers South Fauna Survey – Phase I. Unpublished report for Western Areas NL.
- Biota Environmental Sciences (Biota) (2010). Spotted Quoll Haul Road Single Phase Fauna Survey. Unpublished report for Western Areas N.L. May 2010.
- Brearley, D.R., Dunlop, J.N., and Osborne, J.M. (1998). Biological survey and environmental assessment of the Emily-Ann Project area. Unpublished report for Lionore Pty Ltd.
- Duncan, S. Traill, B.J. & Watson, C. (2006). Vertebrate Fauna of the Honman Ridge - Bremer Range district, Great Western Woodlands, Western Australia. Unpublished report for the Wilderness Society.

- Harewood, G. (2020). Fauna Survey (Level 2) - Phase 1 (October 2020) and Phase 2 (March 2014). Unpublished report for Audalia Resources Ltd. Version 4.
- How, R.A., Newbey, K.R., Dell, J., Muir, B.G., & Hnatiuk, R.J. (1988). The biological survey of the eastern goldfields of Western Australia. Part 4. Lake Johnston-Hyden Study Area. Records of the Western Australian Museum, supplement No. 30. (includes fauna survey results from Lake Cronin, McDermid Rock, Frank Hann NP and Peak Charles).

As with the databases searches some reports refer to species that would not occur in the survey area due to a lack of suitable habitat (extent and/or quality) and this fact was taken into consideration when compiling the potential fauna species list for the survey area. It should also be noted that the NatureMap database is likely to include some records from previous fauna surveys in the area including some of those listed above.

3.2.3 Existing Publications

The following represent the main publications used to identify and refine the potential fauna species list for the survey area:

- Anstis, M. (2013). Tadpoles and Frogs of Australia. New Holland Publishers, Sydney.
- Barrett, G., Silcocks, A., Barry, S., Cunningham, R. and Poulter, R. (2003). The New Atlas of Australian Birds. Royal Australasian Ornithologists Union, Victoria.
- Bush, B., Maryan, B., Browne-Cooper, R. & Robinson, D. (2007). Reptiles and Frogs in the Bush: Southwestern Australia. UWA Press, Nedlands.
- Churchill, S. (2008). Australian Bats. Second Edition, Allen & Unwin.
- Cogger, H.G. (2014). Reptiles and Amphibians of Australia. 7th Edition. CSIRO Publishing.
- Johnstone, R.E. and Storr, G.M. (1998). Handbook of Western Australian Birds: Volume 1 – Non-passerines (Emu to Dollarbird). Western Australian Museum, Perth Western Australia.
- Johnstone, R.E. and Storr, G.M. (2004). Handbook of Western Australian Birds: Volume 2 – Passerines (Blue-winged Pitta to Goldfinch). Western Australian Museum, Perth Western Australia.
- Menkhorst, P. and Knight, F. (2011). A Field Guide to the Mammals of Australia. Third edition, Oxford University Press, Melbourne.
- Menkhorst, P., Rogers, D., Clarke, R., Davies, J., Marsack, P. and Franklin, K. (2017). The Australian Bird Guide. First edition, CSIRO Publishing.

- Storr, G.M., Smith, L.A. and Johnstone R.E. (1983). Lizards of Western Australia II: Dragons and Monitors. WA Museum, Perth.
- Storr, G.M., Smith, L.A. and Johnstone R.E. (1990). Lizards of Western Australia III: Geckos and Pygopods. WA Museum, Perth.
- Storr, G.M., Smith, L.A. and Johnstone R.E. (1999). Lizards of Western Australia I: Skinks. Revised Edition, WA Museum, Perth.
- Storr, G.M., Smith, L.A. and Johnstone R.E. (2002). Snakes of Western Australia. Revised Edition, WA Museum, Perth.
- Thompson, S. & Thompson, G. (2006). Reptiles of the Western Australian Goldfields. Published by the Goldfields Environmental Management Group.
- Tyler M.J. & Doughty P. (2009). Field Guide to Frogs of Western Australia, Fourth Edition, WA Museum, Perth.
- Van Dyck, S., Gynther, I. & Baker, A. Eds (2013). Field Companion to The Mammals of Australia. Queensland Museum.
- Wilson, S. and Swan, G. (2017). A Complete Guide to Reptiles of Australia. Fifth Edition, Reed, New Holland, Sydney.

3.2.4 Fauna of Conservation Significance

The conservation significance of fauna species has been assessed using data from the following sources:

- *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*. Administered by the Australian Government Department of the Environment and Energy (DotEE);
- *Biodiversity Conservation Act 2016 (BC Act)*. Administered by the Western Australian DBCA (Govt. of WA 2018). Note: The Wildlife Conservation (Specially Protected Fauna) Notice 2018 has been transitioned under regulations 170, 171 and 172 of the Biodiversity Conservation Regulations 2018 to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the *BC Act*;
- Red List produced by the Species Survival Commission (SSC) of the World Conservation Union (also known as the IUCN Red List - the acronym derived from its former name of the International Union for Conservation of Nature and Natural Resources). The Red List has no legislative power in Australia but is used as a framework for State and Commonwealth categories and criteria; and the
- DBCA Priority Fauna list. A non-legislative list maintained by DBCA for management purposes (DBCA 2019).

The *EPBC Act* also requires the compilation of a list of migratory species that are recognised under international treaties including the:

- Japan Australia Migratory Bird Agreement 1981 (JAMBA);
- China Australia Migratory Bird Agreement 1998 (CAMBA);
- Republic of Korea-Australia Migratory Bird Agreement 2007 (ROKAMBA); and
- Bonn Convention 1979 (The Convention on the Conservation of Migratory Species of Wild Animals).

(Note – Some species listed under JAMBA are also protected under Schedule 3 of the *BC Act*.)

Most, but not all migratory bird species listed in the annexes to these bilateral agreements are also protected in Australia as matters of national environmental significance (NES) under the *EPBC Act*.

The conservation status of all vertebrate fauna species listed as occurring or possibly occurring in the vicinity of the survey area has been assessed using the most recent lists published in accordance with the above-mentioned instruments and is indicated as such in the fauna listings of this report. A full listing of conservation codes is provided in Appendix A.

3.2.5 Likelihood of Occurrence – Vertebrate Fauna of Conservation Significance

Fauna of conservation significance identified during the literature review as previously being recorded in the general area were assessed and ranked for their likelihood of occurrence within the survey area itself, if not directly recorded during the survey period. The rankings and criteria used were:

- Would Not Occur: There is no suitable habitat for the species in the survey area and/or there is no documented record of the species in the general area since records have been kept and/or the species is generally accepted as being locally/regionally extinct (supported by a lack of recent records).
 - Locally Extinct: Populations no longer occur within a small part of the species natural range, in this case within 10 or 20km of the survey area. Populations do however persist outside of this area.
 - Regionally Extinct: Populations no longer occur in a large part of the species natural range, in this case within the southern goldfields. Populations do however persist outside of this area.
- Unlikely to Occur: The survey area is outside of the currently documented distribution for the species in question, or no suitable habitat (type, quality and extent) was identified as being present during the field assessment. Individuals of some species may occur occasionally as vagrants/transients especially if suitable habitat is located

nearby but the survey area itself would not support individuals or a population of the species.

- Possibly Occurs: The survey area is within the known distribution of the species in question and habitat of at least marginal quality was identified as being present during the field assessment, supported in some cases by recent records being documented in literature from within or near the survey area. In some cases, while a species may be classified as possibly being present at times, habitat may be marginal (e.g. poor quality, fragmented, limited in extent) and therefore the frequency of occurrence and/or population levels may be low.
- Known to Occur: The species in question was positively identified as being present (for sedentary species) or as using the survey area as habitat for some other purpose (for non-sedentary/mobile species) during the field survey. This information may have been obtained by direct observation of individuals or by way of secondary evidence (e.g. foraging debris, tracks and scats). In some cases, while a species may be classified as known to occur, habitat may be marginal (e.g. poor quality, fragmented, limited in extent) and therefore the frequency of occurrence and/or population levels may be low.

3.2.6 Taxonomy and Nomenclature

Taxonomy and nomenclature for fauna species used in this report is generally taken from the DBCA's WA Fauna Census Database which is assumed to follow Aplin and Smith (2001) for amphibians and reptiles and Johnstone (2001) for birds. Jackson and Groves (2015) has been used for mammals.

Common names are taken from the WAM recognised primary common name listings when specified, though where common names are not provided they have been acquired from other publications. Sources include Cogger (2014), Wilson and Swan (2017), Van Dyck & Strahan (2013), Christidis and Boles (2008), Bush *et al.* (2007), Tyler & Doughty (2009), and Glauret (1961). Not all common names are generally accepted.

4. SURVEY CONSTRAINTS

The conclusions presented are based upon field data and the environmental monitoring and/or testing carried out over a limited period of time and are therefore merely indicative of the environmental condition of the site at the time of the field assessments. Also, it should be recognised that site conditions can change with time. No seasonal sampling has been carried out as part of this fauna assessment.

Some fauna species are reported as potentially occurring based on there being suitable habitat (quality and extent) within the survey area or immediately adjacent.

The habitat requirements and ecology of many of the species known to occur in the wider area are often not well understood or documented. It can therefore be difficult to exclude species from the potential list based on a lack of a specific habitat or microhabitat within the survey area. As a consequence of this limitation the potential fauna list produced is most likely an overestimation of those species that actually utilise the survey area for some purpose. Some species may be present in the general area but may only use the survey area itself on rare occasions or as vagrants.

In recognition of survey limitations, a precautionary approach has been adopted for this assessment. Any vertebrate fauna species that would possibly occur within the survey area (or immediately adjacent), as identified through ecological databases, publications, discussions with local experts/residents and the habitat knowledge of the Author, has been assumed to potentially occur in the survey area.

5. RESULTS

5.1 SITE SURVEYS

5.1.1 General Fauna Habitat Assessment

The broad scale terrestrial fauna habitats within the survey area presented below are based primarily on vegetation and associated landforms identified by Botanica (2017). The extents of the identified vegetation communities are shown in Figure 4 with a summary description of each given below. Additional information can be found in the flora and vegetation report for the site (Botanica Consulting 2017).

Table 1: Main Terrestrial Fauna Habitats within the Survey Area

Fauna Habitat	Description	Representative Fauna Habitat Attributes	Conservation Significant Species that possibly occur in habitat	Survey Effort	Example Image
<p>CD-Closed Depression- Low samphire shrubland over low open forbland on playa/bare playa</p> <p>Total Area = ~209 ha (~1.2%)</p>	<p>Low samphire shrubland of <i>Tecticornia indica</i> over low open forbland of <i>Disphyma crassifolium</i> on playa and bare playa.</p>	<ul style="list-style-type: none"> Halopyte vegetation providing potential food source Limited vegetation strata supporting a lower avifauna assemblage. Limited leaf litter due to absence of trees Substrate very well suited to a variety of burrowing small mammals and reptiles. 	None	Traverses within habitat- opportunistic observations/ secondary evidence	
<p>CLP - Clay Loam Plain- Eucalypt Woodland/ Mallee Woodland over shrublands</p> <p>Total Area = ~13,599 ha (~77.8%)</p>	<p>Clay loam plain comprising a mosaic of open Salmon Gum woodland over mixed low shrubs and mallee shrubland over <i>Melaleuca pauperiflora</i> and mixed low shrubs.</p>	<ul style="list-style-type: none"> Range of vegetation strata suitable to a variety of passerine and nonpasserine birds. Moderate to high leaf litter in areas of mature woodland. Relatively dense shrubs providing cover for small fauna. Ground not especially suited to burrowing species. 	<p>Malleefowl <i>Leipoa ocellata</i></p> <p>Peregrine Falcon <i>Falco peregrinus</i></p> <p>Western Rosella (Inland ssp) <i>Platycercus icterotis xanthogenys</i></p> <p>Carnaby's Black- Cockatoo <i>Calyptorhynchus latirostris</i></p> <p>Chuditch <i>Dasyurus geoffroii</i></p> <p>Lake Cronin Snake <i>Paroplocephalus atriceps</i></p> <p>Western Brush Wallaby <i>Notamacropus Irma</i></p> <p>Central Long-eared Bat <i>Nyctophilus major tor</i></p>	<p>Traverses within habitat- opportunistic observations/ secondary evidence</p> <p>Two camera trap sites along proposed haul road alignment</p> <p>One acoustic bat recorder site along proposed haul road alignment</p> <p>Level 2 fauna study within this habitat previously conducted within the western extremity of the current survey area (as part of the mine study)- included target searches/ trapping sites, motion cameras and acoustic bat recorders.</p>	
<p><u>Granite Outcrops-Heathland over sparse tussock grassland on granite outcrops</u></p> <p>Total Area = ~265 ha (~1.5%)</p>	<p>Heathland of <i>Thryptomene</i> spp. over sparse tussock grassland of <i>Neurachne alopecuroidea</i> on granite outcrop</p>	<ul style="list-style-type: none"> Limited vegetation strata supporting a lower avifauna assemblage. Limited leaf litter due to absence of trees Limited dense shrubs. Dominated by granite outcrop limited suitable for burrowing. Provide potential water source for fauna. 	<p>Lake Cronin Snake <i>Paroplocephalus atriceps</i></p>	Traverses within habitat- opportunistic observations/ secondary evidence	

Fauna Habitat	Description	Representative Fauna Habitat Attributes	Conservation Significant Species that possibly occur in habitat	Survey Effort	Example Image
<p>HS - Hillslope- Eucalypt woodlands or Mallee woodlands over shrublands or shrublands Total Area = ~349ha (~2.0%)</p>	<p>Rocky hillslopes (lateritic/limonite) comprising a mosaic of regrowth Eucalypt woodland/ mallee woodland to shrubland over mixed Allocasuarina/ Hakea/ Melaleuca shrubland and low shrubland/ tussock grassland or sedges.</p> <p>Located within the western extremity of the survey area only within the proposed mine area.</p>	<ul style="list-style-type: none"> • Limited exfoliating bark. • Limited leaf litter due to the presence of smaller/ regrowth trees. • Limited vegetation strata due to the presence of smaller/ regrowth trees. • Limited dense shrubs. • Dominated by rocky areas less suitable for burrowing. 	<p>Peregrine Falcon <i>Falco peregrinus</i></p> <p>Western Brush Wallaby <i>Notamacropus irma</i></p>	<p>Traverses within habitat- opportunistic observations/ secondary evidence</p> <p>Level 2 fauna study within this habitat previously conducted within the western extremity of the current survey area (as part of the mine study)- included target searches/ trapping sites, motion cameras and acoustic bat recorders</p>	
<p>SLP - Sand Loam Plain- Eucalypt Woodland or shrubland Total Area = ~3,058 ha (~17.5%)</p>	<p>Sand-loam plains comprising a mosaic of <i>Eucalyptus salicola</i> woodland over low open shrubland of Acacia / Grevillea/ and open tussock grassland/ sedges.</p>	<ul style="list-style-type: none"> • Substrate very well suited to a variety of burrowing small mammals and reptiles. • Less diverse vegetation strata supporting a less diverse avifauna assemblage. 	<p>Peregrine Falcon <i>Falco peregrinus</i></p>	<p>Traverses within habitat- opportunistic observations/ secondary evidence</p> <p>One camera trap site along proposed haul road alignment</p>	

5.1.2 Fauna Observations

Vertebrate fauna observations (including bats identified from recordings and camera trap results) are listed in Appendix B. A total of 51 native fauna species were observed (or positively identified from foraging evidence, scats, tracks, skeletons, calls or photographs) within the survey area during the field reconnaissance survey (or on camera traps between April and September 2017). Four introduced species were also recorded.

One listed threatened and one priority vertebrate fauna species were recorded, these being the malleefowl (*Leipoa ocellata*) (listed as Vulnerable under the *BC Act* and *EPBC Act*) and the central long-eared bat (*Nyctophilus major tor*) (listed as Priority 3 by DBCA). Apart from one individual malleefowl being observed, malleefowl tracks and an old extinct, malleefowl nest mound were also located during the survey. No evidence of recent/ current breeding activity was identified within the survey area. The survey area is unlikely to support a resident breeding population though individuals may at times frequent the location while in transit. The locations of the various records are shown in Figure 3. No evidence of any migratory fauna species utilising the survey area was found.

It should be noted that the western rosella (inland ssp) (*Platycercus icterotis xanthogenys*) (listed as Priority 4 by DBCA) while not recorded during the 2017 survey reported on here, was observed during the 2013/14 surveys in or near the main project area in the west and therefore are also likely to occur in some sections of the haul road survey area.

5.2 POTENTIAL VERTEBRATE FAUNA INVENTORY

A list of expected vertebrate fauna species likely to occur in the survey area was compiled from information obtained during the literature review and is presented in Appendix B. The results of some previous fauna surveys carried out in the general area are also summarised in this species listing as are the DBCA NatureMap database search results. The raw database search results from NatureMap (DBCA 2020) and the Protected Matters Search Tool (DotEE 2020) are contained within Appendix C.

Table 2 summarises the numbers of potential vertebrate fauna species considered likely to be present in the general vicinity of the survey area based on the detailed list held Appendix B.

Table 2: Summary of Potential Vertebrate Fauna Species (as listed in Appendix B)

Group	Total number of potential species	Potential number of specially protected species	Potential number of migratory species	Potential number of priority species	Number of species observed L1 Field Survey 2017	Number of species observed L2 Field Survey 2013/14
Amphibians	12	0	0	0	0	1
Reptiles	65	0	0	1	1	32
Birds	119	2	0	1	40	68
Non-Volant Mammals	24 ⁶	0	0	1	6 ⁴	15 ⁵
Volant Mammals (Bats)	9	0	0	1	8	8
Total	229⁶	2	0	4	55⁴	124⁵

Superscript = number of introduced species included in total.

Not all species listed in existing databases and publications as potentially occurring within the region (i.e. *EPBC Act's* Threatened Fauna and Migratory species lists, DBCA's NatureMap Fauna Database and various publications) are likely to be present within the survey area. The list of potential fauna takes into consideration that firstly the species in question is not known to be locally extinct and secondly that suitable habitat for each species, as identified during the habitat assessment, is present within the survey area, though compiling an accurate list has limitations (see Section 4 above).

It should be noted that even if some additional species are omitted from the listing for the specific survey area the resulting list would still very likely represent an over estimation of the fauna species utilising the site (either on a regular or infrequent basis) as a result of the precautionary approach adopted for the assessment.

5.2.1 Vertebrate Fauna of Conservation Significance

A review of the *EPBC Act* threatened fauna list, DBCA's threatened fauna database and priority lists, unpublished reports and scientific publications identified a number of specially protected, migratory or priority fauna species as having been previously recorded or as being potentially present in the general vicinity of the survey area.

The current status of some of these species within the survey area is difficult to determine, however, based on the habitats present and, in some cases, direct observations or recent

nearby records, a total of seven species of conservation significance can be regarded as likely to be utilising the survey area for some purpose at times.

Two of the potential vertebrate fauna species of conservation significance were positively identified as utilising the survey area during the survey period, these being:

- Malleefowl *Leipoa ocellata* – Vulnerable (BC Act), Vulnerable (EPBC Act)
A malleefowl individual was recorded during the field survey along with some recent tracks (outside the survey area) and an extinct, very old nest mound.
- Central Long-eared Bat *Nyctophilus major tor* – P3 (DBCA Priority Species)
Recorded during the bat survey undertaken in April 2017 and during the Level 2 Survey within the main project area in 2013/2014 (Harewood 2020).

The current status on site and/or in the general area of some species is difficult to determine, however, based on the habitats present and, in some cases, recent nearby records, several species of conservation significance can be regarded as possibly utilising the survey area for some purpose at times, these being:

- Lake Cronin Snake *Paroplocephalus atriceps* – P4 (DBCA Priority Species)
Status in the survey area is unknown but possibly occurs given presence of suitable habitat.
- Peregrine Falcon *Falco peregrinus* – OS (BC Act)
The species potentially utilises some sections of the survey area as part of a much larger home range, though records in this area are rare. No potential nest sites in trees observed.
- Western Rosella (Inland ssp) *Platycercus icterotis xanthogenys* – P4 (DBCA Priority Species)
Recorded during the Level 2 Survey in 2013/2104 within the main project area (Harewood 2020). Less likely further east.
- Western Brush Wallaby *Notamacropus irma* – P4 (DBCA Priority Species)
The survey area is at the extreme edge of this species documented range. It has not been recorded to date during surveys but may occur, if only occasionally.

Habitat onsite for some of the species listed above, while considered possibly suitable, may be marginal in extent/quality and species listed above may only visit the area for short periods or as rare/uncommon vagrants.

A number of other species of conservation significance, while possibly present in the general area and/or the southern Goldfields region are not listed as potential species due to the survey area being outside of their currently recognised range, a lack of suitable habitat or known/very likely local or regional extinction (and no subsequent recruitment from adjoining areas). Additional details on these species and others, along with reasons for the omission of some from the potential listing are provided in Table 3 below and in Appendix D.

6. POTENTIAL IMPACTS AND MANAGEMENT

6.1 POTENTIAL IMPACTS

In general, the most significant potential impacts to fauna of any development include:

- Loss of vegetation/fauna habitat that is used for foraging, breeding, roosting, or dispersal (includes loss of hollow bearing trees),
- Fragmentation of vegetation/fauna habitat which may restrict the movement of some fauna species,
- Modifications to surface hydrology, siltation of creek lines,
- Changes to fire regimes,
- Pollution (e.g. oil spills),
- Noise/Light/Dust,
- Spread of plant pathogens (e.g. dieback) and weeds,
- Potential increase in animal strikes by higher frequency of vehicle movements,
- Potential increase in the number of predatory feral species (e.g. foxes, cats), and
- Death or injury of fauna during clearing and construction.

A preliminary assessment of the scale of potential impacts on vertebrate fauna species of conservation significance which may result as a consequence of the proposed construction of the haul road within sections of the survey area is provided in the table below. The assessment is based on the requirement to clear fauna habitat along the haul road route (including borrow pits) though the exact extent and location of works is yet to be finalised.

The impact on the conservation significant species listed as potentially being present will vary depending on their current degree of utilisation/population densities and preferred habitat requirements (e.g. quantity and quality of potential foraging and breeding habitat that is affected).

Table 3: Vertebrate Fauna Species of Conservation Significance - Likelihood of Occurrence and Possible Impacts

Species	Conservation Status (see Appendix A for codes)			Habitat Present	Likelihood of Occurrence	Maximum Possible Impact
	EPBC Act	BC Act	DBCA Priority			
Lake Cronin Snake <i>Paroplocephalus atriceps</i>	-	-	P3	Yes/Marginal?	Possibly Occurs	Loss/modification of small areas of potential habitat. No significant impact likely.
Malleefowl <i>Leipoa ocellata</i>	VU	VU	-	Yes	Known to Occur	Loss/modification of small areas of potential habitat. No significant impact likely.
Peregrine Falcon <i>Falco peregrinus</i>	-	OS	-	Yes	Possibly Occurs	Loss/modification of an area of potential habitat. No significant impact likely.
Migratory Shorebirds and Seabirds	MI	MI	Various	No/Marginal	Unlikely to Occur.	No impact anticipated.
Hooded Plover <i>Charadrius rubricollis</i>	-	-	P4	No/Marginal	Would not Occur	No impact anticipated.
Western Rosella (Inland ssp) <i>Platycercus icterotis xanthogenys</i>	-	-	P4	Yes	Possibly Occurs	Loss/modification of a small area of potential habitat. No significant impact likely.
Night Parrot <i>Pezoporus occidentalis</i>	EN	CR		No/Marginal	Unlikely to Occur	No impact anticipated.
Grey Wagtail <i>Motacilla cinerea</i>	MI	MI	-	No	Would not Occur	No impact anticipated.
Fork-tailed Swift <i>Apus pacificus</i>	MI	MI	-	Yes	Flyover only.	No impact anticipated.
Chuditch <i>Dasyurus geoffroii</i>	VU	VU	-	Yes	Unlikely to Occur	No impact anticipated.
Western Brush Wallaby <i>Notamacropus irma</i>	-	-	P4	Yes	Possibly Occurs	Loss/modification of small areas of potential habitat. No significant impact likely.
Central Long-eared Bat <i>Nyctophilus major tor</i>	-	-	P3	Yes	Known to Occur.	Loss/modification of a small area of potential habitat. No significant impact likely.

Based on the information available it would appear that impacts would be unlikely to alter the status of any one species in the general area despite the potential localised loss of some habitat. This conclusion will however need to be reviewed once planning has progressed to a point more definitive information on the location, extent and degree of clearing is available.

6.2 MINIMISING IMPACTS

The following proposed generalised management recommendations are provided for guidance during future development planning and if considered reasonable and practical should be made a priority for implementation during site development and operation. This listing is not exhaustive and management plans will need to be finalised after liaison with relevant regulatory authorities if required. It is recommended that:

- Planning for development should aim to minimise as much as reasonable and practical the area of remnant vegetation requiring removal. Existing cleared areas/tracks should be used in preference to clearing additional areas.
- Areas subject to clearing should be examined in detail prior to works commencing for the presence of active malleefowl nest mounds. Active mounds will need to be avoided (~50m buffer) at least until after incubation is completed. The final course of action required for active mounds will need to be discussed with DBCA.
- A malleefowl management plan should be formulated and implemented as part of future operation of the haul road with the main aim of minimising the likelihood of road kills, unnecessary clearing of suitable habitat and the risk of unplanned fires. This should include a register of all opportunistic observations of the species.
- During site works, areas requiring clearing should be clearly marked and access to other areas restricted to prevent accidental clearing of areas to be retained. Unauthorised off-track driving and parking should be prohibited.
- Infrastructure should be positioned to avoid or minimise the disruption to surface and sub-surface hydrology where possible. Levees and drains designed to mimic natural drainage flows should be incorporated in plans where disruptions may occur.
- No dead, standing or fallen timber should be removed unnecessarily. Logs (hollow or not) and other debris resulting from land clearing should be used to enhance fauna habitat in untouched and rehabilitated areas if possible.
- Cleared areas should be rehabilitated as soon as is practicable. Monitoring of rehabilitated areas should be carried out and included weed management.
- A Construction and Operations Fire Management Plan should be prepared to reduce the risk of unplanned fires and provide contingency measures to minimise any associated impacts. The plan will include a contingency and response plan in the event of any bushfires that commence as a result of the works on site.
- All staff working on site should be made aware that native fauna is protected. Personnel working on the project should not be allowed to bring firearms, other weapons or pets onsite. Personnel should be discouraged from feeding native and introduced fauna including appropriate refuse management.

- Native fauna injured during clearing or normal site operations should be taken to a designated veterinary clinic or a DBCA nominated wildlife carer.
- Fuel storage facilities should be bunded.
- Any holes, pits or trenches required for services should be kept open for only as long as necessary and suitable escape ramps (45° batter) and bridging provided if the site is to be left unattended for extended periods. Significant sized holes, pits or trenches should be inspected for fauna immediately prior to filling.
- Site personnel should be provided with information detailing the identification of potential species of conservation significance and required to report all sightings to the project manager or delegated environmental officer.

7. CONCLUSION

The fauna assessment reported on here was undertaken for the purposes of delineating and characterising the fauna habitats and faunal assemblages present in the survey area.

With respect to native vertebrate fauna, 27 mammals (including nine bat species), 119 bird, 65 reptile and twelve frog species have previously been recorded in the general area, some of which have the potential to occur in or utilise at times, the survey area.

One listed threatened and one priority vertebrate fauna species were recorded during the field reconnaissance survey carried out in April 2017, these being the malleefowl (*Leipoa ocellata*) (listed as Vulnerable under the *BC Act* and *EPBC Act*) and the central long-eared bat (*Nyctophilus major tor*) (listed as Priority 3 by DBCA).

Based on habitat preferences, previous survey results from nearby areas and currently documented distributions it has been concluded that one additional specially protected vertebrate fauna species (the peregrine falcon) may at times be present. Three DBCA priority species may also occur or utilise sections of the survey area at times (i.e. Lake Cronin snake, western rosella (inland ssp), western brush wallaby) given the existence of some areas of apparently suitable habitat.

Using information currently available it would appear that impacts would be unlikely to alter the status of any one species in the general area despite the potential localised loss of some habitat. A review of the possible impacts on fauna, in particular those of conservation significance in addition to the possible need for further, more detailed survey work to determine the actual status of some species (e.g. malleefowl) in actual impact areas (i.e. clearing footprint) should be undertaken when planning has progressed to a point where more informed decisions and comments can be made.

A series of generalised fauna management recommendations aimed at minimising potential impacts are provided for guidance during future development planning and if considered reasonable and practical should be made a priority for implementation during site development and operation.

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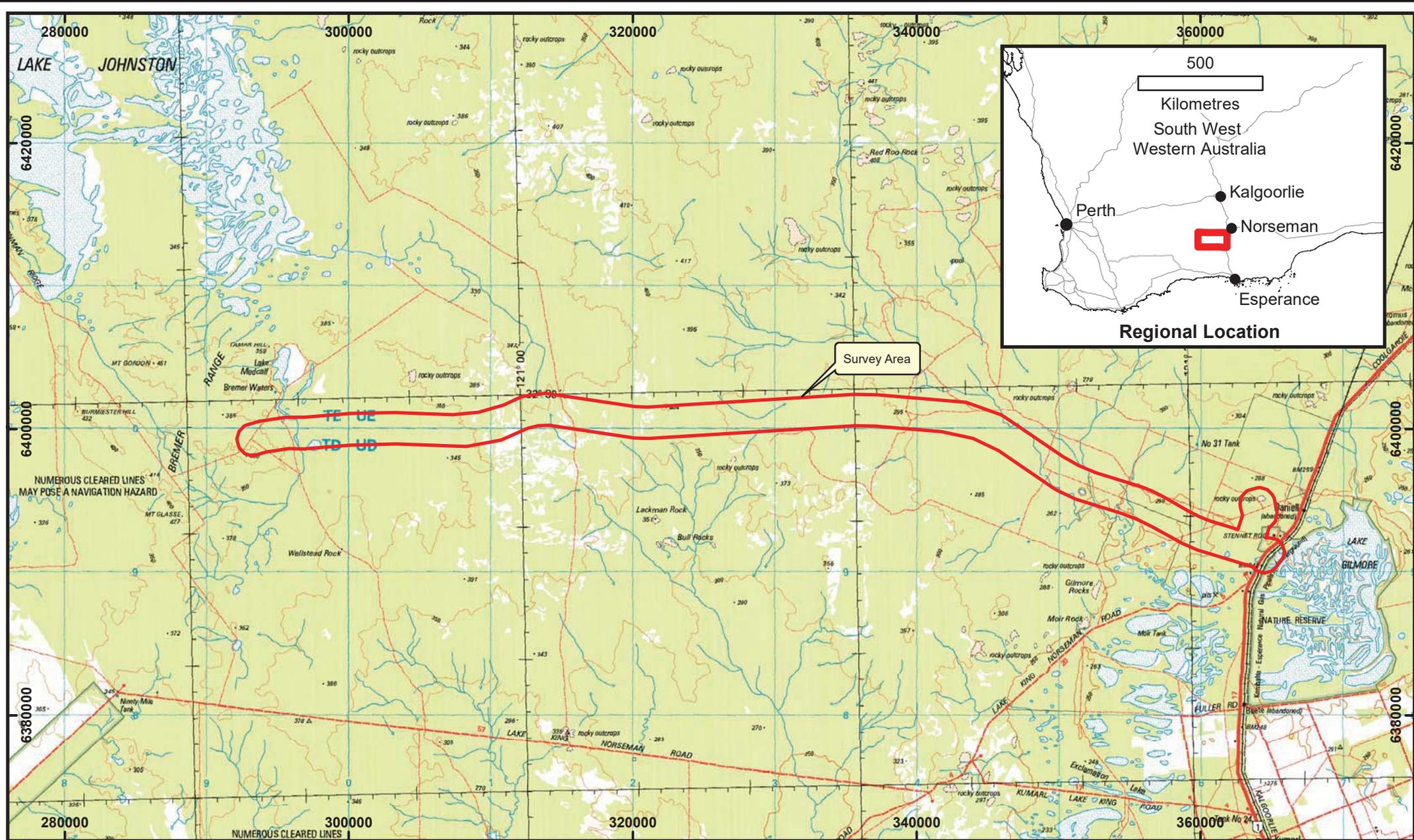
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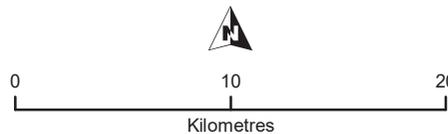
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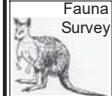
FIGURES



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 Survey Area

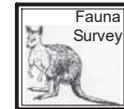
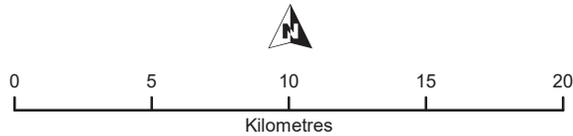


	<p>Audalia Resources Ltd Medcalf Project - Haul Road</p>
	<p>Survey Area and Surrounds</p>
	<p>Drawn: G Harewood Date: Sept 2017 Scale: 1:350,000</p>
	<p>Projection/Coordinate System: UTM/MGA Zone 51 Figure: 1</p>



Legend

 Survey Area



Drawn: G Harewood
Date: Sept 2017
Scale: 1:275,000

Audalia Resources Ltd
Medcalf Project - Haul Road

**Survey Area
Air Photo**



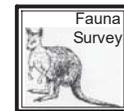
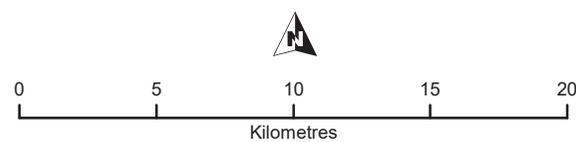
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 Survey Area

 Bat Recording Site
 Camera Trap Sites

Malleefowl Observations

 Malleefowl
 Malleefowl Tracks
 Old (extinct) Malleefowl Mound



Drawn: G Harewood
 Date: Sept 2017
 Scale: 1:275,000

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 Medcalf Project - Haul Road

Recording Sites and Observations

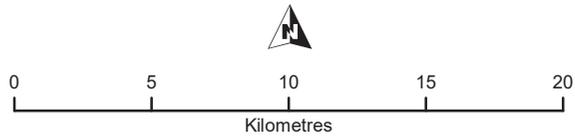


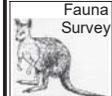
Fauna Habitats

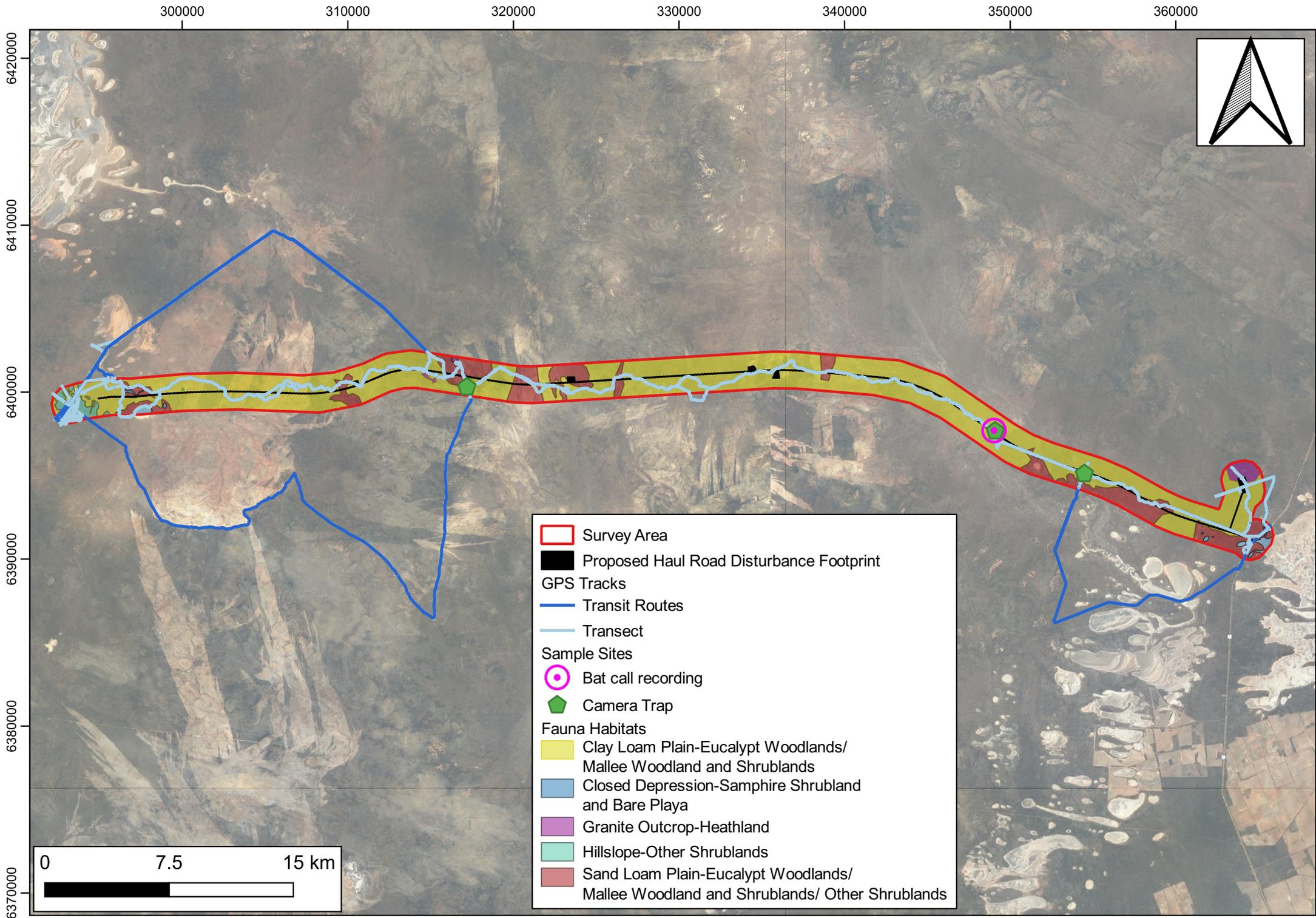
- Clay Loam Plain-Eucalypt Woodlands/
Mallee Woodland and Shrublands
- Closed Depression-Samphire
Shrubland and Bare Playa
- Granite Outcrop-Heathland
- Hillslope-Other Shrublands
- Sand Loam Plain-Eucalypt Woodlands/
Mallee Woodland and Shrublands/
Other Shrublands

Legend

Survey Area



 Fauna Survey	Audalia Resources Ltd Medcalf Project - Haul Road Fauna Habitats (data courtesy Botanica Consulting)
Drawn: G Harewood Date: Feb 2020 Scale: 1:275,000	Projection/Coordinate System: UTM/MGA Zone 51 Figure: 4



- Survey Area
- Proposed Haul Road Disturbance Footprint
- GPS Tracks
- Transit Routes
- Transect
- Sample Sites
- Bat call recording
- Camera Trap
- Fauna Habitats
- Clay Loam Plain-Eucalypt Woodlands/
Mallee Woodland and Shrublands
- Closed Depression-Samphire Shrubland
and Bare Playa
- Granite Outcrop-Heathland
- Hillslope-Other Shrublands
- Sand Loam Plain-Eucalypt Woodlands/
Mallee Woodland and Shrublands/ Other Shrublands



APPENDIX A

CONSERVATION CATEGORIES

EPBC Act (1999) Threatened Fauna Categories

Threatened fauna may be listed under Section 178 of the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* in any one of the following categories:

Category	Code	Description
Extinct	E	There is no reasonable doubt that the last member of the species has died.
*Extinct in the wild	EW	A species (a) is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or (b) has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
*Critically Endangered	CE	A species is facing an extremely high risk of extinction in the wild in the immediate future.
*Endangered	EN	A species: (a) is not critically endangered; and (b) is facing a very high risk of extinction in the wild in the near future.
*Vulnerable	VU	A species (a) is not critically endangered or endangered; and (b) is facing a high risk of extinction in the wild in the medium-term future.
Conservation Dependent	CD	A species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered
*Migratory	Migratory	(a) all migratory species that are: (i) native species; and (ii) from time to time included in the appendices to the Bonn Convention; and (b) all migratory species from time to time included in annexes established under JAMBA, CAMBA and ROKAMBA; and (c) all native species from time to time identified in a list established under, or an instrument made under, an international agreement approved by the Minister.
Marine	Ma	Species in the list established under s248 of the <i>EPBC Act</i>

Note: Only species in those categories marked with an asterisk are matters of national environmental significance (NES) under the *EPBC Act*.

Wildlife Conservation (Specially Protected Fauna) Notice 2015 Categories

Published as Specially Protected under the *Wildlife Conservation Act 1950*, and listed under Schedules 1 to 7 of the Wildlife Conservation (Specially Protected Fauna) Notice.

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

Category	Code	Description
Schedule 1 Critically Endangered species	CR	Threatened species considered to be facing an extremely high risk of extinction in the wild.
Schedule 2 Endangered species	EN	Threatened species considered to be facing a very high risk of extinction in the wild.
Schedule 3 Vulnerable species	VU	Threatened species considered to be facing a high risk of extinction in the wild.
Schedule 4 Presumed extinct species	EX	Species which have been adequately searched for and there is no reasonable doubt that the last individual has died.
Schedule 5 Migratory birds protected under an international agreement	IA	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 the Bonn Convention, relating to the protection of migratory birds.
Schedule 6 Fauna that is of special conservation need as conservation dependent fauna	CD	Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened.
Schedule 7 Other specially protected fauna.	OS	Fauna otherwise in need of special protection to ensure their conservation.

Western Australian DPaW Priority Fauna Categories

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna 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 flora or fauna.

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

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

Category	Code	Description
Priority 1 Poorly Known Species.	P1	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.
Priority 2 Poorly Known Species.	P2	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.
Priority 3 Poorly Known Species.	P3	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.
Priority 4 Rare, Near Threatened and other species in need of monitoring.	P4	(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 do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

*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).

IUCN Red List Threatened Species Categories

The *IUCN Red List of Threatened Species™* is a checklist of taxa that have undergone an extinction risk assessment using the *IUCN Red List Categories and Criteria*.

Categories are summarized below.

Category	Code	Description
Extinct	EX	Taxa for which there is no reasonable doubt that the last individual has died.
Extinct in the Wild	EW	Taxa which is known only to survive in cultivation, in captivity or and as a naturalised population well outside its past range and it has not been recorded in known or expected habitat despite exhaustive survey over a time frame appropriate to its life cycle and form.
Critically Endangered	CR	Taxa facing an extremely high risk of extinction in the wild.
Endangered	EN	Taxa facing a very high risk of extinction in the wild.
Vulnerable	VU	Taxa facing a high risk of extinction in the wild.
Near Threatened	NT	Taxa which has been evaluated but does not qualify for CR, EN or VU now but is close to qualifying or likely to qualify in the near future.
Least Concern	LC	Taxa which has been evaluated but does not qualify for CR, EN, VU, or NT but is likely to qualify for NT in the near future.
Data Deficient	DD	Taxa for which there is inadequate information to make a direct or indirect assessment of its risk of extinction based on its distribution and/or population status.
Not Evaluated	NE	Taxa which has not been evaluated.

A full list of categories and their meanings are available at:

<http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria>

APPENDIX B

VERTEBRATE FAUNA RECORDED OR POTENTIALLY IN SURVEY AREA

Fauna Observed or Potentially in Survey Area

Medcalf Project Haul Road - Audalia Resources Ltd

Approximate centroid 32.515120°S 120.188320°E

Compiled by Greg Harewood - February 2020
Recorded (Captured/Sighted/Heard/Signs) = X

A = Harewood, G. (2020). Fauna Survey (Level 1), Proposed Haul Road, Medcalf Vanadium Mining Project. Unpublished report for Audalia Resources Ltd. V3

B = Harewood, G. (2020). Fauna Survey (Level 2), Phase 1 and 2, Medcalf Vanadium Mining Project. Unpublished report for Audalia Resources Ltd. V3

How, R.A. et al. (1988). The biological survey of the eastern goldfields of Western Australia. Part 4. Lake Johnston-Hyden Study Area. Records of the WAM, supplement No. 30.

C = Lake Cronin results.

D = McDermid Rock results.

E = Frank Hann National Park results.

F = Peak Charles results.

G = Brearley, D.R., Dunlop, J.N., and Osborne, J.M. (1998) Biological survey and environmental assessment of the Emily-Ann Project area. Unpublished report for Lionore Pty Ltd.

H = Duncan, S. et al. (2006). Vertebrate Fauna of the Honman Ridge - Bremer Range district, Great Western Woodlands, Western Australia. Unpublished report for the Wilderness Society.

I = Biota (2006a/2007a). Forrestania Monitoring Survey, Flying Fox Phases I, II, III and IV. Unpublished report for Western Areas NL.

Biota (2006b). Forrestania Water Disposal Pipeline Survey – Fauna and Faunal Assemblages Report. Unpublished report for Western Areas NL.

Biota (2007b). Diggers South Fauna Survey – Phase I. Unpublished report for Western Areas NL.

Biota (2010). Spotted Quoll Haul Road Single Phase Fauna Survey. Unpublished report for Western Areas N.L. May 2010.

J = DBCA (2020). NatureMap Database search. "By Line" Haul Road Centre Line plus 5 km buffer). 12/02/2020.

Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J
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Amphibia

Myobatrachidae

Ground or Burrowing Frogs

<i>Crinia pseudinsignifera</i>	Bleating Froglet	LC										X
<i>Heleioporus albopunctatus</i>	Western Spotted Frog	LC			X		X					X
<i>Limnodynastes dorsalis</i>	Western Banjo Frog	LC			X		X	X				
<i>Myobatrachus gouldii</i>	Turtle Frog	LC					X	X				

BC Act Status - S1 to S7, EPBC Act Status - CR - Critically Endangered, EN = Endangered, VU = Vulnerable, EX = Extinct, DBCA Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions LC = Least Concern - see Appendix A and <http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria-for-others>.

Class Family Species	Common Name	Conservation Status												
			A	B	C	D	E	F	G	H	I	J		
<i>Neobatrachus albipes</i>	White-footed Trilling Frog	LC												
<i>Neobatrachus centralis</i>	Trilling Frog	LC			X	X								
<i>Neobatrachus kunapalari</i>	Kunapalari Frog	LC												
<i>Neobatrachus pelobatoides</i>	Humming Frog	LC			X	X								
<i>Neobatrachus sp.</i>	Unidentified Burrowing Frog							X	X	X				
<i>Neobatrachus sutor</i>	Shoemaker Frog	LC			X									
<i>Pseudophryne guentheri</i>	Crawling Toadlet	LC						X						
<i>Pseudophryne occidentalis</i>	Western Toadlet	LC		X	X	X			X	X			X	X

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Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J
			Reptilia									
Diplodactylidae Geckoes												
<i>Crenadactylus ocellatus</i>	Clawless Gecko			X	X	X	X	X	X	X	X	X
<i>Diplodactylus granariensis granariensis</i>	Wheatbelt Stone Gecko			X	X	X	X	X	X	X	X	
<i>Diplodactylus pulcher</i>	Western Saddled Ground Gecko					X					X	
<i>Lucasium maini</i>	Main's Ground Gecko			X	X	X	X	X	X	X	X	X
<i>Oedura reticulata</i>	Reticulated Velvet Gecko			X	X	X	X	X	X	X	X	
<i>Strophurus intermedius</i>	Southern Spiny-tailed Gecko					X						
<i>Strophurus spinigerus inornatus</i>	Orange-eyed Southwestern Spiny-tailed Gecko			X	X		X				X	
Gekkonidae Geckoes												
<i>Christinus marmoratus</i>	Marbled Gecko			X		X	X		X	X		X
<i>Gehyra variegata</i>	Variegated Dtella			X	X	X	X	X	X	X	X	X
<i>Heteronotia binoei</i>	Bynoe's Gecko			X	X				X	X		X
<i>Underwoodisaurus milii</i>	Barking Gecko			X	X	X			X		X	X

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Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J
			Pygopodidae Legless Lizards									
<i>Delma australis</i>	Marble-faced Delma			X							X	X
<i>Delma butleri</i>	Unbanded Delma								X			
<i>Delma fraseri</i>	Fraser's Legless Lizard			X	X	X			X		X	X
<i>Lialis burtonis</i>	Burton's Legless Lizard			X	X			X	X		X	X
<i>Pygopus lepidopodus</i>	Common Scaly Foot					X		X	X		X	

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Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J
			Agamidae Dragon Lizards									
<i>Ctenophorus cristatus</i>	Crested Bicycle Dragon			X	X	X	X	X	X	X	X	X
<i>Ctenophorus isolepis</i>	Goldfields Military Sand Dragon					X						
<i>Ctenophorus maculatus</i>	Spotted Military Dragon				X	X	X	X			X	
<i>Ctenophorus ornatus</i>	Ornate Crevice Dragon					X	X	X				
<i>Ctenophorus salinarum</i>	Salt Pan Dragon			X	X	X	X	X	X			X
<i>Moloch horridus</i>	Thorny Devil			X	X	X		X	X	X	X	X
<i>Pogona minor minor</i>	Western Bearded Dragon			X	X	X	X	X	X	X	X	
<i>Rankinia adelaidensis chapmani</i>	Eastern Heath Dragon			X	X		X			X	X	
Varanidae Monitor's or Goanna's												
<i>Varanus gouldii</i>	Gould's Sand Monitor			X	X	X		X	X	X	X	X
<i>Varanus rosenbergi</i>	Heath Monitor						X	X	X		X	
<i>Varanus tristis</i>	Black-headed Monitor											

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Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J
			Scincidae Skinks									
<i>Cryptoblepharus buchananii</i>	Buchanan's Snake-eyed Skink			X	X	X	X	X	X	X	X	X
<i>Ctenotus atlas</i>	Southern Malle Ctenotus				X	X			X	X		
<i>Ctenotus impar</i>	Odd-striped Ctenotus				X		X	X			X	
<i>Ctenotus schomburgkii</i>	Barred Wedge-snout Ctenotus			X	X	X	X	X	X	X	X	X
<i>Ctenotus xenopleura</i>	Wide-striped Sandplain Ctenotus					X						
<i>Cyclodomorphus melanops elongatus</i>	Eastern Slender Blue-tongue				X	X			X			
<i>Egernia formosa</i>	Goldfields Crevice Skink								X			
<i>Egernia inornata</i>	Desert Skink					X			X			
<i>Egernia richardi</i>	Woodland Crevice Skink			X	X	X	X			X	X	X
<i>Eremiascincus richardsonii</i>	Broad-banded Sand Swimmer											
<i>Hemiergis initialis initialis</i>	Sth Five-toed Mulch Skink			X		X		X	X	X	X	
<i>Hemiergis peronii peronii</i>	Four-toed Earless Skink						X	X		X		

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Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J
			<i>Lerista distinguenda</i>	SW Four-toed Lerista			X	X		X	X	X
<i>Lerista dorsalis</i>	Southern Four-toed Lerista										X	
<i>Lerista kingi</i>	King's Three-toed Slider											
<i>Lerista picturata</i>	Goldfields Robust Lerista					X			X	X	X	
<i>Lerista timida</i>	Dwarf Three-toed Slider			X		X			X			X
<i>Liopholis multiscutata</i>	Bull Skink				X	X					X	
<i>Menetia greyii</i>	Dwarf Skink		X	X	X	X	X	X	X		X	X
<i>Morethia butleri</i>	Woodland Dark-flecked Morethia			X	X	X	X		X	X		X
<i>Morethia obscura</i>	Shrubland Pale-flecked Morethia			X	X	X	X	X	X	X	X	X
<i>Tiliqua occipitalis</i>	Western Bluetongue				X		X		X	X	X	
<i>Tiliqua rugosa</i>	Bobtail					X	X		X		X	

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Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J
			Typhlopidae Blind Snakes									
<i>Ramphotyphlops australis</i>	Southern Blind Snake			X	X			X	X	X	X	
<i>Ramphotyphlops bicolor</i>	Dark-spined Blind Snake			X								
<i>Ramphotyphlops bituberculatus</i>	Prong-snouted Blind Snake											
<i>Ramphotyphlops hamatus</i>	Northern Hook-snouted Blind Snake									X		
Boidae Pythons, Boas												
<i>Morelia spilota imbricata</i>	Southern Carpet Python							X	X	X		

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Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J
			Elapidae Elapid Snakes									
<i>Brachyuropsis semifasciata</i>	Southern Shovel-nosed Snake					X			X			
<i>Echiopsis curta</i>	Bardick			X			X	X			X	X
<i>Neelaps bimaculatus</i>	Black-naped Snake				X					X		
<i>Parasuta gouldii</i>	Gould's Hooded Snake				X				X	X	X	
<i>Parasuta nigriceps</i>	Black-backed Snake			X					X		X	X
<i>Paroplocephalus atriceps</i>	Lake Cronin Snake	P3			X				X		X	
<i>Pseudechis australis</i>	Mulga Snake				X				X			
<i>Pseudonaja affinis</i>	Dugite			X	X	X	X	X	X		X	X
<i>Pseudonaja modesta</i>	Ringed Brown Snake					X						
<i>Simoselaps bertholdi</i>	Jan's Banded Snake					X	X				X	

Aves

Casuariidae

Emus, Cassowaries

<i>Dromaius novaehollandiae</i>	Emu	LC	X	X	X	X	X	X	X	X	X	X
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Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J
			Megapodiidae Moundbuilders									
<i>Leipoa ocellata</i>	Malleefowl	S3 VU VU	X		X	X		X		X	X	X
Phasianidae Quails, Pheasants												
<i>Coturnix pectoralis</i>	Stubble Quail	LC		X								X
Accipitridae Kites, Goshawks, Eagles, Harriers												
<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk	LC			X	X		X	X	X	X	
<i>Accipiter fasciatus</i>	Brown Goshawk	LC				X						
<i>Aquila audax</i>	Wedge-tailed Eagle	LC	X	X				X	X	X	X	X
<i>Aquila morphnoides</i>	Little Eagle	LC			X	X	X	X		X	X	
<i>Circus assimilis</i>	Spotted Harrier	LC										
<i>Elanus caeruleus</i>	Black-shouldered Kite	LC										
<i>Haliastur sphenurus</i>	Whistling Kite	LC										
<i>Hamirostra isura</i>	Square-tailed Kite	LC		X	X	X	X	X		X	X	X

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Class Family Species	Common Name	Conservation Status											
			A	B	C	D	E	F	G	H	I	J	
Falconidae Falcons													
<i>Falco berigora</i>	Brown Falcon	LC	X	X	X	X	X	X	X	X	X	X	X
<i>Falco cenchroides</i>	Australian Kestrel	LC		X	X		X	X	X			X	X
<i>Falco longipennis</i>	Australian Hobby	LC			X				X	X	X		
<i>Falco peregrinus</i>	Peregrine Falcon	S7 LC							X		X	X	
Otididae Bustards													
<i>Ardeotis australis</i>	Australian Bustard		X	X	X		X						X
Turnicidae Button-quails													
<i>Turnix velox</i>	Little Button-quail	LC		X								X	X
Charadriidae Lapwings, Plovers, Dotterels													
<i>Vanellus tricolor</i>	Banded Lapwing	LC											

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Class Family <i>Species</i>	Common Name	Conservation Status												
			A	B	C	D	E	F	G	H	I	J		
Columbidae Pigeons, Doves														
<i>Ocyphaps lophotes</i>	Crested Pigeon	LC						X			X			
<i>Phaps chalcoptera</i>	Common Bronzewing	LC	X	X	X	X	X	X	X	X	X	X	X	X
<i>Phaps elegans</i>	Brush Bronzewing	LC		X				X	X				X	X

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Class Family Species	Common Name	Conservation Status												
			A	B	C	D	E	F	G	H	I	J		
Psittacidae Parrots														
<i>Cacatua roseicapilla</i>	Galah	LC			X									X
<i>Glossopsitta porphyrocephala</i>	Purple-crowned Lorikeet	LC	X	X	X	X	X			X	X	X		
<i>Melopsittacus undulatus</i>	Budgerigar	LC		X										X
<i>Neophema elegans</i>	Elegant Parrot	LC	X		X		X							X
<i>Nymphicus hollandicus</i>	Cockatiel	LC		X										X
<i>Platycercus icterotis xanthogenys</i>	Western Rosella (inland ssp)	P4		X	X		X	X	X	X				X
<i>Platycercus varius</i>	Mulga Parrot	LC					X	X						X
<i>Platycercus zonarius</i>	Australian Ringneck	LC	X	X	X	X	X	X	X	X	X	X	X	X
<i>Polytelis anthopeplus</i>	Regent Parrot	LC			X		X	X	X	X	X	X	X	

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Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J
Cuculidae Parasitic Cuckoos												
<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo	LC	X	X	X	X	X	X			X	X
<i>Chrysococcyx basalis</i>	Horsfield's Bronze Cuckoo	LC		X	X		X	X		X		X
<i>Chrysococcyx lucidus</i>	Shining Bronze Cuckoo	LC									X	
<i>Chrysococcyx osculans</i>	Black-eared Cuckoo	LC					X	X				
<i>Cuculus pallidus</i>	Pallid Cuckoo	LC		X	X		X	X	X		X	
Strigidae Hawk Owls												
<i>Ninox novaeseelandiae</i>	Boobook Owl	LC	X		X	X	X	X	X	X		
Tytonidae Barn Owls												
<i>Tyto alba</i>	Barn Owl	LC										
Podargidae Frogmouths												
<i>Podargus strigoides</i>	Tawny Frogmouth	LC	X	X	X	X	X	X	X	X	X	X

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Class Family Species	Common Name	Conservation Status										
			A	B	C	D	E	F	G	H	I	J
Caprimulgidae Nightjars												
<i>Eurostopus argus</i>	Spotted Nightjar	LC			X		X		X		X	
Aegothelidae Owlet-nightjars												
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar	LC	X	X	X	X		X	X	X	X	X
Halcyonidae Tree Kingfishers												
<i>Todiramphus pyrrhopygia</i>	Red-backed Kingfisher	LC								X		
<i>Todiramphus sanctus</i>	Sacred Kingfisher	LC							X	X		
Meropidae Bee-eaters												
<i>Merops ornatus</i>	Rainbow Bee-eater	JA LC		X	X	X		X	X	X	X	X
Climacteridae Trecreepers												
<i>Climacteris rufa</i>	Rufous Trecreeper	LC	X	X	X	X	X		X	X	X	

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Class Family <i>Species</i>	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J
			Maluridae Fairy Wrens, GrassWrens									
<i>Malurus leucopterus</i>	White-winged Fairy-wren	LC								X		
<i>Malurus pulcherrimus</i>	Blue-breasted Fairy-wren	LC		X	X	X		X			X	X
<i>Malurus splendens</i>	Splendid Fairy-wren	LC	X									
<i>Stipiturus malachurus</i>	Southern Emu-wren	LC									X	

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Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J
Acanthizidae												
Thornbills, Geryones, Fieldwrens & Whitefaces												
<i>Acanthiza apicalis</i>	Broad-tailed Thornbill	LC	X	X	X	X	X	X	X	X	X	X
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	LC		X	X	X	X	X		X	X	X
<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill	LC			X	X	X			X	X	
<i>Aphelocephala leucopsis</i>	Southern Whiteface	LC						X				
<i>Calamanthus campestris</i>	Rufous Fieldwren	LC			X	X	X				X	
<i>Gerygone fusca</i>	Western Gerygone	LC		X	X				X		X	X
<i>Hylacola cauta whitlocki</i>	Shy Heath-wren (western)		X	X	X		X	X		X	X	
<i>Pyrrholaemus brunneus</i>	Redthroat	LC	X	X	X	X	X		X	X	X	X
<i>Sericornis frontalis</i>	White-browed Scrubwren	LC			X			X				
<i>Smicromnis brevirostris</i>	Weebill	LC	X	X	X	X	X	X	X	X	X	X

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Class Family <i>Species</i>	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J
Pardalotidae Pardalotes												
<i>Pardalotus punctatus</i>	Spotted Pardalote	LC	X	X	X	X	X				X	X
<i>Pardalotus striatus</i>	Striated Pardalote	LC	X	X	X	X	X	X	X	X	X	X

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Class Family Species	Common Name	Conservation Status												
			A	B	C	D	E	F	G	H	I	J		
Meliphagidae Honeyeaters, Chats														
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater	LC	X	X		X		X	X	X	X	X	X	X
<i>Anthochaera carunculata</i>	Red Wattlebird	LC	X	X	X	X	X	X	X	X	X	X	X	X
<i>Certhionyx niger</i>	Black Honeyeater	LC												
<i>Certhionyx variegatus</i>	Pied Honeyeater	LC		X										X
<i>Epthianura albifrons</i>	White-fronted Chat	LC		X	X	X								X
<i>Epthianura tricolor</i>	Crimson Chat	LC									X			
<i>Lichenostomus cratitius</i>	Purple-gaped Honeyeater	LC		X	X	X	X	X	X	X	X	X	X	X
<i>Lichenostomus leucotis</i>	White-eared Honeyeater	LC	X	X	X	X	X	X	X	X	X	X	X	X
<i>Lichenostomus ornatus</i>	Yellow-plumed Honeyeater	LC	X	X	X	X	X	X	X	X	X	X	X	
<i>Lichenostomus plumulus</i>	Grey-fronted Honeyeater	LC												X
<i>Lichenostomus virescens</i>	Singing Honeyeater	LC	X	X		X	X	X			X	X		
<i>Lichmera indistincta</i>	Brown Honeyeater	LC		X	X	X	X	X	X	X	X	X	X	X

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Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J
			<i>Manorina flavigula</i>	Yellow-throated Miner	LC		X	X	X	X	X	
<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater	LC		X	X	X	X	X	X	X	X	X
<i>Phylidonyris albifrons</i>	White-fronted Honeyeater	LC	X	X	X	X		X	X	X	X	
<i>Phylidonyris melanops</i>	Tawny-crowned Honeyeater	LC		X	X	X	X	X		X	X	
<i>Phylidonyris nigra</i>	White-cheeked Honeyeater	LC						X	X		X	
<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater	LC						X			X	
Petroicidae												
Australian Robins												
<i>Drymodes brunneopygia</i>	Southern Scrub-robin	LC	X		X	X	X	X		X	X	
<i>Eopsaltria griseogularis</i>	Western Yellow Robin	LC		X	X	X	X			X	X	
<i>Microeca fascinans</i>	Jacky Winter	LC	X		X	X	X			X	X	
<i>Petroica cucullata</i>	Hooded Robin	LC	X		X	X	X				X	
<i>Petroica goodenovii</i>	Red-capped Robin	LC		X	X	X	X	X	X	X	X	X

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Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J
Pomatostomidae												
Babblers												
<i>Pomatostomus superciliosus</i>	White-browed Babbler	LC	X		X	X		X		X	X	
Cinclosomatidae												
Whipbirds, Wedgebills, Quail Thrushes												
<i>Cinclosoma castanotus</i>	Chestnut Quail-thrush	LC		X	X	X		X	X	X	X	
Neosittidae												
Sitellas												
<i>Daphoenositta chrysoptera</i>	Varied Sittella	LC		X	X	X		X		X	X	X
Pachycephalidae												
Crested Shrike-tit, Crested Bellbird, Shrike Thrushes, Whistlers												
<i>Colluricincla harmonica</i>	Grey Shrike-thrush	LC	X	X	X	X	X	X	X	X	X	X
<i>Falcunculus frontatus</i>	Crested Shrike-tit											
<i>Oreoica gutturalis</i>	Crested Bellbird	LC	X	X	X	X	X	X		X	X	X
<i>Pachycephala inornata</i>	Gilbert's Whistler	LC								X		
<i>Pachycephala pectoralis</i>	Golden Whistler	LC		X	X	X	X	X		X	X	
<i>Pachycephala rufiventris</i>	Rufous Whistler	LC	X			X	X		X		X	

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Class Family Species	Common Name	Conservation Status										
			A	B	C	D	E	F	G	H	I	J
Dicruridae												
Monarchs, Magpie Lark, Flycatchers, Fantails, Drongo												
<i>Grallina cyanoleuca</i>	Magpie-lark	LC									X	X
<i>Myiagra inquieta</i>	Restless Flycatcher	LC										
<i>Rhipidura fuliginosa</i>	Grey Fantail	LC			X			X				X
<i>Rhipidura leucophrys</i>	Willie Wagtail	LC		X	X	X	X	X	X	X	X	X
Campephagidae												
Cuckoo-shrikes, Trillers												
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	LC	X	X	X	X	X	X	X	X	X	X
<i>Lalage tricolor</i>	White-winged Triller	LC		X	X						X	X
Artamidae												
Woodswallows, Butcherbirds, Currawongs												
<i>Artamus cinereus</i>	Black-faced Woodswallow	LC		X	X						X	X
<i>Artamus cyanopterus</i>	Dusky Woodswallow	LC	X	X	X	X	X	X	X	X	X	X
<i>Artamus personatus</i>	Masked Woodswallow	LC		X				X				X
<i>Artamus superciliosus</i>	White-browed Woodswallow	LC		X								X

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Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J
			Cracticidae Currawongs, Magpies & Butcherbirds									
<i>Cracticus nigrogularis</i>	Pied Butcherbird	LC				X			X	X	X	
<i>Cracticus tibicen</i>	Australian Magpie	LC		X			X	X		X	X	X
<i>Cracticus torquatus</i>	Grey Butcherbird	LC	X	X	X	X	X	X	X	X	X	X
<i>Strepera versicolor</i>	Grey Currawong	LC	X	X		X	X	X	X	X	X	X
Corvidae Ravens, Crows												
<i>Corvus bennetti</i>	Little Crow	LC				X	X					
<i>Corvus coronoides</i>	Australian Raven	LC	X	X		X	X		X	X	X	X
<i>Corvus sp.</i>	Unidentified corvid							X				
Motacillidae Old World Pipits, Wagtails												
<i>Anthus australis</i>	Australian Pipit	LC		X	X	X	X	X	X	X	X	X
Estrilidae Grass Finches & Mannikins												
<i>Taeniopygia guttata</i>	Zebra Finch	LC		X								X

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Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J
			Dicaeidae Flowerpeckers									
<i>Dicaeum hirundinaceum</i>	Mistletoebird	LC		X	X	X		X				X
Hirundinidae Swallows, Martins												
<i>Cheramoeca leucosternus</i>	White-backed Swallow	LC										
<i>Hirundo ariel</i>	Fairy Martin	LC				X						
<i>Hirundo neoxena</i>	Welcome Swallow	LC										
<i>Hirundo nigricans</i>	Tree Martin	LC	X	X	X	X	X	X	X	X	X	X
Sylviidae Old World Warblers												
<i>Cincloramphus cruralis</i>	Brown Songlark	LC					X					
<i>Cincloramphus mathewsi</i>	Rufous Songlark	LC		X								
Zosteropidae White-eyes												
<i>Zosterops lateralis</i>	Silvereye	LC		X	X	X	X	X		X	X	X

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Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J
			Mammalia									
Tachyglossidae Echidnas												
<i>Tachyglossus aculeatus</i>	Echidna	LC			X	X	X		X	X	X	
Dasyuridae Carnivorous Marsupials												
<i>Antechinomys laniger</i>	Kultarr	DD										
<i>Ningauai yvonneae</i>	Southern Ningauai	LC		X	X	X						
<i>Sminthopsis crassicaudata</i>	Fat-tailed Dunnart	LC				X						X
<i>Sminthopsis dolichura</i>	Little long-tailed Dunnart	LC				X				X		
<i>Sminthopsis gilberti</i>	Gilbert's Dunnart	LC			X		X					X
<i>Sminthopsis granulipes</i>	White-tailed Dunnart	LC		X	X		X	X				X X
<i>Sminthopsis griseoventer</i>	Grey-bellied Dunnart	LC		X								X X
<i>Sminthopsis ooldea</i>	Ooldea Dunnart	LC		X								X

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Class Family Species	Common Name	Conservation Status											
			A	B	C	D	E	F	G	H	I	J	
Burramyidae Pygmy Possums													
<i>Cercartetus concinnus</i>	Western Pygmy-possum	LC		X	X	X	X	X	X	X	X	X	X
Tarsipedidae Honey Possum													
<i>Tarsipes rostratus</i>	Honey Possum	LC					X	X				X	
Macropodidae Kangaroos, Wallabies													
<i>Macropus fuliginosus</i>	Western Grey Kangaroo	LC	X	X	X	X	X	X	X	X	X	X	X
<i>Macropus robustus</i>	Euro	LC			X					X			
<i>Notamacropus irma</i>	Western Brush Wallaby	P4 LC					X				X	X	
Molossidae Freetail Bats													
<i>Austronomus australis</i>	White-striped Freetail-bat	LC	X	X	X	X	X	X	X	X	X	X	X
<i>Ozimops kitcheneri</i>	South-western Free-tailed Bat	LC	X	X	X	X	X					X	

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Class Family Species	Common Name	Conservation Status	A	B	C	D	E	F	G	H	I	J
Vespertilionidae												
Ordinary Bats												
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat	LC	X	X	X	X	X		X		X	X
<i>Chalinolobus morio</i>	Chocolate Wattled Bat	LC	X	X			X		X		X	X
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat	LC	X	X	X	X			X		X	X
<i>Nyctophilus major tor</i>	Central Long-eared Bat	P4	X	X		X			X			
<i>Scotorepens balstoni</i>	Inland Broad-nosed Bat	LC	X	X		X						X
<i>Vespadelus baverstocki</i>	Inland Forest Bat	LC										
<i>Vespadelus regulus</i>	Southern Forest Bat	LC	X	X	X	X	X	X	X		X	X
Muridae												
Rats, Mice												
<i>Mus musculus</i>	House Mouse	Introduced		X	X	X	X	X	X	X	X	X
<i>Notomys mitchellii</i>	Mitchell's Hopping-mouse	LC		X	X	X	X	X			X	X
<i>Pseudomys albocinereus</i>	Ash-grey Mouse	LC		X	X	X	X	X	X		X	X
<i>Pseudomys bolami</i>	Bolam's Mouse	LC		X	X	X			X			X

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Class Family <i>Species</i>	Common Name	Conservation Status												
			A	B	C	D	E	F	G	H	I	J		
Canidae Dogs, Foxes														
<i>Canis lupus</i>	Dingo/Dog	LC/Introduced	X	X	X	X				X	X	X		
<i>Vulpes vulpes</i>	Red Fox	Introduced	X	X	X	X				X	X	X	X	
Felidae Cats														
<i>Felis catus</i>	Cat	Introduced	X	X		X			X	X	X	X	X	X
Equidae Horses														
<i>Equus caballus</i>	Horse	Introduced	X											
Camelidae Camels														
<i>Camelus dromedarius</i>	Camel	Introduced	X	X										X
Leporidae Rabbits, Hares														
<i>Oryctolagus cuniculus</i>	Rabbit	Introduced		X	X	X			X	X	X	X	X	X

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APPENDIX C

DBCA NATUREMAP & EPBC ACT DATABASE SEARCH RESULTS

NatureMap - Haul Road

Created By Greg Harewood on 12/02/2020

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Method 'By Line'
Vertices 32° 30' 40" S, 120° 47' 49" E 32° 31' 56" S, 121° 28' 50" E 32° 34' 54" S, 121° 34' 11" E
Group By Species Group

Species Group	Species	Records
Amphibian	1	6
Bird	61	690
Mammal	19	168
Reptile	28	589
TOTAL	109	1453

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Amphibian				
1.	25434 <i>Pseudophryne occidentalis</i> (Western Toadlet)			
Bird				
2.	24559 <i>Acanthagenys rufogularis</i> (Spiny-cheeked Honeyeater)			
3.	24260 <i>Acanthiza apicalis</i> (Broad-tailed Thornbill, Inland Thornbill)			
4.	24261 <i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
5.	25544 <i>Aegotheles cristatus</i> (Australian Owllet-nightjar)			
6.	24312 <i>Anas gracilis</i> (Grey Teal)			
7.	24561 <i>Anthochaera carunculata</i> (Red Wattlebird)			
8.	25670 <i>Anthus australis</i> (Australian Pipit)			
9.	24285 <i>Aquila audax</i> (Wedge-tailed Eagle)			
10.	24610 <i>Ardeotis australis</i> (Australian Bustard)			
11.	25566 <i>Artamus cinereus</i> (Black-faced Woodswallow)			
12.	24353 <i>Artamus cyanopterus</i> (Dusky Woodswallow)			
13.	24356 <i>Artamus personatus</i> (Masked Woodswallow)			
14.	24357 <i>Artamus superciliosus</i> (White-browed Woodswallow)			
15.	25598 <i>Cacomantis flabelliformis</i> (Fan-tailed Cuckoo)			
16.	24734 <i>Calyptorhynchus latirostris</i> (Carnaby's Cockatoo, White-tailed Short-billed Black Cockatoo)		T	
17.	24564 <i>Certhionyx variegatus</i> (Pied Honeyeater)			
18.	24431 <i>Chrysococcyx basalis</i> (Horsfield's Bronze Cuckoo)			
19.	25675 <i>Colluricincla harmonica</i> (Grey Shrike-thrush)			
20.	25568 <i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
21.	25592 <i>Corvus coronoides</i> (Australian Raven)			
22.	24671 <i>Coturnix pectoralis</i> (Stubble Quail)			
23.	25595 <i>Cracticus tibicen</i> (Australian Magpie)			
24.	25596 <i>Cracticus torquatus</i> (Grey Butcherbird)			
25.	25673 <i>Daphoenositta chrysoptera</i> (Varied Sittella)			
26.	25607 <i>Dicaeum hirundinaceum</i> (Mistletoebird)			
27.	24470 <i>Dromaius novaehollandiae</i> (Emu)			
28.	25692 <i>Eopsaltria australis</i> (Yellow Robin)			
29.	24567 <i>Epthianura albifrons</i> (White-fronted Chat)			
30.	25621 <i>Falco berigora</i> (Brown Falcon)			
31.	25622 <i>Falco cenchroides</i> (Australian Kestrel, Nankeen Kestrel)			
32.	25530 <i>Gerygone fusca</i> (Western Gerygone)			
33.	24296 <i>Hamirostra isura</i> (Square-tailed Kite)			
34.	34001 <i>Hylacola cauta</i> subsp. <i>whitlocki</i> (Shy Groundwren)			
35.	24367 <i>Lalage tricolor</i> (White-winged Triller)			
36.	24557 <i>Leipoa ocellata</i> (Malleefowl)		T	
37.	24573 <i>Lichenostomus cratitius</i> (Purple-gaped Honeyeater)			
38.	25659 <i>Lichenostomus leucotis</i> (White-eared Honeyeater)			
39.	25661 <i>Lichmera indistincta</i> (Brown Honeyeater)			
40.	24551 <i>Malurus pulcherrimus</i> (Blue-breasted Fairy-wren)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
41.	24583 <i>Manorina flavigula</i> (Yellow-throated Miner)			
42.	47997 <i>Melanodryas cucullata</i> (Hooded Robin)			
43.	25663 <i>Melithreptus brevirostris</i> (Brown-headed Honeyeater)			
44.	24736 <i>Melopsittacus undulatus</i> (Budgerigar)			
45.	24598 <i>Merops ornatus</i> (Rainbow Bee-eater)			
46.	24742 <i>Nymphicus hollandicus</i> (Cockatiel)			
47.	24618 <i>Oreoica gutturalis</i> (Crested Bellbird)			
48.	25681 <i>Pardalotus punctatus</i> (Spotted Pardalote)			
49.	25682 <i>Pardalotus striatus</i> (Striated Pardalote)			
50.	24659 <i>Petroica goodenovii</i> (Red-capped Robin)			
51.	24409 <i>Phaps chalcoptera</i> (Common Bronzewing)			
52.	25587 <i>Phaps elegans</i> (Brush Bronzewing)			
53.	24746 <i>Platycercus icterotis</i> subsp. <i>xanthogenys</i> (Western Rosella (inland))		□4	
54.	25721 <i>Platycercus zonarius</i> (Australian Ringneck, Ring-necked Parrot)			
55.	25703 <i>Podargus strigoides</i> (Tawny Frogmouth)			
56.	24278 <i>Pyrrholaemus brunneus</i> (Redthroat)			
57.	25614 <i>Rhipidura leucophrys</i> (Willie Wagtail)			
58.	30948 <i>Smicronis brevirostris</i> (Weebill)			
59.	25597 <i>Strepera versicolor</i> (Grey Currawong)			
60.	30870 <i>Taeniopygia guttata</i> (Zebra Finch)			
61.	24851 <i>Turnix velox</i> (Little Button-quail)			
62.	25765 <i>Zosterops lateralis</i> (Grey-breasted White-eye, Silvereye)			

Mammal

63.	24254 <i>Camelus dromedarius</i> (Dromedary, Camel)	□		
64.	24086 <i>Cercartetus concinnus</i> (Western Pygmy-possum, Mundarda)			
65.	24186 <i>Chalinolobus gouldii</i> (Gould's Wattled Bat)			
66.	24187 <i>Chalinolobus morio</i> (Chocolate Wattled Bat)			
67.	24041 <i>Felis catus</i> (Cat)	□		
68.	24132 <i>Macropus fuliginosus</i> (Western Grey Kangaroo)			
69.	24223 <i>Mus musculus</i> (House Mouse)	□		
70.	24229 <i>Notomys mitchellii</i> (Mitchell's Hopping-mouse)			
71.	24194 <i>Nyctophilus geoffroyi</i> (Lesser Long-eared Bat)			
72.	43367 <i>Nyctophilus major</i> subsp. <i>tor</i> (Central Long-eared Bat)		□3	
73.	24085 <i>Oryctolagus cuniculus</i> (Rabbit)	□		
74.	24230 <i>Pseudomys albocinereus</i> (Ash-grey Mouse)			
75.	24232 <i>Pseudomys bolami</i> (Bolam's Mouse)			
76.	24199 <i>Scotorepens balstoni</i> (Inland Broad-nosed Bat)			
77.	24112 <i>Sminthopsis granulipes</i> (White-tailed Dunnart)			
78.	25515 <i>Sminthopsis griseoventer</i> (Grey-bellied Dunnart)			
79.	24117 <i>Sminthopsis ooldea</i> (Ooldea Dunnart)			
80.	24206 <i>Vespadelus regulus</i> (Southern Forest Bat)			
81.	24040 <i>Vulpes vulpes</i> (Red Fox)	□		

Reptile

82.	24980 <i>Christinus marmoratus</i> (Marbled Gecko)			
83.	25456 <i>Crenadactylus ocellatus</i> (Clawless Gecko)			
84.	30893 <i>Cryptoblepharus buchananii</i>			
85.	24871 <i>Ctenophorus cristatus</i> (Bicycle Dragon)			
86.	24888 <i>Ctenophorus salinarum</i> (Salt Pan Dragon)			
87.	25074 <i>Ctenotus schomburgkii</i>			
88.	24995 <i>Delma australis</i>			
89.	25766 <i>Delma fraseri</i> (Fraser's Legless Lizard)			
90.	25469 <i>Diplodactylus granariensis</i>			
91.	25251 <i>Echiopsis curta</i> (Bardick)			
92.	25104 <i>Egernia richardi</i>			
93.	24959 <i>Gehyra variegata</i>			
94.	25474 <i>Hemiergis initialis</i>			
95.	24961 <i>Heteronotia binoei</i> (Bynoe's Gecko)			
96.	25131 <i>Lerista distinguenda</i>			
97.	42411 <i>Lerista timida</i>			
98.	25005 <i>Lialis burtonis</i>			
99.	30935 <i>Lucasium maini</i>			
100.	25184 <i>Menetia greyii</i>			
101.	24904 <i>Moloch horridus</i> (Thorny Devil)			
102.	25190 <i>Morethia butleri</i>			
103.	25192 <i>Morethia obscura</i>			
104.	25255 <i>Parasuta nigriceps</i>			
105.	24907 <i>Pogona minor</i> subsp. <i>minor</i> (Dwarf Bearded Dragon)			
106.	25511 <i>Pseudonaja affinis</i> (Dugite)			
107.	25518 <i>Strophurus spinigerus</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
108.	24983 <i>Underwoodisaurus milii</i> (Barking Gecko)			
109.	25218 <i>Varanus gouldii</i> (Bungarra or Sand Monitor)			

Conservation Codes

- T are or likely to become extinct
- presumed extinct
- A protected under international agreement
- other specially protected fauna
- 1 priority 1
- 2 priority 2
- 3 priority 3
- 4 priority 4
- 5 priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.



BC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the BC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the BC Act including significance guidelines, forms and application process details.

Report created 12/02/20 16:01:13

[Summary](#)

[Details](#)

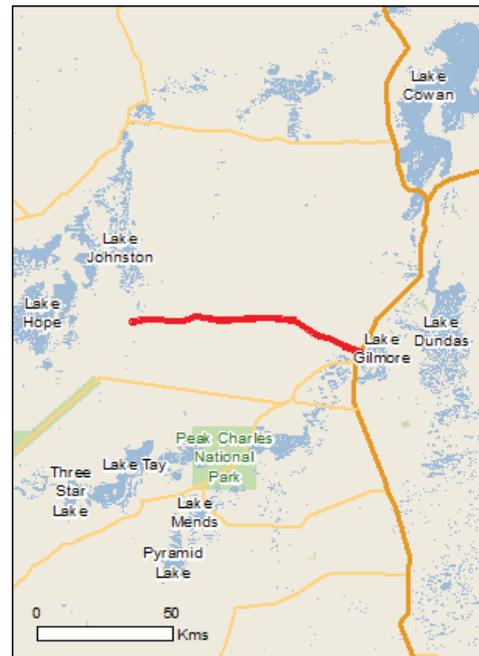
[Matters of National](#)

[Other Matters Protected by the BC Act](#)

[Data Information](#)

[Caveat](#)

[Attributed Elements](#)



This map may contain data which are
Commonwealth of Australia
Geoscience Australia, © 2010

[Coordinates](#)

Buffer 1.0 km



Summary

Matters of National Environmental 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	None
Great Barrier Reef Marine Park	None
Commonwealth Marine Area	None
Listed Threatened Ecological Communities	None
Listed Threatened Species	6
Listed Migratory Species	7

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 environment anywhere.

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 Land	None
Commonwealth Heritage Places	None
Listed Marine Species	12
Whales and Other Cetaceans	None
Critical Habitats	None
Commonwealth Reserves Terrestrial	None
Australian Marine Parks	None

Other Information

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

State and Territory Reserves	1
International Forest Agreements	None
Invasive Species	10
Nationally Important Wetlands	None
Key Ecological Features Marine	None

Details

Matters of National Environmental Significance

Listed Threatened Species [Resource Information](#)

Name	Status	Type of Presence
Birds		
Calidris ferruginea Curlew Sandpiper 1856	Critically Endangered	Species or species habitat may occur within area
Leipoa ocellata Malleefowl 1934	Vulnerable	Species or species habitat likely to occur within area
Lepopus occidentalis Night Parrot 159350	Endangered	Species or species habitat may occur within area

Mammals

Dasyurus leopoldi Chuditch, Western Quoll 1330	Vulnerable	Species or species habitat may occur within area
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Plants

Banisia sphaerocarpa var. dolichostyla Ironcaps Banisia, Ironcap Banisia 10518	Vulnerable	Species or species habitat may occur within area
Boycea pycnophylloides Saltmat 21161	Endangered	Species or species habitat may occur within area

Listed Migratory Species [Resource Information](#)

Species is listed under a different scientific name on the BC Act Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Corktailed Petrel 1678		Species or species habitat likely to occur within area

Migratory Terrestrial Species

Motacilla cinerea Grey Wattle 1642		Species or species habitat may occur within area
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Migratory Wetlands Species

Actitis hypoleucos Common Sandpiper 159309		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper 1874		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris ferruginosa Curlew Sandpiper 1856	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Sectoral Sandpiper 1858		Species or species habitat may occur within area
Sandion haliaetus Sprey 1952		Species or species habitat may occur within area

Other Matters Protected by the BC Act

Listed Marine Species [Resource Information](#)

Species is listed under a different scientific name on the BC Act Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper 159309		Species or species habitat may occur within area
Apus pacificus Forktailed Gull 1678		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret 159541		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret 159542		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper 1874		Species or species habitat may occur within area
Calidris ferruginosa Curlew Sandpiper 1856	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Sectoral Sandpiper 1858		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo 1705		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater 1670		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail 1642		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Andion haliaetus Spree 1952		Species or species habitat may occur within area
Thinornis rubricollis Wooded Warbler 159510		Species or species habitat may occur within area

Data Information

State and Territory Reserves	Resource Information
Name	State
Unnamed WA42943	WA

Invasive Species

Weeds reported here are the 20 species of national significance (WoN), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
Birds		
<i>Columba livia</i> Rock Pigeon, Rock Dove, Domestic Pigeon 1803		Species or species habitat likely to occur within area
<i>Streptopelia senegalensis</i> Australian Turtle Dove, Australian Dove 1781		Species or species habitat likely to occur within area
<i>Turnus vulgaris</i> Common Starling 1389		Species or species habitat likely to occur within area

Mammals

<i>Camelus dromedarius</i> Dromedary, Camel 17		Species or species habitat likely to occur within area
<i>Canis lupus familiaris</i> Domestic Dog 182654		Species or species habitat likely to occur within area
<i>Felis catus</i> Cat, House Cat, Domestic Cat 119		Species or species habitat likely to occur within area
<i>Mus musculus</i> House Mouse 1120		Species or species habitat likely to occur within area
<i>Lepus europaeus</i> Rabbit, European Rabbit 1128		Species or species habitat likely to occur within area
<i>Vulpes vulpes</i> Red Fox, Fox 118		Species or species habitat likely to occur within area

Plants

Name

Status

Type of presence

Carrichtera annua

Ward's Weed 19511

Species or species habitat
likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to see and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, state vegetation maps, 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 distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) or with point locations and described habitat or environmental modelling (MARCANT or BCCM habitat modelling) using point locations and environmental data layers.

Where very little information is available for 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 10 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, 100 or 250 map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database

- threatened species listed as extinct or considered as variants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, variant, or only occur in small numbers

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

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

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

Coordinates

32.52472 120.79952, 32.51768 120.84528, 32.5212 120.9704, 32.51768 120.98384, 32.50904 121.01136, 32.51896 121.09008, 32.51352 121.25776, 32.52024 121.34032, 32.55928 121.41136, 32.5756 121.46576, 32.59352 121.5048, 32.60888 121.55728

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](#)
[Biodlife 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.

APPENDIX D

SIGNIFICANT SPECIES PROFILES

Lake Cronin Snake *Paroplocephalus atriceps*

Status and Distribution: Listed as Priority 3 by DBCA. Known only from a small number of specimens.

Scattered records from Lake Cronin south east to Peak Elenora (Fraser Range) (Cogger 2014, Bush *et al.* 2007, Wilson and Swan 2017).

Habitat: Semi-arid woodlands and rocky outcrops (Wilson and Swan 2017).

Likely presence in survey area: Status in the survey area is unknown but possibly occurs given presence of suitable habitat.

Listed as a potential species based on available information.

Potential impact of development: Loss/modification of small areas of potential habitat. No significant impact considered likely.

Malleefowl *Leipoa ocellata*

Status and Distribution: This species is listed as Schedule 3 under the *BC Act* and as Vulnerable under the *EPBC Act*. Originally common, but now generally rare to uncommon and patchily distributed.

Current distribution mainly southern arid and semi-arid zones, north to Shark Bay, Jingemarra, Colga Downs and Yeelirrie, east to Earnest Giles Range, Yeo Lake, lower Ponton Creek and to Eucla and west and south to Cockleshell Gully, the Wongan Hills, Stirling Range, Beaufort Inlet, Hatters Hill, Mt Ragged and Point Malcolm (Johnstone and Storr 1998).

Habitat: Mainly scrubs and thickets of mallee *Eucalyptus* spp., boree *Melaleuca lanceolata* and bowgada *Acacia linophylla*, also dense litter forming shrublands.

Likely presence in survey area: A malleefowl individual was recorded during the field survey along with some recent tracks (outside the survey area) and an extinct, very old nest mound.

Listed as a potential species based on available information.

Potential impact of development: Loss/modification of small areas of potential habitat. No significant impact considered likely.

Peregrine Falcon *Falco peregrinus*

Status and Distribution: This species is listed as Schedule 7 under the *BC Act*. Individuals of this species are uncommon/rare but wide ranging across Australia. Moderately common at higher levels of the Stirling Range, uncommon in hilly, north west Kimberley, Hamersley and Darling Ranges; rare or scarce elsewhere (Johnstone and Storr 1998).

Habitat: Diverse from rainforest to arid shrublands, from coastal heath to alpine (Morcombe 2004). Mainly about cliffs along coasts, rivers and ranges and about wooded watercourses and lakes (Johnstone and Storr 1998). The species utilises the ledges, cliff faces and large hollows/broken spouts of trees for nesting. It will also occasionally use the abandoned nests of other birds of prey. Also known to utilise decommissioned open cut pit walls for nesting.

Likely presence in survey area: The species potentially utilises some sections of the survey area as part of a much larger home range, though records in this area are rare. No potential nest sites in trees observed.

Listed as a potential species based on available information.

Potential impact of development: Loss/modification of small areas of potential habitat. No significant impact considered likely.

Hooded Plover *Charadrius rubricollis*

Status and Distribution: The western subspecies of the hooded plover is listed as Priority 4 by DBCA. Breeds on south-west Western Australian coast, from Cape Naturaliste to Eyre, and on inland lakes as far north-east as L. Cowan and L. Moore and north-west to Yalgorup Lakes, south of Perth.

Habitat: Broad sandy ocean beaches and bays, coastal and inland salt lakes (Pizzey & Knight 2012).

Likely presence in survey area: The scattered salt lakes in the general area represent potential habitat for this species however the proposed haul road does not intersect directly through any wetland areas suitable for this species.

Not listed as a potential species based on available information.

Potential impact of development: No impact on this species or its preferred habitat will occur.

Migratory Shorebirds

A number of migratory shorebirds have previously been recorded in the general area. Not all specific species are discussed in detail.

Status and Distribution: Most migratory shorebirds are listed under Schedule 5 of the *BC Act*, as Migratory under the *EPBC Act* and/or under international agreements to which Australia is a signatory. All species are either widespread summer migrants to Australia or residents. State and Federal conservation status varies between species.

Habitat: Varies between species but includes beaches and permanent/temporary wetlands varying from billabongs, swamps, lakes, floodplains, sewerage farms, saltwork ponds, estuaries, lagoons, mudflats sandbars, pastures, airfields, sports fields and lawns.

Likely presence in survey area: The scattered salt lakes in the general area represent potential habitat for some of these species if inundated however the proposed haul road does not intersect directly through any wetland areas suitable for these species.

None listed as a potential species based on available information.

Potential impact of development: No impact on this species or its preferred habitat will occur.

Western Rosella (Inland ssp) *Platycercus icterotis xanthogenys*

Status and Distribution: The inland sub species of the western rosella is listed as Priority 4 by DBCA. At present rare to moderately common (Johnstone and Storr 1998). Local extinctions have occurred in 25% of local government authorities, representing about 40% of the total range, mostly in the north and east (Saunders and Curry 1990, Saunders and Ingram 1995, Mawson and Long 1996, Mawson and Johnstone 1997). Still declining in wheatbelt, but stable in western woodland and forest (Mawson and Johnstone 1997). Semiarid southern interior: Wongan Hills (formerly), Kununoppin, Moorine Rock, Parker Range, Yardina Rock and Ten Mile Rocks, west to Toodyay, the Dale River, Mt Saddleback and Kojonup, and south to the Stirling Range, lower Fitzgerald River, Ravensthorpe, Frank Hann National Park and Red Lake; casual further north (Mt Jackson, Karalee, Gnarlbine Rock) (Johnstone and Storr 1998).

Habitat: Mainly eucalypt and casuarina woodlands and scrubs, especially of wandoo, flooded gum, salmon gum, tall mallees and *Allocasuarina huegeliana*. Attracted to seeding *E wandoo*, *A. huegeliana*, *Glischrocaryon flavescens* and *Olearia revoluta* and to flowering *Melaleuca acuminata* and *Eucalyptus eremophilrx* (Johnstone and Storr 1998).

Likely presence in survey area: Recorded during the Level 2 Survey in 2013/2104 within the main project area (Harewood 2017). Less likely further east.

Listed as a potential species based on available information.

Potential impact of development: Loss/modification of small areas of potential habitat. No significant impact considered likely.

Night Parrot *Pezoporus occidentalis*

Status and Distribution: This species is listed as Schedule 1 under the *BC Act* and as Endangered under the *EPBC Act*. Historical evidence indicates that night parrots were distributed over much of semi-arid and arid Australia (Garnett and Crowley 2000). Extremely secretive and hard to flush, in WA there are only five accepted records of night parrots since 1935, four from the Pilbara region (1979, 1980, 2005 DotEE 2017 and 2017 (Harewood unpublished)) and several observations near Lorna Glen station/Lake Carnegie south/east of Wiluna (Hamilton *et al.* 2017).

Habitat: Preferred habitat is thought to be spinifex grasslands or samphire and chenopod shrublands on claypans, floodplains or the margins of salt lakes, creeks or other water bodies (Johnstone and Storr 1998; Higgins 1999; DotEE 2017).

Likely presence in survey area: Habitat with the haul road alignment appears largely unsuitable. There are no recent or historical records of this species in the area.

Not listed as a potential species based on available information.

Potential impact of development: No impact on this species or its preferred habitat considered likely.

Fork-tailed Swift *Apus pacificus*

Status and Distribution: The fork-tailed swift is listed as Schedule 5 under the *BC Act* and as migratory under the *EPBC Act* including international agreements to which Australia is a signatory. It is a summer migrant (Oct-Apr) to Australia (Morcombe 2004).

Habitat: Low to very high airspace over varied habitat from rainforest to semi desert (Morcombe 2004).

Likely presence in survey area: It is potentially a very infrequent summer visitor to the survey area but is entirely aerial and largely independent of terrestrial habitats. Would only occur very occasionally if at all, and then only temporarily.

Not listed as a potential species based on available information.

Potential impact of development: No impact on this species will occur.

Grey Wagtail *Motacilla cinerea*

Status and Distribution: The grey wagtail is listed as Schedule 5 under the *BC Act* and as Migratory under the *EPBC Act* including international agreements to which Australia is a signatory. A rarely recorded, accidental vagrant that has on a few occasions been recorded on widely separated parts of the Australian coastline (Pizzey & Knight 2012).

Habitat: In Australia, near running water in disused quarries, sandy, rocky streams in escarpments and rainforest, sewerage ponds, ploughed fields and airfields (Pizzey & Knight 2012).

Likely presence in survey area: This species preferred habitat is absent from the Survey area and under normal circumstances it would not occur in this area.

Not listed as a potential species based on available information.

Potential impact of development: No impact on this species or its preferred habitat will occur.

Chuditch *Dasyurus geoffroii*

Status and Distribution: Listed as Scheduled 3 under the *BC Act* and as Vulnerable under the *EPBC Act*. Formerly occurred over nearly 70 per cent of Australia. The Chuditch now has a patchy distribution throughout the Jarrah forest and mixed Karri/Marri/Jarrah forest of southwest Western Australia. Also occurs in very low numbers in the Midwest, Wheatbelt and South Coast Regions with records from Moora to the north, Yellowdine to the east and south to Hopetoun.

Habitat: Chuditch are known to have occupied a wide range of habitats from woodlands, dry sclerophyll (leafy) forests, riparian vegetation, beaches and deserts. Riparian vegetation appears to support higher densities of Chuditch, possibly because food supply is better or more reliable and better cover is offered by dense vegetation. Chuditch appear to utilise native vegetation along road sides in the wheatbelt (CALM 1994). The estimated home range of a male Chuditch is over 15 km² whilst that for females is 3-4 km² (Sorena and Soderquist 1995).

Likely presence in survey area: This species was subject to two targeted trapping surveys undertaken during the level 2 survey at the main survey area in 2013/2014. No chuditch were recorded and given there are no other documented records in immediate vicinity the species is considered unlikely to occur except possibly occasional as transient individuals. The absence of any feral predator control or possible recruitment from adjoining areas means it is unlikely to be persists in the area under normal circumstances.

Not listed as a potential species based on available information.

Potential impact of development: No impact on this species or its preferred habitat will occur.

Western Brush Wallaby *Notamacropus irma*

Status and Distribution: Listed as Priority 4 by DBCA. The western brush wallaby is distributed across the south-west of Western Australia from north of Kalbarri to Cape Arid (DBCA information pamphlet).

Habitat: The species optimum habitat is open forest or woodland, particularly favouring open, seasonally wet flats with low grasses and open scrubby thickets. Also found in some larger areas of mallee and heathland in the wheatbelt (Van Dyck *et al.* 2013).

Likely presence in survey area: The survey area is at the extreme edge of this species documented range. It has not been recorded to date during surveys but may occur, if only occasionally.

Listed as a potential species based on available information.

Potential impact of development: Modification/loss of a very small area of potential habitat. No significant impact anticipated.

Central Long-eared Bat *Nyctophilus major tor*

Status and Distribution: Listed as Priority 3 by DBCA. Historical distribution included the Coolgardie, Hampton and northern Avon Bioregions in Western Australia, Gawler Bioregion and western part of the 'Eyre and York Blocks' Bioregion in South Australia. A specimen from Ooldea in the Great Victoria Desert Bioregion of South Australia. One other specimen from a car grill after a night-time drive from Marla (Stony Plains Bioregion of SA) to Alice Springs in the Northern Territory via the Stuart Highway in c.1985. No historical data on abundance.

Currently known from several localities in Western Australia and in South Australia. No evidence that range has contracted, but it is apparently rare in Great Victoria Desert, Nullarbor and Stony Plains Bioregions while it is locally common in Coolgardie, Hampton, Gawler and western Eyre-York Block Bioregions (Duncan *et al* (ed) 1999).

Habitat: Gleans ground, bark and foliage surfaces; forages in and against cluttered airspaces. The species is often netted, and sometimes caught in pit traps, in heavy eucalypt woodlands and tall woodlands of the Coolgardie Bioregion of Western Australia with a tall shrub understorey of *Melaleuca lanceolata*, *M. pauperiflora*, *M. quadrifaria*, *Eremophila spp.* etc. Less common in open woodlands. Has been netted at dams in the

Coolgardie and Hampton Bioregions of Western Australia while in South Australia has been associated with a range of mallee (*Eucalyptus*) species, *Acacia papyrocarpa*, *A. ramulosa*, *Casuarina cristata* and found to the fringes of the treeless Nullarbor Plain (Duncan *et al* (ed) 1999). Roosts in tree cavities, in foliage and under loose bark (Churchill 2008).

Likely presence in survey area: Recorded during the bat survey undertaken in April 2017 and during the Level 2 Survey within the main survey area in 2013/2014 (Harewood 2017).

Listed as a potential species based on available information.

Potential impact of development: Loss/modification of some foraging and potential roosting habitat is possible but this is unlikely to alter the status of the species on a local or regional scale.

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The conclusions are based upon field data and the environmental monitoring and/or testing carried out over a limited period of time and are therefore merely indicative of the environmental condition of the site at the time of preparing the report. Also it should be recognised that site conditions, can change with time.

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