Wingellina Nickel Project

Flora and Fauna Desktop Study of Tenement L69/12

May 2008

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Executive Summary

Metals X Limited (Metals X) propose to undertake a groundwater exploration program on tenement L69/12, located approximately 90km to the south-west of the Wingellina community in the Great Victoria Desert of Western Australia. Metals X have submitted a Clearing Permit Application (CPA) for the area of proposed disturbance, which will involve clearing of up to 5.0 ha within this tenement. The boundary of the proposed CPA area, hereafter referred to as the Project Area, lies in a south-west to north-east orientated band which overlies an existing access road, and is approximately 27.5 km in length and 2.5 km in width.

Metals X commissioned Outback Ecology in April 2008 to conduct a desktop review of information relating to flora and fauna within tenement L69/12, with the aim of providing information to Metals X to facilitate addressing the "Ten Principles for Clearing Native Vegetation", as listed under Schedule 5 of the *Environmental Protection Act 1986* .

The objectives of this study were to:

- Review relevant biological databases and publicly-available literature to compile background information applicable to the Project Area;
- Prepare a list of flora and fauna expected to occur in the Project Area;
- Identify flora and fauna of conservation significance that may be present; and
- Identify significant habitats that may be present.

Based on the results of the desktop study, there is a relative paucity of information on the flora and fauna of the region. Surveys undertaken in the area to date have been limited to sporadic surveys associated with mining development or broad-scale vegetation mapping.

No site assessment was undertaken when preparing this desktop study. The results presented are solely based on a desktop study and review of available aerial imagery. Subsequently the evaluations provided on the likelihood of flora, vegetation, habitat and terrestrial fauna occurring within the Project Area are estimations based on available literature.

A regional search of the area utilising Federal and State databases revealed that there were no Declared Rare or Priority Flora recorded in the region. It should be noted that the lack of records for the area is likely to be a reflection of the lack of survey effort in the area, rather than a true reflection of species abundance and distribution.

While no Threatened Ecological Communities are recorded for the bioregion, the Mirramiratjarra dune field is considered to be an 'at-risk' ecosystem within the Great Victorian Desert Eastern Subregion (GVD3) (Barton and Cowan, 2001). The Mirramiratjarra dune field is considered unique for its dune formation, vegetation and drainage system. The primary threatening processes to this ecosystem are grazing pressure from camels and rabbits.

Fauna species of conservation significance identified from a regional search of the Department of Environment and Conservation's (DEC) Threatened and Priority Fauna Database include: the Black-footed Rock-wallaby (*Petrogale lateralis* ssp), the Marsupial Mole (*Notoryctes* spp) and the Malleefowl (*Leipoa ocellata*). Other fauna species of conservation significance that may occur in the region include; Mulgara, Greater Bilby, Southern and Northern Marsupial Moles, Princess Parrot, Australian Bustard, Rainbow Bee-eater, Western Slender-billed Thornbill and the Great Desert Skink.

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1.0 INTRODUCTION

1.1 Project Background

Metals X Limited (Metals X) propose to undertake a groundwater exploration program on tenement L69/12, located approximately 90km to the south-west of the Wingellina community and Wingellina Nickel Project in the Great Victoria Desert of Western Australia (**Figure 1**).

Metals X have submitted a Clearing Permit Application (CPA) for the area of proposed disturbance, which will involve clearing of up to 5.0 ha within this tenement for the purpose of drilling water exploration drill holes. The boundary of the proposed CPA area, hereafter referred to as the Project Area, lies in a south-west to north-east orientated band which overlies an existing access road, and is approximately 27.5 km in length and 2.5 km in width (**Figure 2**). In accordance with the terms of the Access Agreement that Metals X has with the Traditional Owners on tenement L69/12, the proposed disturbance activity will be confined to within close proximity of existing access roads.

Metals X commissioned Outback Ecology in April 2008 to a conduct desktop review of information relating to flora and fauna within tenement L69/12, with the aim of providing information to Metals X to facilitate addressing the "Ten Principles for Clearing Native Vegetation", as listed under Schedule 5 of the *Environmental Protection Act 1986*.

1.2 Scope and Objectives of Study

The purpose of this desktop study is to provide information to Metals X to enable them to address the *Ten Principles for Clearing Native Vegetation* as listed under Schedule 5 of the *Environment Protection Act 1986.*

The specific objectives of this study were to:

- Review relevant biological databases and publicly-available literature to compile background information applicable to the Project Area;
- Prepare a list of flora and fauna expected to occur in the Project Area;
- Identify flora and fauna of conservation significance that may be present; and
- Identify significant habitats that may be present.

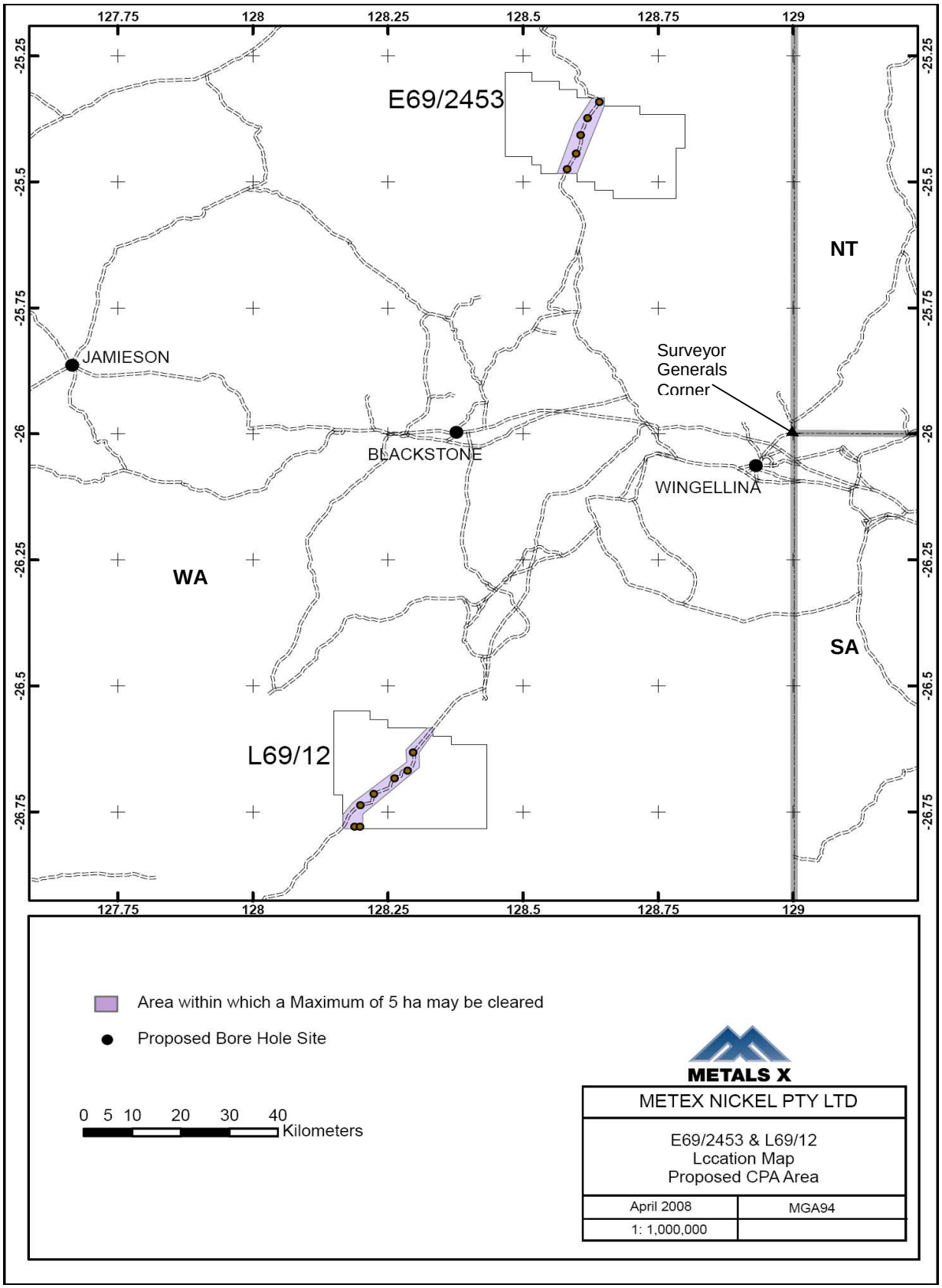

Figure 1 Map showing regional location of tenement L69/12.

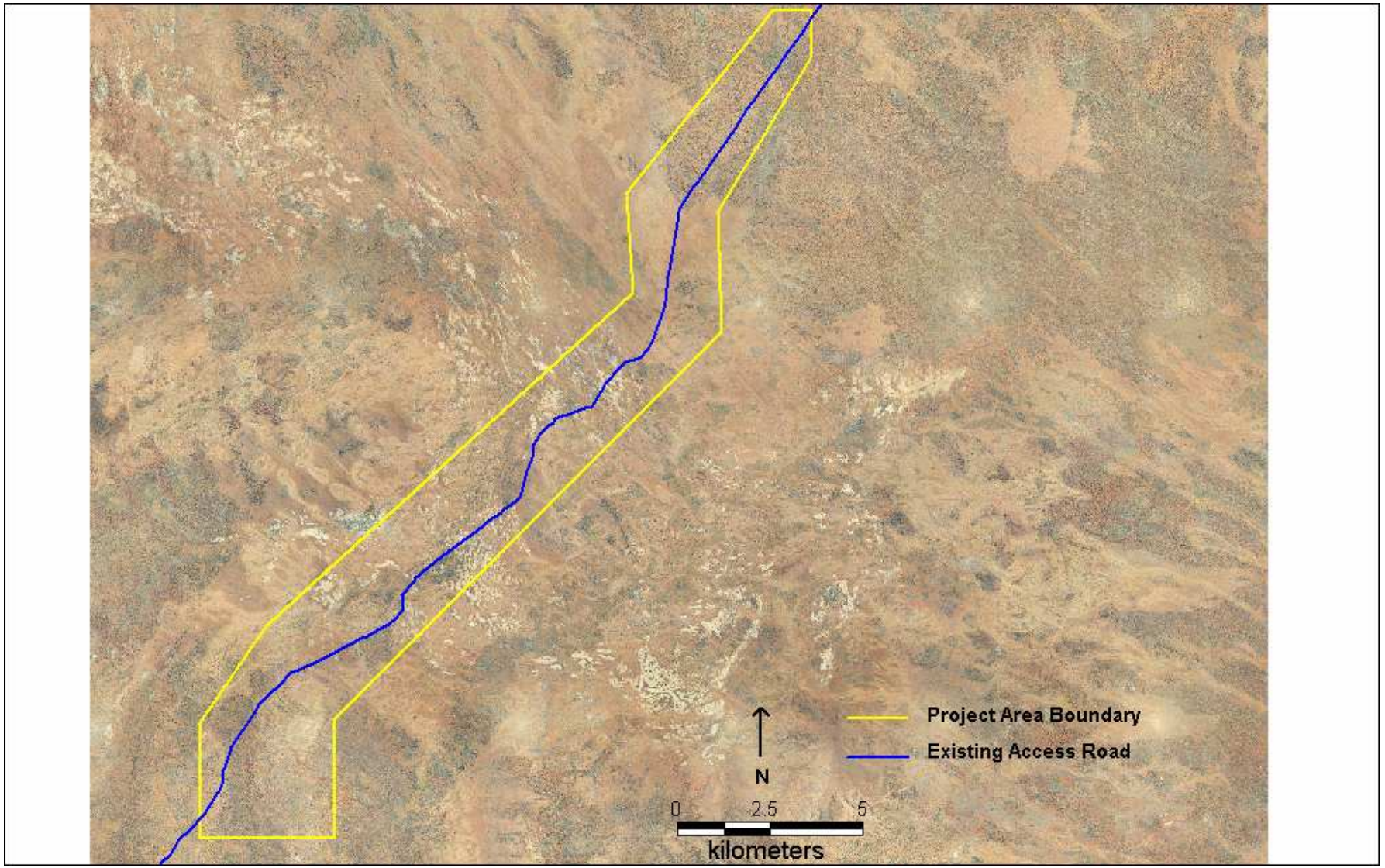

Figure 2 Aerial imagery showing boundary of Project Area within Tenement L69/12

2.0 EXISTING ENVIRONMENT

2.1 Climate

The climate of the eastern subregion of the Great Victorian Desert is characterised as a true arid desert with all months considered 'dry' on the basis of average rainfall figures (Beard 1974). The region is influenced by a northern tropical/summer climatic pattern. Rainfall is variable, however, the majority is received during summer, largely due to the movement of low pressure troughs and tropical lows associated with monsoon troughs moving south in the region. Winters are mild and associated with a high pressure subtropical ridge (BOM, 2008).

The closest meteorological stations to Project Area are the Warburton Airfield, 177km to the north-west and the Giles Meteorological Station 183km to the north. Mean annual rainfall recorded at the Warburton Airfield is 248mm with the majority falling between November and March (**Figure 3**). A similar rainfall trend has been recorded at the Giles Meteorological Station, with a slightly higher mean rainfall of 284mm. A mean maximum daily temperature of 37.8 °C has been recorded at the Warburton Station during January, with the minimum mean temperature of 5.7 °C recorded during July (BOM, 2008).

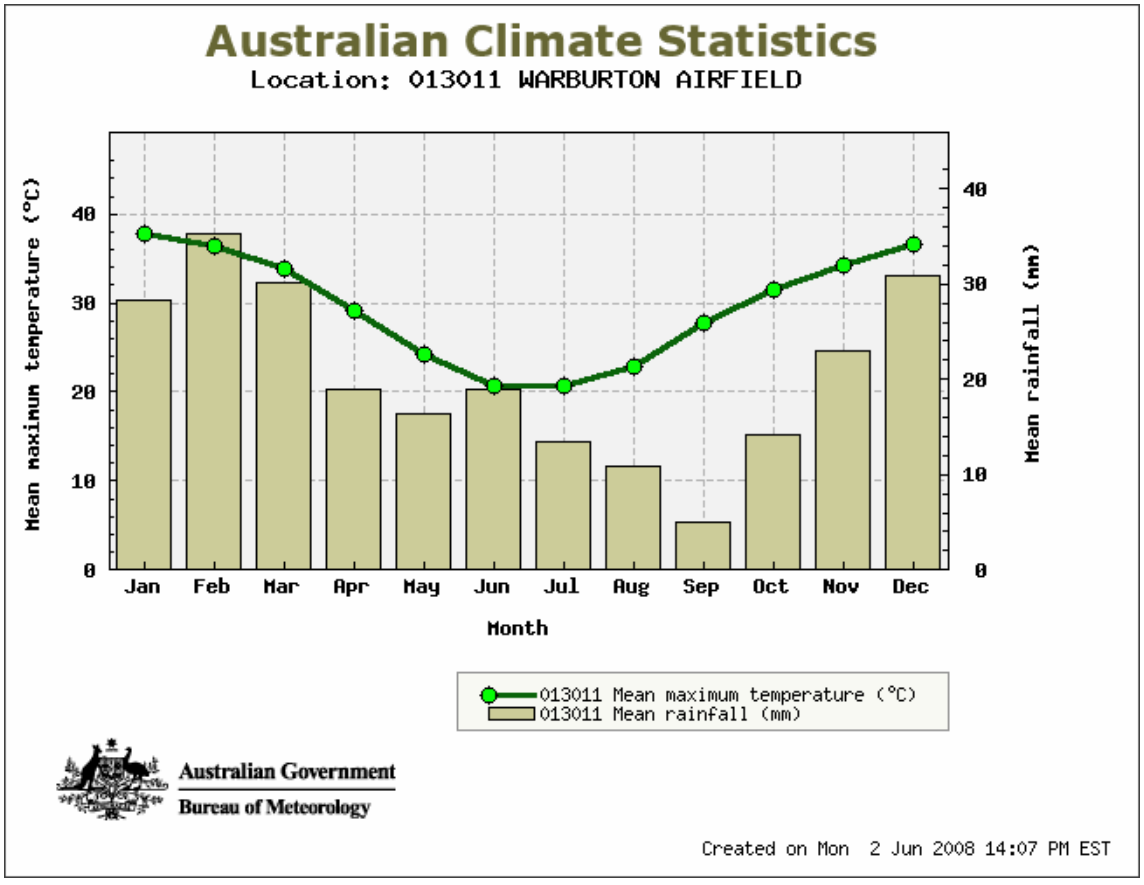

Figure 3 Climate data for the Warburton Airfield Meteorological Station (BOM, 2008).

2.2 IBRA Region

The Interim Biogeographic Regionalisation of Australia (IBRA) recognises 85 bioregions across Australia primarily delineated on the basis of climate, geomorphology, landform lithology, flora and fauna. Tenement L69/12 is located within the Great Victorian Desert biogeographic region (bioregion) (Thackway and Cresswell, 1995). The Great Victorian Desert bioregion spans Western Australia and South Australia and is comprised of 5 sub-regions. GVD1-3 is within Western Australia while GVD 4-5 are primarily within South Australia (Barton and Cowan, 2001). A map providing the layout of the Great Victoria Desert bioregion and the breakdown of the 3 subregions is provided within **Appendix A**.

Tenement L69/12 is located in GVD 3 subregion. The eastern section of GVD 3 is underlain by Devonian sediments of the Gunbarrel Basin, with extensive sandplains of deep Quaternary aeolian sands. Major landforms of the region consist of salt lakes and valley floors with lake derived dunes. Sand plains can also be found with extensive seif dunes running east-west, occasional outcropping (breakaways) and quartzite hills provide minor relief (Barton and Cowan, 2001).

The vegetation of the subregion is primarily a tree steppe of *Eucalyptus gongylocarpa*, Mulga and *E. youngiana* over hummock grassland dominated by *Triodia basedowii* on the aeolian sands. *Acacia* spp., dominate the colluvial soils with *Eremophila* and *Santalum* spp. forming the understorey. Halophytes are confined to edges of salt lakes and saline drainage systems (Barton and Cowan, 2001).

3.0 METHODS

3.1 Flora, Vegetation and Ecology

A search of the following databases was undertaken to gather information on the flora, vegetation and ecological communities known or likely to occur within the Project Area and surrounds:

- Department of Environment and Conservation (DEC) Threatened (Declared Rare) Flora database, Western Australian Herbarium (WAHERB) database for priority species that have been opportunistically collected and the DEC Declared Rare and Priority Flora List for rare and priority flora that are declared rare, poorly known or require monitoring (**Appendix B**);
- DEC Threatened Ecological Communities database for listings of communities known, or likely to occur (**Appendix C**); and
- The Commonwealth *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* Protected Matters Database for flora of conservation significance and TECs (**Appendix D**).

The database searches encompassed a search area with 100km radius around the Project Area central co-ordinates: **$26^0$41'00"S, $128^0$15'00"E (GDA 94)**

3.2 Terrestrial Fauna and Habitat

A search of the following databases was undertaken to gather information on the fauna and faunal habitat known or likely to occur within the Project Area and surrounds:

- The Commonwealth *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* Protected Matters Database for fauna of conservation significance (**Appendix D**);
- DEC Threatened and Priority Fauna Database (**Appendix E**);
- Western Australian Museum (WAM) 'Faunabase' database (**Appendix F**);
- Birds Australia (BA) Atlas Database (**Appendix G**);
- Refugia for Biological Diversity in Arid and Semi-arid Australia (**Appendix H**)
- The Australian Wetlands Database to highlight Ramsar Wetlands (Wetlands of International Importance) and wetlands of National Significance (**Appendix I**).
- The Environment Reporting Tool of the Australian Government Department of Environment, Water, Heritage and Arts (DEWHA) (**Appendix J**);
- The Australian Natural Resources Atlas of the National Land and Water Resources Audit (NLWRA) (**Appendix A**);
- Species Profile and Threats Database (SPRAT)

As per the flora, vegetation and TEC searches, the fauna and habitat database searches encompassed an area with a radius of 100km around the Project Area central co-ordinate:

3.3 Review of Existing Biological Survey Work

Publicly-available literature relevant to the Project Area, and previous biological survey work undertaken in the bioregion was reviewed.
Key documents reviewed included:

- Halpern Glick Maunsell. (2002) *Acclaim Exploration NL Wingellina Baseline Biological Survey*.
- Robinson, A.C., Copley, P.B., Canty, P.D., Baker, L.M., and Nesbitt, B.J. (2003) *A Biological survey of the Anangu Pitjantjatjara Lands, South Australia 1991-2001*.
- Beard, J. (1974). *Great Victoria Desert: Explanatory Notes to Sheet 3. 1:1 000 000 series. Vegetation Survey of Western Australia.*
- Pearson D., Miller J., Butler M., Butler M., Brennan K., Thompson W. (2006). *Learning about country.* Landscope Vol. 23 No.2 Summer 2007-08 Naturebase. Department of Environment and Conservation.

A summary of the above literature is provided in Section 6.

In April 2008, Outback Ecology conducted a Level 2 flora and fauna survey over Metal X' Wingellina Nickel Project, approximately 90km to the north east of the Project Area. Findings of this work (currently unpublished) were also given consideration when preparing this desktop study.

3.4 Survey Limitations

Results from this desktop study indicate there is a relative paucity of documented information of the flora and fauna species in the Great Victoria Desert bioregion. In addition, surveys undertaken in the area to date have been limited to sporadic surveys associated with mining development or broad-scale vegetation mapping. A comprehensive systematic biological survey of the Anangu-Pitjantjatjara lands in South Australia has been carried out, although comparisons to areas surrounding tenement L69/12 may be of limited use due to differing topography, geology and distance. It is considered that the most relevant literature to the Project Area is the broad-scale vegetation mapping carried out by Beard (1974).

No site assessment was undertaken when preparing this document. The results and conclusions presented are based on a desktop study and review of aerial imagery only. A general assessment has been made as to the likelihood of particular species of conservation significance occurring within the Project Area. Subsequently the evaluations provided on the likelihood of flora, vegetation, habitat and terrestrial fauna occurring within the Project Area are estimations based on available literature.

4.0 RESULTS – FLORA AND VEGETATION

4.1 Declared Rare Flora

No Declared Rare or Priority Flora were listed on the *Western Australia Herbarium Specimen* database or the Department of Environment and Conservation's *Threatened (Declared Rare) Flora* database (**Appendix B**). No threatened species were identified in the area on the EPBC Act Protected Matters database (**Appendix D**).

4.2 Vegetation

A site visit to the L69/12 tenement area has not been undertaken and data on vegetation associations of the area is depauperate. As such, vegetation descriptions have been derived from interpretation of Google Earth imagery and available aerial imagery alone (**Figure 2**). The descriptions of vegetation are essentially informal and make no representations as to the species present; rather, the intent is to delineate vegetation into clear units based on distinct differences that can be associated with geological features of the Project Area.

The vegetation of the L69/12 tenement area can be separated into four broad categories:

- **Drainage channel vegetation**. Ephemeral drainage channels are observed in the south-west corner of the tenement opening onto the floodplains area that dominates the majority of the tenement area. Drainage channels tend to be areas of high localised diversity and can provide refugia for locally uncommon species, particularly annual species such as Asteraceae. It would be possible that Myrtaceae and Cyperaceae may be found in these

drainage channels. Beard (1974) found that mallee became dominant along drainage lines in the general area. It is also highly likely that *Eucalyptus* spp. would be found along these drainage lines as is consistent with a survey of the nearby Wingellina area (Outback Ecology, unpublished data).

- **Floodplains and playa vegetation**. The floodplains vegetation appears to be the dominant vegetation of the area. Canopy cover is very open and is potentially dominated by mulga over *Triodia* spp. and other grasses as is common in nearby areas (Outback Ecology, unpublished data). The floodplains area also hosts what appear to be areas of clay with a signature that is consistent with underlying salinity. Beard (1974) has described stands of *Casuarina pauper* occurring over hardpans in the region. It would be reasonable to expect halophytic vegetation in these areas.
- **Dune/Ridge vegetation**. Signatures of parallel ridge-like topography are observed in the east of the tenement. It is unclear from available imagery as to whether these are dunes or quartzite ridges. The top of the dune/ridges are sparsely vegetated and the interdunal signatures are consistent with the occurrence of *Triodia* spp. Irregular ridge/dunes can be seen scattered throughout the floodplains vegetation and may be analogous to the ecosystem 'at risk' identified by Barton and Cowan (2001) - Mirramiratjarra dune fields.
- **Upper plain vegetation**. The upper plain vegetation is observed in the north-east of the tenement. The signature for this vegetation association is consistent with very dense vegetation, underlain in parts by the dark signature of *Triodia* spp.

4.3 Threatened Ecological Communities

The searches conducted of both the Western Australian DEC's Threatened Ecological Communities Database (**Appendix C**) and the Commonwealth *EPBC Act 1999* Protected Matters Database (**Appendix D**), provided no listings of known occurrences of threatened or priority ecological communities within a 100km radius of the Project Area.

Whilst there are no TECs within the search area, there is an 'at risk' ecosystem found within the GVD-3 subregion (Barton and Cowan, 2001). The Mirramiratjarra dune field, which is a unique dune formation, vegetation and drainage system, is found to occur within the bioregion. 'At risk' ecosystems are generally being impacted by specific stresses and may potentially only be 'at risk' in a defined area. There is currently no legislative protection associated with the assignment of 'at risk' status to an ecosystem. It is unknown as to whether the Mirramiratjarra ecosystem is found within the L69/12 tenement area.

4.4 Conservation and Heritage Areas in the Region

A search of the EPBC Act Protected Matters data base indicates that there are no World Heritage Properties, National Heritage Place or Wetlands of International significance within 100km of the Project Area (**Appendix D**).

The Project Area is located within the southern region of the Ngaanyatjarra Lands Indigenous Protected Area (**Appendix D and Appendix J**).

5.0 RESULTS – TERRESTRIAL FAUNA

5.1 Broadscale Fauna Habitat Classes

Aerial imagery, results of database searches and available literature on the region was used to identify the broad terrestrial fauna habitats that are expected to occur over the Project Area

Broad habitat types include:

- Drainage lines;
- Floodplains and playa;
- Sand dunes and ridges ;
- Low mulga woodlands;
- Mallee shrublands;
- Hummock grasslands;
- Samphire and salt lakes; and
- Rocky outcrops (Barton & Cowan, 2001).

5.2 Current Impacts and Habitat Condition

The National Land and Water Audit (NLWRA, 2008) for the Great Victorian Desert Eastern subregion (GVD 3) highlights threatening impacts within the Project Area (**Appendix A**). Ecosystems and species at risk are currently subject to a large number of threatening processes, and the trend is not known in many cases. Impacts identified by the audit of the bioregion include: changed fire regimes; grazing pressure; changed hydrology; feral animals (especially goats, foxes, camels and rabbits); pollution; pathogens; increased vegetation fragmentation; and proximity to mining activities.

Examination of Landgate Satellite Remote Sensing Services Fire Scar Mapping (accurate to 1km) indicated that fires had burnt extensive areas of the Project Area over the last ten years, with some areas having been burnt several times (Landgate, 2008).

Terrestrial vertebrate species at risk within the bioregion have also been identified, and threats to viability described (**Table 1**).

Table 1 Terrestrial vertebrate species at risk and threatening processes within the Great Victorian Desert Subregion 3, (NLWRA, 2008)

Species Name	Threatening Processes	Threatening Processes Notes
Great Desert Skink *(Egernia kintorei)*	Changed fire regimes	No data
	Feral animals	Foxes and cats
Western Slender-billed Thornbill *(Acanthiza iredalei iredalei)*	Changed fire regimes	No data
Princess Parrot *(Polytelis alexandrae)*	Grazing pressure	No data
Malleefowl *(Leipoa ocellata)*	Feral animals	Foxes and cats
	Firewood collection	No data
	Grazing pressure	No data
Mulgara *(Dasycercus cristicauda)*	Changed fire regimes	No data
	Feral animals	Foxes and cats
Greater Bilby *(Macrotis lagotis)*	Changed fire regimes	No data
	Feral animals	Foxes
Southern Marsupial Mole *(Notoryctes typhlops)*	Changed fire regimes	No data
	Feral animals	Foxes and cats
Black-footed Rock-wallaby (*Petrogale lateralis* MacDonnell Ranges race)	Habitat fragmentation	No data
	Feral animals	Foxes and dingos

Specific threats to terrestrial vertebrate fauna identified in the bioregion include (NLWRA, 2008):

- Feral predators (foxes and cats);
- Grazing pressure;
- Changed fire regimes; and
- Vegetation fragmentation.

Although vegetation clearing is not significant in the region, vegetation and habitat fragmentation can occur through the effects of over-grazing, particularly from large herds of One-humped Camels.

The landscape within which the Project Area is located is subject to frequent burning. Inappropriate fire regimes have been recognised as a major threatening process in the bioregion (NLWRA, 2008). Habitats that provide refuge against frequent fire are important for the maintenance of biodiversity in such a landscape. Habitats such as Mulga woodlands and Spinifex plains will be adversely affected by frequent burning, which in turn, will have a negative influence on fauna species such as the Greater Bilby, Mulgara and the Great Desert Skink.

5.3 Sensitive Fauna Habitats

Fauna that are regarded as “rare and/or endangered” or habitats which are site or type-specific and possess high ecological value are of State significance. Habitats which exhibit such a level of significance will contain either specific habitat-dependent fauna or high biodiversity and are poorly represented elsewhere. If fauna habitat is poorly represented in conservation reserves its conservation significance is increased.

5.3.1 Breakaways and Ridges

The GVD 3 subregion has been found to contain significant refugia, specifically breakaways and ranges (Barton & Cowan, 2001). These areas have the potential to provide habitat for important short-range endemic (SRE) invertebrates. Species associated with short-range endemism are often invertebrates correlated with mesic refugia and belong to taxa such as the mygalomorph spiders, millipedes, centipedes, scorpions, pseudoscorpions, isopods and land snails (Harvey, 2002).

Several common habitat factors are favoured by SRE invertebrates, primarily mesic areas that offer protection from heat, desiccation and predators, and provide a source of moisture.

Examples of such areas include:

- rocky crevices, particularly those in gorges;
- south or south-east facing ridges and breakaways are most likely to contain SREs due to the shade they receive ;
- in deep litter deposits that have accumulated under vegetation;
- under bark; and
- near water supplies.

It is understood Metals X do not propose to conduct any exploration activity within the vicinity of rocky ridgelines, rocky outcrops or gorges.

5.3.2 Wetlands of National Importance

The nearest wetlands of national importance within the GVD 3 subregion are located 400km to the west south-west of the project Area. Yeo Lake and Lake Throssell consists of samphire flats and low open-shrublands (**Appendix I**). When these lakes contain water, they are considered to be important for migratory wetland birds (**Appendix G**).

5.4 Vertebrate Fauna Potentially Occurring Over the Project Area

Species lists of vertebrate fauna previously recorded, or potentially occurring over the Project Area are provided in the following sections. Lists have been prepared based on published information relevant to the area and information obtained from database searches.

5.4.1 Mammals

Twenty -four species of mammal were recorded over the Project Area (WAM, 2008) (**Table 2**). Of these, twenty-three were native species, one introduced; eight Dasyurids (carnivorous marsupials), three native rodents, one Canidae, three macropods and four bats were recorded.

Table 2 Native mammal species potentially occurring over the Project Area

Family	Common Name	Scientific name
Dasyuridae	Kultarr	*Antechinomys laniger*
	Mulgara	*Dasycercus cristicauda*
	Wongai Ningaui	*Ningaui ridei*
	Fat-tailed Pseudoantechinus	*Pseudoantechinus macdonnellensis*
	Fat-tailed Dunnart	*Sminthopsis crassicaudata*
	Hairy-footed Dunnart	*Sminthopsis hirtipes*
	Long-tailed Dunnart	*Sminthopsis longicaudata*
	Ooldea Dunnart	*Sminthopsis ooldea*
Macropodidae	Rufous Hare-Wallaby	*Lagorchestes hirsutus*
	Euro	*Macropus robustus erubescens*
	Black-footed Rock wallaby	*Petrogale lateralis lateralis*
Molossidae	White-striped Freetail-bat	*Tadarida australis*
Vespertilionidae	Gould`s Wattled Bat	*Chalinolobus gouldii*
	Lesser Long-eared Bat	*Nyctophilus geoffroyi*
	Inland Cave Bat	*Vespadelus findlaysoni*
Notoryctidae	Southern Marsupial mole	*Notoryctes typhlops*
	Northern Marsupial mole	*Notoryctes caurinus*
Peramelidae	Golden bandicoot	*Isoodon auratus auratus*
Thylacomyidae	Bilby	*Macrotis lagotis*
Muridae	Spinifex Hopping-mouse	*Notomys alexis*
	Sandy Inland Mouse	*Pseudomys hermannsburgensis*
	Desert Mouse	*Pseudomys desertor*
Myrmecobidae	Numbat	*Myrmecobius fasciatus*
Canidae	Dingo	*Canis lupus dingo*

There are 52 mammal species known from the entire Great Victorian Desert 3 Subregion (NLWRA, 2008). Furthermore, NLWA (2008) considers that some mammal species no longer occur in the

bioregion, and a number of species are now extinct (e.g Crescent Nailtail Wallaby, Lesser Stick-nest Rat and the Lesser Bilby).

Apart from the hopping-mice, all these species are critical weight range (CWR) mammals with weights between 35g and 5,500g. These CWR mammal species have been most affected by environmental changes following European settlement, predominantly due to fox and cat predation (Burbidge and McKenzie, 1998). The bioregion, therefore, has very high 'faunal attrition' and 'faunal contraction' indices at 0.41 and 0.43 respectively (NLWA, 2008).

5.4.2 Birds

The Western Australian Museum FaunaBase database lists 33 bird species occurring over the Project Area (**Table 3**) compared to 178 species of birds listed in the Birds Australia database search for the Bioregion (**Appendix G**). Differences in numbers are due to differences in survey scale and survey intensity. Scale refers to the size of area surveyed and variability of habitats covered. Survey intensity includes the length of the survey period as well as timing of surveys. For example, Birds Australia data was accumulated over many years over the entire bioregion within numerous habitats.

Table 3 Avian species potentially occurring over the Project Area

Family	Common Name	Scientific Name
Megapodiidae	Malleefowl	*Leipoa ocellata*
Columbidae	Crested Pigeon	*Ocyphaps lophotes*
	Spinifex Pigeon	*Geophaps plumifera*
Cacatuidae	Galah	*Cacatua roseicapilla*
Psittacidae	Princess Parrot	*Polytelis alexandrae*
	Australian Ringneck	*Platycercus zonarius zonarius*
Cuculidae	Black-eared Cuckoo	*Chrysococcyx osculans*
Podargidae	Tawny Frogmouth	*Podargus strigoides brachypterus*
Acanthizidae	Redthroat	*Pyrrholaemus brunneus*
	Inland Thornbill	*Acanthiza apicalis*
	Southern Whiteface	*Aphelocephala leucopsis*
	Banded Whiteface	*Aphelocephala nigricincta*
Meliphagidae	Grey-headed Honeyeater	*Lichenostomus keartlandi*
	Yellow-throated Miner	*Manorina flavigula*
	White-plumed Honeyeater	*Lichenostomus penicillatus*
	Pied Honeyeater	*Certhionyx variegatus*
Pomatostomidae	White-browed Babbler	*Pomatostomus superciliosus*
Psophodidae /Cinclosomatidae	Chestnut Quail-thrush	*Cinclosoma castanotus*
	Chestnut-breasted Quail-thrush (Western)	*Cinclosoma castaneothorax marginatum*
Pachycephalidae	Grey Shrike-thrush	*Colluricincla harmonica rufiventris*

Family	Common Name	Scientific Name
Dicruridae	Grey Fantail	*Rhipidura fuliginosa*
Cracticidae	Australian Magpie(Black-backed)	*Cracticus tibicen tibicen*
Corvidae	Torresian Crow	*Corvus orru*
Maluridae	Dusky Grasswren	*Amytornis purnelli purnelli*
	Variegated fairy-wren	*Malurus lamberti assimilis*
	Rufous-crowned Fairy-wren	*Stipiturus ruficeps ruficeps*
	Striated Grasswren	*Amytornis striatus striatus*
	Splendid Fairy-wren	*Malurus splendens musgravi*
Petroicidae	Jacky Winter	*Microeca fascinans assimilis*
Climacteridae	Rufous Treecreeper	*Climacteris rufa*
Otididae	Australian Bustard	*Ardeotis australis*

5.4.3 Reptiles

The GVD 3 subregion is rich in reptiles and over 79 species are listed within the WAM Fauna Base database (**Table 4**).

Table 4 Reptile species potentially occurring over the Project Area

Family	Common name	Scientific Name
Agamidae (Dragons)	Mulga Dragon	*Caimanops amphiboluroides*
	Ring-tailed Dragon	*Ctenophorus caudicinctus*
	Mallee Military Dragon	*Ctenophorus fordi*
	Black-collared Dragon	*Ctenophorus clayi*
	Central-netted Dragon	*Ctenophorus nuchalis*
	Central Military Dragon	*Ctenophorus isolepis*
	Western Netted Dragon	*Ctenophorus reticulates*
	Rusty Dragon	*Ctenophorus rufuscens*
	Lozenged-marked Dragon	*Ctenophorus scutulatus*
	Blue-lined Dragon	*Diporiphora winneckei*
	Long-nosed Dragon	*Lophognathus longirostris*
	Dwarf Bearded Dragon	*Pogona minor minor*
	Thorny Devil	*Moloch horridus*
	Centralian Earless Dragon	*Tympanocryptis centralis*
Boidae (Python)	Stimpson's Python	*Antaresia stimsoni stimsoni*
Elapidae (Elapid Snakes)	Desert Death Adder	*Acanthophis pyrrhus*
	Narrow-banded Shovel-nosed Snake	*Brachyurophis fasciolata fasciolata*
	Southern Shovel-nosed Snake	*Brachyurophis semifasciata*
	Yellow-faced Whipsnake	*Demansia psammophis psammophis*
	Moon Snake	*Furina ornata*
	Monk Snake	*Parasuta monachus*
	King Brown Snake	*Pseudechis australis*
	Ringed Brown Snake	*Pseudonaja modesta*

Family	Common name	Scientific Name
	Gwadar	*Pseudonaja nuchalis*
	Desert Banded Snake	*Simoselaps anomalus*
	Rosen's Snake	*Suta fasciata*
Gekkonidae (Geckos)	Fat-tailed Gecko	*Diplodactylus conspicillatus*
	Sandplain Gecko	*Diplodactylus stenodactylus*
		Diplodactylus pulcher
		Gehyra purpurascens
		Gehyra montium
	Variegated Gecko	*Gehyra variegata*
	Bynoe's Gecko	*Heteronotia binoei*
	Beaded Gecko	*Lucasium damaeum*
	Smooth Knob-tailed Gecko	*Nephurus levis levis*
		Nephurus vertebralis
	Pale Knob-tailed Gecko	*Nephurus laevissimus*
	Beaked Gecko	*Rhynchoedura ornata*
	Western Spiny-tailed Gecko	*Strophorus strophurus*
	Northern Spiny-tailed Gecko	*Strophorus ciliaris aberrans*
	Jewelled Gecko	*Strophorus elderi*
	Northern Spiny-tailed Gecko	*Strophorus ciliaris*
Pygopodidae (Legless Lizards)		*Delma nasuta*
		Delma pax
		Pygopus nigriceps
Scincidae (Skinks)	Fence Skink	*Cryptoblepharus plagiocephalus*
	Lively Ctenotus	*Ctenotus alacer*
		Ctenotus ariadnae
		Ctenotus brooksi brooksi
	Narrow-lined Ctenotus	*Ctenotus dux*
		Ctenotus helenae
		Ctenotus leonhardii
	Leopard Ctenotus	*Ctenotus pantherinus ocellifer*
Scincidae (Skinks)	Fourteen-lined Ctenotus	*Ctenotus quattuordecimlineatus*
		Ctenotus schomburgkii
		Ctenotus septenarius
	Spinifex Slender Blue-tongue	*Cyclodomorphus melanops elongatus*
	Spinifex Slender Blue-tongue	*Cyclodomorphus melanops melanops*
	Pygmy Spiny-tailed Skink	*Egernia depressa*
	Great Desert Skink	*Egernia kintorei*
	Desert Skink	*Egernia inornata*
	Night Skink	*Egernia striata*
	Broad-banded Sand-swimmer	*Eremiascincus richardsonii*
		Lerista desertorum
		Lerista bipes
		Lerista ips
		Lerista muelleri
		Lerista labialis
	Grey's Skink	*Menetia greyii*

Family	Common name	Scientific Name
		Morethia boulengeri
		Proablepharus reginae
	Centralian Blue-tongue	*Tiliqua multifasciata*
Typhlopidae (Blind Snakes)		*Ramphotyplopsendoterus*
		Ramphotyplops waitii
Varanidae (Monitors)	Spiny-tailed Monitor	*Varanus acanthurus*
	Black-headed Monitor	*Varanus tristus tristus*
	Pygmy Desert Monitor	*Varanus eremius*
	Perentie	*Varanus giganteus*
	Pygmy Mulga Monitor	*Varanus gilleni*
	Sand Monitor	*Varanus gouldii*

5.4.4 Amphibians

Four frog species have the potential to be found in the Project Area (**Table 5**). Most of the species are burrowing ground frogs that are restricted to the plains which contain substrates that are easy to penetrate and/or minor drainage lines occurring over the Project Area. All species breed in ephemeral or temporary water bodies.

Table 5 Amphibian species potentially occurring over the Project Area

Family	Common Name	Scientific Name
Hylidae (Tree Frogs)	Water-holding Frog	*Cyclorana playcephala*
Myobatrachidae (Ground Frogs)	Trilling Frog	*Neobatrachus centralis*
	Shoemaker Frog	*Neobatrachus sutor*
	Orange-crowned Toadlet	*Pseudophryne occidentalis*

5.4.5 Introduced Species

Introduced species occurring in the bioregion include cattle, camels, rabbits, foxes and cats (NLWRA, 2008) (**Table 6**)

Table 6 Introduced exotic species potentially occurring over the Project Area

Group	Common Name	Scientific Name
Mammals	House Mouse	*Mus musculus*
	Cat	*Felis catus*
	European Rabbit	*Oryctolagus cuniculus*
	One humped Camel	*Camelus dromedarius*
	European Cattle	*Bos taurus*
	Red Fox	*Vulpes vulpes*

5.5 Fauna Species of Conservation Significance

5.5.1 Framework for Conservation Significance

Fauna species that have been formally recognised as rare, threatened with extinction or as having high conservation value are protected by law under Commonwealth and state legislation. At the national level, fauna are protected under the *Environmental Protection and Biodiversity Conservation Act, 1999* (EPBC Act). Within Western Australia fauna can be listed under various Schedules under the *Western Australian Wildlife Conservation Act, 1950*. Definitions of conservation significance are presented in **Appendix K**.

The International Union for the Conservation of Nature (IUCN) reviews conservation status and lists fauna under various categories (the IUCN Red List). Categories for fauna and their conservation status used under the EPBC Act are those recommended by the IUCN. The *Western Australian Conservation Act, 1950* uses a set of 'Schedules', but the DEC also classifies species using IUCN categories.

International agreements that Australia has entered into include the Japan-Australia Migratory Bird Agreement (JAMBA) and the China-Australia Migratory Bird Agreement (CAMBA) that cover migratory species of avifauna, particularly trans-equatorial waders, and the Bonn Convention (The Convention on the Conservation of Migratory Species of Wild Animals).

The EPBC Act has lists of migratory species that are recognised under these international treaties. Particular species listed in JAMBA are also protected under Schedule 3 of the Western Australian Wildlife conservation Act.

The Department of Environment and Conservation (DEC) also recognises species not listed under the Western Australian Wildlife Conservation Act, but for which there is some concern, and has produced a supplementary list of 'Priority' fauna. These species as well as those listed in various Government endorsed Action Plans (eg. Duncan, *et al*. 1999; Garnett and Crowley, 2000) are also of recognised significance. Other species of conservation significance include endemics, those with restricted or fragmented ranges, or those that are at the extreme limits of their distribution. Short-range endemic fauna are those with naturally restricted distributional ranges.

The conservation significance of terrestrial vertebrate fauna potentially occurring over the Project Area can be assessed at four spatial scales:

- International - National - Species listed under the EPBC Act, IUCN, and International Treaties
- State - Species listed under the Western Australian Wildlife Conservation Act, 1950
- Regional - DEC listed Priority Species and species listed in Action Plans
- Local - Species not listed under any Acts or relevant publications, but considered of conservation significance due to patterns of distribution.

5.5.2 Vertebrate Species of Conservation Significance

Information from the DEC Threatened and Priority Fauna Database was augmented with additional information relating to species' likelihood of occurrence based upon other database searches (WAM Faunabase, Birds Australia database, EPBC Protected Matters Report) and other literature..

Vertebrates identified were:

- Mulgara (*Dasycercus cristicauda)*
- Greater Bilby (*Macrotis lagotis*)
- Northern Marsupial Mole (*Notoryctes caurinus*)
- Southern Marsupial Mole (*Notoryctes typhlops*)
- Black-footed Rock-wallaby (MacDonnell Ranges) (*Petrogale lateralis* ssp)
- Malleefowl *(Leipoa ocellata)*
- Princess Parrot *(Polytelis alexandrae)*
- Slender-billed Thornbill (*Acanthiza iredalei iredalei)*
- Australian Bustard *(Ardeotis australis)*
- Rainbow Bee-eater (*Merops ornatus*)
- Oriental Plover *(Charadrius veredus)*
- Giant Desert Skink *(Egernia kintorei)*

A list was prepared of species of conservation significance with the potential to occur over the Project Area (**Table 7**). It includes several additional species to those identified from the DEC Threatened and Priority Fauna Database. Likelihood of occurrence is then discussed on an individual species basis.

Species considered regionally extinct, outside their range, or restricted to habitats not present at the Project site, have been excluded from **Table 7**. These include the Greater and Lesser Stick-nest Rat, Lesser Bilby, and Crescent Nailtail Wallaby.

Table 7 Species of International, National, State or Regional conservation significance potentially occurring over the Project Area

Group	Name		National	State	Regional	Likelihood of occurrence
Mammals	Mulgara	*Dasycercus cristicauda*	VU	S1		P
	Greater Bilby	*Macrotis lagotis*	VU	S1		U
	Southern Marsupial Mole	*Notoryctes typhlops*	EN	S1		P
	Northern Marsupial Mole	*Notoryctes caurinus*	EN	S1		P
	Black-footed Rock-wallaby (MacDonnell Ranges)	*Petrogale lateralis spp*	VU	S1		P
Birds	Malleefowl	*Leipoa ocellata*	VU	S1		P
	Princess Parrot	*Polytelis alexandrae*	VU		P4	P
	Western Slender-billed Thornbill	*Acanthiza iredalei iredalei*	VU			P

Group	Name		National	State	Regional	Likelihood of occurrence
	Australian Bustard	*Ardeotis australis*			P4	L
	Rainbow Bee-eater	*Merops ornatus*	Mig(JAMBA)			L
	Oriental Plover	*Charadrius veredus*	Mig(CAMBA)			U
Reptiles	Great Desert Skink	*Egernia kintorei*	VU	S1		P

Key	Conservation Status	Key	Conservation Status
EN	Endangered	SP	Specially Protected
VU	Vulnerable	Mig	Migratory Species
S1	Schedule 1	P#	Priority Fauna
S4	Schedule 4	Mig	Migratory Species
R	Recorded	P	Possible
L	Likely	U	Unlikely

Mammals of Conservation Significance

Mammals of conservation significance known from the bioregion with the potential to occur over the Project Area include the Mulgara, Greater Bilby, Southern and Northern Marsupial Moles and the Black-footed Rock-wallaby.

There are records of **Mulgara** within the GVD 3 subregion (**Appendix D**) but not within the Project Area. It is possible that this species occurs within the Project Area due to the availability of suitable habitat e.g. hummock grasslands (Barton and Cowan, 2001).

The **Greater Bilby** once occurred over the GVD 3 subregion, however in WA it is now confined to sparse desert populations in the Gibson and Great Sandy Deserts, south of Warburton, the Pilbara and Dampierland bioregions, as well as the Kimberley (Faunabase, 2008; Strahan, 2000). It is unlikely that the Greater Bilby still survives over the Project Area.

The **Southern and Northern Marsupial Moles** burrow in sand dunes, inter-dunal flats and sandy soils along river flats. One record of a Marsupial Mole species in 1996 was taken within the region surrounding the Project Area along with other records from the WA Musuem south and east of Warburton (Faunabase, 2008). It is possible that these two species are found over the Project Area.

The **Black-footed Rock-wallaby** (MacDonnell Ranges subspecies) once occurred over the region surrounding the Project Area and a Threatened and Priority Fauna database search has revealed four records. Its distribution extends from west of the Project Area to Central Australia and the species inhabits rocky escarpments with crevices and caves (Pearson, 1992; Robinson et al, 2003). As rocky escarpments are found over the Project Area, it is possible this species is found over the Project Area.

Birds of Conservation Significance

Birds of conservation significance known from the bioregion with the potential to occur over the Project Area are listed below.

The **Malleefowl's** distribution incorporates areas west of the Project Area near Warburton and north-east in the Northern Territory (FaunaBase, 2008). The Malleefowl is a ground-dwelling bird that inhabits scrubs and thickets of mallee, boree and bowgada and other dense litter shrublands (Johnstone & Storr, 1998). It is therefore possible that this species could still occur in the habitats present, particularly Mulga communities.

The **Princess Parrot** is an inhabitant of lightly-wooded country of desert areas to the north-west and north-east of the Project Area; from the Great Sandy Desert, through the Gibson Desert and into the Great Victoria Desert (Blakers *et al*, 1984). It is possible for this species to occur over the Project Area.

The **Western Slender-billed Thornbill's** *(Acanthiza iredalei iredalei)* preferred habitat is saltbush communities and samphire flats associated with lake systems. From the available information these habitat types (particularly samphire communities) are present over the Project Area and it possible that this species may occur.

The **Australian Bustard** has a wide distribution across Australia and there is a WA Museum record south west of the Project Area (FaunaBase, 2008). The presence of suitable habitat within the Project Area (open to lightly timbered woodlands, grasslands) suggests that this species likely to occur.

The **Rainbow Bee-eater** occupies numerous habitats including open woodlands, semi-arid scrub and grasslands (Morcombe, 2000). The Rainbow Bee-eater, a federally-listed migratory species, is likely to occur over the Project Area.

No records are known of migratory waders and/or waterbirds directly using the Project Area, the EPBC Protected Matters database search identified the **Oriental Plover**, as migratory under the EPBC Act and potentially occurring over the Project Area. This species is listed under Commonwealth legislation (CAMBA) and is known from the region, however as there are no water bodies within the Project Area, it is unlikely they will occur.

Reptiles of Conservation Significance

The **Great Desert Skink** occurs on red sandplains and sand ridges supporting spinifex *(Triodia* spp.*)* predominantly to the north-east and north-west of the Project Area (Pearson *et al*. 2001). Nationally, current strongholds for the Great Desert Skink appear to be the Tanami Desert, Uluru and an area of the Gibson Desert north of Warburton. Although the precise distribution of this species is likely to remain vague, three main populations appear to occur in WA; at Patjarr (240km northwest of Warburton), the vicinity of Lake MacKay, and Rudall River National Park. The Project Area is outside the species current core distribution, however, based on available habitat it is possible that the Great Desert Skink occurs over the Project Area.

A new species of **Taipan** (*Oxyuranus temporalis*) (Doughty *et al*, 2007) was discovered within the Central Ranges Bioregion, in a combined Western Australian Museum, South Australian Museum Department of Environment and Conservation (DEC) survey conducted in 2006. As only one specimen was catalogued, it is not possible to determine the likelihood of this species occurring over the Project Area.

5.6 Short Range Endemics

Short-range endemism refers to taxa with naturally-restricted distributional ranges, suggested by Harvey (2002) as less than 10,000km^2. These taxa are also characterised by poor dispersal, reliance on discontinuous habitats, low growth rates, often seasonally activity in cooler, wetter months and often exhibit low fecundity (Harvey, 2002). Short-range endemic (SRE) fauna in Australia are dominated by invertebrate species, a group which has to date received little investigation due to its diverse nature. Recently, more reliable, up-to-date taxonomic evaluation of these taxa has begun, resulting in some data and literature on SRE species. Taxonomic groups known to display short-range endemism include mygalomorph spiders, land snails, millipedes, centipedes, scorpions, pseudoscorpions, and isopods (Harvey, 2002); and these groups are often targeted during SRE surveys.

The EPA (2004) acknowledges that short-range endemism is a characteristic that should be considered in impact assessments. Species associated with short-range endemism are often invertebrates correlated with mesic refugia and belong to taxa such as the mygalomorph spiders, millipedes and land snails. Isolated rocky ridges can be significant for range-restricted invertebrates. Although little information on the actual invertebrates that are likely to occur over the Project Area is available, there is increasing awareness of species with restricted distributions in the region, particularly associated with habitat parameters associated with rock outcrops.

Fire refuges and mesic areas are also important for short-range endemic (SRE) invertebrates. Several common habitat factors are favoured by SRE invertebrates; primarily more-mesic areas that offer protection from heat, desiccation and predators, and provide a source of moisture.

Examples of such areas include:

- rocky crevices, particularly those in gorges;
- south or south-east facing ridges and breakaways are most likely to contain SREs due to the shade they receive ;
- in deep litter deposits that have accumulated under vegetation;
- under bark; and
- near water supplies.

It is understood Metals X do not propose to conduct any exploration activity within the vicinity of rocky ridgelines, rocky outcrops or gorges.

6.0 REVIEW OF EXISTING LITERATURE

Beard, J. (1974). ***Great Victoria Desert. Explanatory Notes to Sheet 3, 1:1 000 000 Series. Vegetation Survey of Western Australia.***

This broad scale vegetation mapping provides a generalised overview of the vegetation associations of the Great Victoria Desert and the Eremaean Botanical Province as defined by Beard (1974). Descriptions of the vegetation associations are the result of interpretation of aerial photographs and ground truthing.

Tenement L69/12 is located in the Helms Botanical District (sometimes referred to as the Great Victorian Desert Natural Region) (Beard 1974). This region is approximately equivalent to the IBRA Bioregion GVD 3. Beard (1974) broadly describes the vegetation as homogenous and dominated by a tree steppe of *Eucalyptus gongylocarpa* and *Triodia basedowii,* sometimes exclusively. The vegetation is very consistent across the Botanical District (Beard, 1974).

Two of the vegetation associations described by Beard (1974) occur in tenement L69/12:

- *Acacia aneura* Low Woodland occurring between confused sandhills (a_1Li)
- *Acacia aneura* and *Eucalyptus* spp. Scrub over *Triodia basedowii* grass steppe (a_1Si/eSi.t_2Hi).

Apart from the dominant tree steppe, Beard (1974) also observed mallee occurring in some areas. The most typical and consistent mallee species is *Eucalyptus youngiana*. The grass tree *Xanthorrhoea thorntonii* also occurs in groups at widely-scattered intervals (Beard, 1974).

HGM Maunsell 2002; ***Wingellina Baseline Biological Survey*****.**

This report includes an inventory of all the flora and fauna recorded during a Level 1 survey of the surrounds of the Wingellina townsite in April 2002 (an area of approx. 100km2). The area surveyed by HGM Maunsell in 2002 is approximately 90km to the north-east of the tenement L69/12. This survey was undertaken in the Central Ranges IBRA bioregion. The Central Ranges bioregion is adjacent to the GVD-3 subregion, although differs in terms of both geology and dominant vegetation types (Graham and Cowan, 2001).

A total of 188 plants were recorded during this survey, 75 of which had not been previously recorded for the area. No Declared Rare or Priority flora were identified from this survey. Six introduced taxa were recorded, five of which were new records for the Central Ranges bioregion. HGM Maunsell concluded that a high level of human activity in the vicinity of the Wingellina townsite had exacerbated the spread of weed species.

Seven vegetation communities were identified during the survey none of which were restricted to the survey area. None of the communities recorded in the survey are nationally listed as threatened

ecological communities under the EPBC Act. However, three communities were considered to be regionally significant;

- Grassland of Poaceae spp. with occasional *Senna glutinosa* subsp. *glutinosa* and *Sida fibulifera* in patches of cracking clay.
- Low Scrub over *Triodia* spp. in sand over sand dunes.
- Low Open Woodland of *Eucalyptus gamophylla* and *Eucalyptus socialis* subsp. *eucentrica* over *Acacia validinervia* over mixed shrubs over *Triodia scariosa* in clay loam on upper slopes of mafic ridges.

These vegetation communities were considered to be regionally significant due to their isolation and underlying geomorphology. This survey was undertaken in a different bioregion to the proposed Project Area and is therefore difficult to determine whether similar vegetation could be found in the area surrounding L69/12.

HGM Maunsell (2002) recorded four species of mammals during the survey. Of these, three were native species and one introduced. Fifty-four species of birds were recorded. Nine species of reptile were recorded, including two geckos, six dragons, two legless lizards, two monitors and three skinks.

A. C. Robinson, P. B. Copley, P. D. Canty, L. M. Baker and B. J. Nesbitt (Eds) (2003). *A Biological Survey of the Anangu Pitjantjatjara Lands, South Australia*.

This report includes an inventory of all the flora and fauna recorded during a survey of the Anangu-Pitjantjatjara (AP) lands of South Australia. It forms part of a comprehensive biological survey of South Australia spanning 10 years. A total of 14 132 plants were recorded in the Anangu-Pitjantjatjara lands with only 38% of those records represented as a vouchered specimens in the South Australian State herbarium, attesting to the paucity of documented botanical information of the area. A number of species recorded in this survey are also known from collections within Western Australia. It is possible that the distribution of some of the species recorded in the South Australian survey would extend to the area of tenement L69/12.

In terms of comparable vegetation associations, the relevance of the South Australian survey to tenement L69/12 is likely to be limited as areas in closest proximity to tenement L69/12, were highly restricted due to cultural sensitivities and restricted access. Sites that were visited in close proximity to tenement L69/12 were limited to the tops of ranges and midslope areas. Opportunistic records from the nearby Mann Range, Tomkinson and Musgrave Ranges suggest that vegetation associations in this region are largely the product of underlying geology and topography.

This report recorded 41 species of mammals during the survey. Of these, 30 were native species and eleven introduced. One hundred and twenty-nine species of birds were recorded. Ninety-two species of reptile and three amphibians were recorded.

Pearson D., Miller J., Butler M., Butler M., Brennan K., Thompson W. (2006). Learning about country. Landscope Vol. 23 No.2 Summer 2007-08 Naturebase, Department of Environment and Conservation

In 2006, a survey of the Ngaanyatjarra lands was performed by the Western Australia Museum (WAM), Department of Environment and Conservation (DEC), South Australian Museum, Department of Environment and Heritage (DEH) (South Australia) and the Ngaanyatjarra people. The survey investigated flora, vertebrate fauna, invertebrates and subterranean fauna. Seven hundred and twenty plant specimens were recorded, including 37 species that were either new records or significant range extensions. A new species of Taipan was recorded, (*Oxyuranus temporalis*), and range extensions of several gecko species were documented. One hundred species of spiders identified within this survey are thought to be undescribed.

7.0 DISCUSSION AND RECOMMENDATIONS

7.1 Future Survey Work

Results from this desktop study indicate a number of terrestrial vertebrate fauna of conservation significance may occur over the Project Area. A site survey would be required to refine assessments of the likelihood of these species occurring.

It is understood that the disturbance footprint of the proposed groundwater exploration program will be limited to an area within close proximity of the existing access road. If results of the exploration program conclude the targeted aquifer could provide a viable water source for the proposed Wingellina Nickel Project, and subsequently the development of a borefield is proposed, it is recommended a site survey of the Project Area be undertaken prior to disturbance beyond that proposed in the current exploration program.

Guidance for conducting fauna and flora surveys for an environmental impact assessment in Western Australia is available through Position Statement No 3. “Terrestrial Biological Surveys as an Element of Biodiversity Protection” (EPA, 2002), and Guidance Statement No 56 “Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia” (EPA, 2004). The Level of survey required would be dependent on the scale and nature of impact of the proposed disturbance in the Project Area and the sensitivity of the surrounding environment.

7.2 General Management Guidelines

The general management guidelines below are suggested to minimise potential impacts of the exploration program to vegetation, habitat and fauna of the Project Area:

- Reduce vegetation clearance to an absolute minimum.
- Progressively rehabilitate exploration disturbance to an appropriate standard.
- Where practicable, avoid clearance or disturbance where practicable to spinifex sandplains and dune systems. These form the primary habitat for the Mulgara, Greater Bilby and Great Desert Skink.
- Avoid disturbance to rock ridges and outcrops. These features may be important habitat for short–range endemic invertebrate species and other fauna of conservational significance that may occur in the area.
- Minimise impacts to surface hydrology by avoiding drainage features wherever possible.
- Discourage the establishment of any semi-permanent artificial structures that may hold water supplies (drill sumps etc).
- Implement standard dust suppression methods when drilling in the Project Area, to reduce impacts to surrounding vegetation.

- Prevent the establishment of new weed species, and the further spread of existing weed species by ensuring machinery hygiene prior to entering Project Area.
- Develop strategies to reduce the likelihood of increased populations of feral animals, such as appropriate refuse management. For example, ensure food scraps are disposed of appropriately during the exploration program.
- Implement environmental management strategies that have been applied and are currently in place at the Wingellina Nickel Project.

A number of the above environmental management guidelines have been successfully incorporated within the Wingellina Nickel Project exploration program. It is recommended that key Metals X site personnel ensure that these guidelines are continued to be implemented within the pending groundwater exploration program. This will involve implementing an operating procedure ensuring contract personnel are educated in the importance of the above guidelines in reducing environmental impact and secondly overseeing the ground operations to ensure these guidelines are adhered to.

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Appendix A

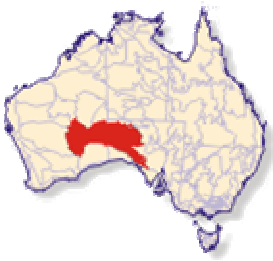
National Lands and Water Resources Audit – Great Victoria Desert Biodiversity Assessment

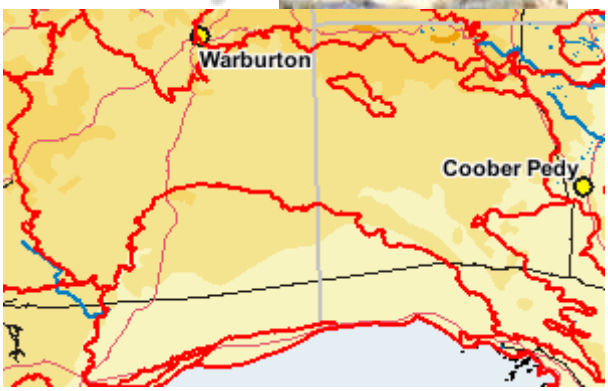
Biodiversity Assessment - Great Victoria Desert

Specify a region: -- select region --

On this page

Great Victoria Desert





Introduction

Arid active sand-ridge desert of deep Quaternary aeolian sands. Mostly overlying Permian and Devonian strata of the Gunbarrel Basin. Tree steppe of *Eucalyptus gongylocarpa*, Mulga and *E. youngiana* over hummock grassland dominated by *Triodia basedowii*. The climate is arid, with summer and winter rain averaging 150 -190mm per annum. Landforms consists of red sand plains with patches of aeolian dunefields, salt lakes and major valley floors with lake derived dunes, and out-cropping and silcrete-capped mesas and plateaus (breakaways). Climate is arid with summer and winter rain. Three subregions are recognised in WA: GVD1 - The western end is underlain by Yilgarn Craton. There is a higher proportion of sandplains in comparison to the entire bioregion. GVD2 - is arid active sand-ridge desert with extensive dune fields of deep Quaternary aeolian sands overlying Permian strata of the Gunbarrel Basin. GVD3 - Eastern is underlain by Devonian sediments of the Gunbarrel Basin, with extensive sandplains of deep Quaternary aeolian sands.

Vegetation is primarily a Tree steppe of *Eucalyptus gongylocarpa,* Spinifex (*Triodia spp*) and mallee (*Eucalyptus kingsmilli, E. youngiana*) over hummock grassland dominated by *Triodia basedowii* on the aeolian sands, *Acacia* and Mulga occur on the colluvial soils with *Eremophila* and *Santalum* spp.

Scattered marble gum (*E gongylocarpa*) and native pine (*Callistris spp)* occur on the deeper sands of the sand plains. Halophytes such as salt bush (*Atriplex*), Bluebush (*Kochia*), and samphire (*Arthrocnemum*) occur marginal to the salt lakes and in saline drainage areas.

Summary of overall condition and trend

Condition is good, apart from the western fringes of GVD1 which have been degraded by grazing from stock. CWR species have declined or become extinct. Feral herbivoures (camels and rabbits) and . lLarge, intense summer wildfires have reduced vegetation biomass throughout the region, although the grazing effects are more pronounced in wetlands. Continental landscape stress class is between 5 and 6 (GVD1 and 3 =6, GVD2 =5) as assessed by the Landscape Health report (1 is most stressed, 6 is least stressed).

Summary of conservation priorities:

Control feral herbivores and carnivores, introduction of fire management regimes to reduce the size and impact of summer wildfires, and ecological surveys to gain more knowledge of the bioregion are the management priorities. Resourcing and isolation are major constraints to management activities. Increasing interests in mineral prospects and the possibility of mine development will require management. Region has a medium priority for reserve consolidation with 9.4% in IUCN I-IV reserves, and minimal sub-regional bias.

Natural values

Rare species include the Princess Parrot, Samphire Thornbill, Sandhill Dunnart, Marsupial Mole, Mulgara, Rock Wallaby, *Lerista puncticauda, Egernia kintorei Conospermum toddii, Calytrix warburtonensis, Dampiera ramosa, Dicrastylis nicholsii, Eremophila aureivisca, E. undulata Eucalyptus articulata, Labichea deserticola, Micromyrtus helmsii, Olearia arida, Ptilotus stipitatus, Thruptomene wittweri,* Threatened Ecological Communities include the Yellow sandplain communities of the Great Victorian Desert, Assemblages of Queen Victoria Spring and the Mirramiratjarra dune field. One hummock grassland vegetation-type (444) is confined entirely to GVD1 and two vegetation-types (2245 and 4621) have greater than 85% confined to GVD2.

Click here to link to a table of natural values within each subregion

Wetlands

Two wetland of national significance are listed: Yeo Lake and Lake Throssell (WA044) are both in good condition with recovery expected in the short term with minimal intervention. Both were old pastoral leases. Yeo Lake is now a Nature Reserve and Lake Throssell was never taken up or developed as a pastoral lease and is a proposed reserve. The trend is condition improving with the removal of stock aiding in the recovery. The threatening process is mainly feral animals, including rabbits, goats, foxes, cats and stray stock.

There are two wetlands of regional significance: Lake Minigwal and Lake Rason. Both are significant for the maintenance of ecological processes. Lake Minigwal is a seasonal intermittent saline lake with a static trend and in good condition. Threatening processes include feral animals and a changed hydrology due to de-watering of mine sites and discharge of hypersaline water into lake beds. Lake Rason is also a seasonal intermittent saline lake with a static trend, but it is in near-pristine condition with mineral exploration and feral animals as threatening processes.

Nationally important wetlands

Map: IBRA map showing DIWA locations, towns, subregions, major roads and reserves and most common threatening processes.

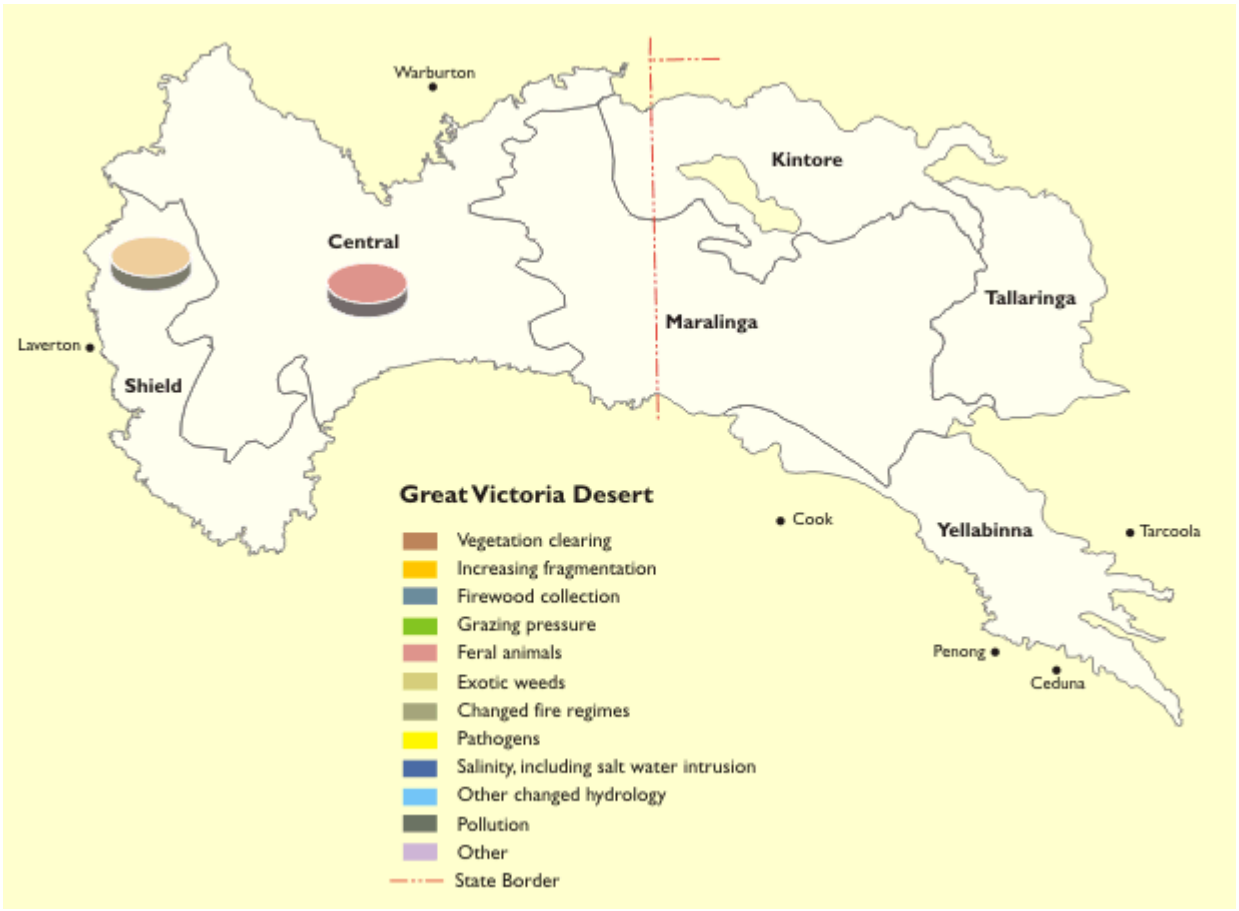


Table: Australia's Important Wetlands (Directory of Important Wetlands of Australia): their type, condition, trend and threatening processes within each subregion.

There is no data available for this table within the bioregion.

Regionally important wetlands

Click here to link to a table of provisional identification of wetlands of regional significance: their type and special values within each subregion. The reliability of the overall subregional assessment is indicated.

Click here to link to a table of provisional identification of wetlands of regional significance: their condition, trend and threatening processes within each subregion.

Riparian Zones

The is no external drainage. Riparian vegetation is confined to major creek systems that only flow intermittently, and is of limited extent. On pastoral leases on western edge of region, its condition is degraded. But it is in near-pristine in remaining areas. The trend is declining on pastoral leases and static for the remainder. Threatening processes include

grazing pressure on pastoral lease areas in western section, feral animals, changed fire regimes, and changed hydrology from de watering of mines and lowering of water tables.

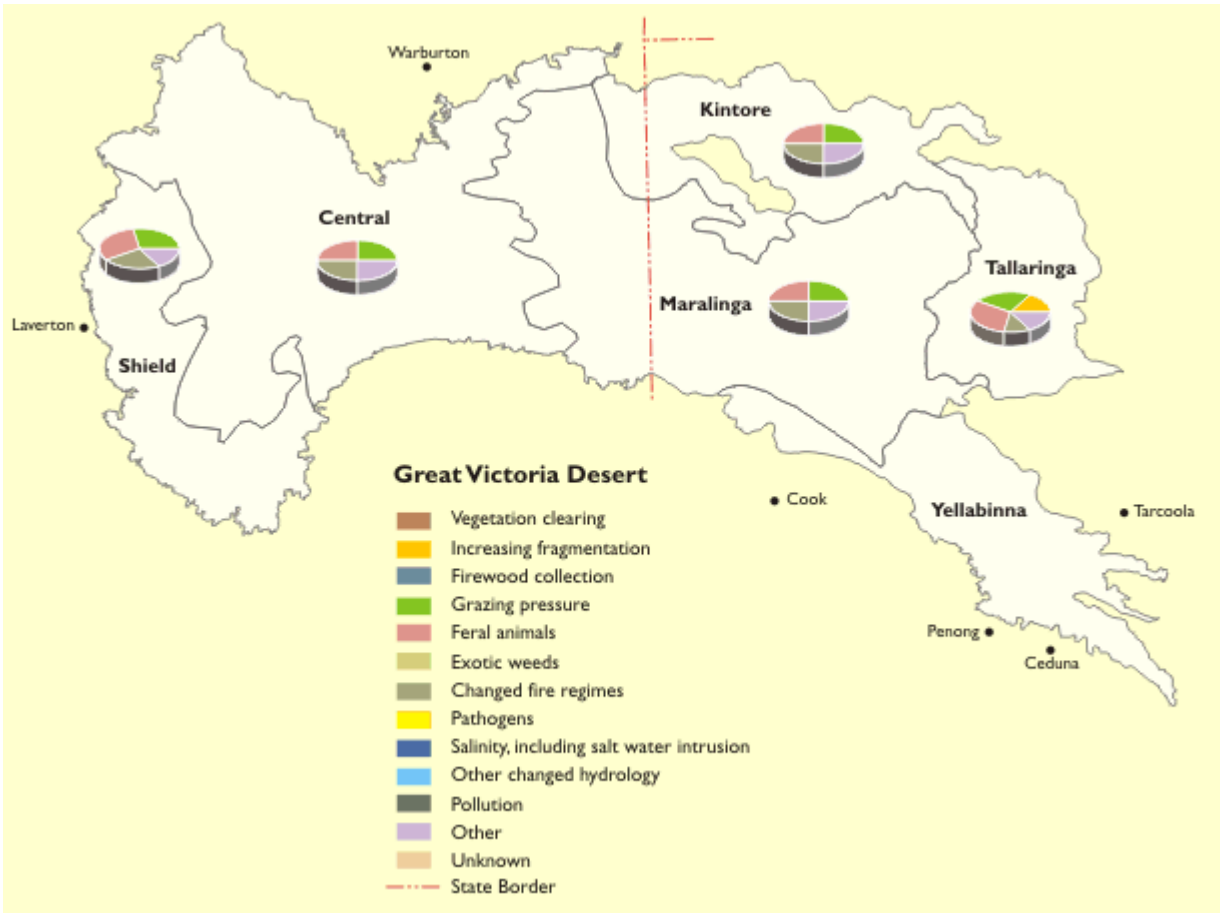
Map: Riparian threatening processes.

Click here to link to a table of riparian zones: their average condition, trend and threatening processes for each subregion. The reliability of this overall assessment is indicated.

Ecosystems at risk

The following ecosystems are considered vulnerable: Yellow sandplain communities of the Great Victoria Desert have a very diverse mammal and reptile faunas (NVIS 24) and their distinctive plant communities are threatened by grazing, feral animals, mining and changed fire regimes; assemblages of Queen Victoria Spring (NVIS 25) are threatened by grazing, feral animals and changed fire regimes; Mirramiratjarra dune field is an unique dune formation with a vegetation and drainage system threatened by grazing pressures and feral animals.

Map: IBRA map showing frequency of threatening processes for ecosystems.



Click here to link to a table of provisional list of threatened ecosystems in Australia: their broad vegetation type (National Vegetation Information System - Major Vegetation Subgroup), recommended status, current legislative protection as a threatened ecosystem, trend and bioregional distribution. These ecosystems are arranged in the bioregion of their principal occurrence. The reliability of the recommended status is indicated.

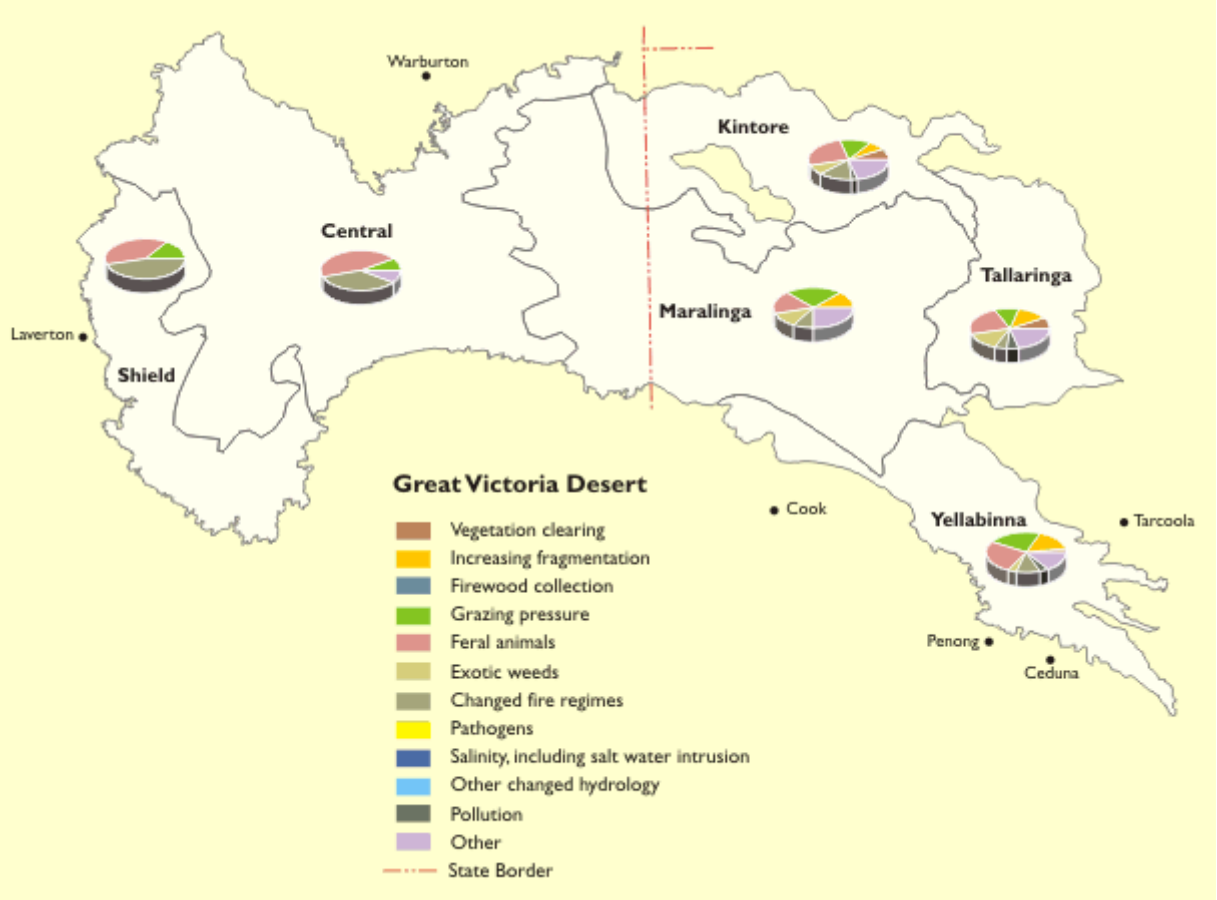
Click here to link to a table of provisional list of threatened ecosystems in each subregion: their threatening processes.

Click here to link to a table of provisional list of threatened ecosystems in each subregion: their recommended recovery actions

Species at risk

The Marsupial Mole and two plants (*Eucalyptus articulata*, *Conospermum toddii*), are considered endangered. One bird, one skink, three mammals and one plant are considered vulnerable, while a further 19 are listed either priority 1 or 2 under WA State legislation. Threatening processes to both fauna and flora include carnivorous and herbivorous feral animals, changed fire regimes, and grazing pressures.

Map: IBRA map showing frequency of threatening processes for species.



Click here to link to a table of species at risk in each subregion: their status, trend and subregional distribution. The reliability of the assessment of trend is indicated and whether recovery plans have been prepared.

Click here to link to a table of species at risk in each subregion: their threatening processes.

Click here to link to a table of species at risk in each subregion: their status recommended recovery actions.

Birds

The Great Victoria Desert was much wetter during the second Atlas than the first, thanks to a series of cyclones, which may explain some apparent increases in species like the Emu. A handful of limited range, threatened and introduced species do occur in the bioregion, but apparently only in small numbers. With only a small number of surveys over an enormous area, trends must be interpreted with extra caution. None were detected statistically.

Status: Semi-arid avifauna that responds primarily to rainfall change and has the highest level of Australian endemism.

Rare and threatened: No major populations.

Increasers: None indicative of landscape health.

Indicators: Emu, Australian Bustard, Banded Lapwing, Scarlet-chested Parrot, White-browed Treecreeper, Hooded Robin, Jacky Winter, Varied Sittella, Crested Bellbird, Restless Flycatcher.

Trend: No trends detected.

Scenario: Possible decline of some ground-feeding birds as a result of changes in fire regime, grazing or predators.

Actions: No grazing in representative areas and the adoption of reduced, conservative grazing rates in key habitat across the bioregion, along with appropriate fire regime to maintain diversity.

Click hereto download a summary report including the physical characteristics of the bioregion, a species list, and summary statistics [Excel file]. The file may open on your screen. To save it to your system 'Save as' under the File menu.

Mammals

Number of species and status

There are 52 mammal species within this bioregion. (The maximum number of species recorded in a bioregion is 86 and the minimum is 25).

Click here to link to a table of number of species in each status class for this bioregion.

Click here to link to a list of mammal species and their status for this bioregion.

Critical weight range

The critical weight range (35 - 5500 g) of mammals is the size range of Australian mammals that have been most affected by environmental changes following European settlement. In this bioregion, the proportion of mammal fauna within the critical weight range is .5. (The maximum proportion of fauna within the critical weight range recorded in a bioregion is 0.632 and the minimum is 0.222).

Faunal Attrition Index

Faunal attrition is a measure of contraction or loss of species richness with a region. A high index value means many species have declined or are extinct in the bioregion. The index can be used to compare the status of mammal fauna to regional attributes such as changes since European settlement and average annual rainfall. The Faunal Attrition

Index for mammals in this bioregion is .41. (The maximum faunal attrition index value recorded in a bioregion is 0.66 and the minimum is 0).

Click here to link to a table of Faunal Attrition Index for groups of mammals shows the contributions of each group to overall patterns of faunal decline.

Faunal Contraction Index

A range contraction index is a measure of the extent to which the range inhabited by a particular species has contracted. A high index value means that many of the species comprising the region's original mammal fauna have contracted from a high proportion of the regions they originally occurred in. The faunal contraction index for the mammal fauna in this bioregion is .43. (The maximum faunal contraction index value recorded in a bioregion is 0.51 and the minimum is 0.07).

Faunal Endemism Index

Endemic species are those restricted to certain regions. Regions containing endemic species are considered to have high biodiversity conservation values because opportunities to conserve those species do not exist elsewhere. A high index value means that the species comprising the original mammal fauna typically occurred in few bioregions. The faunal endemism index value for the mammal fauna in this bioregion is .66. (The maximum faunal endemism index value recorded in a bioregion is 0.79 and the minimum is 0.52).

New Endemism Index

Extant (still surviving) species that have undergone major range contractions can be considered 'new endemics'. Bioregions that contain new endemic species are often important refugia for threatened species. The new endemism index for the mammal fauna in this bioregion is .6. (The maximum new endemism index value recorded in a bioregion is 0.93 and the minimum is 0.5).

Table: Translocated Species

There is no data available for this table within the bioregion.

Exotic Mammals

The number of introduced exotic mammal species that occur within this bioregion is 7. (The maximum number of introduced exotic mammal species in a bioregion is 16 and the minimum is 5).

Click here to link to a list of introduced exotic mammal species for this bioregion.

Extinct mammal species

The number of extinct mammal species that previously occurred within this bioregion is 21. (The maximum number of extinct mammal species in a bioregion is 29 and the minimum is 0).

Click here to link to a list of extinct mammal species for this bioregion.

Management responses

Reserve consolidation

The existing system comprises seven reserves and includes the Great Victoria Desert Nature Reserve, the largest reserve in Western Australia. There are five A-class Nature Reserves and one C-class Nature Reserve in WA with a total area of 1.9 million hectares. They include examples of 17 of the region's 39 vegetation associations: hummock grass, mallee, mulga and various eucalypt communities as well as communities of the Queen Victoria Springs yellow sandplain.

In addition to the 'at risk' communities described above, eight vegetation associations have a high priority for reservation: mallee scrub shrublands, low Mulga woodlands between sandridges, low *Allocasuarina cristata* woodlands, Mulga and Marble Gum over hard spinifex, succulent steppe with an open low woodland comprising of Mulga over saltbush, grassland and shrub steppe of mulga and mallee over soft spinifex, succulent steppe of saltbush and bluebush, and the Mirramiratjarra dune field complex which is a unique dune formation, vegetation and drainage system.

The main constraints on filling these gaps are resource related in terms of management and research, although competing landuses (pastoral industry) and prospective mineral exploration and mining leases are also factors. Aboriginal Land Agreements will probably enhance biodiversity conservation.

Overall 9.4% of the bioregion is reserved in IUCN I-IV reserves and the bioregion is IBRA reservation Class 5. However GVD3 is considered Class 4. The sub-regions have the following percentages within IUCN I-IV reservations: GVD1=7.8%, GVD2=10.3%, GVD3=8.4%.

Reserve management standard is ranked 'fair' as biodiversity values and management issues are poorly identified and some resource degradation is occurring, although retrievable. Predator control through aerial dog baiting programs has occurred in pastoral areas, and the impact of feral herbivores is unknown. Wildfire management is non-existent although mining exploration activities are supervised.

Click here to link to a table of comprehensiveness, adequacy and representativeness (CAR) of the National Reserve System in terms of ecosystems and area sampled and a ranking of reserve management. The bioregional priority for consolidating the National Reserve System is based on this CAR analysis and threat.

Table: Bioregional and subregional priorities and ecosystem priorities to consolidate the National Reserve System and associated ecosystem constraints.

There is no data available for this table within the bioregion.

Off-park conservation for species and ecosystem recovery

Main recovery actions required for 'at risk' ecosystems and species include habitat retention, if not by reservation then by by agreements with landholders. Fire management is a high priority to reduce the effect of large intense, summer wildfires on biota. Feral animal control is also a required action, as it will assist in the recovery of CWR species. Futher research is needed to determine species status and distribution, which will help to increase knowledge of the biodiversity values and conservation issues in the region.

Limited off-park measures for the various species and ecosystem conservation/recovery efforts listed above are needed in all three sub-regions. There are few major conflicting land uses, as much of desert is Unallocated Crown Land, Aboriginal Reserve or Conservation Reserve. Pastoral industry, mineral exploration and possible mine establishment are considered the main conflicting land use, but localised. Once the 'Spinifex Agreement' with indigenous peoples is implemented, extensive areas of the desert will be managed for conservation.

Integrated NRM

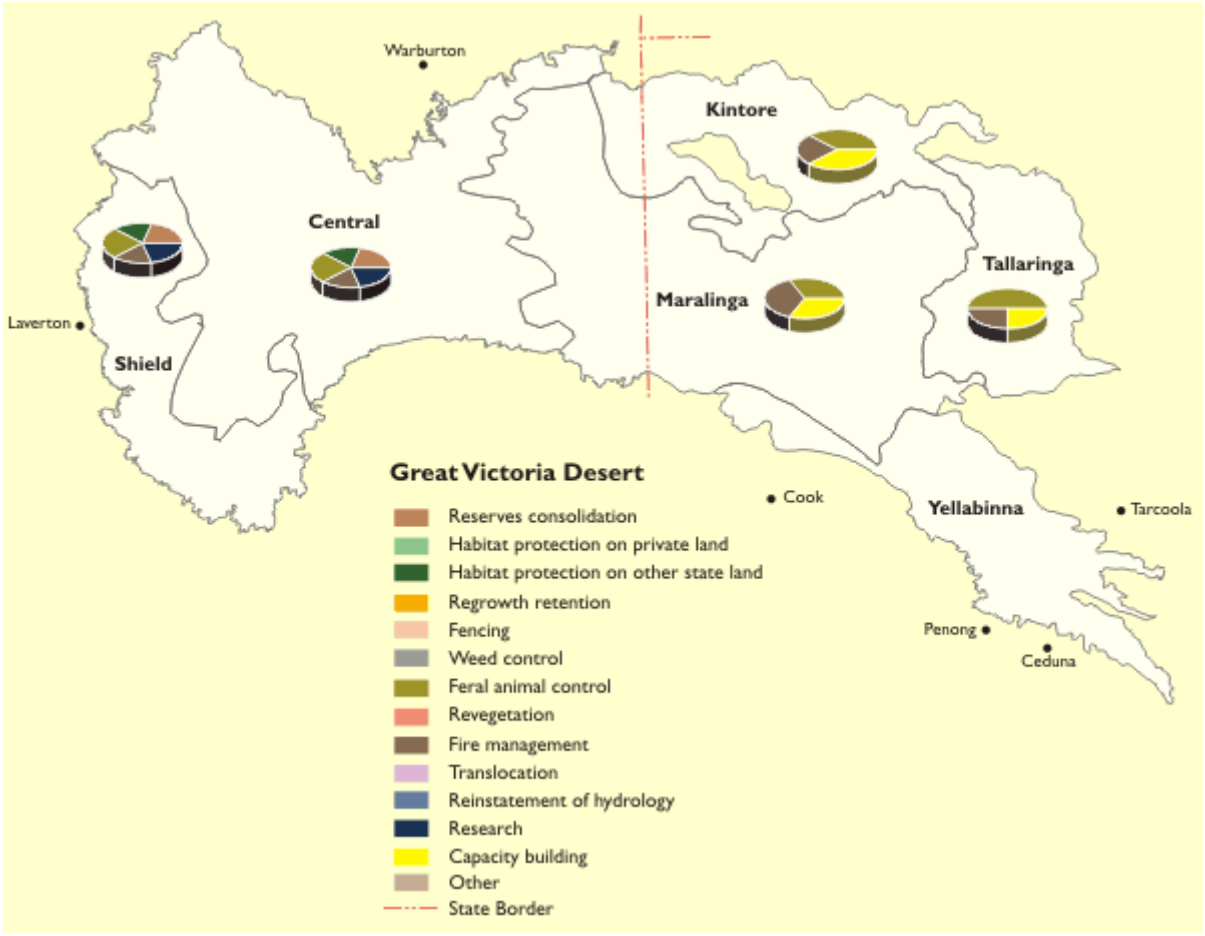
Existing NRM initiatives include the Wildlife Conservation, Pastoral and Mining Acts. The last two include clauses related to protection of land and natural vegetation. Pest management including feral animal control is a priority in 'threat abatement planning'. There are industry 'Codes of Practice' guidelines on the extent of vegetation that should be removed during mineral exploration and restorative actions to mitigate damage.

Opportunities include reviews of industry codes of practice to strengthen protection of biodiversity, and duty of care for leasehold and other lands. Threat abatement planning in relation to vegetation and threaten species management plans, pest management and fire management plans. Capacity building with the community, landholders, industry and institutions is another opportunity for NRM.

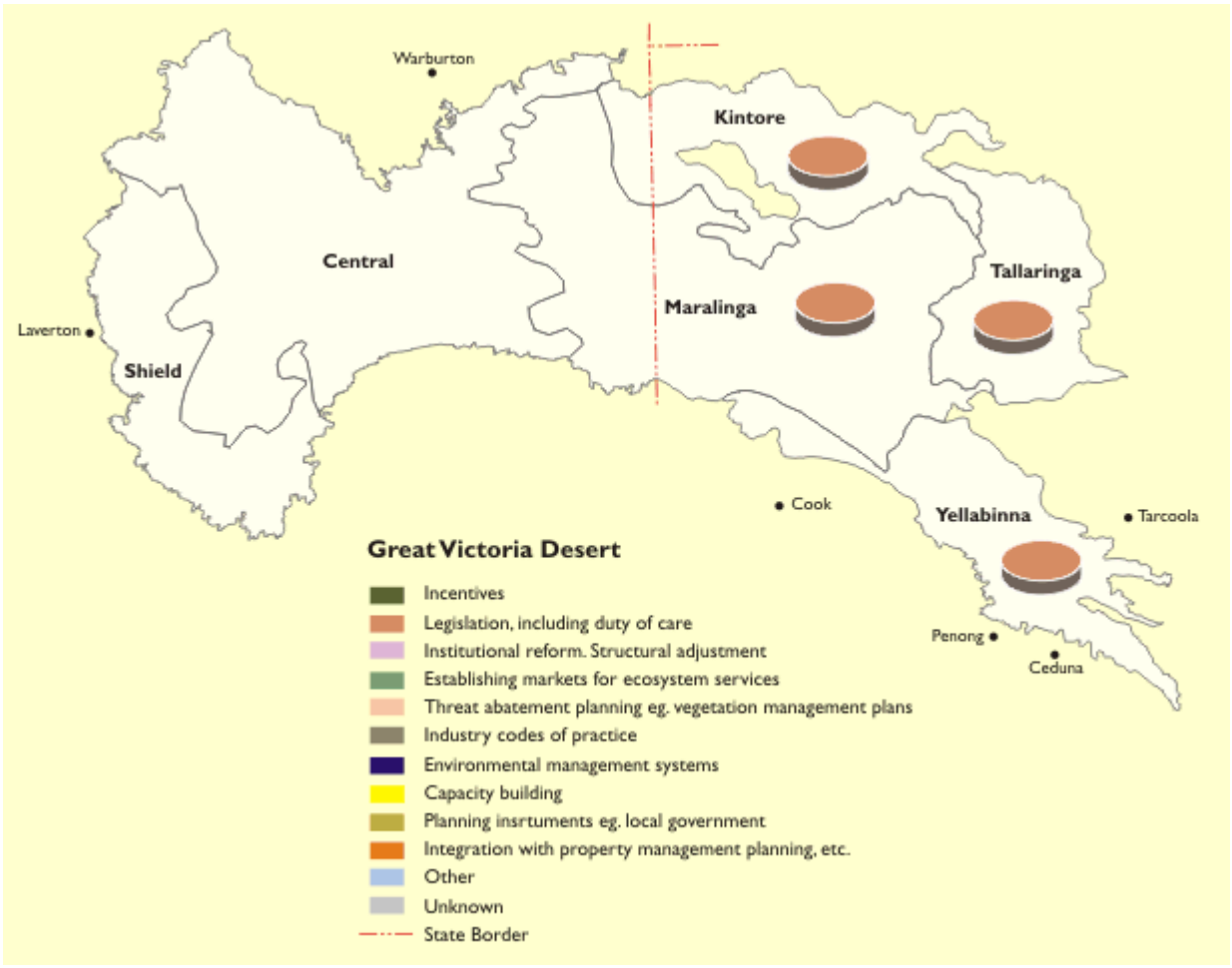
However the region's remoteness and absence of infrastructure adds to the costs of implementing NRM. Other impediments include the Land Administration Act, the extent of mining leases and tenements, and limited financial and staff resources. These NRM priorities apply equally to all GVD subregions.

Map: IBRA map showing frequency of recovery actions (species).

Map: IBRA map showing frequency of recovery actions (ecosystems).



Map: IBRA map showing existing projects part of NRM.



Click here to link to a table of contribution of integrated Natural Resource Management to the protection of biodiversity in each subregion: existing measures and effectiveness.

Table: The contribution of integrated Natural Resource Management to the protection of biodiversity in each subregion: feasible opportunities and comments.

There is no data available for this table within the bioregion.

Further Information & Gaps

Data gaps and research priorities

Regolith mapping is unavailable at better than 1:250 000 resolution. No systematic biological survey has been made of the region, although these has been some assessment of biota on proposed and current reserves and a number of localised studies have occurred. There is little fine scale floristic data available for the sub-region. There are few data on habitat requirements of virtually all invertebrate species, most emphemeral plants, persisting CWR mammals and uncommon vertebrate and plant species. There are no data to provide a regional context on life-history (including population trend) of any

species, even rabbits, and no quantitative data on the affect of exotic predators, introduced herbivores or weed colonisation.

References

Environment Australia 2000. Revision of the Interim Biogeographic Regionalisation of Australia (IBRA) and the Development of Version 5.1. - Summary Report. Department of Environment and Heritage, Canberra.

A complete list of references is available by clicking here.

Further information

View the *Landscape Health in Australia* report.

View the *Terrestrial Biodiversity Assessment 2002* report.

Download the *Terrestrial Biodiversity Assessment 2002* Database - Biodiversity Audit Data Entry System (BADES), and specifications

Click here to link to a table of some major data gaps in each subregion in terms of protecting biodiversity.

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Australian Natural Resources Atlas
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Canberra ACT 2601 Australia
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Mammals

List of mammal species and their status occurring in

Species	Common name	Status
Dasycercus cristicauda	Mulgara	Endangered (SA)
Dasycercus cristicauda	Mulgara	Vulnerable (Commonwealth)
Dasycercus cristicauda	Mulgara	Vulnerable (NT)
Dasycercus cristicauda	Mulgara	Vulnerable (WA)
Notoryctes typhlops	Yitjarritjarri, Southern Marsupial Mole	Endangered (Commonwealth)
Notoryctes typhlops	Yitjarritjarri, Southern Marsupial Mole	Endangered (SA)
Notoryctes typhlops	Yitjarritjarri, Southern Marsupial Mole	Endangered (WA)
Notoryctes typhlops	Yitjarritjarri, Southern Marsupial Mole	Vulnerable (NT)
Nyctophilus timoriensis (South-eastern form)	Eastern Long-eared Bat	Vulnerable (Commonwealth)
Nyctophilus timoriensis (South-eastern form)	Eastern Long-eared Bat	Vulnerable (NSW)
Petrogale lateralis MacDonnell Ranges race	Warru, Black-footed Rock-wallaby (MacDonnell Ranges race)	Endangered (SA)
Petrogale lateralis MacDonnell Ranges race	Warru, Black-footed Rock-wallaby (MacDonnell Ranges race)	Vulnerable (Commonwealth)
Petrogale lateralis MacDonnell Ranges race	Warru, Black-footed Rock-wallaby (MacDonnell Ranges race)	Vulnerable (WA)
Sminthopsis psammophila	Sandhill Dunnart	Endangered (Commonwealth)
Sminthopsis psammophila	Sandhill Dunnart	Endangered (NT)
Sminthopsis psammophila	Sandhill Dunnart	Endangered (WA)

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Biodiversity Assessment - Great Victoria Desert

Species at risk

Table: Species at risk in each subregion: their status, trend and subregional distribution. The reliability of the assessment of trend is indicated and whether recovery plans have been prepared.

Species Group	Species name	EPBC listing	State listing	Trend	Recommended rank	Existing recovery plans (yes/no)	Subregional occurrence
				GVD1			
Birds	Leipoa ocellata (Malleefowl)	Vulnerable	NSW (E); NT (E); SA (V); VIC (E); WA (V)	Unknown	No data	No	AW1; AW2; BBS23; BBS24; BBS25; CAR2; COO1; COO2; COO3; CP2; CP3; CP4; CP5; CR1; DRP10; DRP5; DRP9; ESP1; ESP2; EYB1; EYB3; EYB4; EYB5; GD1; GS1; GS2; GS3; GVD1; GVD2; GVD4; GVD6; HAM;

							SSD1; STP4
Vascular plants	Conospermum toddii (Victoria Desert Smokebush)	Endangered	WA (V)	Static	Quantitative and qualitative	No	GVD1; GVD2; MUR1
				GVD3			
Birds	Cacatua leadbeateri (Major Mitchell's Cockatoo)	No data	NSW (V); QLD (V); SA (V); VIC (V)	Unknown	No data	No	BBN1; BBS10; BBS12; BBS15; BBS17; BBS18; BBS19; BBS20; BHC1; BHC2; BHC3; BHC4; CHC11; CHC2; CHC3; CHC5; CHC8; CHC9; CP1; CP2; CP3; CP4; CP5; DRP1; DRP10; DRP2; DRP3; DRP4; DRP5; DRP6; DRP7; DRP8; DRP9; EYB5; FIN4; FLB3; GAW1; GAW2; GAW3; GAW5; GVD3;

Birds	Lophoictinia isura (Square-tailed Kite)	No data	NSW (V); SA (V); VIC (E)	Unknown	No data	No	GVD4; BBS22; BBS23; BBS24; BBS25; BHC2; BHC4; CHC11; CHC9; CP5; DRP4; DRP5; DRP8; DRP9; FLB1; GVD3; MDD1; MDD2; MDD4; MDD5; MDD6; MUL16; MUL3; MUL7; NAN2; NAN3; NAN4; NCP2; NET1; NET10; NET13; NET14; NET16; NET17; NET4; NET7; NET9; NSS1; NSS2; RIV1; RIV2; RIV3;
Birds	Polytelis alexandrae (Princess Parrot, Alexandra's	Vulnerable	NT (V)	Unknown	No data	No	CHC3; CR1; FIN1; FIN2; FIN3; GAS2;

	Parrot)					GAS3; GD1; GD2; GSD1; GSD2; GSD4; GVD1; GVD3; LSD2; MAC1; MAC2; MAC3; MUR1; NUL1; NUL2; MII3; PIL1; SEQ1; TAN1
Mammals	Notoryctes typhlops (Yitjarritjarri, Southern Marsupial Mole)	Endangered	NT (V); SA (E); WA (E)	Unknown	No data	No	COO3; CR1; CR2; FIN1; FIN2; FIN3; GAW2; GD1; GSD2; GSD5; GVD1; GVD2; GVD3; GVD4; LSD2; MAC2; MUR1; NUL1; NUL2; TAN1; TAN2
Mammals	Nyctophilus timoriensis (South-eastern form) (Eastern Long-eared Bat)	Vulnerable	NSW (V)	Unknown	No data	No	BBS18; EYB4; EYB5; GAW1; GAW2; GAW5; GVD3; GVD6; MDD1;

Vascular plants	Hibbertia crispula	Vulnerable	SA (V)	Unknown	No data	No	MUL3; NUL3 GVD3; GVD6; NUL3
Vascular plants	Olearia arida (desert daisy-bush)	No data	SA (V)	Unknown	No data	No	GVD3; GVD4
Vascular plants	Santalum spicatum (sandalwood)	No data	SA (V)	Unknown	No data	No	CHC2; EYB2; FLB3; FLB4; FLB5; GAW1; GAW2; GAW4; GVD3; GVD6; NUL3
Vascular plants	Sclerolaena symoniana (Symons bindyi)	No data	SA (V)	Unknown	No data	No	GVD3; GVD5
Vascular plants	Stipa nullanulla (Club Spear-grass)	Vulnerable	SA (V)	Unknown	No data	No	DRP9; EYB3; EYB4; EYB5; GAW1; GAW2; GAW3; GAW4; GAW5; GVD3; GVD6; MDD1; MDD2; MDD4
			GVD4				
Birds	Amytornis striatus (Striated Grasswren)	No data	NSW (V); SA (V)	Unknown	No data	No	CP2; CP3; CR2; EYB5; FLB4; FLB5; GAW1; GVD4; GVD6;

Biodiversity Assessment - Great Victoria Desert

Species at risk and the Threatening Process

Table: Species at risk in each subregion: their threatening processes.

Species name	Threatening processes	Threatening processes notes
	GVD1	
Conospermum toddii (Victoria Desert Smokebush)	Changed fire regimes	No data
Conospermum toddii (Victoria Desert Smokebush)	Feral animals	Camels and rabbits
Conospermum toddii (Victoria Desert Smokebush)	Grazing pressure	No data
Dasycercus cristicauda (Mulgara)	Changed fire regimes	No data
Dasycercus cristicauda (Mulgara)	Feral animals	Foxes and cats
Eucalyptus articulata (Ponton Creek Mallee)	Changed fire regimes	perhaps
Notoryctes typhlops (Yitjarritjarri, Southern Marsupial Mole)	Changed fire regimes	No data
Notoryctes typhlops (Yitjarritjarri, Southern Marsupial Mole)	Feral animals	Foxes and cats
Polytelis alexandrae (Princess Parrot, Alexandra's Parrot)	Changed fire regimes	No data
Polytelis alexandrae (Princess Parrot, Alexandra's Parrot)	Feral animals	Foxes and cats
Sminthopsis psammophila (Sandhill Dunnart)	Changed fire regimes	No data
Sminthopsis psammophila (Sandhill Dunnart)	Feral animals	Cats and Foxes
Thryptomene wittweri (Mountain Thryptomene)	Changed fire regimes	No data
Thryptomene wittweri (Mountain Thryptomene)	Feral animals	Goats

Thryptomene wittweri (Mountain Thryptomene)	Grazing pressure	No data
	GVD2	
Acanthiza iredalei iredalei (Slender-billed Thornbill (western))	Changed fire regimes	No data
Acanthiza iredalei iredalei (Slender-billed Thornbill (western))	Feral animals	Foxes
Conospermum toddii (Victoria Desert Smokebush)	Changed fire regimes	No data
Conospermum toddii (Victoria Desert Smokebush)	Feral animals	Camels and rabbits
Conospermum toddii (Victoria Desert Smokebush)	Grazing pressure	No data
Dasycercus cristicauda (Mulgara)	Changed fire regimes	No data
Dasycercus cristicauda (Mulgara)	Feral animals	Cats and foxes
Petrogale lateralis MacDonnell Ranges race (Warru, Black-footed Rock-wallaby (MacDonnell Ranges race))	Other - describe	Nothing needed to gerl out of field
	GVD3	
Cacatua leadbeateri (Major Mitchell's Cockatoo)	Grazing pressure	Impeding the recruitment of trees that will be used for breeding in the future.
Cacatua leadbeateri (Major Mitchell's Cockatoo)	Other - describe	Nest robbing and trapping for aviculture.
Hibbertia crispula	Exotic weeds	No data
Hibbertia crispula	Feral animals	Rabbits and goats
Hibbertia crispula	Grazing pressure	No data
Hibbertia crispula	Increasing fragmentation and loss of remnants	No data
Lophoictinia isura (Square-tailed Kite)	Other - describe	Fewer than 10 individuals known from SA and no recent evidence of breeding
Notoryctes typhlops (Yitjarritjarri, Southern Marsupial Mole)	Changed fire regimes	Changed fire regimes in the spinifex dominated sandy deserts.
Notoryctes typhlops (Yitjarritjarri, Southern Marsupial Mole)	Feral animals	Predation by foxes and cats.

Notoryctes typhlops (Yitjarritjarri, Southern Marsupial Mole)	Other - describe	Overall lack of knowledge on biology of species and threats
		Predation by dingoes
Nyctophilus timoriensis (South-eastern form) (Eastern Long-eared Bat)	Grazing pressure	Has reduced the quality of habitat
Olearia arida (desert daisy-bush)	Exotic weeds	No data
Olearia arida (desert daisy-bush)	Feral animals	Rabbits and goats
Olearia arida (desert daisy-bush)	Grazing pressure	No data
Olearia arida (desert daisy-bush)	Increasing fragmentation and loss of remnants	No data
Polytelis alexandrae (Princess Parrot, Alexandra's Parrot)	Changed fire regimes	A rare nomadic desert species that aggregates to breed in River Red Gum and Desert Oak woodland. The end tom traditional Aboriginal burning practises may have altered a significant component of their habitat mosaic.
Polytelis alexandrae (Princess Parrot, Alexandra's Parrot)	Grazing pressure	Some of their extensive range affected by sheep and cattle grazing and virtually all by rabbit and camel grazing and browsing
Santalum spicatum (sandalwood)	Grazing pressure	Grazing by rabbits, goats and stock
Santalum spicatum (sandalwood)	Other - describe	Lack of regeneration
Sclerolaena symoniana (Symons bindyi)	Exotic weeds	No data
Sclerolaena symoniana (Symons bindyi)	Feral animals	Rabbits and goats
Sclerolaena symoniana (Symons bindyi)	Grazing pressure	No data
Sclerolaena symoniana (Symons bindyi)	Increasing fragmentation and loss of remnants	No data
Stipa nullanulla (Club Spear-grass)	Changed fire regimes	No data
Stipa nullanulla (Club Spear-grass)	Changed hydrology - salinity	Rising saline groundwater
Stipa nullanulla (Club Spear-grass)	Grazing pressure	The species is highly palatable to stock and rabbits and it only survives where protected from grazing

Stipa nullanulla (Club Spear-grass)	Other - describe	Recreational pursuits such as the use of trail bikes and four wheel drives. The species occurs near gypsum salt lakes which are often subject to mining.
	GVD4	
Amytornis striatus (Striated Grasswren)	Broad scale vegetation clearing	Clearance of suitable habitat.
Amytornis striatus (Striated Grasswren)	Changed fire regimes	Excessively frequent fires are likely to eliminate refuges and further fragment the population. Extensive fires that destroy mature hummock grassland over large areas.
Amytornis striatus (Striated Grasswren)	Feral animals	Predation by foxes and feral cats
Amytornis striatus (Striated Grasswren)	Grazing pressure	Grazing by stock, particularly in mallee habitats.
Ardeotis australis (Australian bustard)	Exotic weeds	Invasion of pastoral land by woody weeds.
Ardeotis australis (Australian bustard)	Feral animals	Predation of chicks and eggs by foxes.
Ardeotis australis (Australian bustard)	Other - describe	Agriculture - bustards regularly desert nests in response to disturbance by humans, sheep or cattle. Traditional and illegal hunting
Ardeotis australis (Australian bustard)	Pollution	Pesticides either directly or indirectly ingested are held responsible for local extinctions.
Cacatua leadbeateri (Major Mitchell's Cockatoo)	Grazing pressure	Impeding the recruitment of trees that will be used for breeding in the future.
Cacatua leadbeateri (Major Mitchell's Cockatoo)	Other - describe	Nest robbing and trapping for aviculture.
Codonocarpus pyramidalis	Grazing pressure	Goat and Rabbit grazing
Codonocarpus pyramidalis	Other - describe	Lack of recruitment
Leipoa ocellata (Malleefowl)	Broad scale vegetation clearing	Clearance of native vegetation for agriculture.
Leipoa ocellata (Malleefowl)	Changed fire regimes	Fragmented populations are vulnerable to wildfire, which may make habitat unfavourable for 10-20 years.
Leipoa ocellata (Malleefowl)	Feral animals	Predation by fox and feral cat.
Leipoa ocellata	Grazing pressure	Grazing by stock, feral goats or very high

(Yellow Swainson-pea)		
Turnix varia (Painted Button-quail)	Feral animals	Predation by fox and cats as the species is ground dwelling.
Turnix varia (Painted Button-quail)	Grazing pressure	Continued grazing of remnant areas depleted habitat quality.
Turnix varia (Painted Button-quail)	Increasing fragmentation and loss of remnants	The species shuns cleared or grazed areas and is therefore susceptible to isolation.

Before you download

Most publications are downloadable as PDF files. Adobe Acrobat Reader is required to view PDF files.

If you are unable to access a publication, please contact us to organise a suitable alternative format.

Key

Links to an another web site
Opens a pop-up window

Biodiversity Assessment - Great Victoria Desert

Exotic Mammals

Introduced exotic mammal species that occur in this bioregion.

Species name
Mus domesticus (Hinton, 1916) House Mouse
Canis lupus dingo (Meyer, 1793) Dingo
Vulpes vulpes (Linnaeus, 1758) Red Fox
Felis catus (Linnaeus, 1758) Cat
Oryctolagus cuniculus (Linnaeus, 1758) European Rabbit
Camelus dromedarius (Linnaeus, 1758) Dromedary, Camel
Ovis aries (Linnaeus, 1758) Sheep

Biodiversity Assessment - Great Victoria Desert

Exctinct Mammals

Extinct mammal species recorded for this bioregion.

Species	Common name	Status
Dasycercus cristicauda	Mulgara	Extinct (NSW)
Leporillus apicalis	Lesser Stick-nest Rat	Extinct (Commonwealth)
Leporillus apicalis	Lesser Stick-nest Rat	Extinct (NT)
Leporillus apicalis	Lesser Stick-nest Rat	Extinct (Vic)
Leporillus apicalis	Lesser Stick-nest Rat	Extinct (WA)

Appendix B

Search Results of the Department of Environment and Conservation Threatened and Priority Flora Databases

E-mail Correspondence from DEC – Threatened Flora Database Search L69/12

-----Original Message-----
From: Long, Bridgitte [mailto:Bridgitte.Long@dec.wa.gov.au]
Sent: Monday, 21 April 2008 12:57 PM
To: Trinity File
Subject: RE: Request for database search - Flora

Hi Trinity

Please find attached the results from the Threatened (Declared Rare) Flora Database and the WA Herbarium database for the Lehmann Hills area. There were no results from the Declared Rare and Priority Flora Species List for this search. A search was carried out of all three databases for the second site (Lupton Hills), however this search returned no results.

An invoice will be forwarded from our finance branch for $250+GST. Please refer to the attached letter for the Conditions of Supply for this information.

Regards

Bridgitte Long
Threatened Flora Database Officer
Species and Communities Branch
Department of Environment and Conservation
Ph (08) 9334 0123 Fax (08) 9334 0278
bridgitte.long@dec.wa.gov.au

From: Trinity File [mailto:trinity.file@outbackecology.com]
Sent: Friday, 18 April 2008 3:47 PM
To: Long, Bridgitte
Cc: Martin Henson
Subject: Request for database search - Flora

Hi Bridgitte,

Can you please provide me with 2 separate DRF and Priority flora database searches, with an area of 50km radius around the following central coordinates:

Search 1. Central Coordinate: **25º24'30"S, 128º36'24"E**

Search 2. Central Coordinate: **26º41'0"S, 128º15'0"E**

The search is being conducted on behalf of Metals X Limited for their Wingellina Nickel Project on the corner of the WA, SA and NT borders. The information is being sought as part of a desktop study which is to be used for supporting information in a Clearing Permit Application (CPA).
The two CPAs are for areas in which Metals X plans to explore for water.
The Search 1 Central coordinate is located on Exploration tenement E69/2453; and Search 2 Central coordinate is located on miscellaneous tenement L69/12.

The preferred delivery format of the search results is electronic.

An invoice (~$250 + GST) can be raised to Outback Ecology at 1/71 Troy Terrace, Jolimont 6014.

I can be reached on 9388 8799 or via return email if you require any further information.

Thank you for your assistance.

Kind regards

Trinity

Trinity File

Eastern Australia Business Manager
Outback Ecology

1/71 Troy Terrace
JOLIMONT WA 6014
Ph: +61 8 9388 8799
Fax: +61 8 9388 8633
www.outbackecology.com

Department of Environment and Conservation

Your reference:
Our reference: 2008/001163-1
Enquiries: Bridgitte Long

Phone: 9334 0123
Fax: 9334 0278
Email: bridgitte.long@dec.wa.gov.au

Outback Ecology
1/71 Troy Terrace
Jolimont WA 6014

Attention: Trinity File

Dear Ms File

REQUEST FOR RARE FLORA INFORMATION

I refer to your request of 18th April 2008 for information on rare flora in the Lehmann Hills and Lupton Hills areas. The search co-ordinates used were 24^0 55' - 25^0 47' S and 128^0 02' - 129^0 10' E, and 26^0 15' - 27^0 05' S and 127^0 41' - 128^0 48' E (GDA94), respectively.

A search was undertaken for this area of **(1)** the Department's *Threatened (Declared Rare) Flora* database (for results, *if any*, see "Threatened Flora Data" – coordinates are GDA94), **(2)** the *Western Australian Herbarium Specimen* database for priority species opportunistically collected in the area of interest (for results, *if any*, see "WAHERB"- coordinates are GDA94 – see condition number 9 in the attached 'Conditions in Respect of Supply' and **(3)**, the Department's *Declared Rare and Priority Flora List* [this list is searched using 'place names'. This list which may also be used as a species target list, contains species that are declared rare (Conservation Code R or X for those presumed to be extinct), poorly known (Conservation Codes 1, 2 or 3), or require monitoring (Conservation Code 4) – for results, *if any*, see "Declared Rare and Priority Flora List"]. The results are attached electronically to this email.

Attached also are the conditions under which this information has been supplied. Your attention is specifically drawn to the seventh point, which refers to the requirement to undertake field investigations for the accurate determination of rare flora occurrence at a site. *The information supplied should be regarded as an indication only of the rare flora that may be present and may be used as a target list in any surveys undertaken.*

The information provided does not preclude you from obtaining and complying with, where necessary, land clearing approvals from other agencies.

An invoice for $250 (plus GST) to supply this information will be forwarded.

It would be appreciated if any populations of rare flora encountered by you in the area could be reported to this Department to ensure their ongoing management.

If you require any further details, or wish to discuss rare flora management, please contact Dr Ken Atkins, Manager, Species and Communities Branch, on (08) 9334 0455.

Yours faithfully

BA Long
.....
for Keiran McNamara
DIRECTOR GENERAL
DEPARTMENT OF ENVIRONMENT AND CONSERVATION

21st April, 2008

<u>Please note:</u> Co-ordinates supplied for all data search requests must be provided in latitude/longitude format, 'eastings and northings' are no longer suitable. Thank you.

DEPARTMENT OF ENVIRONMENT AND CONSERVATION

RARE FLORA INFORMATION

CONDITIONS IN RESPECT OF SUPPLY OF INFORMATION

1. All requests for data to be made in writing to the Director General, Department of Environment and Conservation, Attention: Threatened Flora Database Officer, Species and Communities Branch.

2. The data supplied may not be supplied to other organisations, nor be used for any purpose other than for the project for which they have been provided, without the prior written consent of the Director General, Department of Environment and Conservation.

3. Specific locality information for Declared Rare Flora is regarded as confidential, and should be treated as such by receiving organisations. Specific locality information for DRF may not be used in public reports without the written permission of the Director General, Department of Environment and Conservation. Publicly available reports may only show generalised locations or, where necessary, show specific locations without identifying species. The Department is to be contacted for guidance on the presentation of rare flora information.

4. Note that the Department of Environment and Conservation respects the privacy of private landowners who may have rare flora on their property. Rare flora locations identified in the data as being on private property should be treated in confidence, and contact with property owners made through the Department of Environment and Conservation.

5. Receiving organisations should note that while every effort has been made to prevent errors and omissions in the data provided, they may be present. The Department of Environment and Conservation accepts no responsibility for this.

6. Receiving organisations must also recognise that the database is subject to continual updating and amendment, and such considerations should be taken into account by the user.

7. **It should be noted that the supplied data do not necessarily represent a comprehensive listing of the rare flora of the area in question. Its comprehensiveness is dependant on the amount of survey carried out within the specified area. The receiving organisation should employ a botanist, if required, to undertake a survey of the area under consideration.**

8. Acknowledgment of the Department of Environment and Conservation as source of the data is to be made in any published material. Copies of all such publications are to be forwarded to the Department of Environment and Conservation, Attention: The Manager, Species and Communities Branch.

9. The development of the PERTH Herbarium database was not originally intended for electronic mapping (eg. GIS ArcView). The latitude and longitude coordinates for each entry are not verified prior to being databased. It is only in recent times that collections have been submitted to PERTH with GPS recorded in latitude and longitude coordinates. Therefore, be aware when using this data in ArcView that some records may not plot to the locality description given with each collection.

THE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

DECLARED RARE AND PRIORITY FLORA LIST

for Western Australia

CONSERVATION CODES

R: Declared Rare Flora - Extant Taxa

Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.

X: Declared Rare Flora - Presumed Extinct Taxa

Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such.

1: Priority One - Poorly known Taxa

Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

2: Priority Two - Poorly Known Taxa

Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

3: Priority Three - Poorly Known Taxa

Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but are in need of further survey.

4: Priority Four - Rare Taxa

Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years.

Note, the need for further survey of poorly known taxa is prioritised into the three categories depending on the perceived urgency for determining the conservation status of those taxa, as indicated by the apparent degree of threat to the taxa based on the current information.

Appendix C

Search Results for the Department of Environment and Conservation Threatened Ecological Communities Database

Trinity File

From: Podesta, Mia [Mia.Podesta@dec.wa.gov.au]
Sent: Friday, 18 April 2008 3:05 PM
To: Trinity File
Subject: Results of TEC/PEC Search - Wingellina (OE)

Hi Trinity,

I refer to your request on the 18th of April 2008 for information on threatened and priority ecological communities occurring within 50km radius of the search areas co-ordinates: Search 1: -25.4082598 and Search 2: -26.6832718, 128.2500009.

A search was undertaken on the Department's Threatened Ecological Communities database. Please note that there are no known occurrences of threatened or priority ecological communities recorded within these boundaries.

Attached are the conditions under which this information has been supplied. The information supplied should be regarded as an indication only of the threatened and priority ecological communities that may be present.

It would be appreciated if any occurrences of threatened and priority ecological communities encountered by you in the area could be reported to this Department to ensure their ongoing management.

An invoice for $165 (including GST) for the supply of this information will be forwarded. Please note that all TEC/PEC searches where records are found are now provided as shapefiles, and will be a standard price of $220 due to changes in the way we produce information for searches.

Regards

Mia

Mia Podesta (nee Morley)
Ecologist - Threatened Ecological Community Database
Department of Environment and Conservation, Kensington
Ph: 9334 0116
Fax: 9334 0300
Email: Mia.Podesta@dec.wa.gov.au

From: Trinity File [mailto:trinity.file@outbackecology.com]
Sent: Friday, 18 April 2008 2:12 PM
To: Podesta, Mia
Subject: Ecological Community Database Search Request

Hi Mia,

Can you please provide me with 2 separate Threatened Ecological Communities database searches, with an area of 50km radius around the following central coordinates:

Search 1. Central Coordinate: Eastings 460442 Northings 7189777 MGA Zone 52

Search 2. Central Coordinate: Eastings 425380 Northings 7048415 MGA Zone 52

The search is being conducted on behalf of Metals X Limited for their Wingellina Nickel Project on the corner of the WA, SA and NT borders. The information is being sought as part of a desktop study which is to be used for supporting information in a Clearing Permit Application (CPA). The two CPAs are for areas in which Metals X plans to explore for water.

The preferred delivery format of the search results is electronic.

An invoice (~$250 + GST) can be raised to Outback Ecology at 1/71 Troy terrace, Jolimont 6014.

I can be reached on 9388 8799 or via return email if you require any further information.

Thank you for your assistance.

Kind regards

Trinity

Trinity File

Eastern Australia Business Manager
Outback Ecology

1/71 Troy Terrace
JOLIMONT WA 6014
Ph: +61 8 9388 8799
Fax: +61 8 9388 8633
www.outbackecology.com

Appendix D

Search Results of the Federal Government Environment Protection and Biodiversity Conservation Act Protected Matters Database

28 May 2008 12:30

EPBC Act Protected Matters Report

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

You may wish to print this report for reference before moving to other pages or websites.

The Australian Natural Resources Atlas at http://www.environment.gov.au/atlas may provide further environmental information relevant to your selected area. Information about the EPBC Act including significance guidelines, forms and application process details can be found at http://www.environment.gov.au/epbc/assessmentsapprovals/index.html

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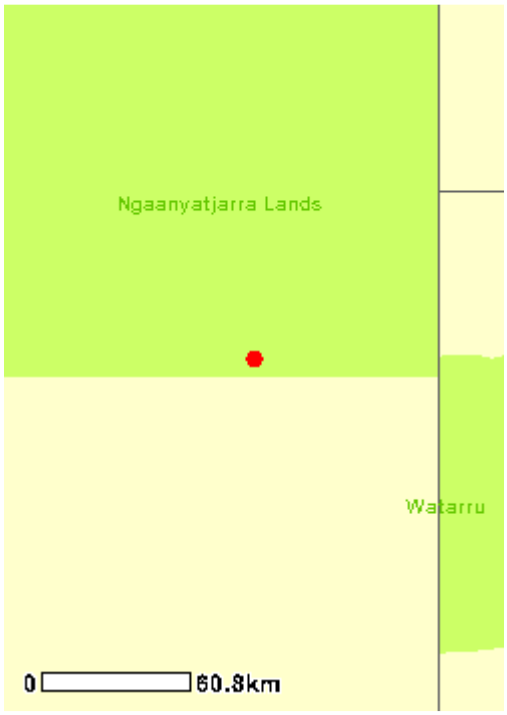

Search Type: Point

Buffer: 100 km

Coordinates: -26.68333,128.25

Report Contents:

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 - see http://www.environment.gov.au/epbc/assessmentsapprovals/guidelines/index.html.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Significance: (Ramsar Sites)	None
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	None
Threatened Species:	5
Migratory Species:	3

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 and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage/index.html.

Please note that the current dataset on Commonwealth land is not complete. Further information on Commonwealth land would need to be obtained from relevant sources including Commonwealth agencies, local agencies, and land tenure maps.

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. Information on EPBC Act permit requirements and application forms can be found at http://www.environment.gov.au/epbc/permits/index.html.

Commonwealth Lands:	1
Commonwealth Heritage Places:	None
Places on the RNE:	1
Listed Marine Species:	2
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

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

State and Territory Reserves:	2
Other Commonwealth Reserves:	None
Regional Forest Agreements:	None

Details

Matters of National Environmental Significance

Threatened Species [Dataset Information]	Status	Type of Presence
Birds		
Leipoa ocellata Malleefowl	Vulnerable	Species or species habitat likely to occur within area
Polytelis alexandrae Princess Parrot, Alexandra's Parrot	Vulnerable	Species or species habitat may occur within area
Mammals		
Dasycercus cristicauda Mulgara	Vulnerable	Species or species habitat likely to occur within area
Petrogale lateralis MacDonnell Ranges race Warru, Black-footed Rock-wallaby (MacDonnell Ranges race)	Vulnerable	Species or species habitat may occur within area
Reptiles		
Egernia kintorei Great Desert Skink, Tjakura, Warrarna, Mulyamiji	Vulnerable	Species or species habitat may occur within area
Migratory Species [Dataset Information]	Status	Type of Presence
Migratory Terrestrial Species		
Birds		
Leipoa ocellata Malleefowl	Migratory	Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater	Migratory	Species or species habitat may occur within area
Migratory Wetland Species		
Birds		
Charadrius veredus Oriental Plover, Oriental Dotterel	Migratory	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Dataset Information]	Status	Type of Presence
Birds		
Charadrius veredus Oriental Plover, Oriental Dotterel	Listed - overfly marine area	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater	Listed - overfly marine area	Species or species habitat may occur within area
Commonwealth Lands [Dataset Information]		
Defence		
Places on the RNE [Dataset Information] Note that not all Indigenous sites may be listed.		
Natural		
Ranges of the Western Desert WA		

Extra Information

State and Territory Reserves [Dataset Information]
Ngaanyatjarra Lands Indigenous Protected Area, WA
Watarru Indigenous Protected Area, SA

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 Heritage and Register of National Estate properties, Wetlands of International 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 seek 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.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under "type of presence". For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the migratory and marine provisions of the Act have been mapped.

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 vagrants
- 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, vagrant, 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.

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

Acknowledgments

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

- New South Wales National Parks and Wildlife Service
- Department of Sustainability and Environment, Victoria
- Department of Primary Industries, Water and Environment, Tasmania
- Department of Environment and Heritage, South Australia Planning SA
- Parks and Wildlife Commission of the Northern Territory
- Environmental Protection Agency, Queensland
- Birds Australia
- Australian Bird and Bat Banding Scheme
- Australian National Wildlife Collection
- Natural history museums of Australia
- 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, Atherton and Canberra
- University of New England
- Other groups and individuals

ANUCliM Version 1.8, Centre for Resource and Environmental Studies, Australian National University was used extensively for the production of draft maps of species distribution. Environment Australia is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Last updated:

Department of the Environment, Water, Heritage and the Arts
GPO Box 787 Canberra ACT 2601 Australia
Telephone: +61 (0)2 6274 1111

Appendix E
Search Results of the Department of Environment and Conservation Threatened and Priority Fauna Database

Threatened and Priority Fauna Database

26.15 °S 127.79 °E / 27.15 °S 128.76 °E Search area 2. (plus~50km buffer)

* Date	Certainty	Seen	Location Name	Method

Schedule 1 - Fauna that is rare or is likely to become extinct

Notoryctes sp **Marsupial Mole** *1 records*

This species is an inhabitant of sandy desert areas and is rarely observed or recorded.

1996	1	1		Day sighting

Petrogale lateralis ssp. (ANWC CM15314) **Black-footed Rock-wallaby, Warru (Mc** *3 records*

This species thrives in steep, complex rocky habitats providing tunnels, caves and crevices for shelter and protection from predators. Recent records (1996 &2000) in surrounding areas (approx. 100km west) suggest that this species may occur in the area in question.

	1	1	Ngaanyatjarra-Giles	
	1	1	Ngaanyatjarra-Giles	
1873	2	0	Ngaanyatjarra-Giles	

Leporillus conditor **Greater Stick-nest Rat, Wopilkara** *1 records*

This species is presumed extinct in the wild on the mainland but old stick nests remain in small caves and under ledges in breakaways and gorges.

1873	1	0	Ngaanyatjarra-Giles	Definite signs

Leipoa ocellata **Malleefowl** *1 records*

This species was once widely distributed across southern Australia. It prefers woodland or shrubland with an abundant litter layer that provides essential material for the construction of its nest mound.

1873	1	0	Ngaanyatjarra-Giles	Eggs

Schedule 2 - Presumed extinct

Onychogalea lunata **Crescent Nailtail Wallaby** *2 records*

1873	2	1	Ngaanyatjarra-Giles	Day sighting
1961	1	0	Cavenagh Range	Bones

***** Information relating to any records provided for listed species:-
Date: date of recorded observation
Certainty (of correct species identification): 1=Very certain; 2=Moderately certain; and 3=Not sure.
Seen: Number of individuals observed.
Location Name: Name of reserve or nearest locality where observation was made
Method: Method or type of observation

Appendix F

Search Results of Western Australian Museum's (WAM) Faunabase Database

WA Museum FaunaBase Search Results for Vertebrate Terrestrial Fauna

Reptiles collected between -24.5612, 125.65 and -27.0071, 128.9754

Agamidae
Caimanops amphiboluroides
Ctenophorus caudicinctus graafi
Ctenophorus clayi
Ctenophorus fordi
Ctenophorus isolepis gularis
Ctenophorus nuchalis
Ctenophorus reticulatus
Ctenophorus rufescens
Ctenophorus scutulatus
Diporiphora winneckei
Lophognathus longirostris
Moloch horridus
Pogona minor minor
Tympanocryptis lineata centralis

Boidae
Antaresia stimsoni stimsoni

Elapidae
Acanthophis pyrrhus
Brachyurophis fasciolata fasciata
Brachyurophis semifasciata
Demansia psammophis psammophis
Furina ornata
Parasuta monachus
Pseudechis australis
Pseudonaja modesta
Pseudonaja nuchalis
Simoselaps anomalus
Suta fasciata

Gekkonidae
Diplodactylus conspicillatus
Diplodactylus damaeus
Diplodactylus pulcher
Diplodactylus stenodactylus
Gehyra montium
Gehyra purpurascens
Gehyra variegata
Heteronotia binoei
Nephrurus laevissimus
Nephrurus levis levis
Nephrurus vertebralis
Rhynchoedura ornata
Strophurus ciliaris aberrans
Strophurus elderi
Strophurus strophurus

Pygopodidae
Delma nasuta
Delma pax
Pygopus nigriceps

Scincidae
Cryptoblepharus plagiocephalus
Ctenotus alacer
Ctenotus ariadnae
Ctenotus brooksi brooksi
Ctenotus dux
Ctenotus helenae
Ctenotus leonhardii
Ctenotus pantherinus ocellifer
Ctenotus quattuordecimlineatus
Ctenotus schomburgkii
Ctenotus septenarius
Cyclodomorphus melanops elongatus
Cyclodomorphus melanops melanops
Egernia depressa
Egernia inornata
Egernia kintorei
Egernia striata
Eremiascincus richardsonii
Lerista bipes
Lerista desertorum
Lerista ips
Lerista labialis
Lerista muelleri
Menetia greyii
Morethia boulengeri
Proablepharus reginae
Tiliqua multifasciata

Typhlopidae
Ramphotyphlops endoterus
Ramphotyphlops waitii

Varanidae
Varanus acanthurus
Varanus eremius
Varanus giganteus
Varanus gilleni
Varanus gouldii
Varanus tristis tristis

Mammals collected between -24.9071, 126.2412 and -27.0318, 128.9507

Canidae
Canis lupus dingo

Dasyuridae
Antechinomys laniger
Dasycercus cristicauda
Ningaui ridei
Pseudantechinus macdonnellensis
Sminthopsis crassicaudata
Sminthopsis hirtipes
Sminthopsis longicaudata
Sminthopsis ooldea

Macropodidae
Lagorchestes hirsutus
Macropus robustus erubescens
Petrogale lateralis lateralis

Molossidae
Tadarida australis

Muridae
Mus musculus
Notomys alexis
Pseudomys desertor
Pseudomys hermannsburgensis

Myrmecobiidae
Myrmecobius fasciatus

Notoryctidae
Notoryctes caurinus
Notoryctes typhlops

Peramelidae
Isoodon auratus auratus

Thylacomyidae
Macrotis lagotis

Vespertilionidae
Chalinolobus gouldii
Nyctophilus geoffroyi
Vespadelus finlaysoni

Birds collected between -24.5612, 126.1673 and -27.0318, 128.9261

Acanthizidae
Acanthiza apicalis
Aphelocephala leucopsis
Aphelocephala nigricincta
Pyrrholaemus brunneus

Cinclosomatidae
Cinclosoma castaneothorax marginatum
Cinclosoma castanotus

Climacteridae
Climacteris rufa

Columbidae
Geophaps plumifera
Geophaps plumifera ferruginea
Ocyphaps lophotes

Corvidae
Corvus orru
Corvus orru cecilae

Cracticidae
Cracticus tibicen tibicen

Cuculidae
Chrysococcyx osculans

Dicruridae
Rhipidura fuliginosa

Maluridae
Amytornis purnelli purnelli
Amytornis striatus striatus
Malurus lamberti assimilis
Malurus splendens musgravi
Stipiturus ruficeps ruficeps

Megapodiidae
Leipoa ocellata

Meliphagidae
Certhionyx variegatus
Lichenostomus keartlandi
Lichenostomus penicillatus
Manorina flavigula

Otididae
Ardeotis australis

Pachycephalidae
Colluricincla harmonica rufiventris

Petroicidae
Microeca fascinans assimilis

Podargidae
Podargus strigoides brachypterus

Pomatostomidae
Pomatostomus superciliosus

Psittacidae
Cacatua roseicapilla
Platycercus zonarius zonarius
Polytelis alexandrae

Amphibia collected between -24.7588, 126.3151 and -27.0812, 128.9507

Hylidae
Cyclorana platycephala

Myobatrachidae
Neobatrachus centralis
Neobatrachus sutor
Pseudophryne occidentalis

Appendix G

Search Results of the Birds Australia Atlas Database and Regional Summaries (Great Victoria Desert Bioregion)

Great Victoria Desert

Order	Atlas species no	Common name	Scientific name	Proportion of sightings in bioregion
1	1	**Emu**	*Dromaius novaehollandiae*	Medium
2	7	**Malleefowl**	*Leipoa ocellata*	Low
3	9	**Stubble Quail**	*Coturnix pectoralis*	Low
4	203	**Black Swan**	*Cygnus atratus*	Low
5	207	**Australian Shelduck**	*Tadorna tadornoides*	Low
6	202	**Australian Wood Duck**	*Chenonetta jubata*	Low
7	212	**Australasian Shoveler**	*Anas rhynchotis*	Low
8	211	**Grey Teal**	*Anas gracilis*	Low
9	213	**Pink-eared Duck**	*Malacorhynchus membranaceus*	Low
10	215	**Hardhead**	*Aythya australis*	Low
11	61	**Australasian Grebe**	*Tachybaptus novaehollandiae*	Low
12	62	**Hoary-headed Grebe**	*Poliocephalus poliocephalus*	Low
13	100	**Little Pied Cormorant**	*Phalacrocorax melanoleucos*	Low
14	97	**Little Black Cormorant**	*Phalacrocorax sulcirostris*	Low
15	96	**Great Cormorant**	*Phalacrocorax carbo*	Low
16	188	**White-faced Heron**	*Egretta novaehollandiae*	Low
17	189	**White-necked Heron**	*Ardea pacifica*	Low
18	180	**Straw-necked Ibis**	*Threskiornis spinicollis*	Low
19	232	**Black-shouldered Kite**	*Elanus axillaris*	Medium
20	233	**Letter-winged Kite**	*Elanus scriptus*	Low
21	230	**Square-tailed Kite**	*Lophoictinia isura*	Low
22	231	**Black-breasted Buzzard**	*Hamirostra melanosternon*	Low
23	229	**Black Kite**	*Milvus migrans*	Medium
24	228	**Whistling Kite**	*Haliastur sphenurus*	Medium
25	218	**Spotted Harrier**	*Circus assimilis*	Medium
26	221	**Brown Goshawk**	*Accipiter fasciatus*	Medium
27	222	**Collared Sparrowhawk**	*Accipiter cirrhocephalus*	Medium
28	224	**Wedge-tailed Eagle**	*Aquila audax*	**High**
29	225	**Little Eagle**	*Hieraaetus morphnoides*	Medium
30	239	**Brown Falcon**	*Falco berigora*	**High**
31	235	**Australian Hobby**	*Falco longipennis*	Medium
32	236	**Grey Falcon**	*Falco hypoleucos*	Low
33	238	**Black Falcon**	*Falco subniger*	Low
34	237	**Peregrine Falcon**	*Falco peregrinus*	Low
35	240	**Nankeen Kestrel**	*Falco cenchroides*	**High**
36	55	**Black-tailed Native-hen**	*Gallinula ventralis*	Low
37	59	**Eurasian Coot**	*Fulica atra*	Low
38	176	**Australian Bustard**	*Ardeotis australis*	Medium
39	18	**Little Button-quail**	*Turnix velox*	Medium
40	158	**Common Greenshank**	*Tringa nebularia*	Low
41	157	**Common Sandpiper**	*Actitis hypoleucos*	Low
42	146	**Black-winged Stilt**	*Himantopus himantopus*	Low
43	147	**Banded Stilt**	*Cladorhynchus leucocephalus*	Low
44	148	**Red-necked Avocet**	*Recurvirostra novaehollandiae*	Low
45	143	**Red-capped Plover**	*Charadrius ruficapillus*	Low
46	145	**Inland Dotterel**	*Peltohyas australis*	Low
47	144	**Black-fronted Dotterel**	*Elseyornis melanops*	Low
48	132	**Red-kneed Dotterel**	*Erythogonys cinctus*	Low
49	135	**Banded Lapwing**	*Vanellus tricolor*	Medium
50	133	**Masked Lapwing**	*Vanellus miles*	Low
51	173	**Australian Pratincole**	*Stiltia isabella*	Low
52	125	**Silver Gull**	*Larus novaehollandiae*	Low
53	111	**Gull-billed Tern**	*Sterna nilotica*	Low

54	110	**Whiskered Tern**	*Chlidonias hybridus*	Low
55	957	**Rock Dove**	*Columba livia*	Low
56	34	**Common Bronzewing**	*Phaps chalcoptera*	Medium
57	43	**Crested Pigeon**	*Ocyphaps lophotes*	Medium
58	42	**Spinifex Pigeon**	*Geophaps plumifera*	Low
59	31	**Diamond Dove**	*Geopelia cuneata*	Low
60	30	**Peaceful Dove**	*Geopelia placida*	Low
61	273	**Galah**	*Eolophus roseicapillus*	**High**
62	271	**Little Corella**	*Cacatua sanguinea*	Low
63	270	**Major Mitchell's Cockatoo**	*Cacatua leadbeateri*	Medium
64	274	**Cockatiel**	*Nymphicus hollandicus*	Medium
65	259	**Purple-crowned Lorikeet**	*Glossopsitta porphyrocephala*	Low
66	279	**Princess Parrot**	*Polytelis alexandrae*	Low
67	294	**Australian Ringneck**	*Barnardius zonarius*	**High**
68	297	**Blue Bonnet**	*Northiella haematogaster*	Medium
69	296	**Mulga Parrot**	*Psephotus varius*	**High**
70	310	**Budgerigar**	*Melopsittacus undulatus*	Medium
71	304	**Bourke's Parrot**	*Neopsephotus bourkii*	Medium
72	303	**Scarlet-chested Parrot**	*Neophema splendida*	Medium
73	337	**Pallid Cuckoo**	*Cuculus pallidus*	**High**
74	338	**Fan-tailed Cuckoo**	*Cacomantis flabelliformis*	Low
75	341	**Black-eared Cuckoo**	*Chrysococcyx osculans*	Medium
76	342	**Horsfield's Bronze-Cuckoo**	*Chrysococcyx basalis*	**High**
77	242	**Southern Boobook**	*Ninox novaeseelandiae*	Medium
78	249	**Barn Owl**	*Tyto alba*	Low
79	313	**Tawny Frogmouth**	*Podargus strigoides*	Medium
80	331	**Spotted Nightjar**	*Eurostopodus argus*	Medium
81	317	**Australian Owlet-nightjar**	*Aegotheles cristatus*	Medium
82	325	**Red-backed Kingfisher**	*Todiramphus pyrrhopygia*	Medium
83	326	**Sacred Kingfisher**	*Todiramphus sanctus*	Low
84	329	**Rainbow Bee-eater**	*Merops ornatus*	Medium
85	561	**White-browed Treecreeper**	*Climacteris affinis*	Medium
86	556	**Rufous Treecreeper**	*Climacteris rufa*	Medium
87	532	**Splendid Fairy-wren**	*Malurus splendens*	**High**
88	536	**Variegated Fairy-wren**	*Malurus lamberti*	Medium
89	535	**White-winged Fairy-wren**	*Malurus leucopterus*	Medium
90	528	**Rufous-crowned Emu-wren**	*Stipiturus ruficeps*	Low
91	513	**Striated Grasswren**	*Amytornis striatus*	Medium
92	511	**Dusky Grasswren**	*Amytornis purnelli*	Low
93	565	**Spotted Pardalote**	*Pardalotus punctatus*	Medium
94	570	**Red-browed Pardalote**	*Pardalotus rubricatus*	Medium
95	976	**Striated Pardalote**	*Pardalotus striatus*	Medium
96	488	**White-browed Scrubwren**	*Sericornis frontalis*	Low
97	499	**Shy Heathwren**	*Hylacola cauta*	Medium
98	502	**Rufous Fieldwren**	*Calamanthus campestris*	Low
99	497	**Redthroat**	*Pyrrholaemus brunneus*	Medium
100	465	**Weebill**	*Smicrornis brevirostris*	**High**
101	463	**Western Gerygone**	*Gerygone fusca*	Low
102	476	**Inland Thornbill**	*Acanthiza apicalis*	**High**
103	481	**Chestnut-rumped Thornbill**	*Acanthiza uropygialis*	**High**
104	480	**Slaty-backed Thornbill**	*Acanthiza robustirostris*	Medium
105	482	**Slender-billed Thornbill**	*Acanthiza iredalei*	Low
106	486	**Yellow-rumped Thornbill**	*Acanthiza chrysorrhoa*	Medium
107	466	**Southern Whiteface**	*Aphelocephala leucopsis*	**High**
108	469	**Banded Whiteface**	*Aphelocephala nigricincta*	Low
109	638	**Red Wattlebird**	*Anthochaera carunculata*	Medium
110	640	**Spiny-cheeked Honeyeater**	*Acanthagenys rufogularis*	**High**

111	635	**Yellow-throated Miner**	*Manorina flavigula*	**High**
112	608	**Singing Honeyeater**	*Lichenostomus virescens*	**High**
113	617	**White-eared Honeyeater**	*Lichenostomus leucotis*	Medium
114	620	**Purple-gaped Honeyeater**	*Lichenostomus cratitius*	Low
115	621	**Grey-headed Honeyeater**	*Lichenostomus keartlandi*	Low
116	622	**Yellow-plumed Honeyeater**	*Lichenostomus ornatus*	Medium
117	623	**Grey-fronted Honeyeater**	*Lichenostomus plumulus*	**High**
118	625	**White-plumed Honeyeater**	*Lichenostomus penicillatus*	Medium
119	583	**Brown-headed Honeyeater**	*Melithreptus brevirostris*	Medium
120	594	**White-fronted Honeyeater**	*Phylidonyris albifrons*	**High**
121	599	**Grey Honeyeater**	*Conopophila whitei*	Low
122	589	**Black Honeyeater**	*Certhionyx niger*	Medium
123	602	**Pied Honeyeater**	*Certhionyx variegatus*	Medium
124	449	**Crimson Chat**	*Epthianura tricolor*	**High**
125	450	**Orange Chat**	*Epthianura aurifrons*	Medium
126	448	**White-fronted Chat**	*Epthianura albifrons*	Medium
127	377	**Jacky Winter**	*Microeca fascinans*	**High**
128	381	**Red-capped Robin**	*Petroica goodenovii*	**High**
129	385	**Hooded Robin**	*Melanodryas cucullata*	**High**
130	394	**Western Yellow Robin**	*Eopsaltria griseogularis*	Medium
131	441	**Southern Scrub-robin**	*Drymodes brunneopygia*	Low
132	445	**White-browed Babbler**	*Pomatostomus superciliosus*	**High**
133	865	**Chiming Wedgebill**	*Psophodes occidentalis*	Medium
134	437	**Chestnut Quail-thrush**	*Cinclosoma castanotus*	Medium
135	439	**Cinnamon Quail-thrush**	*Cinclosoma cinnamomeum*	Low
136	549	**Varied Sittella**	*Daphoenositta chrysoptera*	Medium
137	419	**Crested Bellbird**	*Oreoica gutturalis*	**High**
138	403	**Gilbert's Whistler**	*Pachycephala inornata*	Medium
139	398	**Golden Whistler**	*Pachycephala pectoralis*	Low
140	401	**Rufous Whistler**	*Pachycephala rufiventris*	**High**
141	408	**Grey Shrike-thrush**	*Colluricincla harmonica*	**High**
142	728	**Restless Flycatcher**	*Myiagra inquieta*	Medium
143	415	**Magpie-lark**	*Grallina cyanoleuca*	Medium
144	361	**Grey Fantail**	*Rhipidura fuliginosa*	Low
145	364	**Willie Wagtail**	*Rhipidura leucophrys*	**High**
146	424	**Black-faced Cuckoo-shrike**	*Coracina novaehollandiae*	**High**
147	423	**Ground Cuckoo-shrike**	*Coracina maxima*	Medium
148	430	**White-winged Triller**	*Lalage sueurii*	Medium
149	543	**White-breasted Woodswallow**	*Artamus leucorhynchus*	Low
150	544	**Masked Woodswallow**	*Artamus personatus*	Medium
151	545	**White-browed Woodswallow**	*Artamus superciliosus*	Medium
152	546	**Black-faced Woodswallow**	*Artamus cinereus*	**High**
153	547	**Dusky Woodswallow**	*Artamus cyanopterus*	Medium
154	548	**Little Woodswallow**	*Artamus minor*	Medium
155	702	**Grey Butcherbird**	*Cracticus torquatus*	**High**
156	700	**Pied Butcherbird**	*Cracticus nigrogularis*	**High**
157	705	**Australian Magpie**	*Gymnorhina tibicen*	**High**
158	697	**Grey Currawong**	*Strepera versicolor*	Medium
159	930	**Australian Raven**	*Corvus coronoides*	Medium
160	954	**Little Raven**	*Corvus mellori*	Low
161	691	**Little Crow**	*Corvus bennetti*	**High**
162	692	**Torresian Crow**	*Corvus orru*	Medium
163	693	**White-winged Chough**	*Corcorax melanorhamphos*	Low
164	681	**Western Bowerbird**	*Chlamydera guttata*	Low
165	647	**Australian Pipit**	*Anthus novaeseelandiae*	**High**
166	995	**House Sparrow**	*Passer domesticus*	Low
167	653	**Zebra Finch**	*Taeniopygia guttata*	**High**

168	654	**Painted Finch**	*Emblema pictum*	Low
169	564	**Mistletoebird**	*Dicaeum hirundinaceum*	Medium
170	358	**White-backed Swallow**	*Cheramoeca leucosternus*	Medium
171	357	**Welcome Swallow**	*Hirundo neoxena*	Medium
172	359	**Tree Martin**	*Hirundo nigricans*	Medium
173	360	**Fairy Martin**	*Hirundo ariel*	Medium
174	522	**Little Grassbird**	*Megalurus gramineus*	Low
175	509	**Rufous Songlark**	*Cinclorhamphus mathewsi*	Medium
176	508	**Brown Songlark**	*Cinclorhamphus cruralis*	Medium
177	574	**Silvereye**	*Zosterops lateralis*	Low
178	999	**Common Starling**	*Sturnus vulgaris*	Medium

The Great Victoria Desert was much wetter during the second Atlas than the first, thanks to a series of cyclones, which may explain some apparent increases in species like the Emu. A handful of limited range, threatened and introduced species do occur in the bioregion, but apparently only in small numbers. With only a small number of surveys over an enormous area, trends must be interpreted with extra caution. None were detected statistically.

Status: Semi-arid avifauna that responds primarily to rainfall change and has the highest level of Australian endemism.

Rare and threatened: No major populations.

Increasers: None indicative of landscape health.

Indicators: Emu, Australian Bustard, Banded Lapwing, Scarlet-chested Parrot, White-browed Treecreeper, Hooded Robin, Jacky Winter, Varied Sittella, Crested Bellbird, Restless Flycatcher.

Trend: No trends detected.

Scenario: Possible decline of some ground-feeding birds as a result of changes in fire regime, grazing or predators.

Actions: No grazing in representative areas and the adoption of reduced, conservative grazing rates in key habitat across the bioregion, along with appropriate fire regime to maintain diversity.

Appendix H

Refugia for Biological Diversity in Arid and Semi-arid Australia

Refugia for Biological Diversity in Arid and Semi-arid Australia

Biodiversity Series, Paper No. 4
Biodiversity Unit

S.R. Morton, J. Short and R.D. Barker
with an Appendix by G.F. Griffin and G. Pearce

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5. FOCI OF BIOLOGICAL DIVERSITY IN SOUTH AUSTRALIA

5.1. Great Victoria Desert

Area

211,068 km2.

Primary land-use

Crown land, conservation reserves and Aboriginal land.

National Parks and Nature Reserves

Great Victoria Desert Nature Reserve (part), Queen Victoria Spring Nature Reserve, Plumridge Lakes Nature Reserve (part), Neale Junction Nature Reserve, Yeo Lake Nature Reserve and Baker Lake areas (McKenzie and Burbidge 1979), all in Western Australia. The Unnamed Conservation Park in north-eastern South Australia (Greenslade *et al.* 1986), and Tallaringa Conservation Park, Yellabinna Regional Reserve, and Yumbaria Conservation Park (South Australia).

Management problems

Rabbits, house mice, camels, foxes and feral cats appear to be present throughout the Region (e.g. McKenzie and Burbidge 1979). In the South Australian desert rabbits are a major problem, causing loss of tree and shrub species by eating seedlings (Bird in Greenslade *et al.* 1986). In isolated parts of the Yellabinna area, tourist traffic may be leading to some degradation (Copley 1992).

ANZECC-listed species

Mammals: Sandhill dunnarts *Sminthopsis psammophila* (V) occur in the vicinity of Queen Victoria Spring (Hart and Kitchener 1986; Pearson and Robinson 1990), and in the Yellabinna area (Pearson and Robinson 1990; Kemper 1992).

Birds: Malleefowl *Leipoa ocellata* (E) are sparsely distributed throughout the South Australian portion of the Region (Black and Badman in Greenslade *et al*. 1986; Cohen *et al*. 1992; Garnett 1992, p. 32).

Plants: Symon and Copley (in Greenslade *et al.* 1986) collected *Lepidium hyssopifolium* (E) within the Unnamed Conservation Park; see also Cropper (1989).

Species that are regionally endemic

Reptiles: The dragon *Diporiphora linga* is endemic to the eastern Great Victoria Desert (Bird in Greenslade *et al.* 1986; Copley 1992), and *D. reginae* to the west (Cogger 1992). The skinks *Lerista elongata* and *L. puncticauda* occur only in the Region (Cogger 1992). A blind snake *Ramphotyphlops margaretae* is known only from Lake Throssell (Cogger 1992). The eastern population of *Delma fraseri* could be considered restricted and possibly at risk (Bird in Greenslade *et al.* 1986).

Plants: *Grevillea treuriana*, *Lechenaultia* sp. and *Hibbertia crispula* in Yellabinna (Copley 1992).

Relict populations

The plants *Santalum spicatum*, *Daviesia arthropoda*, *Eucalyptus pimpiniana* and *Helichrysum monochaetum* (Copley 1992).

Other significant populations

Mammals: The dasyurids *Sminthopsis hirtipes* and *Antechinomys laniger* are uncommon species found at Yellabinna (Copley 1992).

Birds: The Region is the centre of distribution of the scarlet-chested parrot *Neophema splendida* (Blakers *et al*. 1984; Black and Badman in Greenslade *et al.* 1986). Naretha blue-bonnet parrots *Northiella haematogaster narethae* have been recorded beyond proposed Plumridge Lakes Reserve; also reported by Black and Badman (in Greenslade *et al.* 1986). Pureba Conservation Park and Yellabina Regional Reserve in South Australia have slender-billed thornbills *Acanthiza iredalei iredalei* (Garnett 1992, p. 146). Australian bustards *Ardeotis kori* occur at Yellabinna (Copley 1992).

Reptiles: *Diporiphora reginae* has a restricted distribution around Queen Victoria Spring south to Fraser Range, and is regarded as significant or rare by Burbidge *et al*. (1976).

Plants: *Eucalyptus trivalvis*, *Calytrix gypsophila*, *Comesperma viscidulum* and *Goodenia glandulosa* are disjunct species represented at Yellabinna (Copley 1992). Symon and

Copley (in Greenslade *et al.* 1986) noted seven other species of rare and endangered plants listed by Leigh *et al.* (1984): *Calandrinia disperma*, *Darwinia micropetala*, *Frankenia cineria*, *F. muscosa* (all collected within the Unnamed Conservation Park) and *Lepidium pseudoruderale*, *Eucalyptus pimpiniana*, *Grammosolon truncata*, and *Gnephosis intosa*.

Wetland sites

Morelli and Drewien (1993) recorded Serpentine Lakes, in the Unnamed Conservation Park near the border between South Australia and Western Australia, as a significant palaeodrainage system. There is little information about the Lakes.

Refugia

Despite the lack of detailed data, Serpentine Lakes are noted as a refuge (see section 11.3).

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Appendix I

Search Results of the Australian Wetlands Database

A Directory of Important Wetlands in Australia

To save this report to your computer, use File/Save as, and use a .TXT file extension.

Yeo Lake/Lake Throssell - WA044

Level of importance: National - Directory

Location: Yeo Lake: 27 degrees 56'-28 degrees 09' S, 124 degrees 04'-124 degrees 40' E, Lake Throssell: 27 degrees 21'- 27 degrees 47' S, 123 degrees 53'-124 degrees 22' E; immediately east of the Cosmo Newberry Aboriginal Reserve, 350 km (Lake Yeo) to 400 km (Lake Throssell) north of Kitchener (Trans-Australia Railway Line).

Biogeographic region: Great Victoria Desert

Shire: Laverton.

Area: Lake Yeo: 39 000 ha; Lake Throssell: 32 000 ha.

Elevation: Yeo Lake: c. 350 m ASL; Lake Throssell: c. 370 m ASL.

Other listed wetlands in same aggregation: None.

Wetland type: B2, B8

Criteria for inclusion: 1, 6,

Site description: The site consists of Yeo Lake, Lake Throssell and their associated claypans and ephemeral drainages.

Physical features: Landform: Two megascale irregular elongate sumplands. Yeo Lake is a crescent-shaped lake stretching c. 50 km east-west. Scattered mesoscale to macroscale claypans surround the lake and are numerous around its south-eastern extremity. Two creeks (the western one is a linear drainage c. 20 km long and the eastern one is a forked drainage c. 15 km long) enter Yeo Lake from the south. Lake Throssell lies 20 km north of Yeo Lake. It stretches c. 50 km northeast-southwest and contains numerous microscale to macroscale islands of white gypsiferous dunes rising to 10 m. It is fed by localised drainages, the longest (less than 10 km) of which drains the Scarr Hills to the west of the lake. Numerous isolated mesoscale to macroscale claypans lie up to 25 km north-west. Geological setting: Situated in the Officer Basin, the lakes lie in a wide shallow Cainozoic depression over undifferentiated Permian-Mesozoic sedimentary rocks. They were formerly part of a major river system (the Throssell Palaeoriver) which flowed south-east to the sea, but are now ponding areas for the modern internal drainage. The lake beds consists of Quaternary sand, silt and clay and are covered by an indurated crust of crystalline gypsum and salt. The prevailing westerly winds have created low dunes on the eastern margins of the lakes. Climate: Median and mean annual rainfall at Rawlinna (nearest station with similar rainfall) are 168 mm and 187 mm respectively, mostly

falling in May-June; average annual evaporation is c. 3600 mm (Gower & Boegli 1977; Bunting et al. 1978).

Hydrological features: Water supply: Surface inflow along intermittent drainages and direct precipitation. Inundation: Episodic; the surfaces of the lakes are usually dry, but the sediments of Lake Yeo are saturated with salt water. Water depth: More information is needed, but maximum depth when full may be no more than 0.1 m. Water salinity: Possibly fresh initially, becoming saline, probable class: Hypersaline, poikilohaline. The eastern watercourse which drains northward to Yeo Lake contained a series of freshwater pools (near the abandoned Yeo Homestead) in March 1976. Water colour: Brown initially, settling to clear (Gower & Boegli 1977; Bunting et al. 1978; Burbidge & McKenzie 1979).

Ecological features: Ecological role: More information needed. Plant structural formations: Samphire flats, low open-shrublands.

Significance:

Notable flora: Threatened species: None. Composition: The floor of Yeo Lake is mostly bare, but low shrublands of Bluebush Maireana pyramidata and Saltbush Atriplex sp. with Pigface Disphyma crassifolium subsp. clavellatum and Samphire Halosarcia spp. cover extensive depressions and drainage channels associated with the lake. Small patches of the grass Diplachne muelleri and the shrub Rutidosis helichrysoides grow along the watercourses. Outlying pans are covered with a low open-shrubland of samphire, saltbush and D. crassifolium subsp. clavellatum. Between the pans are gypsum dunes supporting low open-woodlands of Callitris columellaris and Casuarina pauper (to 7 m) over scattered Atriplex sp. and tufts of native grass. The floor of Lake Throssell is mostly vegetated with a variety of halophytic plants, including Atriplex nana, A. vesicaria, Halosarcia indica, H. pruinosa, Maireana amoena, M. carnosa, M. platycarpa, M. pyrimidata, M. tomentosa, Sclerolaena eurotioides, S. patenticuspis. Eucalyptus comitae-vallis and E. sublucida form stands on sand ridges near the lake. E. comitae-vallis also grows in palaeodrainage lines to the south. Cotton bush Ptilotus obovatus occurs only locally near Lake Throssell. Small stunted trees of Casuarina pauper (to 6 m) with a few Eremophila miniata, Acacia sp. and Senecio lautus are scattered over the (mostly bare) dunes in the lake. Low woodlands of C. pauper (to 12 m) with A. aneura, Pittosporum phillyraeoides, E. miniata, Ptilotus obovatus, grasses and forbs surround the lake (Beard 1974; Burbidge & McKenzie 1979; Beard 1990; A.A. Burbidge pers. comm.).

Notable fauna: Threatened species: None. Composition: White-faced Heron Ardea novaehollandiae, Grey Teal Anas gibberifrons, Maned Duck Chenonetta jubata, Black-tailed Native-hen Gallinula ventralis, Banded Plover Vanellus tricolor, Black-fronted Plover Charadrius melanops and Red-kneed Dotterel Erythrogonys cinctus have been recorded on Yeo Lake, associated claypans or fresh pools along ephemeral drainages. Numbers: 60 Maned Duck were observed on a claypan near the Yeo Hills and 40 Banded Plover were counted on claypans near the abandoned Yeo Homestead (c. 6 km south of the lake) in May 1966. There is no information on waterbird usage of Lake Throssell (Johnstone et al. 1979).

Other Fauna: Threatened species: None. Composition: Yeo Lake: c. 64 bird species have been recorded in the area. 31 species of reptile were recorded in the Yeo Lake Nature Reserve in March 1976, four of these were found on the bed of the lake: The geckos Nephrurus vertebralis (on Atriplex flats and sandy interdunes) and Rhynchoedura ornata (on the clayey soil of the lake bed at night), the dragon Amphibolurus reticulatus (in a burrow in the hard clayey floor of the lake) and Sphenomorphus richardsonii (dug from a burrow in moist loamy soil under litter on the lake bed). Red Kangaroo Megaleia rufa, Sandy Mouse Psuedomys hermannsburgensis and three introduced species (House Mouse Mus musculus, European Rabbit Oryctolagus cuniculus and Camel Camelus dromedarius) have been observed or trapped on samphire areas and saltbush and bluebush plains around the lake. Numbers: Masses of tadpoles of Cyclorana maini were reported in drying pools in March 1976 (Johnstone et al. 1979; McKenzie et al. 1979; Smith & Johnstone 1979).

Social and Cultural values: Cultural: The area around Lake Throssell has been used by Aboriginal people and has ethnographic (with several ceremonial and mythological sites) and archaeological components (including painting and artefact sites). In the vicinity is an important mythological site which is a gazetted Protected Area (since 1979, under the Aboriginal Heritage Act 1972). Waterholes with nearby windbreaks, hearths and smoked kangaroo bones provide other evidence of former occupation by Aborigines (L. Bloor pers. comm.). Research: A biological survey of the Yeo Lake area was conducted by WADCALM and the W.A. Museum in March 1979; biological surveys of the Lake Throssell area are proposed (Goldfields Regional Management Plan 1994-2004, WADCALM).

Land tenure: Yeo Lake is entirely within Yeo Lake Nature Reserve (36271, Class A) for Conservation of Flora and Fauna. Lake Throssell, formerly leasehold (Throssell Downs pastoral station), now falls mostly within the proposed Lake Throssell Conservation Park, with the exception of the western end which is part of Reserve (25051) for Use and Benefit of Aboriginal Inhabitants. Surrounding area: Vacant crown land, a reserve for the use and benefit of Aboriginal inhabitants, and leasehold (Yamarna pastoral station).

Current land use: There are Aboriginal and tourist interests in the area. Surrounding area: Aboriginal usage and sparse human population.

Disturbance or threat: Past/present: The saltbush-bluebush association of the salt lakes is the best available stock feed and, given the low regrowth rate, is particularly vulnerable to over grazing.

Potential: No information.

Conservation measures taken: The site is listed on the Register of the National Estate.

Management authority and jurisdiction: The nature reserve is managed by WADCALM for NPNCA; Reserve 25051 is managed by the Aboriginal Lands Trust; former leasehold land by the W.A. Department of Land Administration.

References: See Western Australia Reference List

Compiler & date: Romeny J. Lynch, c/- Department of Conservation and Land Management, Busselton. July- October 1995. Minor revision by Sue Elscot in 2000.

Drainage:

Go to basic query form | Go to advanced query form | Go to spatial query tool

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Our land. Our plan. Our future.
Australian Government | Australian Water Resources 2005 | Bureau of Meteorology | Community Water Grants | Environment Portal | Murray-Darling Basin Initiative | National Action Plan for Salinity and Water Quality | National Centre for Tropical Wetland Research | National Water Commission | Water efficiency labelling

Appendix J

Search Results of the Environment Reporting Tool of the Australian Government Department of Environment, Water, Heritage and Arts (DEWHA)

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Australian Government
Department of the Environment, Water, Heritage and the Arts

[ ]

Environmental Reporting Tool

28 May 2008 12:33

Database Report

This report includes places of national environmental significance that are registered in the Department of the Environment and Water Resources' databases, for the selected area. The information presented here has been provided by a range of groups across Australia, and the accuracy and resolution varies.

Search Type:	Point
Buffer:	100 km
Coordinates:	-26.68333,128.25

Report Contents: Summary >> Details >> Caveat >> Acknowledgment

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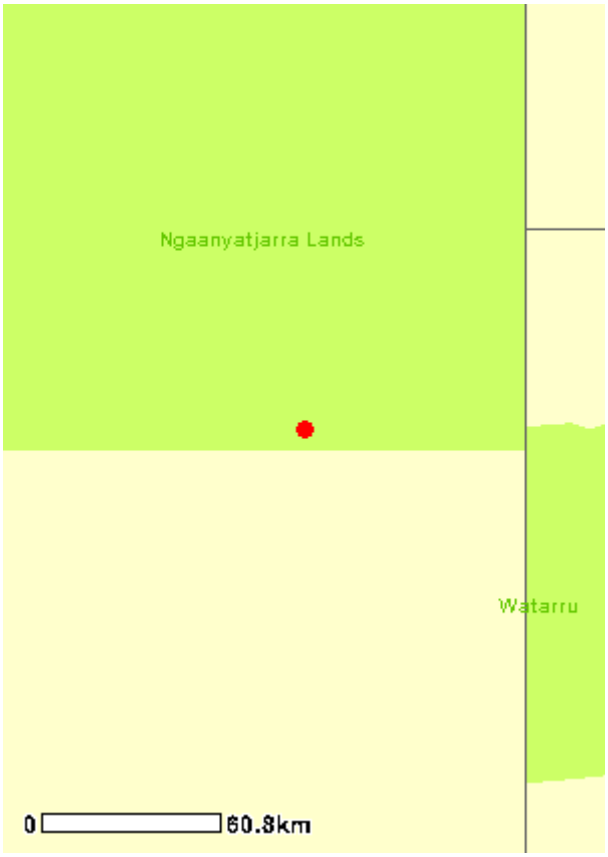

Biodiversity

Threatened Species:	5
Migratory Species:	3
Listed Marine Species:	2
Invasive Species:	4
Whales and Other Cetaceans:	None
Threatened Ecological Communities:	None

Heritage

World Heritage Properties:	None
Australian Heritage Sites:	1

Wetlands

Ramsar sites: (Internationally important)	None
Nationally Important Wetlands:	None

National Pollutant Inventory

Reporting Facilities:	None
Airsheds:	None
Catchments:	None

Protected Areas

Reserves and Conservation Areas:	2
Regional Forest Agreements:	None

Biodiversity

Threatened Species [Dataset Information]	Status	Comments
Birds		
Leipoa ocellata Malleefowl	Vulnerable	Species or species habitat likely to occur within area
Polytelis alexandrae Princess Parrot, Alexandra's Parrot	Vulnerable	Species or species habitat may occur within area
Mammals		
Dasycercus cristicauda Mulgara	Vulnerable	Species or species habitat likely to occur within area
Petrogale lateralis MacDonnell Ranges race Warru, Black-footed Rock-wallaby (MacDonnell Ranges race)	Vulnerable	Species or species habitat may occur within area
Reptiles		
Egernia kintorei Great Desert Skink, Tjakura, Warrarna, Mulyamiji	Vulnerable	Species or species habitat may occur within area

Migratory Species [Dataset Information]	Status	Comments
Migratory Terrestrial Species		
Birds		
Leipoa ocellata Malleefowl	Migratory	Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater	Migratory	Species or species habitat may occur within area
Migratory Wetland Species		

Birds		
Charadrius veredus Oriental Plover, Oriental Dotterel	Migratory	Species or species habitat may occur within area
Listed Marine Species [Dataset Information]	Status	Comments
Birds		
Charadrius veredus Oriental Plover, Oriental Dotterel	Listed - overfly marine area	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater	Listed - overfly marine area	Species or species habitat may occur within area
Invasive Species [Dataset Information]	Status	Comments
Selected Invasive Species: Weeds reported here are the 20 species of national significance (WoNS), 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 Resouces Audit, 2001.		
Mammals		
Felis catus Cat, House Cat, Domestic Cat	Feral	Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit	Feral	Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox	Feral	Species or species habitat likely to occur within area
Plants		
Cenchrus ciliaris Buffel-grass, Black Buffel-grass	Invasive	Species or species habitat may occur within area
Heritage		
Australian Heritage Sites [Dataset Information] Note that not all Indigenous sites may be listed.		
Natural		
Ranges of the Western Desert WA		
Other		

Reserves and Conservation Areas [Dataset Information]

Ngaanyatjarra Lands Indigenous Protected Area, WA

Watarru Indigenous Protected Area, SA

Caveat

The information presented here has been drawn from a range of sources, compiled for a variety of purposes. Details of the coverage of each dataset are included in the metadata [Dataset Information] links above.

Acknowledgment

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

- New South Wales National Parks and Wildlife Service
- Department of Sustainability and Environment, Victoria
- Department of Primary Industries, Water and Environment, Tasmania
- Department of Environment and Heritage, South Australia Planning SA
- Parks and Wildlife Commission of the Northern Territory
- Environmental Protection Agency, Queensland
- Birds Australia
- Australian Bird and Bat Banding Scheme
- Australian National Wildlife Collection
- Natural history museums of Australia
- 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, Atherton and Canberra
- University of New England
- Other groups and individuals

ANUCliM Version 1.8, Centre for Resource and Environmental Studies, Australian National University was used extensively for the production of draft maps of species distribution. The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Appendix K

Summary Tables Describing Conservation Status

IUCN categories also used under the Commonwealth EPBC Act and by DEC

Status	Code	Description
Extinct	(EX)	A taxon is Extinct when there is no reasonable doubt that the last individual has died.
Extinct in the Wild	(EW)	A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range.
Critically Endangered	(CR)	A taxon is Critically Endangered when the best available evidence indicates that it is considered to be facing an extremely high risk of extinction in the wild.
Endangered	(EN)	A taxon is Endangered when the best available evidence indicates that it is considered to be facing a very high risk of extinction in the wild.
Vulnerable	(VU)	A taxon is Vulnerable when the best available evidence indicates that it is considered to be facing a high risk of extinction in the wild.
Lower Risk	(LR)	A taxon is Lower Risk when it has been evaluated, does not satisfy the criteria for any of the categories Critically Endangered, Endangered or Vulnerable. Taxa included in the Lower Risk category can be separated into three subcategories: o Conservation Dependent (cd). Taxa which are the focus of a continuing taxon-specific or habitat-specific conservation program targeted towards the taxon in question, the cessation of which would result in the taxon qualifying for one of the threatened categories above within a period of five years. o Near Threatened (nt). Taxa which do not qualify for Conservation Dependent, but which are close to qualifying for Vulnerable. o Least Concern (lc). Taxa which do not qualify for Conservation Dependent or Near Threatened.
Data Deficient	(DD)	A taxon is Data Deficient when 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)	A taxon is Not Evaluated when it is has not yet been evaluated against the criteria.

Schedules of the Western Australian Wildlife Conservation Act 1950: Wildlife Conservation (Specially Protected Fauna) Notice.

Status	Code	Description
Schedule 1	(S1)	Fauna that is rare or likely to become extinct, are declared to be fauna that is in need of special protection
Schedule 2	(S2)	Fauna that is presumed to be extinct, are declared to be fauna that is in need of special protection
Schedule 3	(S3)	Birds that are subject to an agreement between the governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction, are declared to be faunathat is in need of special protection
Schedule 4	(S4)	Fauna that is in need of special protection, otherwise than for the reasons mentioned above

Priority Fauna Codes used by the Western Australian DEC

Status	Code	Description
Priority One Taxa with few, poorly known populations on threatened lands.	(P1)	Taxa which are known from few specimens or sight records from one or a few localities on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, active mineral leases. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
Priority Two Taxa with few, poorly known populations on conservation lands.	(P2)	Taxa which are known from few specimens or sight records from one or a few localities on lands not under immediate threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
Priority Three Taxa with several, poorly known populations, some on conservation lands.	(P3)	Taxa which are known from few specimens or sight records from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
Priority Four Taxa in need of monitoring.	(P4)	Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands.
Priority Five Taxa in need of monitoring.	(P5)	Taxa which are not considered threatened but are subject to a specific conservatin program, the cessation of which would result in the species becoming threatened within five years.