Level 1 Vegetation, Flora and Fauna Assessment, and Targeted Conservation Significant Flora and Fauna Survey: Mt Macleod West

Fortescue Metals Group Limited

science+design

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7848-2672-11R Final

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Rev No.	Author	Approved for Issue	Date
Draft rev 0	JN/LA/JS	SK/BT	March 2012
Final	JN/LA/JS	LA	February 2013

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Acknowledgements

Ecoscape wishes to acknowledge the assistance of the following Fortescue Metals Group Limited personnel in relation the Mt Macleod West survey:

- Todd Edwards, for coordinating the field survey logistics
- Matthew Dowling, project manager
- Shadi Sayadi and the Bonnie Doon camp crew for accommodation and meals, and helping out with the myriad day-to-day issues that occur during field surveys.

Thanks also to Mike Bamford for discussion and advice on fauna survey methods, and assistance with identification of bird images and tracks.

Executive Summary

Ecoscape was commissioned by Fortescue Metals Group Limited (Fortescue) to undertake a Level 1 Flora and Vegetation Assessment and a Level 1 Fauna Assessment of the Mt Macleod West exploration area within Fortescue's Central Pilbara Project (CPP) area, north-west of Tom Price in the Pilbara region of Western Australia. Ecoscape has conducted a Level 2 Flora and Vegetation of the CPP; this report provides additional information for this area.

Level 1 surveys include background 'desktop' research and a reconnaissance (field) survey to verify the accuracy of the background research. Targeted searches for conservation significant flora and fauna species and significant ecological communities were also conducted.

The flora and vegetation field survey was undertaken in July 2011 and identified:

- 13 different vegetation types plus a mosaic consisting of two of these
- no vegetation type matches the descriptions of any recognised TEC
- one vegetation type is considered analogous to the 'Brockman Iron cracking clay communities of the Hamersley' PEC, **Ap** (*Astrebla pectinata, Stemodia kingii* and *Polymeria longifolia* tussock grassland/sparse herbland with *Acacia victoriae* and *A. synchronicia* scattered shrubs) occupying 152.05 ha
- *Eucalyptus victrix* dominated vegetation (in **EvEb** and **AcEa** vegetation types) is considered to indicate a potential groundwater dependent ecosystem (GDE), and occupied 1.3 ha and 49.9 ha respectively
- 'Valley floor Mulga' and 'Lower slopes Mulga' have been identified as 'Ecosystems at Risk' in Kendrick (2002), however they do not have legislative protection. Within the study area the **AaAbTe**, **AaCf** and **AaTe^2** vegetation types can be considered analogous with 'Valley floor Mulga' and **AaTw^2** analogous with 'Lower slopes Mulga', and occupy 1541.7 ha, and 74.7 ha respectively
- the vegetation condition ranged from Poor (in grazed areas) to Excellent depending of the density of weeds, impacts from grazing and effects of fire
- a total of 232 vascular flora taxa were recorded within the study area from 46 relevés, 12 floristic quadrats and opportunistic observations within the study area
- no TF gazetted under the Government of Western Australia's *Wildlife Conservation Act* (1950) or listed as Threatened under the Commonwealth *EPBC Act* (1999) were recorded from the study area, with the presence of TF species (*Lepidium catapycnon* and *Thryptomene wittweri*) being unlikely as the usual habitat is not present in the study area
- five DEC-listed PF were recorded from the study area; *Astrebla lappacea* (P3), *Iotasperma sessilifolium* (P3), *Rhagodia* sp. Hamersley (P3) and *Themeda* sp. Hamersley Station (P3) and *Vigna* sp. central (P2)

- *Aristida ingrata, Brachyscome iberidifolia*, *Chrysocephalum gilesii*, *Eriachne ciliata*, *Hibiscus sturtii* var. *grandiflorus*, *Rhodanthe charsleyae* and *Rutidosis helichrysoides* subsp. *helichrysoides* were on the edge of their usual range or a range extension
- four introduced flora species, **Acetosa vesicaria* (Ruby dock), **Bidens bipinnata* (Bipinnate Beggarticks), **Cucumis melo* subsp. *agrestis* (Ulcardo Melon) and **Vachellia farnesiana* (Mimosa Bush) were recorded from the study area. No Declared Plants were recorded from the study area.

The fauna field survey to verify findings of the desktop assessment and target conservation-significant species was undertaken from 12-15 August 2011 (42 person hours) and identified:

- five habitat types, corresponding to sheltered gullies and low cliffs with eucalypt woodland; exposed slopes and low ridges with hard spinifex; tussock grassland on valley floor; mulga woodland/snakewood on valley floor; and Triodia grassland with scattered shrubs on valley floor
- habitat was in good to excellent condition throughout the study area except for some recently burnt areas and relatively minor grazing impact. Habitat quality for species of interest was limited by the absence of permanent water sources
- a total of 54 vertebrate species recorded (one frog, six mammals, 13 reptiles, 34 birds), of which one is listed as Vulnerable by the EPBC Act (Pilbara Olive Python), two Priority listed (*P4*) by DEC (Australian Bustard and Western Pebble-mound Mouse) and one Migratory (Rainbow Bee-eater)
- a total of 15 Fauna species of conservation significance are either known or considered potentially to occur in the study area
- conservation significant species with suitable habitat that are likely to be resident or regular visitors include:
    - Long-tailed Dunnart (*Sminthopsis longicaudatus*, *P4*)
    - Northern Short-tailed Mouse (*Leggadina lakedownensis*, *P4*)
    - Western Pebble-mound Mouse (Pseudomys chapmani, *P4*)
    - Australian Bustard (*Ardeotis australis*, *P4*)
    - Bush Stone-Curlew (*Burhinus grallarius*, *P4*)
    - Rainbow Bee-eater (*Merops ornatus*, EPBC *Mig*)
    - Lined Soil-crevice Skink (*Notoscincus butleri*, *P4*)
    - Blindsnake (Ramphotyphlops ganei, *P1*)
- conservation-significant species with relatively poor habitat in the study area, highly unlikely to be resident but relatively mobile and potentially occurring seasonally or intermittently, include:
    - Northern Quoll (*Dasyurus hallucatus,* EPBC *EN*)
    - Pilbara Olive Python (*Liasis olivaceus barroni*, EPBC *VU*)
    - Ghost bat (*Macroderma gigas*, *P4*)

- Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*, EPBC *VU*)
- Grey Falcon (*Falco hypoleucos*, *P4*)
- Peregrine Falcon (*Falco peregrinus*, WCA S4)
- Star Finch (*Neochmia ruficauda subclarescens*, *P4*).

1.0 Introduction

1.1 Project Overview

Ecoscape was commissioned by Fortescue Metals Group Limited (Fortescue) to undertake a Level 1 Flora and Vegetation Assessment and a Level 1 Fauna Assessment of the Mt Macleod West and Dixon Well project area, within Fortescue's Central Pilbara Project exploration area.

This report is for the Mt Macleod West area.

1.1.1 STUDY AREA LOCATION

The study area consists of exploration tenements P47/1407, P47/1408, P47/1409 and E47/1763, known as Mt Macleod West, in Fortescue's Central Pilbara project area, and is in the Shire of Ashburton in the Pilbara region, approximately 40 km north-north-west of Tom Price.

Figure 1 shows the location of the Mt Macleod West study area.

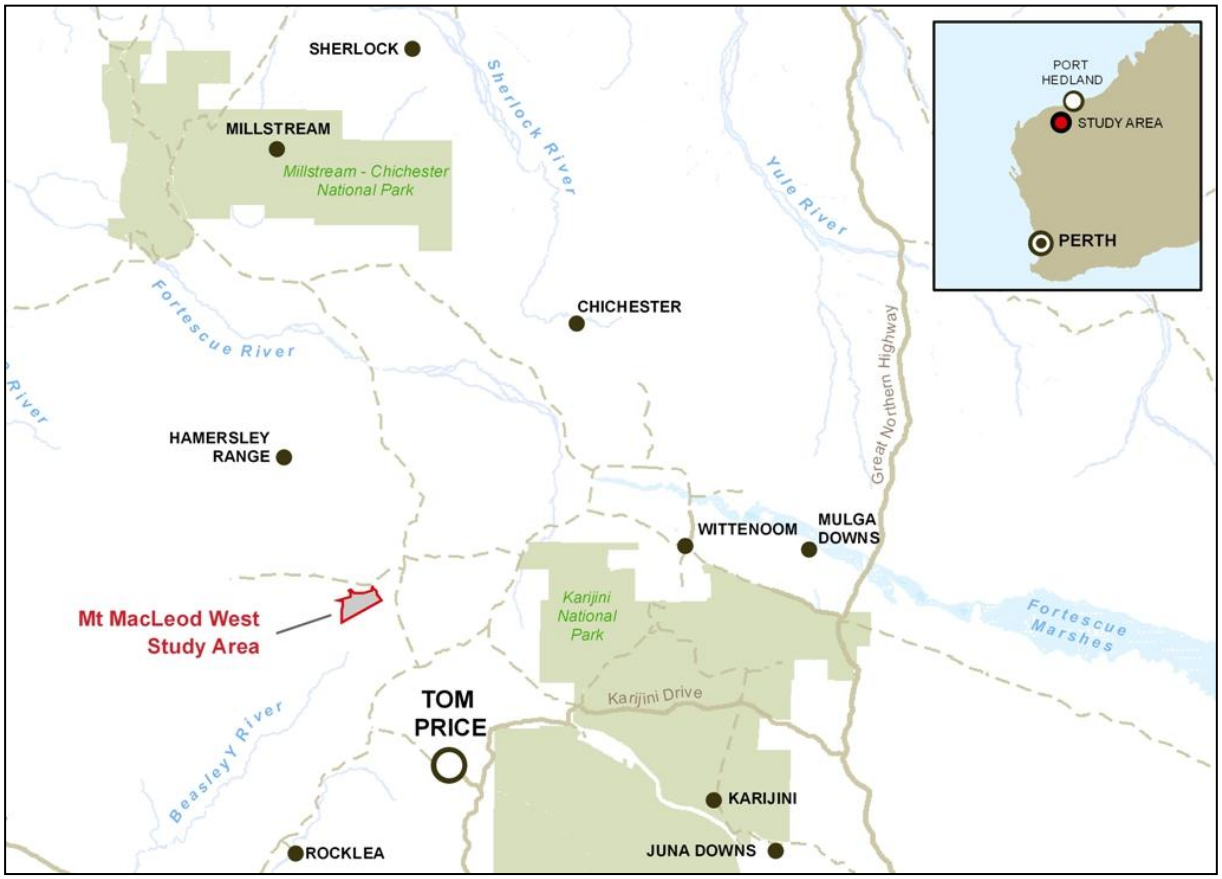

Figure 1: Regional location of the study area

1.2 Project Objectives

The Level 1 Flora and Vegetation assessment and targeted conservation significant flora species searches were undertaken to be compliant with:

- Environmental Protection Authority (EPA) *Guidance Statement No. 51: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessments in Western Australia* (2004a)
- *Terrestrial Biological Surveys as an Element of Biodiversity Protection Position Statement No.* 3 (EPA 2002).

The flora and vegetation assessment involved:

- a background research or 'desktop' study at the locality scale involving a search of all sources of literature, data and map-based information;
- a reconnaissance survey to verify the accuracy of the background study (desktop assessment), to further delineate and characterise the flora and range of vegetation units present within the study area and to identify potential impacts. This involved a survey by qualified botanists to undertake selective, low intensity sampling of the flora and vegetation, including mapping of vegetation units and condition at an appropriate scale
- a targeted survey for conservation significant species and ecological communities.

The Level 1 Fauna assessment and targeted conservation significant fauna species searches were undertaken to be compliant with:

- EPA *Guidance Statement No.56* (2004b);
- *Technical Guide – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment* (EPA & DEC 2010); and
- *Environment Protection and Biodiversity Conservation Act 1999 referral guidelines for the endangered northern quoll, Dasyurus hallucatus, EPBC Act policy statement 3.25* (Department of Sustainability, Environment, Water, Population and Community (DSEWPaC) 2011).

The fauna assessment involved

- a background research or 'desktop' study at the locality scale involving a search of all sources of literature, data and map-based information;
- a reconnaissance survey to verify the accuracy of the background study (desktop assessment), to further delineate and characterise the fauna and faunal assemblages present within the study area and to identify potential impacts. This involved a survey by qualified zoologists to undertake selective, low intensity sampling of the fauna and faunal assemblages, and to provide habitat descriptions and habitat maps of the study area; and
- a targeted trapping survey for conservation significant fauna species and their habitats.

1.3 Previous Surveys

Previous surveys in the Pilbara, reviewed to reference flora and vegetation information, include:

- Ecoscape (2012) *Central Pilbara Project Level 2 Flora and Vegetation Assessment* ; Unpublished report for Fortescue Metals Group Ltd
- Ecoscape (2011) *Pilbara Iron Ore Project – Blacksmith Flora and Vegetation Survey,* Unpublished report for Flinders Mines Ltd
- Ecoscape (2010a) *Level Two Flora and Vegetation Assessment, Firetail Mining Area*, Unpublished report for Fortescue Metals Group Ltd
- ENV Australia (2010) *Solomon Project: Kings Flora and Vegetation Assessment*, Unpublished report for Fortescue Metals Group Ltd
- Coffey Environments (2010) *Flora and Vegetation Assessment, Solomon Project and Investigator*, Unpublished report for Fortescue Metals Group Ltd
- Coffey Environments (2010) *Flora and Vegetation Assessment, Solomon Rail Project Volume 1*, Unpublished report for Fortescue Metals Group Ltd.

Previous fauna surveys pertaining to the central and western Hamersley subregion of the Pilbara include:

- Bamford MJ (2002) Karratha to Tom Price Highway: Karratha to Nanutarra-Munjina Road Section. Assessment of Fauna values and results of Fauna Survey May 2002. Unpublished report commissioned by Gutteridge, Haskins and Davey Pty Ltd; Appendix D of Main Roads Western Australia (2003) Karratha – Tom Price Road, Karratha to Nanutarra-Munjina Rd Section, Consultative Environmental Review (Assessment No. 1244)
- Biota Environmental Sciences (2005) *Fauna Habitats and Fauna Assemblage of Mesa A and G, near Pannawonica*, Unpublished report for Robe River Iron Associates
- Biota Environmental Sciences (2007) *Mesa K Targeted Fauna Survey*, Unpublished report for Pilbara Iron
- Biota Environmental Sciences (2009a) *Hope Downs IV Northern Quoll Position Paper*, Unpublished report for Rio Tinto Iron Ore on behalf of Hamersley HMS
- Biota Environmental Sciences (2009c) *West Turner Syncline Section 10 Development Two-Phase Fauna Survey*. Unpublished report for Pilbara Iron Company
- Coffey Environments (2008) *Level 2 Terrestrial Vertebrate Fauna Assessment for the Solomon Project*, Unpublished report for Fortescue Metals Group Ltd
- Ecologia (2010) *Fortescue Metals Group Ltd Solomon Project: Kings Area Vertebrate Fauna Assessment*, Unpublished report for Fortescue Metals Group Ltd
- Ecoscape (2010b) *Pilbara Iron Ore Project – Blacksmith Vertebrate Fauna and Short Range Endemic Survey,* Unpublished report for Flinders Mines Limited. (7246-2463-10R)
- Ecoscape (2010e) *Vertebrate Fauna and Fauna Habitat Assessment for the Firetail Project*, Unpublished report for Fortescue Metals Group Limited. (7152-2418-09R1)

- Ecoscape (2010d) *Solomon Project – Rail Re-alignment Fauna Assessment*, Unpublished report for Fortescue Metals Group Limited (7291-2480-10R)
- Ecoscape (2010c) *Solomon Project – Rail Camp Sites 1, 2 and 3, Fauna Assessment*, Unpublished report for Fortescue Metals Group Limited (7369-2480-10R)
- Morgan D, Ebner B, and Beatty S (2009) Fishes in groundwater dependent pools of the Fortescue and Yule Rivers; Pilbara, Western Australia. Centre for Fish and Fisheries Research, Murdoch University
- Muir BG (ed) (1983) A Fauna Survey of the Hamersley Range National Park, Western Australia, 1980. National Parks Authority of Western Australia, Bulletin No 1
- Thompson GG, Thompson SA and Finlayson GR (2010) Spatial and temporal variations in the trapped terrestrial fauna of the Hamersley Range, Western Australia. *Journal of the Royal Society of Western Australia* 93: 51-64.

2.0 Existing Environment

2.1 Physical Environment

2.1.1 CLIMATE

The Pilbara region experiences an arid climate, which is influenced by two air masses, the Indian tropical maritime air moving in from the west or north-west, and the tropical continental air from the inland. During the warmer part of the year, there is a hot low-pressure system over the region resulting in clear skies and very high temperatures from November to February with average maximum temperatures generally between 35°C and 40°C. During the winter months the average maximum temperature generally falls to between 22°C and 30°C, the range of which is generally greater in inland areas away from the moderating effects of onshore winds common in coastal areas (Australian Government 2009a).

The Pilbara lies south of the area normally penetrated by the north-west monsoon in the summer months, and is only occasionally influenced by weather systems of the westerly circulation in the winter months. Rainfall is therefore low and variable. The majority of rainfall occurs between December and March, as the result of moist tropical storms and cyclones originating in the north, with a pronounced dry period between August and November (Australian Government 2009a).

Figure 2 outlines monthly rainfall and temperature averages for the Wittenoom Bureau of Meteorology (BoM) site, approximately 170 km to the east and derived from data collected between 1950 and 2011. Weather data for the 12 months prior to the survey, also included in Figure 2, is derived from Wittenoom (for rainfall) and Paraburdoo Airport (for temperature) (BoM 2011). Paraburdoo Airport is located approximately 160 km south-east of the Mt Macleod West area.

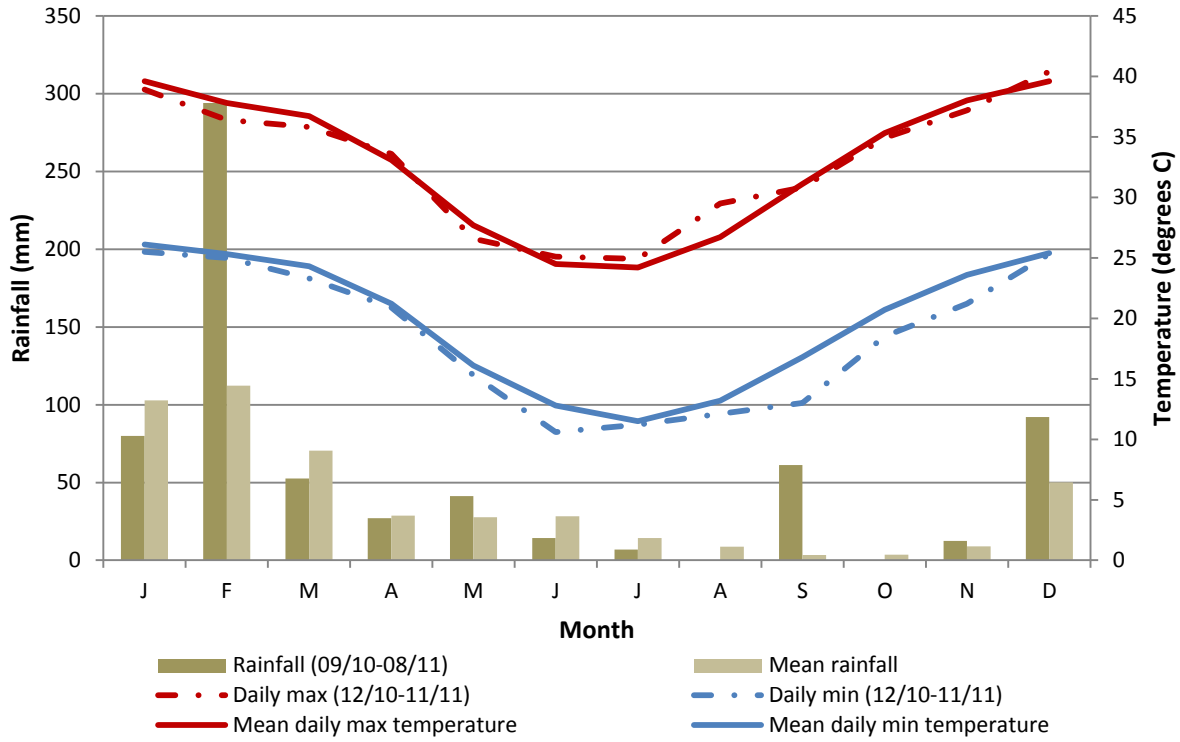

Figure 2: Monthly rainfall, and daily maxima and minima for Wittenoom BoM site (1950 – 2011) and Paraburdoo Airport (2011) (BoM 2011)

2.1.2 GEOLOGY

The following geological units occur in the Mt Macleod West study area (Thorne & Tyler 1997).

Table 1: Geological Units (Thorne & Tyler 1997)

Unit	Description
Qa	Alluvium - unconsolidated silt, sand, and gravel; in drainage channels and adjacent floodplains
Qw	Alluvium and colluvium – red-brown sandy and clayey soil; on low slope and sheetwash areas
Qc	Colluvium – superficial, unconsolidated sand and gravel
AHm	Marra Mamba Iron Formation: chert, banded iron-formation, and pelite
AFj	Jeerinah Formation: pelite, metasandstone, chert, metabasaltic pillow lava and breccias, and metamorphorphosed felsic volcanic rock; intruded by numerous metadolerite sills

2.1.3 LAND SYSTEMS

The Department of Agriculture, as part of the rangeland resource surveys, has comprehensively described and mapped the biophysical resources of the Pilbara region, together with an evaluation of the condition of the soils and vegetation throughout (Van Vreeswyk *et al*. 2004). As part of this process an inventory of land types, land systems and land units with particular use capabilities, habitats or conservation values were established to assist in land use planning. According to this mapping, the following land systems (grouped according to land type on the basis of a combination of landform, soil, vegetation, and drainage characteristics) occur within the study area (**Table 2**).

Table 2: Descriptions of land type and systems occurring in the Mt Macleod West study area (Van Vreeswyk *et al*. 2004)

Unit	Description
Land type 1	**Hills and ranges with spinifex grasslands**
Newman land system	Rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands.
Land type 8	**Stony plains with spinifex grasslands**
Boolgeeda land system	Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands and mulga shrublands.
Land type 15	**Alluvial plains with snakewood shrublands**
Hooley land system	Alluvial clay plains supporting a mosaic of snakewood shrublands and tussock grasslands.

The extent of the land systems outlined above within the Mt Macleod West study area is indicated in **Map 1**, and their regional extent is provided in **Table 3**.

Table 3: Extent of land systems within the Mt Macleod West study area and regional representation

Land System	Extent within study area (km2)	Proportion of study area (%)	Pilbara extent (km2)	Pilbara extent (%)
Newman Land System	17.92	47.06	14580	0.39
Boolgeeda Land System	15.47	40.63	7748	0.19
Hooley Land System	4.69	12.31	590	0.80

2.1.4 DRAINAGE

Caves Creek, which is a tributary of the Ashburton River, is located to the north of the study area and flows in a westerly direction. A minor north-flowing tributary of Caves Creek is located within the study area, close to the eastern edge. **Map 1** displays the major drainage in the study area.

2.2 Biological Environment

2.2.1 BIOGEOGRAPHIC REGION

The Mt Macleod West study area is located within the Pilbara biogeographic region as defined in the Interim Biogeographical Regionalisation for Australia (IBRA) (Australian Government 2009b). Biogeographic regions are delineated on the basis of similar climate, geology, landforms, vegetation and fauna. The Pilbara biogeographic region includes four major components; the Hamersley, Fortescue Plains, Chichester and Roebourne subregions (Thackway & Cresswell 1995). The study area is located entirely within the Hamersley subregion described in the 2002 *Biodiversity Audit of Western Australia's 53 Biogeographical Subregions* (McKenzie *et al.* 2003) as:

Mountainous area of Proterozoic sedimentary ranges and plateaux, dissected by gorges (basalt, shale and dolerite). Mulga low woodland over bunch grasses on fine textured soils in valley floors, and Eucalyptus leucophloia *over* Triodia brizoides *on skeletal soils of the ranges. The climate is semi-desert tropical, average 300mm rainfall, usually in summer cyclonic or thunderstorm events. Winter rain is not uncommon. Drainage into either the Fortescue to the north, the Ashburton to the south, or the Robe to the west.*

2.2.2 FLORA

2.2.2.1 Conservation Significant Flora Species

Conservation significant flora species, for the purposes of this report, are those that are listed as Threatened Flora (TF) and Priority Flora (PF).

TF species are listed by the DEC, with some given additional legislative protection by being listed listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* (Australian Government).

Flora species are classified as Threatened Flora (TF, also known as Declared Rare Flora, DRF) or listed as Priority Flora (PF) where populations are geographically restricted or threatened by local processes. The DEC enforces regulations under Government of Western Australia's *Wildlife Conservation Act (WC Act)* (1950) to conserve TF and protect significant populations. Rare flora (as they are termed in the *WC Act*) are gazetted under Sub-section 2 of Section 23F of the *WC Act*, thereby making it an offence to remove or damage rare flora without Ministerial approval.

Flora species may also be listed by the DEC as PF where populations are geographically restricted or threatened by local processes.

Definitions of the Commonwealth (Department of Sustainability, Environment, Water, Population and Communities, DSEWPaC) categories are provided in **Table 18**, **Appendix One**. Not all DEC-listed TF species are listed under the EPBC Act.

There are six categories covering TF and PF species in Western Australia (DEC 2011), which are outlined in **Table 19**, **Appendix One**.

PF for Western Australia are regularly reviewed by the DEC whenever new information becomes available, with species status altered or removed from the list when data indicates that they no longer meet the requirements outlined in **Table 19**, **Appendix One**.

DEC Database Search

The DEC Threatened Flora database search identifies TF and PF data from validated populations of TF and some PF from the Threatened Flora Database (DEFL), specimens in the Western Australian

Herbarium (WAHERB) and the DEC Declared Rare Flora and Priority Flora Database (Access database). Combined, TF and PF species are referred to as *conservation significant flora* species.

Sixty three conservation significant vascular flora taxa (species, subspecies and varieties) were identified from the DEC Threatened Flora database search as occurring within 15 km of the combined Western Hub and Central Pilbara (Mt Macleod West) study areas (Map 2 in **Appendix Two**). *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727) (P3) has previously been recorded near the southern boundary of the study area.

Two TF taxa, *Lepidium catapycnon* and *Thryptomene wittweri* were identified by the DEC database search, along with 15 P1 taxa, 11 P2 taxa, 28 P3 taxa and six P4 taxa.

The conservation significant flora previously recorded from within 15 km Mt Macleod West are:

- *Astrebla lappacea* (P3); recorded from approximately 8 km to the north-east, approximately 8 km to the north-west and approximately 13 km to the east
- *Calotis latiuscula* (P3); recorded from approximately 8 km to the north-east
- *Dampiera anonyma* (P3); recorded from approximately 12 km to the north and 11 km to the north-east
- *Eragrostis surreyana* (P3); recorded from approximately 11 km to the north-east
- *Eremophila magnifica* subsp. *velutina* (P3); recorded from approximately 6 km to the north
- *Goodenia nuda* (P4); recorded from approximately 9 km to the north-east
- *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727) (P3); recorded within the study area near the south-east boundary and 4 km to the east
- *Helichrysum oligochaetum* (P1); recorded from approximately 12 km to the north-west
- *Indigofera* sp. Bungaroo Creek (S. van Leeuwen 4301) (P3); recorded from approximately 12 km to the north-west
- *Polymeria distigma* (P3); recorded from approximately 7.5 km to the south
- *Rhagodia* sp. Hamersley (M. Trudgen 17794) (P3); recorded from approximately 10 km to the west
- *Sida* sp. Barlee Range (S. van Leeuwen 1642) (P3); recorded from approximately 12 km to the north-west and approximately 5 km to the south
- *Sida* sp. Hamersley Range (K. Newbey 10692) (P1); recorded from approximately 12 km to the north-west and approximately 14 km to the east
- *Swainsona* sp. Hamersley Station (A.A. Mitchell 196) (P3); recorded from approximately 17 km to the north-east
- *Themeda* sp. Hamersley Station (M.E. Trudgen 11431) (P3); recorded from three records approximately 5-13 km to the east.

Map 2 illustrates the locations of species closest to the study area.

The DEC Threatened Flora database search does not identify other *significant flora* species, described in *Guidance Statement No. 51* (EPA 2004a) as including keystone or relictual species, those having anomalous features, range extremities, range extensions, population outliers, restricted subtaxa and hybrids, local endemics or poorly reserved species.

Protected Matters Search

A review of the DSEWPaC online databases (Protected Matters Search Tool and Species Profile and Threats Database) was also conducted to identify any additional threatened flora with Commonwealth protection nearby. The results of the Protected Matters Search are reproduced in **Appendix Three**.

2.2.2.2 Introduced Species

Declared Plants are listed under the *Agriculture and Related Resources Protection Act 1976* (Government of Western Australia 1976) and require a degree of control, depending on their rating in the district they are encountered (Government of Western Australia 2009). There are 88 Declared Plants listed for the Shire of Ashburton.

Plants declared as *P1* prohibit movement of plants or seeds, including prohibiting the movement of contaminated machinery and produce. *P2 Declared Plants* require eradication of the infestation until no plants remain, *P3 Declared Plants* require control preventing spread of seed or plant pars within and from the property, including destroying plants and preventing seed set, and *P4 Declared Plants* are required to be controlled to prevent the spread of the infestation, including destroying plants and preventing seed set.

Introduced species (weeds) are commonly recorded, particularly in disturbed areas including those targeted for grazing by introduced species, including cattle. Plants are regarded as introduced if they are listed as such on FloraBase (Western Australian Herbarium 1998–).

Commonly occurring introduced species recorded from previous Ecoscape surveys in the Hamersley Range area include:

- Bipinnate Beggartick, **Bidens bipinnata*
- Buffel Grass, **Cenchrus ciliaris*
- Kapok Bush, **Aerva javanica*
- Mimosa Bush, **Vachellia farnesiana*
- Ruby Dock, **Acetosa vesicaria*
- Spiked Malvastrum, **Malvastrum americanum.*

2.2.3 VEGETATION

2.2.3.1 Vegetation Associations

John Beard and associates conducted a systematic survey of native vegetation during the 1970s, and described the vegetation systems in Western Australian at a scale of 1:250 000 in the south-west of Western Australia and at a scale of 1:1 000 000 in the less developed areas of the state. The vegetation survey of Western Australia maps and explanatory memoirs (1974-1981) are credited to J.S. Beard (or Beard with various co-authors).

Beard's vegetation maps attempted to depict the native vegetation as it was presumed to be at the time of settlement, and is known as the pre-European vegetation type and extent and has since been developed in digital form by Shepherd *et al.* (2002).

The broad vegetation associations (Map 3) identified from the study area are:

- 18 - Low woodland; mulga (*Acacia aneura*)
- 29 - Sparse low woodland; mulga, discontinuous in scattered groups
- 82 - Hummock grasslands, low tree steppe; snappy gum over *Triodia wiseana*
- 175 - Short bunch grassland - savanna/grass plain (Pilbara).

2.2.3.2 Threatened and Priority Ecological Communities

Threatened Ecological Communities (TECs) are categorised at both Commonwealth level (Australian Government 1999) and State level (DEC 2010), while Priority Ecological Communities (PECs) are categorised at State level (DEC 2010). The status of the Commonwealth and State categories are summarised in **Table 20** and **Table 21**, **Appendix One**.

According to the list of TECs on the Department of Environment and Conservation (DEC) TEC database endorsed by the Minister for the Environment (DEC 2010), there are two State-listed TECs within the Pilbara bioregion:

1. The *vulnerable 'Themeda* grasslands on cracking clays (Hamersley Station, Pilbara)'. This TEC is described as grassland plains dominated by the perennial *Themeda* (kangaroo grass) and many annual herbs and grasses.
2. The *endangered '*Ethel Gorge aquifer stygobiont community'.

Of these only the *Themeda* grassland TEC is located within the Hamersley (PIL3) IBRA subregion (Kendrick 2002).

There are no Commonwealth-listed TECs within the Pilbara bioregion (Australian Government 2010).

There are 29 PECs listed as occurring in the Pilbara bioregion (DEC 2011). Many PECs are either not mapped in the Pilbara bioregion or the mapping is not available to the public and therefore exact locations are often unknown. The PECs most likely to occur in and near the study area are:

- The *P1* 'Brockman Iron cracking clay communities of the Hamersley Range'. Rare tussock grassland dominated by *Astrebla lappacea* in the Hamersley Range, on the Newman land system. Tussock grassland on cracking clays- derived in valley floors, depositional floors. This is a rare community and the landform is rare. Known from near West Angeles, Newman, Tom Price and boundary of Hamersley and Brockman Stations.
- The *P3* '*Triodia* sp. Robe River assemblages of mesas of the Robe Valley'. This community is typically restricted to mesas and cordillo landforms where the plant assemblages are dominated by or contain *Triodia* sp. Robe River and are indicative of inverted landscapes; that is, where *Triodia* sp. Robe River occurs in combination with species that are considered 'out-of-context' from their normal habitat. The community is a combination of *Triodia* sp. Robe River with *Acacia pruinocarpa, A. citrinoviridis* on slopes or peaks of mesas. These two *Acacias* are generally found associated with Pilbara creeklines, and their occurrence is probably indicative of the genesis of the mesa surfaces in wetlands, then erosion of the landscape and 'inversion of the landscape' such that the mesa slopes and peaks that were previously low in the landscape become high points.

Communities identified from the DEC and Protected Matters database searches were specifically targeted during the vegetation survey, according to potential areas of shared landform, geological and habitat characteristics within the study area. Any vegetation types encountered during the field surveys exhibiting floristic or structural affinities with identified TECs/PECs, based upon available descriptions, were highlighted for further analysis.

DEC Database Search

The DEC Ecological Communities database search, conducted using a 15 km buffer around the Mt Macleod West study area, identified that the study area was within the administrative buffers of the *'Themeda* grasslands on cracking clays (Hamersley Station, Pilbara)' TEC.

The DEC Ecological Communities database search does not identify other *significant vegetation* described in *Guidance Statement No. 51* (EPA 2004a), including scare vegetation types, communities including unusual species or a novel combination of species, vegetation acting as a refuge or key habitat for threatened species, vegetation representative of a range of a unit, or vegetation having a restricted distribution.

Map 3 displays the locations of the TECs identified from the DEC database search.

2.2.3.3 Ecosystems at Risk

'Ecosystems at Risk' were identified by regional ecologists and others as part of the then Department of Conservation and Land Management's (CALM, now DEC) *Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002* (CALM 2002). These ecosystems do not have any legislative protection.

'Ecosystems at Risk' identified from the Hamersley subregion (PIL3) of the Pilbara bioregion that may occur in or near the study area include:

- the *vulnerable* 'Grove/inter-grove mulga, eastern Hamersley Range' ecosystem, threatened by grazing, weeds and hydrological change
- the *vulnerable* 'Valley floor mulga' ecosystem, threatened by grazing, weeds, fire and hydrological change
- the *endangered* 'Lower-slope mulga' ecosystem, threatened by fire
- the *vulnerable* 'Hill-top floras, Hamersley Range' ecosystem, threatened by fire
- the *vulnerable* 'All major ephemeral water courses' ecosystem, threatened by grazing and weeds
- the 'Other stygofauna associated with aquifers near mining below water table' ecosystem, threatened by mine dewatering.

2.2.3.4 Groundwater Dependent Ecosystems

Groundwater Dependent Ecosystems (GDEs) have been defined as ecosystems that are dependent on groundwater for their survival at some stage or stages of their lifecycle, however groundwater use cannot be equated with groundwater dependence (Eamus 2009).

GDEs are generally associated with drainage. Several species found in these areas are considered to be phreatophytic (ie plant species that have greater water use than can be provided from the soil surface profile), including the facultative phreatophytes *Eucalyptus camaldulensis* and *E. victrix*, that are dependent on groundwater for part of their lifecycle and/or in times of drought. These species are recorded as requiring access to groundwater in some landscapes but can utilise water stored in the soil profile in other landscapes (Astron Environmental Services 2008). However, there is some debate whether *E. victrix* is actually phreatophytic or vadophytic (reliant on moisture in the soil surface profile) (eg Resource and Environmental Management Pty Ltd 2007). However, adopting the precautionary principle outlined in EPA *Position Statement No. 7 – Principles of Environmental Protection* (2004c), vegetation types characterised by *E. victrix* should be considered to be indicative of potential GDEs.

2.2.3.5 Sheet Flow Dependent Communities

Mulga (*Acacia aneura* sens lat) often occurs as a grove – intergrove formation on valley floors and floodplains. Regeneration of these groves are generally considered to be dependent of sheet flow in times of heavy rain (eg Muller 2005).

Mulga was previously considered the common name for *Acacia aneura*. Until recently there were 12 varieties of *Acacia aneura* in Western Australia. Following a revision of this group, a number of new taxa have been identified. The common name 'Mulga', for the purposes of this report, includes the closely-related *Acacia aptaneura, A. pteraneura, A. macranura, A. fuscaneura, A. caesaneura, A. ayersiana, A. incurvaneura, A. brachystachya, A. catenulata subsp. catenulata, A. craspedocarpa, A. minyura, A. ramulosa, A. sibirica* and *A. aneura* var. *intermedia*.

2.2.4 FAUNA

The conservation status of fauna species is assessed under Commonwealth and State Acts being the *EPBC act (1999)* and the Western Australian *Wildlife Conservation Act* (1950). The significance levels for fauna used in the *EPBC Act* (1999) are those recommended by the International Union for the Conservation of Nature and Natural Resources (IUCN) and reviewed by Mace and Stuart (1994). *EPBC Act (1999)* categories are listed in **Table 18**, **Appendix One**.

The WA *Wildlife Conservation Act* (1950) uses a set of Schedules but also classifies species using some of the IUCN categories. DEC Schedules, which provide special protection to listed fauna under the WA *Wildlife Conservation Act* (1950) and definitions are shown in **Table 19, Appendix One**.

In Western Australia, the DEC has produced a supplementary list of Priority Fauna, listed using priority codes, which are species that are not considered *Threatened* under *the Wildlife Conservation Act* but for which the DEC considers there is cause for concern. Some Priority species, however, are also assigned to the IUCN Conservation Dependent category. DEC Priority categories definitions are shown in **Table 19**, **Appendix One**. It is important to recognise that such Priority Lists have no statutory standing, but are used to assist the DEC when considering which fauna are most in need of more surveys or other investigations, in order to establish their status in the wild.

The Priority Fauna List for Western Australia includes taxa organised by priority codes that either:

- have recently been removed from the schedule of threatened fauna
- have a restricted range, are uncommon or are declining in range and/or abundance, but which do not meet the criteria for inclusion on the schedule of threatened fauna
- have been nominated for consideration for the schedule of threatened fauna and for which there is insufficient information for the advisory committee to make an assessment of their status
- are worthy of inclusion on such a list, as determined by the DEC.

The Priority Fauna List for Western Australia is reviewed by the DEC whenever new information on relevant taxa becomes available. Taxa are removed from the list by the DEC as they cease to meet the requirements identified above. In addition to these conservation levels, species that have been introduced are indicated.

Vertebrate taxonomy in this report follows the Western Australian Museum (WAM) checklists last updated 6 Oct 2009, except for birds where the classification and sequence follows Christidis & Boles (2008) and bats which follows Armstrong & Reardon (2006).

DEC Database Search

A search of the DEC Threatened, Priority or other specially protected fauna database was conducted for an area comprising the Mt Macleod study area with a buffer of 20 km. There were five conservation significant fauna species identified through DEC database searches as known to occur within this area (**Table 4**):

- Spectacled Hare-wallaby (mainland) (*Lagorchestes conspicillatus leichardti– P3*
- Western Pebble-mound Mouse (*Pseudomys chapmani*) – *P4*
- Soil-crevice Skink (*Notoscincus butleri*) – *P4*
- Australian Bustard (*Ardeotis australis*) – *P4*
- Bush Stone-curlew (*Burhinus grallarius*) – *P4*.

EPBC Protected Matters Search Tool

Results of the *Protected Matters Search Tool* (PMST, Australian Government 2011a) were obtained for the Mt Macleod study area including a 10 km buffer. Three *Threatened Species* of fauna were listed as potentially occurring in each of the study areas (**Table 4**, EPBC status *EN* and *VU*; PMST report M or L):

- Northern Quoll (*Dasyurus hallucatus*) – EN
- Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*) – VU
- Pilbara Olive Python (*Liasis olivaceus barroni*) – VU.

The PMST results also list *Migratory, Listed Marine*, and *Invasive* species. Migratory and/or marine species identified as potentially occurring in the study area include (M or L as in **Table 4**):

- Fork-tailed Swift (*Apus pacificus*) – M
- Great Egret (*Ardea modesta* (=*alba*)) – M
- Cattle Egret (*Ardea ibis*) – M
- White-bellied Sea-Eagle (*Haliaeetus leucogaster*) – L
- Rainbow Bee-eater (*Merops ornatus*) – M
- Oriental Plover (*Charadrius veredus*) – M.

NatureMap and other resources

A search of DEC's online *NatureMap* database (2011) identified 227 species as recorded in a rectangle (117°13'50'' - 117°58'27'' E, 22°30'51'' - 22°08'33'' S) centred on the Mt Macleod study area and approximating the 'area of interest' indicated by FMG (276 faunal taxa, as subspecies and synonyms are often listed separately). In addition to species identified by the DEC threatened and priority search (on a smaller area) and PMST, three further taxa of conservation significance were listed by NatureMap as known to occur in this area:

- Short-tailed Mouse (*Leggadina lakedownensis*) – P4
- Star Finch (western) (*Neochmia ruficauda subclarescens*) – P4
- Swinhoe's Snipe (*Gallinago melanura*) – M.

Table 4: Threatened, Priority and other conservation-significant fauna search results

Family	Common Name	Species	EPBC status	WCA status	DEC status	DEC Threatened fauna database	EPBC Protected Matters report	Hamersley (Kendrick)
Terapontidae	Fortescue Grunter	*Leiopotherapon aheneus*			*P 4*			+
Dasyuridae	Northern Quoll	*Dasyurus hallucatus*	*E N*	*S 1*	*E N*		L	+
	Long-tailed Dunnart	*Sminthopsis longicaudata*			*P 4*	+		+
Macropodidae	Spectacled Hare-wallaby	*Lagorchestes conspicillatus leichardti*			*P 3*			
Megadermatidae	Ghost Bat	*Macroderma gigas*			*P 4*	+		+
Hipposideridae	Pilbara Leaf-nosed Bat	*Rhinonicteris aurantia*	*V U*	*S 1*	*V U*	+	L	+
Muridae	Short-tailed Mouse	*Leggadina lakedownensis*			*P 4*			
	Western Pebble-mound Mouse	*Pseudomys chapmani*			*P 4*			+
Scincidae	Blue-tailed Skink	*Lerista zietzi*						+
	Soil-crevice Skink	*Notoscincus butleri*			*P 4*	+		
Typhlopidae	Blind Snake	*Ramphotyphlops ganei*			*P 1*	+		+
	Blind Snake	*Ramphotyphlops pilbarensis*						+
Pythonidae	Pilbara Olive Python	*Liasis olivaceus barroni*	*V U*	*S 1*				+
Apodidae	Fork-tailed Swift	*Apus pacificus*	*M*				M	
Ardeidae	Great Egret	*Ardea modesta* (=*alba*)	*M*				M	
	Cattle Egret	*Ardea ibis*	*M*				M	
Accipitridae	White-bellied Sea-eagle	*Haliaeetus leucogaster*	*M*				L	
Falconidae	Grey Falcon	*Falco hypoleucos*			*P 4*			
	Peregrine Falcon	*Falco peregrinus*	*M*	*S 4*				+
Otididae	Australian Bustard	*Ardeotis australis*			*P 4*	+		
Burhinidae	Bush Stone-curlew	*Burhinus grallarius*			*P 4*	+		+
Charadriidae	Oriental Plover	*Charadrius veredus*	*M*				M	
Scolopacidae	Swinhoe's Snipe	*Gallinago megala*	*M*					
Meropidae	Rainbow Bee-eater	*Merops ornatus*	*M*				M	
Estrildidae	Star Finch (western)	*Neochmia ruficauda subclarescens*			*P 4*			

Abbreviations: (EPBC status) *EN*, endangered; *VU*, vulnerable; *M*, migratory; (WCA Status) *S1*, Schedule 1 'rare or likely to become extinct'; *S4*, Schedule 4 'other specially protected fauna'; (DEC status) *T*, 'rare or likely to become extinct'; *P1*, Priority 1 'Taxa with few, poorly known populations on threatened lands'; *P4*, Priority 4 'Taxa in need of monitoring'; (EPBC Protected Matters report) L, 'Species or species habitat likely to occur'; M, 'Species or species habitat may occur'; (other columns) +, listed as present.

3.0 Methods

3.1 Flora and Vegetation

The flora and vegetation assessment methodology used was developed to comply with Ecoscape's interpretation of a Level 1 survey based upon the EPA's *Guidance Statement No 51* (2004a) and *Position Statement No.* 3 (EPA 2002).

Level 1 surveys incorporate background research and a reconnaissance survey, and are often used to identify preliminary information that may be of assistance when preparing for a more intensive and detailed survey.

In addition to the Level 1 survey, targeted and opportunistic searches for conservation significant flora species, particularly Threatened Flora (TF) and Priority 1 (P1) and Priority 2 (P2) taxa, were also conducted.

The data collected during the field survey was used to:

- describe and map the broad vegetation types of the study area to indicate the distribution and relative abundance of each vegetation unit and to help to define units of particular conservation value
- identify vascular flora taxa of particular conservation significance
- identify large infestations of introduced plant species and occurrences of Declared Plants.

The vegetation was described and mapped using relevés (unbounded flora sampling site) recorded in characteristic areas of each vegetation type, as assessed in the field. The data recorded from each relevé included physical characteristics of the environment (habitat). Up to three dominant and characteristic species from each of the traditional three strata (upper, mid and ground, including cover class for each stratum), along with each species' maximum height and cover were recorded.

In addition to the relevés, Ecoscape had established and recorded 12 floristic quadrats ('quadrats') from within the Mt Macleod West study area during its Central Pilbara Project (CPP) survey (Ecoscape 2012). These quadrats were established and first recorded in March/April 2011 and rescored in August 2011. They measured 50 m x 50 m and were recorded over two seasons at NVIS Level 5, thus satisfying the requirements of a Level 2 survey according to EPA *Guidance Statement No. 51* (2004a).

Therefore, in part, this survey meets the requirement of a Level 2 survey.

3.1.1 FIELD SURVEYS

The flora and vegetation vegetation mapping and relevé field survey was conducted by Jared Nelson (flora collecting licence SL009325) and Markus Mikli (SL009313) over five days, during July 2011.

The timing of the field survey, in July, was not ideal to identify all species, particularly grasses, however many conservation significant shrub and herb taxa are known to flower during this period, providing negligible limitations in terms of identifying these.

The Level 2 quadrats were recorded in March/April and August, 2001. Seasonal conditions were considered to be excellent over both season, and provided no constraints to identifying flora species.

3.1.1.1 Vegetation Descriptions

Vegetation was described from each of the quadrats and relevès using the height and estimated cover of dominant and characteristic species of each stratum, based on the National Vegetation Inventory System (NVIS, National Heritage Trust 2003) (**Table 5**), recorded at Level V.

The vegetation condition of the quadrats and relevés were assessed using a rating scale devised by Trudgen (1991), which the DEC has previously advised as the most appropriate for assessing vegetation condition in the Pilbara region (Coffey Environments 2007). This rating scale is outlined in **Table 6**. The vegetation condition of the study area was not assessed or mapped, however it was recorded for each quadrat and relevé. The vegetation condition of the study area was assessed by extrapolating the value recorded for each quadrat and relevé and applying the condition to the vegetation type in the vicinity.

3.1.2 TIMING OF SURVEYS

The Level 1 survey of the Mt Macleod West study area was conducted during winter (July), when the majority of ephemeral species are usually flowering. Season conditions in 2011 were considered to be *excellent*. Rainfall in the season December 2010 – June 2011 was 607.9 mm, which is 139.9% of the December – July long-term mean of 434.5 mm (**Figure 3**).

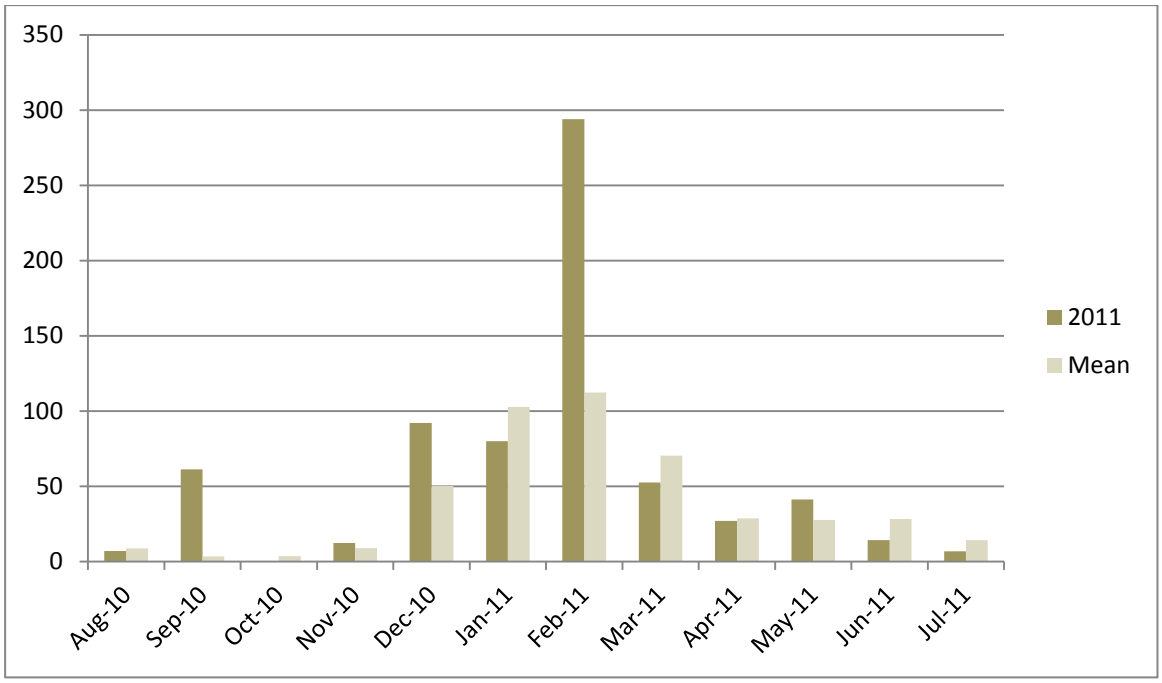

Figure 3: Monthly rainfall totals for the Wittenoom BoM site for the periods preceding the survey (August 2010 – July 2011).

Table 5: NVIS structural formation terminology (terrestrial vegetation) (National Heritage Trust 2003)

	Cover Characteristics							
	Foliage cover *	70-100	30-70	10-30	<10	» 0 (scattered)	0-5 (clumped)	unknown
	Cover code	d	c	i	r	bi	bc	unknown
Growth Form	**Height Ranges (m)**	**Structural Formation Classes**						
tree, palm	<10,10-30, >30	closed forest	open forest	woodland	open woodland	isolated trees	isolated clumps of trees	trees
tree mallee	<3, <10, 10-30	closed mallee forest	open mallee forest	mallee woodland	open mallee woodland	isolated mallee trees	isolated clumps of mallee trees	mallee trees
shrub, cycad, grass-tree, tree-fern	<1,1-2,>2	closed shrubland	shrubland	open shrubland	sparse shrubland	isolated shrubs	isolated clumps of shrubs	shrubs
mallee shrub	<3, <10, 10-30	closed mallee shrubland	mallee shrubland	open mallee shrubland	sparse mallee shrubland	isolated mallee shrubs	isolated clumps of mallee shrubs	mallee shrubs
heath shrub	<1,1-2,>2	closed heathland	heathland	open heathland	sparse heathland	isolated heath shrubs	isolated clumps of heath shrubs	heath shrubs
chenopod shrub	<1,1-2,>2	closed chenopod shrubland	chenopod shrubland	open chenopod shrubland	sparse chenopod shrubland	isolated chenopod shrubs	isolated clumps of chenopod shrubs	chenopod shrubs
samphire shrub	<0.5,>0.5	closed samphire shrubland	samphire shrubland	open samphire shrubland	sparse samphire shrubland	isolated samphire shrubs	isolated clumps of samphire shrubs	samphire shrubs
hummock grass	<2,>2	closed hummock grassland	hummock grassland	open hummock grassland	sparse hummock grassland	isolated hummock grasses	isolated clumps of hummock grasses	hummock grasses
tussock grass	<0.5,>0.5	closed tussock grassland	tussock grassland	open tussock grassland	sparse tussock grassland	isolated tussock grasses	isolated clumps of tussock grasses	tussock grasses
other grass	<0.5,>0.5	closed grassland	grassland	open grassland	sparse grassland	isolated grasses	isolated clumps of grasses	other grasses
sedge	<0.5,>0.5	closed sedgeland	sedgeland	open sedgeland	sparse sedgeland	isolated sedges	isolated clumps of sedges	sedges
rush	<0.5,>0.5	closed rushland	rushland	open rushland	sparse rushland	isolated rushes	isolated clumps of rushes	rushes
herb	<0.5,>0.5	closed herbland	herbland	open herbland	sparse herbland	isolated herbs	isolated clumps of herbs	herbs
fern	<1,1-2,>2	closed fernland	fernland	open fernland	sparse fernland	isolated ferns	isolated clumps of ferns	ferns
bryophyte	<0.5	closed bryophyte-land	bryophyte-land	open bryophytelan d	sparse bryophyteland	isolated bryophytes	isolated clumps of bryophytes	bryophytes
lichen	<0.5	closed lichenland	lichenland	open lichenland	sparse lichenland	isolated lichens	isolated clumps of lichens	lichens
vine	<10,10-30, >30	closed vineland	vineland	open vineland	sparse vineland	isolated vines	isolated clumps of vines	vines

Table 6: Vegetation condition rating scale (Trudgen 1991)

Condition Rating	Description
E=Excellent	Pristine or nearly so; no obvious signs of damage caused by activities of European man.
VG= Very Good	Some relatively slight signs of damage caused by activities of European man. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds such as **Ursinia anthemoides* or **Briza* spp., or occasional vehicle tracks.
G=Good	More obvious signs of damage caused by activities of European man, including some obvious signs of impact on the vegetation structure such as that caused by low levels of grazing or by selective logging. Weeds as above, possibly plus some more aggressive ones such as **Ehrharta* spp.
P=Poor	Still retains basic vegetation structure or ability to regenerate to it after very obvious activities of European man, such as grazing, partial clearing (chaining) or frequent fires. Weeds as above, probably plus some aggressive ones such as **Ehrharta* spp.
VP=Very Poor	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species including very aggressive species.
D=Degraded	Areas that are completely or almost completely without native species in the structure of their vegetation; ie areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.

3.1.2.1 Relevé Data

The botanical survey involved the sampling of 46 relevés (unmarked areas with the vegetation described as if it occurred within a 50 m x 50 m area, which is the standard quadrat size used in the Pilbara for botanical surveys), with the following parameters recorded at each relevé site:

- MGA coordinates recorded in GDA 94 datum using a hand-held Global Positioning System (GPS), to an accuracy usually within 5 m
- vegetation description based on the height and estimated cover of dominant and characteristic species and strata
- description of landform and habitat
- broad description of surface soil type and stony surface mantle
- evidence of grazing, mining exploration activities, weed invasion, frequent fires etc. Fire effects were only considered a negative impact if they were caused by repeated burning eg for pastoral purposes.

The same data was collected from each of the floristic quadrats, with the addition of a full floristic list from within a marked 50 m x 50 m area.

Representative photographs of the vegetation at each site were taken using a digital camera.

Voucher specimens of dominant and characteristic taxa from the relevés were only collected when the assessors could not identify the species with certainty in the field. Specimens collected were dried and treated in accordance with the requirements of the West Australian Herbarium. These voucher specimens were identified by Ecoscape and ME Trudgen, using appropriate publications, and/or comparison with pressed specimens housed at the Western Australian Herbarium, but have not yet been submitted to the Herbarium.

3.1.2.2 Floristic Quadrat Data

The CPP Level 2 survey involved the sampling of marked 50 m x 50 m floristic quadrats over two seasons in 2011. The information collected from each floristic quadrat included the same as for the relevés, with the additional of a complete floristic list.

Twelve floristic quadrats were located within the Mt Macleod West study area. These are prefixed 'CP11'.

3.1.2.3 Conservation Significant Flora

No systematic grid search of the study area was undertaken for conservation significant flora species. However, targeted searches of areas identified from the DEC database search were conducted, including slopes, hilltops (where accessible), rock piles, calcrete areas and adjacent, clay pans and drainage lines were undertaken. Opportunistic searches were also conducted when moving between relevé sites.

Where possible, the space between surveyors was 20-30 m in order to widen the search area.

3.1.2.4 Introduced Flora

Opportunistic observation of significant infestations of introduced species (weeds) and presence of *Declared Plants* were recorded from the study area.

3.1.3 BOTANICAL LIMITATIONS

Table 7: Botanical limitations.

Possible Limitations	Constraints (Yes/No); Significant, Moderate or Negligible	Comments
Competency/experience of the consultant botanist	No constraints	Lead survey staff have relevant recent experience surveying in the Pilbara region.
Proportion of the flora identified	No constraints	The survey was largely conducted as a Level 1 reconnaissance survey, with no floristic quadrats recorded. All dominant species used to identify vegetation characteristics were identified. Full floristic quadrats were also recorded within the study area; a complete floristic list was recorded from each of these. All species were identified. The survey included a targeted search for conservation significant flora species. All potential TF and PF flora were identified.
Sources of information (historic/recent or new data)	Negligible	There were few sources of information relevant to the area, however the survey was a reconnaissance survey to acquire the information.
Proportion of the task achieved and further work that may need to be undertaken	Negligible	The reconnaissance survey was conducted at sufficient detail to identify major flora and vegetation attributes in preparation for a more detailed survey. Inaccessible areas would require more intensive surveys for conservation significant flora species.
Timing/weather/season/cycle	No constraints	The timing of the field survey and weather were optimal to identify plant species with above average rainfall prior to the survey, which was conducted in July 2011.
Intensity of survey	Negligible	The study area was surveyed at sufficient intensity to describe the dominant flora and vegetation types of the area in preparation for a more intensive (Level 2) survey. Accessible areas were sufficiently surveyed to identify the presence of most conservation significant flora species.
Completeness (eg was relevant area fully surveyed)	Negligible	All areas of the survey were visited sufficiently to satisfy the objectives of this survey. Some areas of the northern and southern extents had limited vehicle access, so were search less intensively.
Resources (eg degree of expertise available for plant identification)	No constraints	Sufficient expertise was available to identify all flora species.
Remoteness and/or access problems	No constraints	All areas of the survey were visited sufficiently to satisfy the objectives of this survey.
Availability of contextual (eg bioregional) information for the study area	Negligible	Little biological information is available for the study area, however this survey was conducted as a Level 1 reconnaissance survey to acquire background information.

3.2 Fauna

The fauna assessment methodology used was developed to comply with Ecoscape's interpretation of the requirements of a Level 1 survey based upon the EPA's *Guidance for the Assessment of Environmental Factors No 56: Terrestrial Fauna Surveys for Environmental Impact Assessment in Western* Australia (2004a) and *Technical Guide – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment* (2010). The targeted trapping for Northern Quoll considered the *EPBC Act 1999 referral guidelines for the endangered northern quoll* (DSEWPaC 2011).

3.2.1 FIELD SURVEY

The fauna and habitat field survey was conducted by John Scanlon (Senior Environmental Scientist, Zoologist) and Claudia McHarrie (Graduate Environmental Scientist) over 4 days in mid-August 2011, under DEC Regulation 17 fauna licence SF008135.

The fauna assessment comprised a reconnaissance survey of the study area combined with targeted trapping for Northern Quoll. The reconnaissance aspect of the survey was used to verify the applicability of background desktop studies, familiarise survey personnel with the study area and provide habitat assessments and habitat maps. Timing of the targeted survey is consistent with DSEWPaC survey guidelines for Northern Quoll (DSEWPaC 2011a) (May-August inclusive, primarily to avoid disturbance during the reproductive period).

Techniques used in the reconnaissance survey include:

- bird census using both visual and auditory techniques
- spotlighting significant habitat i.e. gorges, caves and creeks
- trail cameras set in likely areas of fauna activity for conservation significant fauna species
- leaf litter raking, rock pile and fallen log hand searching
- identification of scats, bones, tracks, diggings and burrows and the analysis of predator scats.

Opportunistic observations

Opportunistic observations were made during the day whilst driving and walking the study area. Searches were conducted by two personnel during the survey period. Searches were focussed on potential conservation significant fauna species habitats, including rocky gorges, hilltops and cave areas, creeklines, spoil heaps and water holes. Opportunistic searches also comprise spotlighting along roads and on water holes. Photography was used to record observations, allowing subsequent identification of animals and tracks not determinable in the field.

Bird Census

Bird censuses were undertaken each day at sunrise and sunset. Each census requires the observer to remain in one place for a duration of 20 minutes, recording the number of bird species and number of individuals of each species, in the immediate surrounding area, based on sightings and calls. Census points were undertaken in all habitat types, including Spinifex grasslands, creeklines, water

holes and hilltops. Birds observed or heard, while travelling around the site or checking traps were also recorded in a species list.

Trail Cameras

Six trail cameras were set in positions chosen to maximise the likelihood of capturing fauna movement: adjacent to small caves, in wooded gullies, and over a water trough. The water-trough camera set to operate day and night; the remainder were set to record still images or video, from 6pm (sunset) to 6am (sunrise), and bait was scattered in front of cameras to increase the likelihood of attracting fauna. Cameras operated for one to three nights during the survey.

Targeted Northern Quoll Trapping

Consultation prior to the survey commencing was undertaken with DSEWPaC Officer Mr Tim McGrath who provided a response that the approach to be used by Ecoscape is consistent with the guidance as outlined in the draft referral guidelines for the Northern Quoll (McGrath 2011).

Twenty cage traps were set in areas of potential Northern Quoll habitat within the study site (**Map 6**). These locations included rocky gorges, small caves, and creeklines. Traps were placed in protected areas, covered with either a hessian bag or Spinifex to provide shade. Traps remained in place for three nights and were checked early each morning. Bait was replaced when required. Bait used was universal type as specified in the DSEWPaC guidelines.

Field survey effort for Mt Macleod is indicated in **Table 8**.

Table 8: Survey effort, Mt Macleod

Technique	Survey Effort
Cage traps	60 nights
Trail cameras	12 nights, 3 days
Bird census	6 x 20 minutes
Spotlighting	8 person hours
Hand searching	30 person hours

1.1.1 TAXONOMY AND NOMENCLATURE

Taxonomy and nomenclature for fauna species used in this report follows that of the Western Australian Museum, except for bats, which follow Armstrong & Reardon (2006) and birds which follow Christidis & Boles (2008).

Table 9 lists the references used in the field. Ecoscape has presumed that the identifications referred to in the Appendices or in reports used to provide local and regional comparative data were correct and has only corrected records where the nomenclature was obviously incorrect.

Table 9: References used for species identification.

Reference	Identification
Menkhorst & Knight (2011)	Mammals
WA Museum field guides; Wilson & Swan (2008)	Reptiles
Simpson & Day (2004)	Birds

3.2.2 FAUNA SURVEY LIMITATIONS

Table 10: Limitations of fauna survey

Possible Limitations	Constraints (Yes/No): Significant, Moderate or Negligible	Comment
Competency/experience of the consultant conducting the survey	No Constraint	All field survey staff have relevant recent experience surveying in the Pilbara region. Senior staff have extensive experience with species identification over all fauna assemblages
Scope	No Constraint	Scope as Level 1 survey, not including invertebrates or attempting to inventory all species present; access to all habitat types was unconstrained. Target Survey for Northern Quoll was designed to meet DSEWPaC guidelines, and had no limitations.
Proportion of fauna identified, recorded and/or collected	No Constraint	No vertebrate species collected, all vertebrate fauna observed identified
Proportion of the task achieved and further work that may need to be undertaken	No Constraint	Reconnaissance and targeted surveys were adequate to identify and map likely habitats for conservation significant species, but not to determine their actual presence, distribution or abundance, with the exception of Northern Quoll.
Timing/weather/season/cycle	No	Survey conducted in August suitable for mammals, but not most reptiles or some birds that would be more active or only present in warmer/wetter conditions. Timing was suitable for Northern Quoll, as per DSEWPaC guidelines.
Intensity of survey (eg In retrospect was the intensity adequate?)	No Constraint	Intensity judged to be adequate for level of survey
Disturbances which affected results of the survey	Yes, Moderate	Unusually poor climatic conditions in recent years have probably reduced abundance of some target species. Exploration activity (clearing tracks) has caused localised habitat degradation but probably not further altered the fauna assemblage to a significant extent, and also improved access
Sources of information	No Constraint	Most relevant information sources readily available
Completeness (eg Was relevant area fully surveyed?)	Yes, Negligible	Access to parts of the study area were limited by existing tracks, terrain, and time, but all significant habitats and landscape features were surveyed
Resources (eg Degree of expertise available for identification)	No Constraint	Adequate resources available
Remoteness and/or access problems	Yes, Moderate	Some areas (hills in north-west of study area) unable to be accessed due to distance from tracks.

Possible Limitations	Constraints (Yes/No): Significant, Moderate or Negligible	Comment
Availability of contextual (eg bioregional) information for the survey area	Yes, Negligible	Physical environmental information not limiting. Flora and vegetation context provided by concurrent survey included in this report. Previous fauna surveys conducted in the same IBRA subregion allowed species inventory to be predicted, but some relevant taxonomic revisions and survey results are not currently available

4.0 Results

4.1 Flora and Vegetation

4.1.1 CONSERVATION SIGNIFICANT FLORA SPECIES

***Environmental Protection and Biodiversity Conservation Act* 1999**

At a Commonwealth level, flora is protected under the Commonwealth *EPBC Act* 1999. This lists threatened species that are considered *Critically Endangered, Endangered, Conservation Dependant, Extinct*, or *Extinct in the Wild*.

No plant taxon recorded in the study area is listed as Threatened pursuant to Schedule 1 of the *EPBC Act* (1999).

***Wildlife Conservation Act* 1950**

The DEC enforces regulations under the Government of Western Australia's *WC Act* (1950) to conserve TF and protect significant populations. Rare flora species are gazetted under Subsection 2 of Section 23F of the *WC Act* (1950), thereby making it an offence to remove or damage rare flora without Ministerial approval, obtained on each occasion for each population.

No plant taxon recorded in the survey is gazetted as a TF pursuant to Subsection 2 of Section 23F of the *WC Act* (1950).

Priority Flora

The DEC also maintains a list of flora taxa which are considered to be poorly known, uncommon, or under threat, but for which there is insufficient justification on the basis of known distribution and population sizes to be included on the TF schedule. These are classified as Priority Flora (PF).

Five PF were recorded from the study area, listed below. Their locations are included in **Table 11** and shown on **Map 4**. A brief description of each taxa given below.

Table 11: Coordinates of Priority Flora species

Species	Cons. Code	GDA mE	GDA mN
Astrebla lappacea	P3	563837	7531448
Iotasperma sessilifolium	P3	563828	7531654
Rhagodia sp. Hamersley (M. Trudgen 17794)	P3	558736	7525745
Rhagodia sp. Hamersley (M. Trudgen 17794)	P3	558696	7525627
Themeda sp. Hamersley Station (M.E. Trudgen 11431)	P3	564056	7530806
Themeda sp. Hamersley Station (M.E. Trudgen 11431)	P3	564078	7530795
Vigna sp. central (M.E. Trudgen 1626)	P2	560163	7526453

***Astrebla lappacea* (P3)**

Astrebla lappacea is a perennial tussock grass to 0.8 m tall. It has loosely overlapping spikelets (**Plate** 1) compared with the densely overlapping spikelets of *Astrebla pectinata*, with which it typically co-occurs. *Astrebla lappacea* is widespread in New South Wales, Queensland, South Australia and the Northern Territory, however in Western Australia it is known only from four WAH records from the cracking clay soils of Hamersley Station. *Astrebla lappacea* is listed as a characteristic species of the P1 'Brockman Iron cracking clay communities of the Hamersley Range' PEC. This species was recorded from quadrat CP11038, and was occurred in the **Ap** vegetation type on cracking clay.

Plate 1: *Astrebla lappacea*

***Iotasperma sessilifolium* (P3)**

Iotasperma sessilifolium is an erect herb to 0.4 m high with pink flowers (**Plate 2**). It is known from seven WAH collections, six from the Pilbara bioregion. van Leeuwen and Bromilow (2002) consider this species to be of tropical origin with a disjunct distribution; it is also sparsely distributed across the Northern Territory. *Iotasperma sessilifolium* was associated with cracking clay.

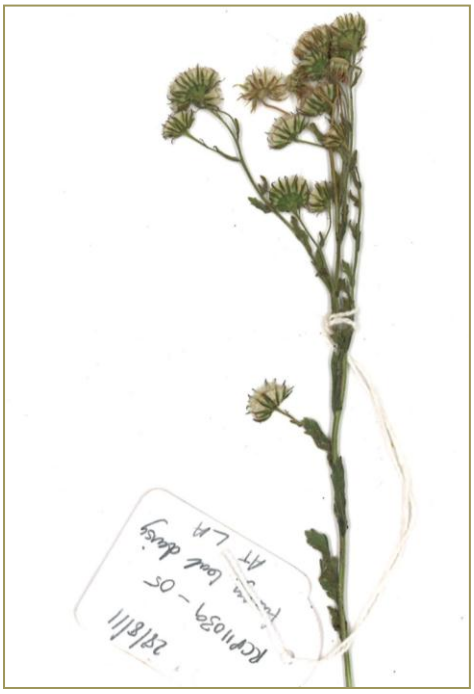

Plate 2: *Iotasperma sessilifolium*

***Rhagodia* sp. Hamersley (P3)**

Rhagodia sp. Hamersley (M. Trudgen 17794) is an erect spindly shrub generally associated with Mulga (*Acacia aptaneura*). It differs from the more common *Rhagodia eremaea* in its narrow, less odorous leaves. There are 11 records of *Rhagodia* sp. Hamersley listed on FloraBase (Western Australian Herbarium & DEC 2011), mostly from the Pilbara bioregion (with one record in the Gascoyne bioregion). **Plate 3** shows the form of this species.

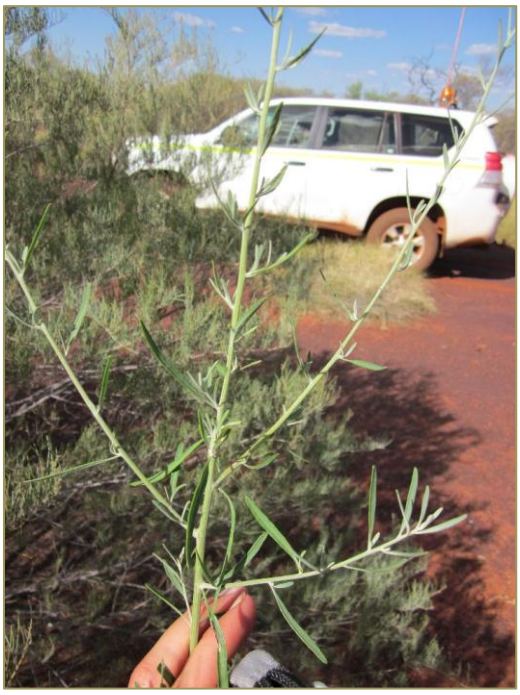

Plate 3: *Rhagodia* sp. Hamersley (M. Trudgen 17794)

***Themeda* sp. Hamersley Station (P3)**

Themeda sp. Hamersley Station (M.E. Trudgen 11431) is an undescribed (phrase name) species with 13 records listed on FloraBase (Western Australian Herbarium & DEC 2011). Most records are from on and near Hamersley Station, however it has been collected from east of Karijini National Park, and also occurs near Karratha, Millstream and Nullagine in the Pilbara bioregion. It is a perennial tussock grass with flowering yellow culms to 2 m high and blue-green to purplish leaves. **Plate 4** and **Plate 5** illustrate *Themeda* sp. Hamersley Station.

Plate 4: *Themeda* sp. Hamersley Station (form)

Plate 5: *Themeda* sp. Hamersley Station (seed heads)

***Vigna* sp. central (M.E. Trudgen 1626) (P2)**

Vigna sp. central (M.E. Trudgen 1626) is an unnamed (phrase name) herb with six collections listed on FloraBase (Western Australian Herbarium & DEC 2011). It has been collected from Karijini National Park (in the Hamersley Range) and from near Onslow and Woodie Woodie in the Pilbara bioregion and northern Carnarvon bioregion, although Fortescue have also recorded this species from Christmas Creek (two records, ENV Australia 2011 (in prep)) and Nyidinghu (one record, Cardno 2011 (*in prep.*)). It is described as a vine or prostrate herb with yellow flowers.

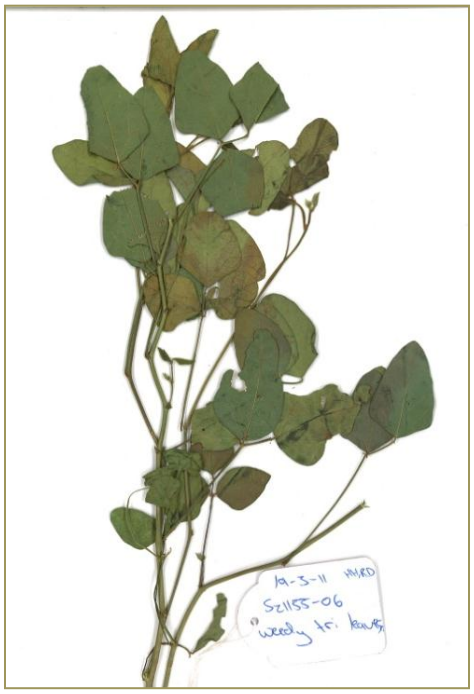

Plate 6: *Vigna* sp. central (M.E. Trudgen 1626)

Other Significant Species

No flora species, other than those already listed above, were considered to be significant.

Species Range Extents

A number of species were on the edge of their known range or range extensions. Using NatureMap (DEC & Western Australian Museum 2011) to estimate distances, these were:

- *Aristida ingrata*; westerly range extension of approximately 270 km
- *Brachyscome iberidifolia*; on the northern edge of its usual range
- *Chrysocephalum gilesii*; on the western edge or very minor westerly range extension
- *Eriachne ciliata*; on the southern edge of its usual range
- *Hibiscus sturtii* var. *grandiflorus*; north-westerly range extension of approximately 140 km
- *Rhodanthe charsleyae*; western edge or very minor westerly range extension

- *Rutidosis helichrysoides* subsp. *helichrysoides*; westerly range extension of approximately 100 km.

All other dominant and characteristic species recorded during this assessment were within their usual extents.

4.1.2 INTRODUCED FLORA

No Declared Plants were recorded during the survey.

Acetosa vesicaria* (Ruby dock, **Plate 7), **Bidens bipinnata* (Bipinnate Beggarticks), **Cucumis melo* subsp. *agrestis* (Ulcardo Melon) and **Vachellia farnesiana* (Mimosa Bush) were recorded from the study area (**Table 12**; shown on **Map 4**). No occurrences were considered to be significant.

Plate 7: *Acetosa setosa* (Ruby Dock)

Table 12: Coordinates of introduced flora species

Species	GDA mE	GDA mN
*Acetosa vesicaria	563035	7527484
*Bidens bipinnata	562553	7530433
*Bidens bipinnata	562810	7530408
*Bidens bipinnata	562839	7530393
*Bidens bipinnata	562890	7530376
*Bidens bipinnata	562911	7530353
*Bidens bipinnata	563321	7528634
*Bidens bipinnata	563035	7527494
*Bidens bipinnata	563039	7527318
*Bidens bipinnata	558630	7530554
*Bidens bipinnata	558639	7530533
*Bidens bipinnata	563578	7529269
*Bidens bipinnata	563458	7529330
*Bidens bipinnata	563178	7530288

Species	GDA mE	GDA mN
**Bidens bipinnata*	560163	7526452
**Bidens bipinnata*	559784	7529893
**Cucumis melo* subsp. *agrestis*	565351	7529075
**Cucumis melo* subsp. *agrestis*	563827	7531653
**Vachellia farnesiana*	563826	7531474
**Vachellia farnesiana*	563820	7531589
**Vachellia farnesiana*	563884	7531561
**Vachellia farnesiana*	563661	7531030
**Vachellia farnesiana*	563648	7530956
**Vachellia farnesiana*	563624	7530547
**Vachellia farnesiana*	563738	7530539
**Vachellia farnesiana*	563823	7530745
**Vachellia farnesiana*	564095	7530773
**Vachellia farnesiana*	562994	7530341
**Vachellia farnesiana*	563811	7527563
**Vachellia farnesiana*	558653	7526541
**Vachellia farnesiana*	562642	7527689
**Vachellia farnesiana*	564137	7530588
**Vachellia farnesiana*	557510	7525022
**Vachellia farnesiana*	562705	7527982

4.1.3 FLORA INVENTORY

Two hundred and thirty two vascular flora were recorded from the quadrats, as dominant and characteristic specie of the relevés and from opportunistic observations (**Appendix Six**). Of these, five were of conservation significance (**Table 11**) and four were introduced (**Table 12**).

4.1.4 VEGETATION

4.1.4.1 Vegetation Types

The following vegetation types were recorded from the Mt Macleod West study area from 46 relevés and 12 floristic quadrats. The extents of each of these vegetation types are shown in **Table 13**. A description and characteristic photograph of each vegetation type are given below.

Table 13: Extents of each vegetation type in the study area

Code	Vegetation Type	Relevé/ Quadrat No.	Area (ha)	Proportion
AaAbTe	*Acacia aptaneura, A. pruinocarpa and Corymbia deserticola* subsp. *deserticola* sparse shrubland/scattered trees over *Acacia bivenosa* and *A. ancistrocarpa* sparse shrubland over *Triodia epactia* and *T. wiseana* open hummock grassland	CP11025 MR1111 MR1119 MR1126 MR1129 MR1131 MR1133 MR1137 MR1138 MR1144	1375.07	36.12

Code	Vegetation Type	Relevé/ Quadrat No.	Area (ha)	Proportion
AaCf	*Acacia aptaneura* woodland over *Chrysopogon fallax, Sporobolus australasicus* and **Bidens bipinnata* open tussock grassland/sparse herbland	MR1112 MR1114	64.07	1.68
AaTe[1]	*Acacia aptaneura* shrubland over *Triodia epactia* and *Ptilotus obovatus* open hummock grassland/sparse shrubland	CP11021 CP11024 CP11029 MR1123 MR1127 MR1132 MR1142	156.57	4.11
AaTe[2]	*Acacia aptaneura* open shrubland over *Triodia epactia, Eriachne* sp. and *Chloris pectinata* hummock grassland/open tussock grassland	CP11027 MR1128	102.52	2.69
AaTw[1]	*Acacia atkinsiana, A. bivenosa* and *A. tenuissima* shrubland over *Triodia wiseana* hummock grassland with *Corymbia deserticola* subsp. *deserticola* scattered trees	MR1139	7.53	0.20
AaTw[2]	*Acacia aptaneura, A. pruinocarpa* and *A. bivenosa* open shrubland over *Triodia wiseana* and *T. epactia* hummock grassland	MR1113	74.70	1.96
AcEa	*Acacia citrinoviridis* and *Eucalyptus victrix* woodland over *Eulalia aurea, Themeda* sp. Hamersley Station and *Eriachne benthamii* open tussock grassland	MR1106	49.9.	1.31
Ap	*Astrebla pectinata, Stemodia kingii* and *Polymeria longifolia* tussock grassland/sparse herbland with *Acacia victoriae* and *A. synchronicia* scattered shrubs	CP11037 MR1103 MR1115 MR1116 (MR1105)	152.05	3.99
AxEm	*Acacia xiphophylla* sparse shrubland over *Eriachne mucronata*, *Eragrostis benthamii* and *Sclerolaena cornishiana* sparse tussock grassland/sparse herbland	CP11038 MR1101 MR1104 (MR1107 MR1108)	63.23	1.66
AxEm/Ap mosaic	Mosaic of AxEm (on rises) and Ap	MR1107 MR1108 and MR1105	135.50	3.56
ChApTe	*Corymbia hamersleyana* sparse woodland over *Acacia pyrifolia* var. *pyrifolia* and *A. dictyophleba* sparse shrubland over *Triodia epactia* and *Themeda triandra* hummock grassland/sparse tussock grassland	-	4.20	0.11
EgAeTe	*Eucalyptus gamophylla* and *Corymbia deserticola* subsp. *deserticola* open woodland over *Acacia exilis, A. atkinsiana* and *A. bivenosa* sparse shrubland over *Triodia epactia* and *T. wiseana* hummock grassland	MR1110 MR1117 MR1141	141.94	3.73

Code	Vegetation Type	Relevé/ Quadrat No.	Area (ha)	Proportion
ElAaTw	*Eucalyptus leucophloia* subsp. *leucophloia*, *Hakea chordophylla* and *Corymbia hamersleyana* open woodland/scattered shrubs over *Acacia atkinsiana*, *A. maitlandii* and *A. exilis* open shrubland over *Triodia wiseana* and *Indigofera monophylla* hummock grassland/sparse shrubland	CP11023 CP11026 CP11028 MR1109 MR1118 MR1120 MR1121 MR1124 MR1125 MR1130 MR1135 MR1136 MR1140 MR1143 MR1145 MR1146	1433.40	37.65
EvEb	*Eucalyptus victrix* woodland over *Vachellia farnesiana* sparse shrubland over *Eriachne benthamii, Eulalia aurea* and *Chrysopogon fallax* closed tussock grassland with **Vachellia farnesiana* scattered shrubs	CP11123 MR1102	1.30	0.03
ExAbTe	*Eucalyptus xerothermica, E. gamophylla* and *Corymbia hamersleyana* open woodland over *Acacia bivenosa and Senna artemisioides* subsp. *oligophylla* open shrubland over *Triodia epactia* hummock grassland	CP11105 MR1122 MR1134	39.98	1.05
Cl	Cleared	-	3.70	0.10
Rehab	Rehabilitated Area	-	1.03	0.03
TOTAL			**3806.73**	

Vegetation codes are formulated using initials for dominant and characteristic species in each strata, following Fortescue's *Flora and Vegetation Guidelines* (2011) and subsequent instructions

AaAbTe

Vegetation type description: *Acacia aptaneura, A. pruinocarpa* and *Corymbia deserticola* subsp. *deserticola* sparse shrubland/scattered trees over *Acacia bivenosa* and *A. ancistrocarpa* sparse shrubland over *Triodia epactia* and *T. wiseana* open hummock grassland. Other common species included *Aristida latifolia*, *Corymbia hamersleyana* and *Senna glutinosa* subsp. *glutinosa*.

This vegetation type occurred on valley floors and occasionally on lower slopes. This vegetation type was assessed from nine relevés and one quadrat, where the vegetation condition varied from Good to Excellent. **Plate 8** illustrates the **AaAbTe** vegetation type.

Plate 8: AaAbTe vegetation type (relevé MR1119)

AaCf

Vegetation type description: *Acacia aptaneura* woodland over *Chrysopogon fallax, Sporobolus australasicus* and **Bidens bipinnata* open tussock grassland/sparse herbland. Other common species include *Centipeda minima* subsp. *macrocephala* and *Chloris pectinata*.

This vegetation type occurred on valley floors. This vegetation type was assessed from two relevés, where the vegetation condition varied from Poor to Good largely due to grazing impacts. **Plate 9** illustrates the **AaCf** vegetation type.

Plate 9: AaCf vegetation type (relevé MR1114)

AaTe[1]

Vegetation type description: *Acacia aptaneura* shrubland over *Triodia epactia* and *Ptilotus obovatus* open hummock grassland/sparse shrubland. Other common species included *Eucalyptus xerothermica* sparsely scattered in some areas, and *Acacia bivenosa, A. ancistrocarpa, A. pruinocarpa, Aristida inaequiglumis, Corymbia deserticola* subsp. *deserticola* and *Chrysopogon fallax.*

This vegetation type occurred on valley floors. This vegetation type was assessed from four relevés and three quadrats, where the vegetation condition varied from Good to Excellent. **Plate 10** illustrates the **AaTe[1]** vegetation type.

Plate 10: AaTe[1] vegetation type (relevé MR1123)

AaTe^2

Vegetation type description: *Acacia aptaneura* open shrubland over *Triodia epactia, Eriachne* sp. and *Chloris pectinata* hummock grassland/open tussock grassland.

This vegetation type occurred on valley floors. This vegetation type was assessed from one relevé and one quadrat, where the vegetation condition was Good. **Plate 11** illustrates the **AaTe^2** vegetation type.

The *Eriachne* sp. could not be identified due to insufficient material.

Plate 11: AaTe^2 vegetation type (relevé MR1128)

AaTw[1]

Vegetation type description: *Acacia atkinsiana, A. bivenosa* and *A. tenuissima* shrubland over *Triodia wiseana* hummock grassland with *Corymbia deserticola* subsp. *deserticola* scattered trees. *Acacia ancistrocarpa* is also characteristic of this vegetation type.

This vegetation type occurred on lower slopes. This vegetation type was assessed from one relevé, where the vegetation condition was Excellent. **Plate 12** illustrates the **AaTw[1]** vegetation type.

Plate 12: AaTw[1] vegetation type (relevé MR1139)

AaTw^2

Vegetation type description: *Acacia aptaneura, A. pruinocarpa* and *A. bivenosa* open shrubland over *Triodia wiseana* and *T. epactia* hummock grassland. *Acacia inaequilatera* and *Senna glutinosa* subsp. *glutinosa* are also characteristic.

This vegetation type occurred on lower slopes. This vegetation type was assessed from one relevé, where the vegetation condition was Excellent. **Plate 13** illustrates the **AaTw^2** vegetation type.

Plate 13: AaTw^2 vegetation type (relevé MR1113)

AcEa

Vegetation type description: *Acacia citrinoviridis* and *Eucalyptus victrix* woodland over *Eulalia aurea, Themeda* sp. Hamersley Station and *Eriachne benthamii* open tussock grassland. *Centipeda minima* subsp. *macrocephala* was also characteristic of the lower stratum.

This vegetation type was associated with a drainage line (creek). This vegetation type was assessed from one relevé, where the vegetation condition was Very good. **Plate 14** illustrates the **AcEa** vegetation type.

Plate 14: AcEa vegetation type (relevé MR1106)

Ap

Vegetation type description: *Astrebla pectinata, Stemodia kingii* and *Polymeria longifolia* tussock grassland/sparse herbland with *Acacia victoriae* and *A. synchronicia* scattered shrubs. Other common species included *Dichanthium fecundum, Eragrostis setifolia* and *Sporobolus australasicus*, with *Acacia xiphophylla* an occasional occurrence although this species was generally associated with minor rises.

This vegetation type occurred on cracking clay valley floor soils. This vegetation type was assessed from four relevés (one of which was in a mosaic with vegetation type **AxEm**) and one quadrat, where the vegetation condition ranged from Poor to Very good. **Plate 15** illustrates the **Ap** vegetation type.

Plate 15: Ap vegetation type (relevé MR1103)

AxEm

Vegetation type description: *Acacia xiphophylla* sparse shrubland over *Eriachne mucronata*, *Eragrostis benthamii* and *Sclerolaena cornishiana* sparse tussock grassland/sparse herbland. Other common species included *Sporobolus australasicus, Acacia aptaneura, Astrebla pectinata, Eragrostis xerophylla, Eremophila maculata* var. *brevifolia*, Poaceae spp. and *Senna hamersleyensis.*

This vegetation type occurred on minor rises in valley floors. This vegetation type was assessed from four relevés (two of which were in the mosaic with vegetation type **Ap**) and one quadrat, where the vegetation condition varied from Good to Very good. **Plate 16** illustrates the **AxEm** vegetation type.

Plate 16: AxEm vegetation type (relevé MR1108)

AxEm/Ap mosaic

Mosaic of **AxEm** (on rises) and **Ap** (on the valley floor/flat). **Plate 16** illustrates the **AxEm** vegetation type within the mosaic, with the **Ap** grassland vegetation type visible in the right midground.

ChApTe

Vegetation type description: *Corymbia hamersleyana* sparse woodland over *Acacia pyrifolia* var. *pyrifolia* and *A. dictyophleba* sparse shrubland over *Triodia epactia* and *Themeda triandra* hummock grassland/sparse tussock grassland.

This vegetation type was associated with minor drainage lines on lower slopes. No relevés were recorded in this vegetation type, however it has been frequently recorded from valleys within the Hamersley Range during the CPP survey (Ecoscape 2012).

EgAeTe

Vegetation type description: *Eucalyptus gamophylla* and *Corymbia deserticola* subsp. *deserticola* open woodland over *Acacia exilis, A. atkinsiana* and *A. bivenosa* sparse shrubland over *Triodia epactia* and *T. wiseana* hummock grassland. Other common species included *Acacia ancistrocarpa, A. maitlandii, Corymbia hamersleyana, Senna artemisioides* subsp. *oligophylla, S. glutinosa* subsp. *pruinosa* and *Themeda triandra.*

This vegetation type occurred on lower slopes. This vegetation type was assessed from three relevés, where the vegetation condition was Excellent. **Plate 17** illustrates the **EgAeTe** vegetation type.

Plate 17: EgAeTe vegetation type (relevé MR1141)

ElAaTw

Vegetation type description: *Eucalyptus leucophloia* subsp. *leucophloia*, *Hakea chordophylla* and *Corymbia hamersleyana* open woodland/scattered shrubs over *Acacia atkinsiana, A. maitlandii* and *A. exilis* open shrubland over *Triodia wiseana* and *Indigofera monophylla* hummock grassland/sparse shrubland. Other common species *included Acacia bivenosa, A. exilis, A. monticola, A. pyrifolia* subsp. *pyrifolia, Bulbostylis barbata, Cymbopogon ambiguus, Goodenia cusackiana, Eriachne ciliata, E. mucronata, E. pulchella* subsp. *dominii, Grevillea wickhamii, Petalostylis labicheoides* and *Senna glutinosa* subsp. *glutinosa.*

This vegetation type occurred on hills of the Newman land system, from mid-slope to crests. This vegetation type was assessed from 13 relevés and three quadrats, where the vegetation condition was Excellent. **Plate 18** illustrates the **ElAaTw** vegetation type.

Plate 18: ElAatiTw vegetation type (relevé MR1145)

EvEb

Vegetation type description: *Eucalyptus victrix* over *Eriachne benthamii, Eulalia aurea* and *Chrysopogon fallax* closed tussock grassland with **Vachellia farnesiana* scattered shrubs. A *Cyperus* sp. was also characteristic of the drainage line.

This vegetation type was associated with drainage lines on valley floors and was assessed from one relevé and one quadrat, where the vegetation condition was Good. **Plate 19** illustrates the **EvEb** vegetation type.

Plate 19: EvEb vegetation type (relevé MR1102)

ExAbTe

Vegetation type description: *Eucalyptus xerothermica, E. gamophylla* and *Corymbia hamersleyana* open woodland over *Acacia bivenosa and Senna artemisioides* subsp. *oligophylla* open shrubland over *Triodia epactia* hummock grassland. Other common species included *Acacia aptaneura*, *A. tenuissima, A. tumida* var. *pilbarensis, Corymbia deserticola* subsp. *deserticola, C. hamersleyana Eucalyptus xerothermica* and *Triodia wiseana.*

This vegetation type occurred on lower slopes. This vegetation type was assessed from two relevés and one quadrat, where the vegetation condition was Excellent. **Plate 20** illustrates the **ExAbTe** vegetation type.

Plate 20: ExAbTe vegetation type (relevé MR1134)

4.1.4.2 Conservation Significance of Vegetation Types

Threatened or Priority Ecological Communities

No vegetation assessed as being, or likely to be considered, as a TEC was recorded from within the Mt Macleod West study area.

The 'Brockman Iron cracking clay communities of the Hamersley' PEC has been identified as occurring within the Mt Macleod West study area; vegetation type **Ap**.

Advice from the DEC Species and Communities Branch[1] indicates that *Astrebla* dominated grasslands with an overstorey do not qualify as the PEC. As there is no clearly defined point when sparse, scattered trees and shrubs qualify as an overstorey, Ecoscape considers that an overstorey of >2% canopy cover constitutes a stratum. Therefore, vegetation with scattered trees and shrubs where

[1] Emails from Val English and Jill Pryde to Lyn Atkins, September 15 and 16 2011.

they have >2% canopy cover, are considered to be woodlands or shrublands as appropriate. Similarly, grasslands within a small-scale mosaic with shrublands and woodlands are also not considered for inclusion in the PEC.

Vegetation type **Ap**, where it does not occur as a mosaic, corresponds with the PEC, and occupied 152.05 ha on the southern and eastern edges of the study area. The mosaic that includes this vegetation type (and is not considered to be included in the PEC) occurs to the west of Wackilina Creek.

Concurrently with this survey, Ecoscape has also assessed and mapped the nearby grasslands considered to be included in the '*Themeda* grasslands on cracking clays (Hamersley Station, Pilbara)' TEC (Ecoscape 2011). This survey indicates that much of the area previously considered for inclusion in the TEC are dominated by *Astrebla* spp, not *Themeda* spp, and are therefore included in the PEC rather than the TEC. Near the Mt Macleod West study area, the TEC has been interpreted to occur within 300 m of the eastern side of the study area boundary, where the vegetation type is entirely Astrebla-dominated grassland on cracking clay on the valley floor. The TEC *'Themeda* grasslands on cracking clays (Hamersley Station, Pilbara)' is approximately two kilometres to the east of the study area.

Sheet Flow Dependent Communities

Grove – intergrove Mulga is considered to be dependent on surface water flows to regenerate (eg Muller 2005). Mulga groves, defined as areas dominated by Mulga species, and having a distinct edge where the vegetation type changes (usually to a grassland) that is usually (but not always) repeated in a pattern, were not identified from or near the study area.

Groundwater Dependent Ecosystems

Eucalyptus victrix is a facultative phreatophyte, so at least partly groundwater dependent (eg Astron Environmental Services 2008; Maunsell Australia Pty Ltd 2006). However, *E. victrix* is generally only considered, at most, to be weakly phreatophytic and has been demonstrated to not be dependent of groundwater in some locations (eg Resource and Environmental Management Pty Ltd 2007). Despite this, the precautionary principle outline in EPA *Position Statement No. 7 – Principles of Environmental Protection* (2004c) should be followed and *E. victrix* considered to be at least partly groundwater dependent and characteristic of a potential GDE.

The **EvAb** and **AcEa** vegetation types were dominated by *E. victrix* or had this species as a characteristic component, and therefore can be considered potential groundwater dependent ecosystems (GDEs).

Other species associated with minor drainage lines, including *Acacia* spp. (eg *A. tumida, A. citrinoviridis*) and *Corymbia hamersleyana,* are not considered to be groundwater dependent (eg Astron Environmental Services 2008).

'Ecosystems at Risk'

'Ecosystems at Risk' do not have any statutory protection. They were identified by regional ecologists and others as part of the then Department of Conservation and Land Management's (CALM, now DEC) *Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002* (CALM 2002).

The DEC considers 'Hilltop floras, Hamersley Range' as a *vulnerable* 'Ecosystem at Risk' due to frequent fires preventing regeneration and deliberate burning (Kendrick 2002). There are no areas that could be considered as 'Hilltop floras' in the study area.

'All major ephemeral water courses' is also identified as an 'Ecosystem at Risk' in Kendrick (2002). Caves Creek is located to the north of the study area, with a tributary within the study area on the eastern/south-eastern side. Whilst it could not be considered a 'major' in or near the study area, it is a major tributary of Duck Creek, that is in turn a major tributary of Ashburton River. Therefore, activities that impact on stream flow or water quality have potential to impact on other 'major ephemeral water courses'.

Other nearby 'Ecosystems at Risk' listed in Kendrick (2002) include 'Valley floor Mulga', and 'Lower slopes Mulga'. Vegetation dominated by Mulga (*Acacia aptaneura*) occurs in the study area and includes vegetation types **AaAbTe**, **AaCf** and **AaTe^2** on valley floors and **AaTw^2** on lower slopes.

Other Measures of Vegetation Type Significance

In EPA *Guidance Statement No. 51* (2004a), the EPA list several reasons why vegetation may be considered to be significant in addition to its listing as a TEC or PEC or because the extent is below a minimum threshold. These reasons, which may apply at a number of scales but are not defined in detail, include:

- scarcity
- unusual species
- novel combinations of species
- role as a refuge
- role as a key habitat for threatened species or large populations representing a significant proportion of the local to regional total population of a species
- being representative of the range of a unit (particularly a good local and/or regional example of a unit in 'prime' habitat, at the extremes of range, recently discovered range extension or isolated outliers of the main range)
- restricted distribution.

Locally significant vegetation, unless it is a TEC, do not have any form of statutory protection.

Aside from those discussed above, all other vegetation types in the Mt Macleod West study area are considered to be widespread and of little significance.

4.1.5 VEGETATION CONDITION

Relevés were recorded in areas that were typical of the targeted vegetation type. The vegetation condition (Trudgen 1991) was recorded for each relevé and extrapolated to each vegetation type.

The vegetation condition of the study area ranged from Poor to Excellent, largely depending on the impacts of grazing. The extents and proportion of each vegetation condition rating category is shown in **Table 14**. **Map 6** shows vegetation condition in the study area.

Table 14: Vegetation Condition (Trudgen 1991)

Condition Rating	Excellent	Very good	Good	Poor	Very poor	Degraded	Other (Cleared/ Rehab)
Extent (ha)	2211.15	1371.75	195.15	23.95	0	0	4.74
Proportion (%)	58.1	36.0	5.1	0.6	0	0	0.1

4.2 Fauna

4.2.1 HABITAT TYPES

There were 5 habitat types identified within the study area. These were differentiated based on landform and vegetation type. The habitat types are described as:

- M1 - Sheltered gullies and low cliffs with eucalypt woodland
- M2 - Exposed slopes and low ridges, mainly hard spinifex
- M3 – Tussock grassland on valley floor
- M4 – mulga woodland/snakewood on valley floor
- M5 – Triodia grassland with scattered shrubs on valley floor.

The condition of all habitats was determined to be excellent, with no evidence of recent fire, and abundant fresh growth of *Triodia* spp. and *Acacia* spp. No surface water was recorded and all drainage appears to be ephemeral. Some grazing impact in tussock grass areas (habitat types M3, M4) results in lower habitat quality for certain species (eg Northern Short-tailed Mouse, Western Star Finch).

The habitats were mapped based on landscape position, vegetation and soil type and are shown on **Table 15**. The majority of the study area is made up of habitat types M2 and M5 which are associated with Newman and Boolgeeda land systems, respectively (**Plate 22** and **Plate 25**). Table 15 shows the amount of each habitat type within the study area and the percentage extent.

Habitats M1 (**Plate 21**), M3 (**Plate 23**) and M4 (**Plate 24**) made up a small percentage of the study area; however they provide values of shelter, water resources and foraging, making these habitats important for the survival and persistence for many fauna species.

Table 15: Extent of each habitat type within the study area

Habitat Type	Extent within study area (ha)	Proportion of study area (%)
M1 – sheltered gullies and low cliffs with eucalypt woodland	56.32	1.48
M2 – exposed slopes and low ridges, mainly hard spinifex	1252.55	32.9
M3 – tussock grassland on valley floor	330.26	8.68
M4 – mulga woodland/snakewood on valley floor	81.59	2.14
M5 – Triodia grassland with scattered shrubs on valley floor	2086.02	54.79
Total	3806.74	

Plate 21. Habitat Type M1

Plate 22. Habitat Type M2

Plate 23. Habitat Type M3

Plate 24. Habitat Type M4

Plate 25. Habitat Type M5

4.2.2 OPPORTUNISTIC OBSERVATIONS

Thirteen bird species (in addition to those recorded in the census) were recorded opportunistically at other times and locations in and adjacent to the Mt Macleod study area, bringing the total to 34. Observed numbers of the additional species were mostly low (1-2), consistent with low actual numbers or difficulty in detection, with the exception of Australian Ringneck (7). The only conservation-significant species recorded opportunistically was Australian Bustard (DEC P4), based on tracks and also some feathers caught on a barbed wire fence in the *Astrebla* grassland adjacent to the eastern end of the study area.

A Wedge-tailed Eagle was seen circling over the western part of the study area, and the presence of at least two Whistling Kites was recorded by camera trap. A Spotted Harrier was also seen during census, near a large nest of sticks in a dead tree that may have belonged to this species. No other raptor roosts, nests or feeding signs were identified.

Scats of Euro were observed commonly, in the open as well as associated with overhangs and small caves. This species is dependent on frequent access to water, and the only individual seen directly was close to one of two station bores that also had large numbers of birds present; no other permanent water sources were identified.

One frog was found at night under a water tank. Reptile activity was relatively low due to cool and drying conditions, but active or basking individuals of some species were observed on and adjacent to the study area. These included Mulga Snake, Stimson's Python, Bearded Dragon, Ringtailed Dragon, and several skinks. An FMG employee at Bonnie Doon camp informed us that he had, a few days previously, seen a '3 m long' brown-coloured snake crossing the Mt Brockman road adjacent to the study area: though anecdotal, this is considered a plausible record of a Pilbara Olive Python.

A dead, young adult Dingo (with complete but nearly unworn dentition) was present beside the north-south station track in the eastern part of the study area. Decay was well advanced and cause of death was not apparent, but signs warning of 1080 baits were present at the nearby bore. Dingo tracks were observed at several sites, where individuals had repeatedly patrolled newly cleared tracks. Two Dingo scats were found, containing mainly tussock grass bitten into 0.5-2 cm sections, and with no identifiable animal remains such as hair, feathers or bones. The resting trace of a Cat (prints and traces made in sitting, lying down, and entering and leaving the site) was observed in a clearing.

Several sites with sandy or dusty substrates suitable for fauna traces were examined, mostly on recently cleared tracks. Identifiable tracks include those of Bustard, Dingo, and Cat (mentioned above), large Mulga Snakes, smaller snakes and/or pygopodids, large (Bearded) and small dragon lizards, large goannas (Perentie *Varanus giganteus*, or possibly Yellow-spotted Monitor *V. panoptes*), and Spinifex Hopping-mouse. Two unusual and distinctive trackways in dust are interpreted as those of large geckos, probably Banded Knob-tail *Nephrurus wheeleri* (with tail-drag marks) and Western Shield Spiny-tail *Strophurus wellingtonae*. A complete skeleton of a Burton's Snake-lizard, and two inactive Pebble-mound Mouse (DEC *P4*) mounds were observed near one of the trapping sites.

A total of 55 vertebrate species was recorded by these methods (one frog, six mammals, 13 reptiles, 35 birds); they are listed in **Table 24**, and photographs of some species are also included as **Plate 26**-**Plate 46** (**Appendix 8**).

4.2.3 BIRD CENSUS

21 species of birds were identified by sight or call during six sessions of bird census over four days, the number of individuals ranging from one (five species) to approximately 75. Eight or more individuals were recorded in the following species, which are thus regarded as common and conspicuous in the study area: Zebra Finch (75), Crested Pigeon (23), Striated Pardalote (21), Galah (15), Budgerigar (10), Yellow-throated Miner (10), and Rufous Whistler (9).

The only conservation-listed species recorded was a pair of Rainbow Bee-eaters (EPBC-listed *migratory* species, but widespread and common).

4.2.4 TRAIL CAMERAS

Identifiable images of fauna were obtained from two cameras at separate sites. One (MCAM4) captured two images of a Torresian Crow eating bait just after sunset (6:05 pm). The camera on the water trough (MCAM1) recorded several videos of cattle drinking at night, but also numerous birds between dawn and dusk: Crested Pigeons (up to 15 individuals at one time), Little Corellas (13), Galahs (9), Ringneck Parrot (3), Torresian Crow (2), Whistling Kite (two individuals at different times), Common Bronzewing (1), Australian Magpie (1), Magpie Lark (1), a probable Black-faced Cuckoo-shrike (1), and flocks of Zebra Finch (20 or more birds in the background). **Table 16** lists the co-ordinates for the locations of each camera.

Table 16: Camera co-ordinates in metres (GDA94 MGA zone 50).

Item	Easting	Northing
MCAM1	563620	7530117
MCAM2	559866	7529317
MCAM3	562234	7527195
MCAM4	563817	7528292
MCAM5	559994	7527880
MCAM6	559872	7527961

4.2.5 TRAPPING

Cage traps were set in denning and foraging habitat of the Northern Quoll, and baited with universal bait. Traps were checked each morning within two hours of sunrise. No captures of any species were made in 60 trap nights at Mt Macleod.

5.0 Discussion

5.1 Flora and Vegetation

5.1.1 SURVEY EFFORT

This assessment of the Mt Macleod West study area was a Level 1 survey according to EPA *Guidance Statement No. 51* (2004a) and *Position Statement No.* 3 (EPA 2002), and was conducted as a reconnaissance survey with targeted searches for conservation significant flora. However, the Mt Macleod West study area is located within a larger area that has been subject to a Level 2 assessment (the Central Pilbara Project (CPP), Ecoscape 2012), and as such this survey provides additional information on the study area. The Mt Macleod West study area is situated in an area considered to be 'regional' within the CCP area, and as such it was not surveyed with the intensity of other areas considered likely to be resource or infrastructure areas.

5.1.2 FLORA OF CONSERVATION SIGNIFICANCE

A total of 232 vascular flora taxa were recorded from within the study area from relevé sites, quadrats and opportunistic observations (**Appendix Six**). The seasonal conditions were considered excellent.

Sixty two TF and PF taxa were identified from the DEC database search request of the study area and nearby, with one (P3 species *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727)) identified as having previously been recorded within the study area. Two TF species listed under the Commonwealth *EPBC Act* (1999) as *vulnerable* and *WC Act* (1950), *Lepidium catapycnon* and *Thryptomene wittweri,* were identified from the DEC database search request as occurring close to the study area. Neither were located during the field assessment, and as both are known to occur high in the landscape they are unlikely to occur in the study area due to the lack of suitable habitat.

Five PF species, *Astrebla lappacea* (P3), *Iotasperma sessilifolium* (P3), *Rhagodia* sp. Hamersley (P3), *Themeda* sp. Hamersley Station (P3) and *Vigna* sp. central (P2), were recorded from the study area. *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727) (P3) had previously been recorded from the study area but was not recorded during this survey.

Priority flora species do not have specific protection, however the DEC expects that the proponent of any clearing that will impact on these species demonstrates that they have taken appropriate action to minimise impacts.

5.1.2.1 Conservation Significant Flora Risk Assessment

It is considered that the majority of the TF and PF taxa anticipated to occur within the study area would have recognisable (if present) due to the survey timing (coinciding with the majority of species' flowering periods) and excellent seasonal conditions. However, as a result of the large scale

of the survey, and limited access to some northern and eastern sections, it is not possible to rule out the possibility of additional conservation significant flora occurring within the study area.

Therefore a risk assessment, identifying the likelihood of conservation significant species occurring on the Mt Macleod West study area is included in **Table 26, Appendix Eight**. The likelihood of a species occurring in the study area is based on the following attributes, as listed on FloraBase (WAH 2011a; 2011b) and tailored to Pilbara populations and including information from recent nearby surveys. The attributes were:

- the broad soil type usually associated with the species
- the broad landform usually associated with the species
- the usual vegetation (characteristic species) with which the species is usually associated
- the species having previously been recorded from nearby (approximately 50 km; including the current WH and CPP surveys).

The likelihood rating is assigned using the following categories:

- recorded (ie it does occur within the study area)
- almost certain: it is expected to occur within the study area (but was not recorded)
- likely: it will probably occur within the study area
- unlikely: it could occur but is not expected
- none (Rare): none of the attributes of soil, landform and associated vegetation that are characteristic of the species occur in the study area, and it has not previously been recorded nearby. Therefore it almost certainly does not occur within the study area.

The conservation significant flora most likely (ie almost certain) to occur in the study area but not recorded during the survey are:

- *Vigna* sp. central (M.E. Trudgen 1626) (P2)
- *Calotis latiuscula* (P3)
- *Eragrostis surreyana* (P3)
- *Oldenlandia* sp. Hamersley Station (A.A. Mitchell PRP 1479) (P3)
- *Polymeria distigma* (P3)
- *Swainsona* sp. Hamersley Station (A.A. Mitchell 196) (P3)
- *Goodenia nuda* (P4)
- *Rhynchosia bungarensis* (P4).

5.1.3 INTRODUCED SPECIES

No *Declared Plants* are listed under the *Agriculture and Related Resources Protection Act 1976* (Government of Western Australia 1976) were recorded from the study area.

There were no significant infestations of introduced species recorded from the study area, although four introduced species (**Acetosa vesicaria, *Bidens bipinnata, *Cucumis melo* subsp. *agrestis, *Vachellia farnesiana*) were observed in low densities.

5.1.4 VEGETATION CONSERVATION SIGNFICANCE

Thirteen vegetation types, plus a mosaic vegetation type of two of these, were recorded from Mt Macleod West study area, none of which match the description of any recognised TECs.

The **Ap** vegetation type is considered to be analogous with the 'Brockman Iron cracking clay communities of the Hamersley' PEC, however most of the area of this vegetation type is within a mosaic vegetation type that the DEC has advised is not included in the PEC. 152.05 ha of the **Ap** vegetation type was recorded from near the south-eastern corner and eastern boundary of the study area; previously it had been assessed as being approximately 300 m to the east.

The Mt Macleod West study area is within two kilometres distance of an area assessed as being included in the *'Themeda* grasslands on cracking clays (Hamersley Station, Pilbara)' TEC that has been assessed and mapped by Ecoscape (2011). No vegetation considered similar to this TEC was recorded from the study area, although the characteristic species (*Themeda* sp. Hamersley Station; although only the genus is considered to be definitive of the TEC) was recorded.

The 'Ecosystem at Risk' (CALM 2002) 'Valley floor Mulga' was recorded from the study area; however no Mulga vegetation types considered to be grove – intergrove or sheetflow dependent were recorded. Vegetation types **AaAbTe**, **AaCf** and **AaTe^2** are considered to be 'Valley floor Mulga' vegetation types. 'Lower slopes Mulga' was also identified as an 'Ecosystem at Risk'; vegetation type **AaTw^2** is considered analogous.

'Ecosystems at Risk' do not have any formal conservation significance.

The **EvAb** and **AcEa** vegetation types are considered to be potential groundwater dependent ecosystems (GDEs).

None of the other vegetation types are considered significant and all are considered to be widespread and well represented in the broader region.

5.1.5 VEGETATION CONDITION

The vegetation condition of the Mt Macleod West study area, assessed using the Trudgen (1991) Vegetation Condition Rating Scale, ranged from Very poor to Excellent depending of the density of weeds, impacts from grazing and effects of fire. Significant impacts from cattle grazing were observed in some areas.

5.2 Fauna and Habitat

CONSERVATION-SIGNIFICANT AND OTHER SPECIALLY PROTECTED FAUNA

Habitat requirements, documented or potential presence at the site, and likely extent of impact are discussed for each listed species. Species and common names are followed by abbreviations denoting conservation status, as listed in **Table 18** and **Table 19** (**Appendix One**).

FISH

Leipoptherapon aheneus* (Fortescue Grunter) DEC *P4

The Fortescue Grunter (Terapontidae) is endemic to the Pilbara region of Western Australia (Allen *et al.* 2002). The species has only been recorded from permanent water along the Fortescue, Robe and Ashburton drainage systems. It occurs in slow to fast flowing streams and pools, and feeds on small crustaceans and juvenile fish, growing to a maximum length of 13 cm.

The study area lies on the watershed in the Ashburton drainages, but this species is unlikely to occur there at the current time. It is possible that Fortescue Grunter could move into the study area after cyclonic activity and flooding links permanent water bodies via drainage systems, but persistence would be unlikely as there are no permanent flowing watercourses.

MAMMALS

***Dasyurus hallucatus* (Northern Quoll) EPBC EN, WCA EN**

The Northern Quoll (Dasyuridae) is a medium-sized carnivorous marsupial, occurring in a variety of habitats across its range. Rocky areas provide prime habitat as they offer shelter and protection from predators and weather (Hill & Ward 2010). Northern Quoll are opportunistic foragers, feeding on a wide range of prey including beetles, grasshoppers, spiders, scorpions and centipedes, vertebrates up to the size of the Common Brushtail Possum, and also fruit, nectar, carrion and human refuse, switching dietary resources according to season and availability (Hill & Ward 2010). Mating occurs in late June and a single litter of up to eight young are born in July or August, with lactation ceasing in April (Schmitt et al. 1989). Reproductive maturity occurs at 11 months; males usually die within weeks after mating, and most females do not survive more than one breeding season. Body size, home range size and survival rate vary between rocky and savannah habitats, but Pilbara populations have not been well studied.

Pilbara Northern Quoll populations are considered to be already fragmented and to have been in decline since the mid-1980s, with the precise causes unknown (Threatened Species Scientific Committee 2005). The major threat to future survival of the species overall (O'Donnell *et al.* 2010) is the lethally toxic Cane Toad *Chaunus* (or *Bufo*) *marinus*, which has already been implicated in rapid population declines in Queensland and the NT, is now expanding its range westwards into WA, and is likely to become established in parts of the Pilbara within 15 years (TSSC 2005) (Sutherst *et al.* 1996).

Biota (2009b) analysed distribution records of Northern Quoll across the Pilbara in terms of Land Systems (Van Vreeswyk et al. 2004) and results of trapping surveys. Considering the total area of each land system, those with 5 or more records can be ranked as follows: Robe (358 per 10,000 km^2), Horseflat (56), Wona (55), Calcrete (35), Macroy (29), Rocklea (21), River (20), Capricorn (19), McKay (12), Boolgeeda (6.5) and Newman (4.8). Biota (2009b) reported no quoll records for the Hooley land system or any others of the same land type (Christmas, Cowra, Marillana, Narbung or Sherlock; Van Vreeswyk et al. 2004). Most surveys using Elliott traps in the Hamersley Range (where Newman and Boolgeeda predominate) recorded no quolls, whereas there were few null trapping results in the Chichester subregion (Biota 2009).

There is no evidence that Northern Quoll occurs in the study area despite targeted search and trapping effort undertaken in this survey (60 nights). Some potential denning / shelter habitat (considered critical for quoll survival) occurs in the study area in the form of rocky gorges, gullies and escarpments, boulder fields, and small caves (areas within habitat type M2, highlighted in red in **Map 7**). Foraging or dispersal habitat is considered to include any areas of predominantly native vegetation up to 2 km from denning habitat (DSEWPaC 2011b).

***Sminthopsis longicaudata* (Long-tailed Dunnart) DEC P4**

This species is found in rocky areas of central Western Australia and a few sites in central southern Northern Territory. In Western Australia it is found in the Pilbara, Murchinson, Northeastern Goldfields, Ashburton, and Gibson Desert regions (Pavey 2002). It is a rare species that is patchily distributed, but at times it can be locally common (Burbidge *et al.* 2008). It is found in rocky scree and plateau areas, generally with little vegetation or of spinifex hummock grassland, shrubs, and open woodland (Burbidge *et al.* 2008). This species is nocturnal, and its diet includes a variety of invertebrates. Females in captivity give birth to up to five young between the months of October and December (Pavey 2002). There appear to be no major threats to this species. In the range within central Australia this species is affected by the spread of exotic buffel grass, which increases frequency and intensity of fires, and this is also likely to be an issue in parts of Western Australia (IUCN Red List 2011).

There are records of this species in the vicinity of the study area (DEC & Western Australian Museum 2011) and suitable habitat exists, so there is potential for it to occur.

***Lagorchestes conspicillatus leichardti* (Spectacled Hare-wallaby - mainland) DEC P3**

The Spectacled Hare Wallaby (Macropodidae) has declined dramatically in WA; it is now extremely rare and reduced to a few isolated populations in the Pilbara and Kimberley regions in the Pilbara (Department of Conservation and Land Management 1999; Wildlife Australia 1996). This species occupies a wide variety of habitat types including: open forests, open woodland, tall shrublands, tussock grasslands and hummock grasslands. In the drier southern parts of its range it commonly occupies spinifex (*Triodia* or *Plectrachne* spp.) sandplains interspersed with low shrubs and a

diversity of either soft grasses, sedges or herb species. Threats probably include introduced predators (foxes in southern parts of the range and possibly cats), and competitors, the pastoral industry (particularly sheep in the Pilbara and cattle in the south-west Kimberley and possibly MacDonnell Ranges) and changes in fire regimes (central Australia).

The only record of this species in the central Hamersley (DEC & Western Australian Museum 2011) dates from 1966, and it is unlikely that a population still occurs in the subregion (locally extinct).

***Macroderma gigas* (Ghost Bat) DEC P4**

Regional populations of Australia's only carnivorous bat (Megadermatidae) are centred on maternity roosts that are genetically isolated from each other, and only 10 such sites are known to exist, including one at Mt Brockman in the Pilbara (Armstrong 2001; Worthington-Wilmer *et al.* 1994). Most males and subadult females disperse in the non-breeding (dry) season and form smaller temporary colonies sharing one or more daytime roosts (Toop 1985). The persisting arid zone regional population in the Pilbara is also geographically isolated, being separated from extant northern Australian populations and the historical central Australian populations by extensive sandy deserts, and should be further assessed to determine its specific status. The central Australian population is considered to be extinct and the Pilbara population is considered vulnerable.

The Ghost Bat forages by gleaning, eating large insects, frogs, lizards, small birds and mammals. Tideman *et al*. (1985) reported that Ghost Bats in the Northern Territory had individual foraging ranges with a mean area of 61 ha, up to 4 km from their shared daytime roost, which they may utilise for multiple successive nights. The species detect prey using eyes and ears rather than using echolocation, changing vantage points were about every 15 minutes during foraging periods, with a mean distance of 360 m between them. It is an obligate troglodyte, and survival is critically dependent on finding natural roosts in caves, crevices, deep overhangs, and artifical roosts such as abandoned mines (Marshall et al. 1997); the most suitable roosting locations in the Pilbara occur in the Marra Mamba Iron Formation (Armstrong & Anstee 2000). Threats include disturbance and loss of roosting sites due to mining, tourism and internal dereliction of mines through aging of timber supports (Hall et al. 1997). In recent times population declines could be attributable to competition for prey with foxes, feral cats, and prey lost through habitat modification by fire and livestock (Environment Australia 1999).

There are several records within 50 km of the study area including the maternity roost at Mt Brockman; some small caves within habitat type M2 (in low escarpments and gullies highlighted in red in **Map 7**) provide suitable locations for daytime roosts. Low numbers of Ghost Bats may therefore utilise the study area for foraging and daytime roosting during the dry season.

***Rhinonicteris aurantia* (Pilbara Leaf-nosed Bat) WCA VU**

The Pilbara population of the Orange Leaf-nosed Bat (Hipposideridae) is subject to current taxonomic research and may be recognised as a distinct species from northern populations. It is a moderate-

sized bat with short, bright orange fur, relatively small ears and a fleshy noseleaf structure surrounding the nostrils. It appears to be divided into three discrete subpopulations (eastern Pilbara mines and granite, Hamersley Range, Upper Gascoyne), separated by relatively flat areas that impede gene flow such as the Fortescue and Ashburton valley. It is unlikely that the Pilbara Leaf-nosed Bat disperses through the desert or occupies habitat there. Many records of the species in the region are of bats in flight or roadkills, so the number of distinct roost sites is not known.

The Pilbara Leaf-nosed Bat is restricted to caves and mine adits (horizontal shafts) with stable, warm and humid microclimates because of its poor ability to thermoregulate and retain water. The roost is usually over pools of water in deeper mines, or deep within the mine or cave structure in an area that maintains elevated temperature and humidity. Thus, the roosting site is often at depth in mines; in small crevices within caves, usually those ascending between sedimentary rock layers; and with associated groundwater seeps (eg at Barlee Range; Armstrong 2001). Simple vertical shafts are not used and shallow caves beneath mesa bluffs are also unlikely roost sites. However, temporary roosts such as crevices and tree hollows can be used in warm and humid conditions, allowing greater dispersal during the wet season (Armstrong 2001).

Foraging in the Pilbara has been observed in *Triodia* hummock grasslands covering low rolling hills and shallow gullies, with scattered *Eucalyptus camaldulensis* along the creeks (eg near Marble Bar, Bamboo Creek, Lalla Rookh and Copper Hills), over small watercourses amongst granite boulder terrain and around nearby koppies, over pools and low shrubs in ironstone gorges, and above low shrubs and around pools in gravelly watercourses with *Melaleuca leucodendron*, such as in Barlee Range Nature Reserve (Armstrong 2001; Churchill *et al.* 1988). Typically, the Pilbara Leaf-nosed Bat flies low in the open spaces in watercourses and gorges, and over *Triodia* grassland, sometimes within centimetres of the ground, but up to 2–3 m in height. This species is very sensitive to even slight human disturbances. If subject to continual human interference it may completely abandon a roost. It often shares roosts with the Ghost Bat (*Macroderma gigas*), Finlayson's Cave Bat (*Vespadelus finlaysoni*), Common Sheath-tailed Bat (*Taphzous georgianus*), and possibly Hill's Sheath-tailed Bat (*Taphozous hilli*) in some parts of its range. Any management strategy that benefits the Pilbara Leaf-nosed Bat is also likely to benefit these species (DSEWPaC 2011).

There are records from the eastern and western Hamersley but none from the central section, and no indication of deep horizontal caves providing suitable roosts was observed in this survey, so it is unlikely to occur. No impact is likely.

***Leggadina lakedownensis* (Northern Short-tailed Mouse, Lakeland Downs Mouse) DEC P4**

This native rodent (Muridae) is a nocturnal species found in areas of open tussock and hummock grassland, *Acacia* shrubland, and savanna woodland, on alluvial clay or sandy soils. Females give birth to two litters annually. Litters contain up to four young and the gestation period lasts about 30 days. The population is rare and scattered on the mainland with large annual fluctuations that may

not correlate with environmental fluctuations or seasonality. No major or general threats have been identified .

There are *NatureMap* (DEC & Western Australian Museum 2011) records of this species in the vicinity of the study area, so it may also occur on the site along the valleys where clay and sandy soils with acacia shrubland represent suitable habitat. Given the patchy and fluctuating population, any impact would be very difficult to measure but some may occur.

***Pseudomys chapmani* (Western Pebble-mound Mouse) DEC P4**

This native rodent (Muridae) is sparsely distributed within abundant habitat, preferring gentle slopes of rocky ranges sparsely vegetated by *Triodia* grasses, *Senna, Acacia* and *Ptilotus* species. Animals live in small family groups in burrows below mounds of pebbles. Females can produce several litters of four young annually. There appear to be no major threats to this species. The reasons for its elimination from the southern portion of its range are unclear, but may have been related to predation by feral cats and foxes. Mining may be a very localized threat , but this would not affect the overall population size (IUCN 2011b).

Two inactive mounds of this species were detected in the survey, and it is likely to be present at low density. Suitable habitat for this species is extremely abundant and practically continuous (comprising tops as well as lower slopes of hills) throughout the Pilbara, so no significant impact is likely.

BIRDS

***Apus pacificus* (Fork-tailed Swift) EPBC M**

A non-breeding visitor to all states and territories of Australia, this swift (Apodidae) feeds on flying insects and is almost exclusively aerial in habits, flying from less than 1 m to at least 300 m above ground and probably much higher. In Australia they mostly occur over dry and open inland plains, but also over a wide variety of land and marine habitats. Some birds have been sighted in Western Australia arriving from Indonesia between October–November. Flocks have been recorded near Broome on southward passage across the continent. In north and north-west Western Australia, most birds have departed by the end of April. There are no significant threats to the Fork-tailed Swift in Australia (DSEWPaC 2011).

Swifts were not observed in this survey but there are numerous records from the central Hamersley and it would certainly occur in the study area. No impact is likely to occur because of the bird's nomadic aerial habits.

***Ardea modesta* (Eastern Great Egret) EPBC M**

Eastern Great Egrets (Ardeidae; listed by DEC as *Ardea alba modesta*) are widespread in Australia, occurring in a wide range of wetland habitats and breeding (November to April, depending on rainfall) in colonies in wooded and shrubby swamps. They feed on a wide range of invertebrates and

small vertebrates including birds, reptiles and small mammals. The species undertakes some regular seasonal movements, mostly to and from breeding colonies, and towards the coast in the dry season.

Regional differences in reporting rates suggest that individuals migrate north to winter in tropical northern Australia, consistent with changes in the availability of suitable wetland habitat. Regular migration to locations outside of Australia is suspected but not confirmed. Threats include loss and/or degradation of foraging and especially breeding habitat through alteration of water flows, drainage and/or clearing of wetlands for development, frequent burning of wetland vegetation used as nest sites, salinisation, and invasion by exotic plants or fishes (DSEWPaC 2011).

There are few records of Great Egret in the Hamersley relative to nearby subregions; it was not detected during this survey, but may occasionally utilise river valleys and waterholes. It is unlikely that activity on the study site would have any impact on this species.

***Ardea ibis* (Cattle Egret) EPBC M**

The Cattle Egret (Ardeidae) is a relatively recent colonist of Australia (from 1948) from Asia, and occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands. It remains extremely rare in arid and semi-arid regions. In the Pilbara there are only a few records, from Fortescue Marsh, and Ophthalmia Dam near Newman (eastern Hamersley range), and no breeding is reported in this area. This species feed mainly on grasshoppers, but also other insects and small vertebrates. Migration occurs to and from breeding colonies in Australia, but movements are poorly known in north and western Australia. There are few threats in Australia, other than predation by feral cats while nesting (DSEWPaC 2011).

Cattle Egrets have not been recorded within 200 km of the study area and are unlikely to occur there.

***Haliaeetus leucogaster*(White-bellied Sea-eagle) EPBC M**

A large raptor (Accipitridae) distributed mainly along coastlines, offshore islands and large inland waterways, with breeding only in limited areas of its range; it also occurs around freshwater swamps, lakes, reservoirs etc., and feeds on a wide variety of fish, crustaceans and terrestrial vertebrates including carrion. It is common and widespread in much of southern Asia, but has declined in some areas including Australia. The main threats are loss of habitat due to land development, and the disturbance of nesting pairs by human activity. (DSEWPaC 2010c)

Sea-eagles are recorded along the Fortescue River but are not known to extend into the Hamersley range, and are unlikely to occur near the study area.

***Falco hypoleucos* (Grey Falcon) DEC P4**

The rarest of Australia's six falcon species (Falconidae), sparsely distributed throughout the arid zone and even less common in mesic areas (most coastal sightings occurring in drought years). They feed on a wide variety of birds, but most often on ground-feeding parrots and pigeons, as well as some

snakes, lizards, and grasshoppers. Grey falcons use the nests of crows, kites or eagles, most often placed in upper branches of emergent eucalypts, often on a tree-lined watercourse, and eggs are laid between July and October (Olsen & Olsen 1986). There are scattered records through most parts of WA including the Pilbara, but none within 100 km of the study site (NatureMap).

Suitable nesting habitat may occur in the study area, especially along the creekline in the eastern part (highlighted in blue in **Map 7**), and the entire area could be used for. This species would be present sporadically if at all.

Falco peregrinus **(Peregrine Falcon) WCA S4**

This species (Falconidae) is uncommon but wide-ranging throughout Australia, preferring areas with rocky ledges, cliffs, watercourses, open woodland or margins with cleared land. Ledges, cliff faces, large tree hollows and spouts, or abandoned nests of other raptors are used for nesting. Individual Peregrines are occasionally sighted throughout the region, suitable foraging and nesting habitat exists in the study area (especially the larger trees along watercourses, highlighted in blue in **Map 7**) and they may use the study area as part of a larger foraging range.

Ardeotis australis **(Australian Bustard) DEC P4**

A large, omnivorous, partly nocturnal bird of plains, grasslands and woodlands, the Bustard (Otididae) is nomadic, so that numbers fluctuate depending on the availability of food with seasons and following irregular rainfall. Food includes leaves, buds, seeds, fruit, frogs, lizards, and invertebrates. It has disappeared from much of southern Australia due to hunting pressure, but remains common in the north. Their presence also indicates healthy populations of insects and small animals. Threats include human hunting, introduced predators (especially foxes), and thickening of vegetation due to overgrazing or lack of fire. As ground nesters, they are particularly vulnerable to fire in the nesting season.

Although none were sighted, tracks and feathers of Bustard were identified in this survey, and they are likely to occur in much of the study area (particularly grasslands) as they remain fairly common throughout the region.

Burhinus grallarius **(Bush Stone-curlew) DEC P4**

While this bird is found in all mainland states, it is sparsely distributed and continues to decline. The Bush Stone-curlew likes to roost and nest in grassy woodlands with low, sparse grassy or herb understorey. Nests are usually beside a fallen log, which probably makes it harder for foxes to find. Curlews prefer a sparse understorey so they can see predators while foraging for insects. Branches on the ground are essential for the bird's camouflage, and it is unlikely to attempt nesting without it (Department of Sustainability and Environment (Victoria) 2002). This species occurs across much of Australia, preferring lightly wooded country near thickets or long grass that act as daytime shelter. They are usually seen in pairs, although in the breeding season, small flocks gather. Historically this species was widely distributed throughout much of Western Australia but is now considered rare

with an estimated population of 15,000 individuals (Garnett & Crowley 2000). The Bush Stone-curlew is ground dwelling and non-migratory and are therefore susceptible to predation from fox and feral cat.

No evidence of this species was detected but there are records from the vicinity, and suitable habitat exists in the study area (habitat types M3, M4, M5).

Charadrius veredus **(Oriental Plover) EPBC M**

This species (Charadriidae) breeds in Mongolia and adjaecnt parts of Manchuria and Siberia, and it is thought that the entire global population spends the non-breeding season (September to March) in northern Australia, in both coastal and inland areas. Most records are along the north-western coast, between Exmouth Gulf and Derby in Western Australia. Immediately after arriving, Oriental Plovers spend a few weeks in coastal habitats before dispersing further inland to flat, open, semi-arid or arid grasslands, particularly locations with short, sparse grass interspersed with hard, bare ground, such as claypans, dry paddocks, lawns, cattle camps, or recently burnt grasslands. It is not considered globally threatened (DSEWPaC 2010a).

No suitable habitat appears to exist in the study area, but temporarily attractive conditions would exist after fires.

Gallinago megala **(Swinhoe's Snipe) EPBC M**

This snipe (Scolopacidae) breeds in central and southern Siberia, is transient through southern and east Asia, and is a common visitor in parts of northern Australia from October to April (DSEWPaC2010b; IUCN 2011a). It occurs in dense grass and rushes around the edge of fresh and brackish marshes, drying claypans and inundated plains, and feeds on earthworms, insects, terrestrial molluscs, and seeds. It is not considered to be globally threatened ('Least concern' on IUCN Red List).

The study area is not within the predicted range of this species, but there is one record from the vicinity (DEC & Western Australian Museum 2011). It would be at most an occasional visitor to the area.

Merops ornatus **(Rainbow Bee-eater) EPBC M**

The Rainbow Bee-eater is widespread throughout most of Australia, does not depend on any particular habitat or vegetation type for feeding or breeding, and is considered to require no particular habitat protection. Disturbance to areas utilised by the Rainbow Bee-eater, such as sand banks of creeks and drainage lines used to burrow to create nesting chambers between September and February, may have some impact on the breeding success of this species. However, historical disturbance does not represent a major issue to this species and it is common in cleared and semi-cleared habitats (DSEWPaC 2011a).

Several Bee-eaters were seen near creek channels in the eastern part of the study area, and suitable conditions for breeding may exist along banks of dry watercourses.

***Neochmia ruficauda subclarescens* (Star Finch [western]) DEC P4**

Star Finches (Estrildidae) live in grasslands and eucalypt woodland close to water, where they feed on seeds. These Birds tend to be resident in large flocks during the dry season, and disperse to breed during the wet season. The western subspecies has three sub-populations: Shark Bay to Pilbara; Fitzroy River valley, West Kimberley; and Gibb River to Gulf of Carpentaria. The Cape York subspecies (*N. r. clarescens*) is near threatened (Garnett *et al.* 2011), but is not listed by federal or state statutes as it has been recognized as a separate subspecies for only a few years; the southern or eastern subspecies *N. r. ruficauda* is listed by EPBC as *EN* but is possibly extinct. The main threat is thought to be overgrazing of grasslands near water; the species may also require mosaic burning to maintain food supply.

There are scattered records of this species through the Hamersley including one near Caves Creek about 30 km to the west, though it was not recorded in any of the recent survey reports consulted. It was not recorded in this survey and is unlikely to occur in the study area during the dry season due to limited availability of water. Creeklines (within habitat types M1, M3, M4, M5, highlighted in blue in **Map 7**) could be utilised for breeding during the wet season, but the extent of suitable breeding habitat is reduced due to cattle grazing.

REPTILES

***Notoscincus butleri* (Lined Soil-crevice Skink) DEC P4**

This species of skink was originally described from Dampier, then reported from the Harding River dam (Lake Poongkaliyarra; (Storr *et al.* 1999)), but is now also known from numerous localities in the western Hamersley ranges (NatureMap). It is associated with rocky and spinifex-dominated areas near creek and river margins (Wilson & Swan 2008). This species was not recorded in the survey and habitat may not be suitable, as only ephemeral drainage is present in the rocky parts of the study area; however, the cracking clay soils in the eastern part of the study area may also provide suitable *Notoscincus* habitat (type M3).

***Ramphotyphlops ganei* (Blindsnake) DEC P1**

This species (Typhlopidae) occurs at widely scattered sites in the Pilbara, including the eastern and western Hamersley, Fortescue valley, and Chichester range. It appears to be associated with moist areas such as gorges, gullies and floodplains, though there is a record from sandy soil with spinifex (WAM record cited by (Ecologia 2010). Like most other typhlopids it presumably feeds on eggs, larvae and pupae of ants, and individuals are likely to mostly inhabit the topsoil, termitaria and ant nests.

This species may occur in the study area, especially along the river valleys and in sheltered gullies.

Liasis olivaceus barroni **(Pilbara Olive Python) EPBC VU, WCA VU**

The subspecies (Pythonidae) is restricted to ranges within the Pilbara region, north-western Western Australia, such as the Hamersley Range, and islands of the Dampier Archipelago. They are most often seen at night and are generally found around rocky areas, rocky outcrops and cliffs, but they also shelter in logs, flood debris, caves, tree hollows and thick vegetation. They are mostly found close to permanent waterholes, not because they need to drink frequently but because their prey does. Juvenile Olive Pythons feed on small reptiles and (probably) frogs as well as small mammals, shifting to birds and medium-sized mammals (e.g. quolls, rock-wallabies) as adults, which may grow to at least 4 m. Individuals may be sedentary (with a discrete home range associated with water) for most of the year, but can move several kilometres through rocky hills in some seasons, e.g. during June and July males may travel long distances to locate females for breeding (Pearson 2003, Wilson and Swan 2008).

Potential threats to the Pilbara Olive Python are thought to include loss of suitable prey species (e.g. due to Fox in coastal areas), and accidental or deliberate killing of individual snakes by people (Pearson 2003). Cane Toads may also cause the death of some individual young snakes. However, the continued abundance of the same species in the Queensland Gulf Country indicates that neither direct human action (associated with the long-established mining and pastoral industries there), nor Cane Toads, constitute a major threat to survival where toads have been present for over two decades.

Since the Pilbara subspecies was first listed as threatened in Western Australia, many more locality records have accumulated; nine were reported by Smith (1981), 17 by Pearson (1993), and it has been considered “Not threatened, or likely to be. Shouldn’t be on list, common and widespread” (Kendrick 2002). Four populations occur at Pannawonica, Millstream, Tom Price and Burrup Peninsula, and the species is considered stable and in sizable numbers at some known sites (Pearson 2003).

The Olive Python was not observed directly during the survey, but it is likely to occur in the study area and this is supported by a report from the Mt Brockman road directly north of the site (within the area of interest). It is most likely to forage at creeklines (blue highlighted areas in **Map 7**) and any ephemeral waterholes that may be present in the rocky hills (habitat type M2), but value of the habitat is limited because there is no permanent water.

5.2.1 EXTENT AND VULNERABILITY OF SIGNIFICANT HABITATS

Of the five habitat types identified above (**Section 4.2.1**), the most restricted and potentially significant is M1 – sheltered gullies and low cliffs, which could provide habitat for Northern Quolls, Pilbara Olive Pythons and *Ramphotyphlops ganei* if they were present. The significance of this habitat on Mt Macleod is reduced by its small extent and the likely absence of surface water during

the dry season, though there may be small rockholes or seeps that were not detected, and there are some caves within low cliffs and gullies that could provide habitat for bats, including Ghost Bats.

The valley-floor habitat types M3, M4 and M5 (tussock and hummock grasslands with mulga and snakewood) potentially include breeding habitat for some significant species, including Australian Bustard, Rainbow Bee-eater (both observed to be present), Bush Stone-curlew, and Northern Short-tailed Mouse. During the wet season they might also provide breeding habitat for Star Finch. These fauna species remain widely distributed and are currently at a lower level of conservation concern.

Habitat type M2 comprises more open areas on slopes and ridges with hard Spinifex and scattered trees (**Map 7**). The slopes provide habitat for Pebble-mound Mouse and Long-tailed Dunnart. Similar habitats are very extensive and connected throughout the region.

5.2.2 FAUNA CONCLUSIONS

The three species of highest importance based on their listing in both the *WC Act* and the *EPBC Act* are as follows;

- Northern Quoll (*Dasyurus hallucatus*) - EN
- Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*) - VU
- Pilbara Olive Python (*Liasis olivaceus barroni*) - VU.

None of these were recorded directly through the level 1 survey or the targeted Northern Quoll survey undertaken in August 2011, but there is a very recent record of Northern Quoll within 40 km, and there is a plausible anecdotal sighting of an Olive Python adjacent to the study area. Habitat suitable for Northern Quoll and Olive Python exists within the study area ('critical' habitat highlighted in **Map 7**), but of relatively low quality and likely to be occupied intermittently at most. Roosting habitat for the Pilbara Leaf-nosed Bat is unlikely to occur, though it may use parts of the study area for foraging during wet-season dispersal (woodland along creeklines, and hummock grassland on the hills). Impacts on any of these species are likely to be minor.

Rainbow Bee-eater was recorded by the survey and potentially breeds in valley-floor habitat that is likely to be impacted by mining. The other bird species listed as Migratory under the *EPBC Act* are possible transient visitors to the study area and not likely to be significantly impacted by disturbance.

Spectacled Hare-wallaby (DEC P3) has not been recorded in the subregion for some decades and is likely to be locally extinct, so no impact is likely.

Western Pebble-mound Mouse (P4) is well represented by NatureMap records in the subregion, was recorded during the survey, and considered to be a resident. However, it is unlikely to be significantly impacted by mining activity due to its habitat being located on upper slopes and ridges not targeted for mining, and abundant and connected in the region.

Grey Falcon (P4) and Peregrine Falcon (WCA S4) are unlikely to be resident in the study area but may occur there occasionally, utilising the site as part of a much larger foraging range. No significant impact on these species is likely.

Fortescue Grunter (DEC P4) and Star Finch (P4) could occur in the study area during the Wet season, and if so they would be impacted to some extent by mining activity concentrated near creeklines. This is unlikely to be significant for the fish (resident in three river basins), but estimating risk to the Star Finch depends on the number and location of breeding sites in the region, which are poorly known.

Available survey information is insufficient to conclude whether Long-tailed Dunnart (P4), Short-tailed Mouse (P4), or the Blind Snake *Ramphotyphlops ganei* (P1) occur in the study area.

Table 17: **Likelihood of occurrence of conservation significant fauna species in study area**

Scientific Name	Common Name	Conservation Status	Likelihood of occurrence
FISH			
Leipoptherapon aheneus	Fortescue Grunter	P4 (DEC)	Unlikely to occur (wet season transient)
MAMMALS			
Dasyurus hallucatus	Northern Quoll	Endangered (EPBC)	Unlikely to occur but some suitable habitat (low-quality habitat)
Sminthopsis longicaudata	Long-tailed Dunnart	P4 (DEC)	Possibly occurs
Macroderma gigas	Ghost Bat	P4 (DEC)	Possibly occurs (foraging habitat, dry season day roosts)
Rhnionicteris aurantia	Pilbara Leaf-nosed Bat	Vulnerable (EPBC)	Possible transient (foraging habitat only suitable in wet season)
Leggadina lakedownensis	Lakeland Downs Mouse	P4 (DEC)	Possibly occurs
Pseudomys chapmani	Western Pebble-mound Mound	P4 (DEC)	Likely to occur (inactive mounds recorded)
BIRDS			
Apus pacificus	Fork-tailed Swift	Migratory (EPBC)	Likely to occur (aerial nomad)
Ardea modesta	Eastern Great Egret	Migratory (EPBC)	Unlikely to occur
Ardea ibis	Cattle Egret	Migratory (EPBC)	Unlikely to occur
Haliaeetus leucogaster	White-bellied Sea-Eagle	Migratory (EPBC)	Unlikely to occur
Falco hypoleucos	Grey Falcon	P4 (DEC)	Possibly occurs (rare transient, foraging)
Falco peregrinus	Peregrine Falcon	Schedule 4 (WCA)	Possibly occurs (transient, foraging)
Ardeotis australis	Australian Bustard	P4 (DEC)	Resident (recorded)
Burhinus grallarius	Bush Stone-curlew	P4 (DEC)	Possibly occurs
Charadrius veredus	Oriental Plover	Migratory (EPBC)	Unlikely to occur
Gallinago megala	Swinhoe's Snipe	Migratory (EPBC)	Unlikely to occur
Merops ornatus	Rainbow Bee-eater	Migratory (EPBC)	Unlikely to occur
Neochmia ruficauda subclarescens	Star Finch	P4 (DEC)	Possibly occurs (wet season only)
REPTILES			
Notoscincus butleri	Lined Soil-crevice Skink	P4 (DEC)	Unlikely to occur
Ramphotyphlops ganei	Blind Snake	P1 (DEC)	Possibly occurs
Liasis olivaceus barroni	Pilbara Olive Python	Vulnerable (EPBC)	Possibly occurs (recorded adjacent)

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Maps

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Mt Brockman Rd

Tom Price Railway Rd

CAVES CREEK

WACKLINA CREEK

NEW BGD BRO CAL JUR HOY ROC PAR PDG NON

Legend

- River; Creek
- Roads
- Study Area

DAFWA Land Systems

BGD - Boolgeeda Land System	Stony lower slopes and plains below hill systems; not degraded or eroded.
BRO - Brockman Land System	Alluvial plains with cracking clay soils supporting tussock grasslands.
CAL - Calcrete Land System	Low calcrete platforms and plains; not degraded or eroded.
HOY - Hooley Land System	Alluvial clay plains supporting a mosaic of snakewood shrublands and tussock grasslands.
JUR - Jurrawarrina Land System	Hardpan plains and alluvial tracts supporting mulga shrublands with tussock and spinifex grasses.
MCK - McKay Land System	Hills, ridges, plateaux remnants and breakaways of metasedimentary and sedimentary rocks supporting hard spinifex grasslands.
NEW - Newman Land System	Rugged ironstone ridges, plateaux and mountains; hard spinifex pastures in good to excellent condition; no erosion.
NON - Nooingnin Land System	Hardpan plains with very large groves supporting mulga shrublands.
PAR - Paraburdoo Land System	Stony drainage floors and gilgai plains developed from basalt; snakewood with stony chenopod pastures in poor to fair condition; moderate erosion on drainage floors.
PDG - Pindering Land System	Gravelly hardpan plains supporting groved mulga shrublands with hard and soft spinifex
ROC - Rocklea Land System	Rugged basalt hills and dissected plateaux; poorly accessible, not degraded or eroded.
SPH - Spearhole Land System	Gently undulating hardpan plains supporting groved mulga shrublands and hard spinifex
WNM - Wannamunna Land System	Hardpan plains and internal drainage tracts supporting mulga shrublands and woodlands (and occasionally eucalypt woodlands)

GDA 1994 MGA Zone 50

Imagery: Bing Maps Aerial (2010)

Map 1

Aug 2011

Mt MacLeod West Level 1 Flora and Fauna Survey

Land Systems

prepared for FORTESCUE METALS GROUP

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Project No. 2672-11

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Legend

Roads
River; Creek
Study Area

WA Herbarium Conservation Code
Threatened
Priority 1
Priority 2
Priority 3
Priority 4

DEC Threatened Flora Database Conservation Code
Threatened
Priority 1
Priority 2
Priority 3
Priority 4

DEC Ecological Community Database
TEC (Vulnerable) - *Themeda* grasslands on cracking clays (Hamersley Station, Pilbara)
TEC Administrative Buffer

Environmental Protection (Clearing of Native Vegetation) Regulations 2004 (WA)
Schedule 1 Areas
Environmentally Sensitive Areas

Dampiera anonyma
Dampiera anonyma
Eragrostis surreyana
Swainsona sp. Hamersley Station (A.A. Mitchell 196)
Indigofera sp. Bungaroo Creek (S. van Leeuwen 4301)
Sida sp. Barlee Range (S. van Leeuwen 1642)
Sida sp. Hamersley Range (K. Newbey 10692)
Helichrysum oligochaetum
Goodenia sp. East Pilbara (A.A. Mitchell PRP 727)
Eremophila magnifica subsp. *velutina*
Themeda sp. Hamersley Station (M.E. Trudgen 11431)
Themeda sp. Hamersley Station (M.E. Trudgen 11431)
Astrebla lappacea
Calotis latiuscula
Side sp. Hamersley Range (K. Newbey 10692)
CAVES CREEK
Mt Brockman Rd
Tom Price Railway Rd
Spartothamnella puberula
Eremophila magnifica subsp. *velutina*
Astrebla lappacea
Themeda sp. Hamersley Station (M.E. Trudgen 11431)
Ptilotus subspinescens
Ptilotus subspinescens
Goodenia sp. East Pilbara (A.A. Mitchell PRP 727)
Goodenia nuda
Astrebla lappacea
Polymeria distigma
Rhagodia sp. Hamersley (M. Trudgen 17794)
Brachyscome sp. Wanna Munna Flats (S. van Leeuwen 4662)
Ptilotus subspinescens
Sida sp. Barlee Range (S. van Leeuwen 1642)
Acacia bromilowiana
Acacia bromilowiana
Sida sp. Barlee Range (S. van Leeuwen 1642)
Sida sp. Barlee Range (S. van Leeuwen 1642)
Dampiera anonyma
Eremophila magnifica subsp. *velutina*
Sida sp. Hamersley Range (K. Newbey 10692)
WACKILINA CREEK
BARNETT CREEK
Sida sp. Barlee Range (S. van Leeuwen 1642)
Polymeria distigma
Swainsona sp. Hamersley Station (A.A. Mitchell 196)
Iotasperma sessilifolium
Iotasperma sessilifolium
BEASLEY RIVER
Gompholobium karijini
Indigofera sp. Bungaroo Creek (S. van Leeuwen 4301)
Scaevola sp. Hamersley Range basalts (S. van Leeuwen 3675)
Lepidium catapycnon
Lepidium catapycnon

GDA 1994 MGA Zone 50

Imagery: Bing Maps Aerial (2010)

Mt MacLeod West Level 1 Flora and Fauna Survey

Map 2

DEC Database Search Results and Environmental Protection (Clearing of Native Vegetation) Regulation Areas

Aug 2011

prepared for FORTESCUE METALS GROUP

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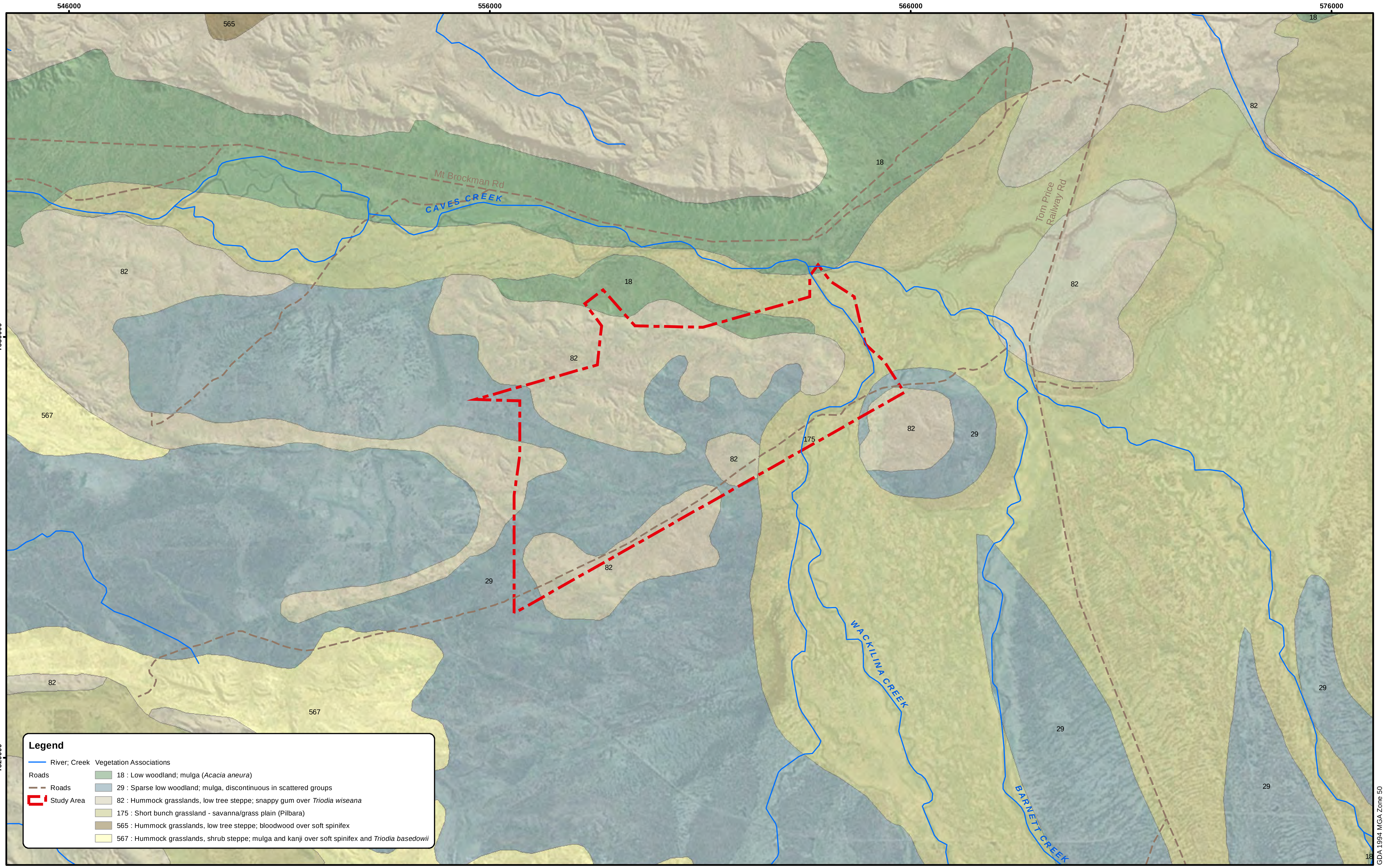
Project No. 2672-11

ecoscape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Mt Brockman Rd
CAVES CREEK
Tom Price Railway Rd
WACKILINA CREEK
BARNETT CREEK
18
29
82
175
565
567
Legend
River; Creek
Roads
Roads
Study Area
Vegetation Associations
18 : Low woodland; mulga (*Acacia aneura*)
29 : Sparse low woodland; mulga, discontinuous in scattered groups
82 : Hummock grasslands, low tree steppe; snappy gum over *Triodia wiseana*
175 : Short bunch grassland - savanna/grass plain (Pilbara)
565 : Hummock grasslands, low tree steppe; bloodwood over soft spinifex
567 : Hummock grasslands, shrub steppe; mulga and kanji over soft spinifex and *Triodia basedowii*
GDA 1994 MGA Zone 50

Imagery: Bing Maps Aerial (2010)

Map 3

Mt MacLeod West Level 1 Flora and Fauna Survey

Vegetation Associations

Aug 2011

prepared for FORTESCUE METALS GROUP

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CAVES CREEK

WACKILINA CREEK

Cm Vf Vf Al Ts Vf Vf Vf Vf Vf Vf Vf AaCf Bb Vf Bb Vf AaCf Bb Bb Cm Bb AcEa Vf Vf AaCf Av Vf Vf Bb Vs Rs Is Vf

Legend

- Study Area
- River; Creek
- Conservation Signifcant Flora

Species

- Al *Astrebla lappacea* (Lindl.) Domin
- Is *Iotasperma sessilifolium* (F.Muell.) G.L.Nesom
- Rs *Rhagodia* sp. Hamersley (M. Trudgen 17794)
- Ts *Themeda* sp. Hamersley Station (M.E. Trudgen 11431)
- Vs *Vigna* sp. central (M.E. Trudgen 1626)

Vegetation Types containing CSF

- *Themeda* sp. Hamersley Station (M.E. Trudgen) 11431

- Introduced Flora

Species

- Av *Acetosa vesicaria* (L.) A.Love
- Bb *Bidens bipinnata* L.
- Cm *Cucumis melo* subsp. *agrestis* (Naudin) Pangalo
- Vf *Vachellia farnesiana* (L.) Wight and Arn.

Vegetation Types containing Introduced Flora

- **Bidens bipinnata*

GDA 1994 MGA Zone 50

Imagery: Bing Maps Aerial (2010)

Map 4

Aug 2011

Mt MacLeod West Level 1 Flora and Fauna Survey

Conservation Significant and Introduced Flora

prepared for FORTESCUE METALS GROUP

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Project No. 2672-11

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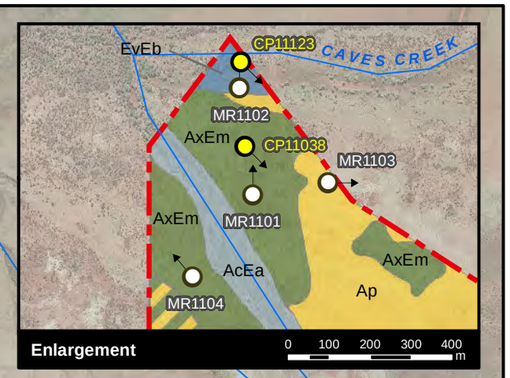
See Enlargement

CAVES CREEK

WACKILINA CREEK



EgAeTe MR1117 MR1118 ChApTe ElAaTw CP11105 EgAeTe EgAeTe MR1122 ExAbTe MR1121 AaTe1 MR1123 ElAaTw MR1124 MR1136 MR1135 ExAbTe MR1134 MR1120 MR1130 CP11026 Rehab MR1133 ElAaTw MR1140 MR1131 CP11025 EgAeTe MR1132 MR1141 MR1139 AatTw1 ElAaTw MR1137 CP11024 AaTe1 MR1144 MR1138 MR1142 CP11023 CP11021 MR1143 AaTe1 ElAaTw AaAbTe

AapCf MR1105 MR1106 AxEm MR1108 MR1107 MR1111 MR1112 AxEm/Ap EgAeTe AaAbTe MR1110 MR1109 AapCf ElAaTw ElAaTw MR1145 CP11037 AaTw2 MR1113 MR1116 MR1146 AaTw2 Ap AcEa AxEm ElAaTw AaTe1 MR1119 CP11029 AaCf Ap MR1115 MR1126 MR1127 AaTe1 MR1114 AxEm CP11028 MR1125 ElAaTw

AaTe2 MR1128 CP11027 MR1129 ElAaTw ElAaTw

Legend

- Releves
- Quadrats
- Photo Direction
- River; Creek
- Study Area

Vegetation Description

AaAbTe	*Acacia aptaneura*, *A. pruinocarpa* and *Corymbia deserticola* subsp. *deserticola* sparse shrubland/scattered trees over *Acacia bivenosa* and *A. ancistrocarpa* sparse shrubland over *Triodia epactia* and *T. wiseana* open hummock grassland
AaCf	*Acacia aptaneura* woodland over *Chrysopogon fallax*, *Sporobolus australasicus* and **Bidens bipinnata* open tussock grassland/sparse herbland
AaTe1	*Acacia aptaneura* shrubland over *Triodia epactia* and *Ptilotus obovatus* open hummock grassland/sparse shrubland
AaTe2	*Acacia aptaneura* open shrubland over *Triodia epactia*, *Eriachne* sp. and *Chloris pectinata* hummock grassland/open tussock grassland
AaTw1	*Acacia atkinsiana*, *A. bivenosa* and *A. tenuissima* shrubland over *Triodia wiseana* hummock grassland with *Corymbia deserticola* subsp. *deserticola* scattered trees
AaTw2	*Acacia aptaneura*, *A. pruinocarpa* and *A. bivenosa* open shrubland over *Triodia wiseana* and *T. epactia* hummock grassland
AcEa	*Acacia citrinoviridis* and *Eucalyptus victrix* woodland over *Eulalia aurea*, *Themeda* sp. Hamersley Station and *Eriachne benthamii* open tussock grassland
Ap	*Astrebla pectinata*, *Stemodia kingii* and *Polymeria longifolia* tussock grassland/sparse herbland with *Acacia victoriae* and *A. synchronicia* scattered shrubs
AxEm	*Acacia xiphophylla* sparse shrubland over *Eriachne mucronata*, *Eragrostis benthamii* and *Sclerolaena cornishiana* sparse tussock grassland/sparse herbland
ChApTe	*Corymbia hamersleyana* sparse woodland over *Acacia pyrifolia* var. *pyrifolia* and *A. dictyophleba* sparse shrubland over *Triodia epactia* and *Themeda triandra* hummock grassland/sparse tussock grassland
EgAeTe	*Eucalyptus gamophylla* and *Corymbia deserticola* subsp. *deserticola* open woodland over *Acacia exilis*, *A. atkinsiana* and *A. bivenosa* sparse shrubland over *Triodia epactia* and *T. wiseana* hummock grassland
ElAaTw	*Eucalyptus leucophloia* subsp. *leucophloia*, *Hakea chordophylla* and *Corymbia hamersleyana* open woodland/scattered shrubs over *Acacia atkinsiana*, *A. maitlandii* and *A. exilis* open shrubland over *Triodia wiseana* and *Indigofera monophylla* hummock grassland/sparse shrubland.
EvEb	*Eucalyptus victrix* woodland over *Eriachne benthamii*, *Eulalia aurea* and *Chrysopogon fallax* closed tussock grassland with **Vachellia farnesiana* scattered shrubs
ExAbTe	*Eucalyptus xerothermica*, *E. gamophylla* and *Corymbia hamersleyana* open woodland over *Acacia bivenosa* and *Senna artemisioides* subsp. *oligophylla* open shrubland over *Triodia epactia* hummock grassland
AxEm/Ap	Mosaic of AxEm (on rises) and Ap
R	Rehabilitated Area
Cl	Cleared

GDA 1994 MGA Zone 50

Imagery: Bing Maps Aerial (2010)

Map 5

Aug 2011

Mt MacLeod West Level 1 Flora and Fauna Survey

Vegetation Types

prepared for FORTESCUE METALS GROUP

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Project No. 2672-11

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Legend

Releves

Vegetation Condition (Trudgen (1991) Scale)

- Excellent
- Very Good
- Good
- Poor
- Very Poor
- Degraded
- Photo Direction
- River; Creek

Study Area

Mapping

Vegetation Condition (Trudgen (1991) Scale)

- Excellent
- Very Good
- Good
- Poor
- Very Poor
- Degraded

Other

- Cleared
- Rehab

CAVES CREEK

MACKLIN A CREEK

CP11123 MR1102 CP11138 MR1103 MR1101 MR1104 MR1105 MR1106 MR1108 MR1107 MR1111 MR1112 MR1117 MR1118 CP11105 MR1122 MR1121 MR1123 MR1110 MR1109 MR1145 CP11037 MR1113 MR1116 MR1146 MR1124 MR1136 MR1135 MR1119 CP11029 MR1126 MR1127 MR1115 MR1134 MR1120 MR1130 CP11026 CP11028 MR1125 MR1114 MR1133 MR1131 CP11025 MR1140 MR1132 CP11027 MR1128 MR1141 MR1139 MR1137 CP11024 MR1129 MR1144 MR1138 MR1142 CP11023 CP11021 MR1143

GDA 1994 MGA Zone 50

Imagery: Bing Maps Aerial (2010)

Map 6

Aug 2011

Mt MacLeod West Level 1 Flora and Fauna Survey

Vegetation Condition

prepared for FORTESCUE METALS GROUP

0 0.5 1 1.5 2 Kms

1:35,000 @ A3

Project No. 2672-11

ecoscape

556000 558000 560000 562000 564000 566000 568000 570000

7532000 7530000 7528000 7526000 7524000

see Enlargement A
see Enlargement B
see Enlargement C
see Enlargement D

Enlargement D 0 80 160 240 m

Enlargement C 0 75 150 225 m

Enlargement A 0 90 180 270 m

Enlargement B 0 50 100 150 m

Legend

- Study Area
- Search Tracks

Survey Locations

- Trail Cameras
- Cage Trap Locations
- Rainbow Bee-eater Sighting
- Bustard Tracks
- Cat Tracks
- Dingo Tracks/Scats/Dead
- Pebble Mound Mouse Mound
- Perentie Tracks
- Snake Tracks/Sighting
- Rock-Wallaby Scats

Fauna Habitat Types

- M1 Sheltered gullies, creeklines and low cliffs
- M2 Triodia grassland on exposed slopes and low ridges
- M3 Tussock grassland on valley floor
- M4 Mulga woodland/snakewood on valley floor
- M5 Triodia grassland and scattered shrubs on valley floor
- Northern Quoll Critical Habitat
- Pilbara Olive Python Critical Habitat

GDA 1994 MGA Zone 50

Imagery supplied by FMG

Map 7

Jan 2013

Mt MacLeod West and Dixon Well Area Level 1 Flora and Fauna Assessments

Fauna Habitat Types and Survey Locations

prepared for FORTESCUE METALS GROUP

0 0.5 1 1.5 2 Km

1:37,015 @ A3

Project No. 2672-11

ecoscape

Appendix One: Definitions and Criteria

Table 18: *EPBC Act* categories for flora and fauna (Australian Government 1999)

EPBC Act Category	Definition
Extinct	A native species is eligible to be included in the extinct category at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
Extinct in the wild	A native species is eligible to be included in the extinct in the wild category at a particular time if, at that time: (a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or (b) it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Critically Endangered	A native species is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
Endangered	A native species is eligible to be included in the endangered category at a particular time if, at that time: (a) it is not critically endangered; and (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
Vulnerable	A native species is eligible to be included in the vulnerable category at a particular time if, at that time: (a) it is not critically endangered or endangered; and (b) it is facing a high risk of extinction in the wild in the medium term future, as determined in accordance with the prescribed criteria.
Conservation Dependent	A native species is eligible to be included in the conservation dependent category at a particular time if, at that time: (a) the species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or (b) the following subparagraphs are satisfied: (i) the species is a species of fish; (ii) the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised; (iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory; (iv) cessation of the plan of management would adversely affect the conservation status of the species.

Table 19: DEC conservation codes and definitions for flora and fauna (DEC 2011)

Conservation Codes for Western Australian Flora and Fauna
T: Schedule 1 under the *Wildlife Conservation Act 1950*
• **Threatened Fauna** (Fauna that is rare or is likely to become extinct) • **Threatened Flora** (Declared Rare Flora – Extant) Taxa* that 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: Schedule 2 under the *Wildlife Conservation Act 1950*
• **Presumed Extinct Fauna** • **Presumed Extinct Flora** (Declared Rare Flora – Extinct) Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such.
1A: Schedule 3 under the *Wildlife Conservation Act 1950*
• **Birds protected under an international agreement** Birds that are subject to an agreement between governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction.
S: Schedule 4 under the *Wildlife Conservation Act 1950*
• **Other specially protected fauna** Fauna that is in need of special protection, otherwise than for the reasons mentioned in the above schedules.
Threatened fauna and flora (Schedule 1) are further ranked by the Department according to their level of threat using IUCN Red List criteria. **CR:** Critically Endangered – considered to be facing an extremely high risk of extinction in the wild. **EN**: Endangered – considered to be facing a very high risk of extinction in the wild. **VU:** Vulnerable – considered to be facing a high risk of extinction in the wild.
Taxa that have not yet been adequately surveyed to be listed under Schedule 1 or 2 are added to the Priority Flora and Priority Fauna Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened flora or fauna. Taxa that are adequately known, are rare but not threatened, or meet criteria for Near Threatened, or that have been recently removed from the threatened list for other than taxonomic reasons, are placed in Priority 4. These taxa require regular monitoring. Conservation Dependent species are placed in Priority 5.
1: Priority One: Poorly-known taxa
Taxa that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.

Conservation Codes for Western Australian Flora and Fauna
2: Priority Two: Poorly-known taxa
Taxa that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.
3: Priority Three: Poorly-known taxa
Taxa that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Taxa may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.
4: Priority Four: Rare, Near Threatened and other taxa in need of monitoring
(a) **Rare.** Taxa that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands. (b) **Near Threatened**. Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. (c) Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.
5: Priority Five: Conservation Dependent taxa
Taxa that are not threatened but are subject to a specific conservation program, the cessation of which would result in the taxa becoming threatened within five years.

Table 20: *EPBC Act* categories for TECs (Australian Government 2011b)

EPBC Act Category	Definition
Critically Endangered (CR)	An ecological community that is facing an extremely high risk of extinction in the wild in the immediate future.
Endangered (EN)	An ecological community that is not critically endangered, and is facing a very high risk of extinction in the wild in the new future.
Vulnerable (VU)	An ecological community that is not critically endangered or endangered, and is facing a high risk of extinction in the medium-term future.

Table 21: DEC definitions and criteria for TECs and PECs (DEC 2010)

Criteria	Definition
Threatened Ecological Communities	
Presumed Totally Destroyed (PD)	An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future. An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant and either of the following applies (A or B): Records within the last 50 years have not been confirmed despite thorough searches of known or likely habitats or All occurrences recorded within the last 50 years have since been destroyed
Critically Endangered (CR)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated. An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria (A, B or C): A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% and either or both of the following apply (i or ii): geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 10 years); modification throughout its range is continuing such that in the immediate future (within approximately 10 years) the community is unlikely to be capable of being substantially rehabilitated. Current distribution is limited, and one or more of the following apply (i, ii or iii): geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 10 years); there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes; there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes. The ecological community exists only as highly modified occurrences that may be capable of being rehabilitated if such work begins in the immediate future (within approximately 10 years).
Endangered (EN)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future. An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B, or C): D) The geographic range, and/or total area occupied, and/or number of discrete occurrences have been reduced by at least 70% since European settlement and either or both of the following apply (i or ii): the estimated geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short term future (within approximately 20 years);

Criteria	Definition
	modification throughout its range is continuing such that in the short term future (within approximately 20 years) the community is unlikely to be capable of being substantially restored or rehabilitated. Current distribution is limited, and one or more of the following apply (i, ii or iii): geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short term future (within approximately 20 years); there are few occurrences, each of which is small and/or isolated and all or most occurrences are very vulnerable to known threatening processes; there may be many occurrences but total area is small and all or most occurrences are small and/or isolated and very vulnerable to known threatening processes. The ecological community exists only as very modified occurrences that may be capable of being substantially restored or rehabilitated if such work begins in the short-term future (within approximately 20 years).
Vulnerable (VU)	An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range. An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium to long-term future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B or C): G) The ecological community exists largely as modified occurrences that are likely to be capable of being substantially restored or rehabilitated. The ecological community may already be modified and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations. The ecological community may be still widespread but is believed likely to move into a category of higher threat in the medium to long term future because of existing or impending threatening processes.
Priority Ecological Communities	
Priority One	Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) and for which current threats exist. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.
Priority Two	Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, state forest, unallocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities, but do not meet adequacy of survey requirements, and / or are not well defined, and appear to be under threat from known threatening processes.
Priority Three	Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or; Communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or; Communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes. Communities may be included if they are comparatively well known from several

Criteria	Definition
	localities, but do not meet adequacy of survey requirements and / or are not well defined, and known threatening processes exist that could affect them.
Priority Four	Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring. J) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change These communities are usually represented on conservation lands. Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. Ecological communities that have been removed from the list of threatened communities during the past five years.
Priority Five	*Conservation Dependent Ecological Communities* Ecological Communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Appendix Two: DEC Database Search Results

Table 22: DEC database search results (Flora)

Species	Habit	Flowering	Landform\Soil	Vegetation Type
T				
Lepidium catapycnon	Open, woody perennial, herb or shrub, 0.2-0.3 m high, stems zigzag	Oct	Skeletal soils, hillsides	*Triodia wiseana* hummock grassland. With *Acacia bivenosa, A. inaequilatera, A. pruinocarpa, A. pyrifolia, Triodia* sp. Shovelanna Hill.
Thryptomene wittweri	Spreading or rounded shrub, 0.5–1.5(–2.1) m high	Apr/Jul/ Aug	Skeletal red stony soils. Breakaways, stony creek beds	
P1				
Bothriochloa decipens var. *cloncurrensis*	-	-	-	-
Calotis squamigera	Procumbent annual, herb, to 0.21 m high	Jul	Pebbly loam	
Eragrostis sp. Mt Robinson (S.van Leeuwen 4109)	Tussock-forming perennial, grass-like or herb, to 0.3 m high	Sep	Red-brown skeletal soils, ironstone. Steep slopes, summits	
Eremophila sp. West Angelas (S. van Leeuwen 4086)	-	-	-	
Eremophila sp. Snowy Mountain (S. van. Leeuwen 3737)	-	-	-	
Eremophila spongiocarpa	Compact, succulent-leaved shrub, to 1 m high	May/Sep	Weakly saline alluvial plain on margins of marsh	
Eucalyptus lucens	Mallee, to 4.5 m high, bark smooth, white, sometimes slightly powdery; leaves glossy green		Ironstone rocky slopes and mountain tops, high in the landscape	
Genus sp. Hamersley Range hilltops (S van Leeuwen 4345)	Rounded shrub, to 0.4 m high	Oct	Skeletal, brown gritty soil over ironstone. Hill summit	Growing in VOSM of *Eucalyptus leucophloia* and *E. gamophylla* over LSB of *Senna pruinosa, Acacia bivenosa, A. maitlandii* and *A. pyrifolia* over ODSD of *A. marramamba* over MDHG of *Triodia* sp.
Helichrysum oligochaetum	Erect annual, herb, to ca 0.25 m high. Fl. yellow	Aug-Nov		Red clay. Alluvial plains
Josephinia sp. Marandoo (M.E. Trudgen 1554)	Small, upright shrub, to 0.3 m high, round, woolly, soft spined fruit. Fl. pink	Aug	Gritty soil, granite. Plains	Mixed shrubland of Senna and Acacia
Lepidium amelum	Erect, spreading shrub, 0.3-1 m high, plants glabrous; leaves sessile, stem-clasping. Fl. white	May-Aug	Sandy loams & stony, calcareous, alkaline soils.	Hummock grassland, low open woodland, disturbed sites
Sida sp. Hamersley Range (K. Newbey 10692)	-	-	-	VOSM of *Eucalyptus gamophylla* and *E. xerothermica* with scattered emergent *E. leucophloia* over OLSB of *Acacia pyrifolia* (SVL 4375) and *Hakea lorea* over DHG of *Triodia* sp.

Species	Habit	Flowering	Landform\Soil	Vegetation Type
Tetratheca fordiana	Dwarf shrub, 0.3–0.4 m high	-	Shale pocket amongst ironstone	
Teucrium pilbaranum	Rounded shrub, to 0.4 m high	May/Sep	Clay. Crab hole plain in a river floodplain, margin of calcrete table	*Chrysopogon fallax* tussock grassland, Open woodland of *Eucalyptus victrix*, with a tussock grass understorey of *Eriachne benthamii*
Vittadinia sp. Coondewanna Flats (s. van Leeuwen 4684)	Tall daisy to 1 m , open canopy, in late flower and dehiscing fruit, cream/white fwrs.	May/Sep	Clay loam soils	*Acacia* thicket over mixed grassland. Species dominating in area include: *Acacia aneura, Eucalyptus ?xerothermica, Themeda ?triandra*.
P2				
Adiantum capillus-veneris	Rhizomatous, perennial, herb (fern), 0.1-0.2 m high	-	Moist, sheltered sites in gorges and on cliff walls	
Cladium procerum	Densely tufted perennial, grass-like or herb (sedge), 2 m high	Nov	Perennial pools	
Eremophila forrestii subsp. Pingandy (M.E. Trudgen 2662)	Low shrub 0.5 m tall with red or pinky flowers with long exerted stamens	May-Jul	Stony soil, slopes	
Gompholobium karijini	Rounded shrub 0.7m high. Fl. golden yellow	Aug-Sep	Hilltop, hillslope, plateau. Ironstone	*Eucalyptus* woodland, *Triodia wiseana*
Indigofera ixocarpa	Shrub, to 1 m high. Fl. pink	May	Skeletal red soils over massive ironstone	
Oxalis sp. Pilbara (M.E. Trudgen 12725)	Small herb to 10 cm tall. Leaves green above, purple below	-	Red-brown pebbly/rocky loam amongst boulders	
Paspalidium retiglume	Tufted annual, grass-like or herb, 0.1–0.5 m high	Apr	Clay	
Pilbara trudgenii	Gnarled, aromatic shrub, to 1 m high	Sep.	Skeletal, red stony soil over ironstone. Hill summits, steep slopes, screes, cliff faces.	
Scaevola sp. Hamersley Range basalts (S. van Leeuwen 3675)	Shrub, to 1 m high	Jul-Aug.	Skeletal, brown gritty soil over basalt. Summits of hills, steep hills	Growing in VOSM of *Eucalyptus kingsmillii* and *Eucalyptus* aff. *hamersleyana* over LSA of Acacia *hamersleyensis* over OLSD of *Ptilotus rotundifolius* over DHG of *Triodia* sp. (SVL 2476).
Spartothamnella puberula	Shrub, 0.35–1.5 m high	Sep-Nov	Rocky loam, sandy or skeletal soils, clay. Sandplains, hills	*Corymbia ferriticola* low woodland over *Petalostylis labicheoides* and *Acacia aneura* tall open shrubland over *Triodia pungens* and *T.* sp. Mt Ella hummock grassland and *Themeda triandra* open tussock grassland.

Species	Habit	Flowering	Landform\Soil	Vegetation Type
Vigna sp. central (M.E. Trudgen 1626)	50 m high x 50 m wide.	-	Sandy plain, Plain with thin sheet of sand (light orange / brown) over compacted hardpan and limestone rock, Claypan of fine cracking clays. Basalt hills in the immediate distance.	*Triodia epactia* hummock grassland over *Cenchrus ciliaris* very open tussock grassland, *Indigofera colutea / Vigna* sp Central / *Rhynchosia minima* low open shrubland. *Eucalyptus camaldulensis* and *Cenchrus ciliaris* association.
P3				
Acacia daweana	Spreading shrub, 0.3–1.5(–2) m high	Jul-Sep	Stony red loamy soils. Low rocky rises, along drainage lines	
Acacia subtiliformis	Spindly, slender, erect shrub, to 3.5 m high	Jun	On rocky calcrete plateau	
Calotis latiuscula	Erect herb, to 0.5 m high	Jun-Oct	Sand, loam. Rocky hillsides, floodplains, rocky creeks or river beds	
Dampiera anonyma	Multistemmed perennial, herb, to 0.5(-1) m high	Jun-Sep	Skeletal red-brown to brown gravelly soil over banded ironstone, basalt, shale and jaspilite. Hill summits, upper slopes	
Dampiera metallorum	Rounded, multistemmed perennial, herb, to 0.5 m high	Apr-Oct	Skeletal red-brown gravely soils over banded ironstone. Steep slopes and summits	
Eragrostis crateriformis	Annual, grass-like or herb, 0.17–0.42 m high	Jan-Jul	Clayey loam or clay. Creek banks, depressions	
Eragrostis surreyana	Tufted annual herb 5-8 (-13) cm high	May-Sep	Drainage line, red-brown clay	
Eremophila forrestii subsp. *viridis*	Much-branched shrub, ca 1 m high	Aug	Sandplain	
Eremophila magnifica subsp. *velutina*	Shrub, 0.5–1.5 m high	Aug-Sep	Skeletal soils over ironstone. Summits	
Fimbristylis sieberiana	Shortly rhizomatous, tufted perennial, grass-like or herb (sedge), 0.25–0.6 m high	May-Jun	Mud, skeletal soil pockets. Pool edges, sandstone cliffs	
Geijera salicifolia	Tree, 1.5–6 m high	Sep	Skeletal soils, stony soils. Massive rock scree, gorges	
Glycine falcata	Mat-forming perennial, herb, to 0.2 m high.Fl. blue, purple	May-Jul	Floodplains. Black clayey sand. Along drainage depressions in crabhole plains on river	
Gymnanthera cunninghamii	Erect shrub, 1-2 m high. Fl. cream-yellow-green	Jan -Dec.	Sandy soils	

Species	Habit	Flowering	Landform\Soil	Vegetation Type
Goodenia sp. East Pilbara (A.A. Mitchell PRP 727)	Open, erect annual or biennial, herb, to 0.2 m high. Fl. yellow	Feb-Sep	Red-brown clay soil, calcrete pebbles. Low undulating plain, swampy plains.	
Indigofera gilesii subsp. *gilesii*	Shrub, to 1.5 m high	May/Aug	Pebbly loam amongst boulders & outcrops, hills	
Indigofera sp. Bungaroo Creek (S. van Leeuwen 4301)	Erect shrub to 2.3 m high, red-pink flowers	Jul-Oct	Creeks and gorges	
Iotasperma sessilifolium	Erect herb. Fl. pink.	-	Cracking clay, black loam. Edges of waterholes, plains	
Oldenlandia sp. Hamersley Station (A.A. Mitchell PRP 1479)	Spreading annual, herb, 0.05–0.1 m high	Mar.	Cracking clay, basalt. Gently undulating plain with large surface rocks, flat crabholed plain	
Olearia mucronata	Densely branched, unpleasantly aromatic shrub, 0.6–1 m high. Fl. white, yellow	Aug-Jan	Schistose hills, along drainage channels	
Phyllanthus aridus	Erect, much-branched shrub, to 0.25 m high. Fl. cream, green	May–Jun	Sandstone, gravel, red sand	
Polymeria distigma	Prostrate trailing herb. Fl. pink	Apr-Jul	Sandy soils	
Ptilotus subspinescens	Compact shrub, to 0.8 m high. Fl. pink, bases of screes	Sep–Oct	Gentle rocky slopes, screes and the bases of screes	
Rhagodia sp. Hamersley (M. Trudgen 17794)	Erect shrub	-	Floodplain / lower slopes	
Rostellularia adscendens var.*latifolia*	Herb or shrub, 0.1–0.3 m high	Apr-May	Ironstone soils. Near creeks, rocky hills	
Sida sp. Barlee Range (S van Leeuwen 1642)	Spreading shrub, to 0.5 m high	Aug	Skeletal red soils pockets. Steep slope	
Triodia sp. Mt. Ella (ME Trudgen 12739)	Perennial, grass-like or herb, 0.4 m high	-	Light orange-brown, pebbly loam. Amongst rocks & outcrops, gully slopes	
Triodia sp. Robe River (M.E. Trudgen et al. MET 12367)	Perennial hummock grass to 0.6 m high	-	Rocky hills and mesas	
Whiteochloa capillipes	Annual or perennial, grass-like or herb, 0.4-1 m high. Fl. red-brown	Feb-Jun		
P4				
Acacia bromilowiana	Tree or shrub, to 12 m high	Jul-Aug	Red skeletal stony loam, orange-brown pebbly, gravel loam, laterite, banded ironstone, basalt. Rocky hills, breakaways, scree slopes, gorges, creek beds	
Eremophila magnifica subsp. *magnifica*	Shrub, 0.5-1.5 m high	Aug-Nov	Skeletal soils over ironstone. Rocky screes	

Species	Habit	Flowering	Landform\Soil	Vegetation Type
Goodenia nuda	Erect to ascending herb, to 0.5 m high. Fl. yellow	Apr-Aug		
Ptilotus mollis	Compact, perennial shrub, to 0.5 m high, soft grey foliage. Fl. white/pink	May, Sep	Stony hills and screes	
Rhynchosia bungarensis	Compact, prostrate shrub, to 0.5 m high	-	Pebbly, coarse sand, banks of flow line	

Appendix Three: EPBC Protected Matters Search Results

Australian Government
Department of Sustainability, Environment, Water, Population and Communities

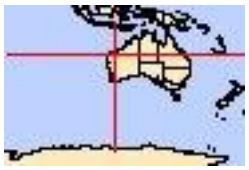
EPBC Act Protected Matters Report: Coordinates

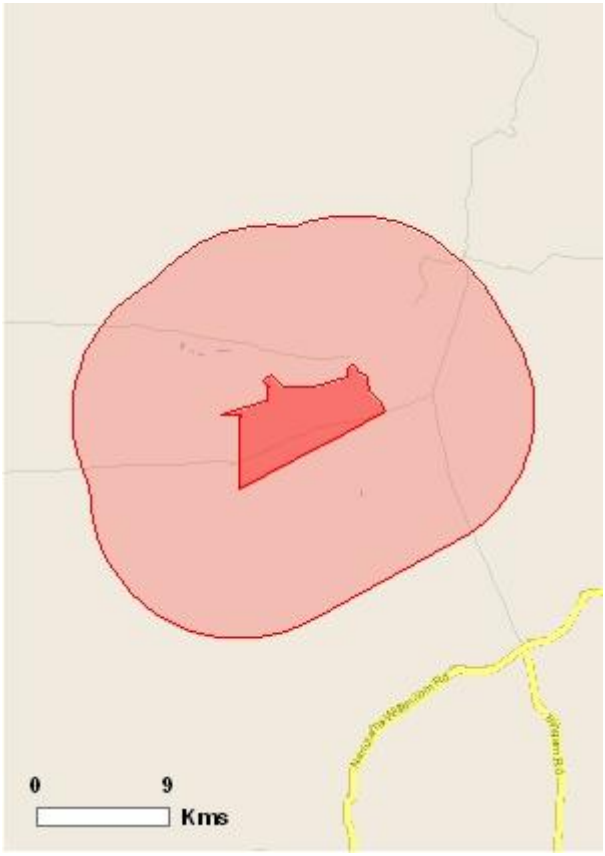
This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

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.

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

Report created: 30/06/11 14:08:06





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

Coordinates
Buffer: 10.0Km

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 Wetlands):	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Threatened Ecological Communitites:	None
Threatened Species:	4
Migratory Species:	8

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:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	6
Whales and Other Cetaceans:	None

Critical Habitats:	None
Commonwealth Reserves:	None

Report Summary for Extra Information

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

Place on the RNE:	None
State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	5
Nationally Important Wetlands:	None

Details

Matters of National Environmental Significance

Threatened Species		**[Resource Information]**
Name	Status	Type of Presence
MAMMALS		
Dasyurus hallucatus		
Northern Quoll [331]	Endangered	Species or species habitat likely to occur within area
Rhinonicteris aurantia (Pilbara form)		
Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat likely to occur within area
PLANTS		
Lepidium catapycnon		
Hamersley Lepidium, Hamersley Catapycnon [9397]	Vulnerable	Species or species habitat likely to occur within area
REPTILES		
Liasis olivaceus barroni		
Olive Python (Pilbara subspecies) [66699]	Vulnerable	Species or species habitat may occur within area

Migratory Species		**[Resource Information]**
Name	Status	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat may occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Migratory Terrestrial Species		
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Merops ornatus		

Rainbow Bee-eater [670]	Species or species habitat may occur within area
Migratory Wetlands Species	
Ardea alba	
Great Egret, White Egret [59541]	Species or species habitat may occur within area
Ardea ibis	
Cattle Egret [59542]	Species or species habitat may occur within area
Charadrius veredus	
Oriental Plover, Oriental Dotterel [882]	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species **[Resource Information]**

Name	Status	Type of Presence
Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat may occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Charadrius veredus		
Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area

Extra Information

Invasive Species **[Resource Information]**

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.

Name	Status	Type of Presence
Mammals		
Felis catus		
Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Oryctolagus cuniculus		
Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Vulpes vulpes		
Red Fox, Fox [18]		Species or species habitat may occur within area
Plants		
Cenchrus ciliaris		
Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area

Prosopis spp.
Mesquite, Algaroba [68407] Species or species habitat may occur within area

Caveat

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

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World 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 following provisions of the EPBC Act have been mapped:
- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:
- threatened species listed as extinct or considered as 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.

Coordinates

-22.326834 117.628287,-22.33471 117.629887,-22.339948 117.635516,-22.346186 117.639705,-22.366667 117.601546,-22.367497 117.6,-22.39434 117.55,-22.39434 117.55,-22.383333 117.55,-22.366667 117.55,-22.35 117.55,-22.35 117.551339,-22.35 117.551339,-22.348676 117.551339,-22.348677 117.539314,-22.340539 117.566667,-22.339922 117.568005,-22.333333 117.568005,-22.332009 117.568005,-22.332009 117.56932,-22.327737 117.565467,-22.324196 117.570004,-22.332009 117.57705,-22.332008 117.584672,-22.332009 117.595318,-22.325649

117.616667,-22.320916 117.616667,-22.318137 117.619397,-22.320135 117.621121,-22.322645 117.623285,-22.325718 117.628061,-22.326834 117.628287

Acknowledgements

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

-Department of Environment, Climate Change and Water, New South Wales
-Department of Sustainability and Environment, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment and Natural Resources, South Australia
-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts
-Environmental and Resource Management, Queensland
-Department of Environment and Conservation, Western Australia
-Department of the Environment, Climate Change, Energy and Water
-Birds Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-SA Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
-State Forests of NSW
-Other groups and individuals

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

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

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| Australian Government |

Appendix Four: NatureMap Fauna Search

NatureMap Species Report

Created By Guest user on 06/09/2011

Method 'By Rectangle'
Extent 117°13' 50" E, 117°58' 27" E, 22°30' 51" S, 22°08' 33" S
Group By Family

Family	Species	Records
Acanthaceae	6	9
Acanthizidae	8	127
Accipitridae	10	38
Aegothelidae	1	3
Agamidae	13	87
Aizoaceae	7	9
Alaudidae	2	5
Amaranthaceae	35	89
Anatidae	5	17
Apiaceae	1	3
Apocynaceae	3	5
Apodidae	1	2
Araliaceae	2	10
Ardeidae	3	18
Artamidae	4	62
Asphodelaceae	1	10
Asteraceae	47	96
Boidae	2	3
Boraginaceae	8	8
Brassicaceae	7	12
Burhinidae	1	1
Campanulaceae	3	4
Campephagidae	6	76
Canidae	1	2
Capparaceae	5	6
Caprimulgidae	1	5
Carphodactylidae	2	9
Caryophyllaceae	2	5
Casuariidae	1	9
Celastraceae	3	3
Centropodidae	1	1
Charadriidae	1	4
Chenopodiaceae	23	36
Cinclosomatidae	2	3
Cleomaceae	1	2
Climacteridae	2	8
Columbidae	6	109
Commelinaceae	1	1
Convolvulaceae	13	38
Corvidae	4	23
Cracticidae	4	61
Cuculidae	4	32
Cucurbitaceae	3	7
Cyperaceae	7	9
Dasyuridae	6	46
Dicaeidae	2	10
Dicruridae	4	92
Dilleniaceae	1	4
Diplodactylidae	9	71
Elapidae	9	21
Elatinaceae	1	1
Emballonuridae	2	7
Equidae	1	1
Estrilidae	4	69
Euphorbiaceae	10	17
Fabaceae	110	246
Falconidae	6	50
Frankeniaceae	1	1
Gekkonidae	5	62
Gentianaceae	1	1
Geraniaceae	2	3
Goodeniaceae	23	74
Gyrostemonaceae	1	1
Halcyonidae	4	29
Haloragaceae	4	8
Hemerocallidaceae	1	1
Hirundinidae	3	14
Hylidae	1	4
Lamiaceae	4	7
Lauraceae	1	2
Loranthaceae	8	16
Lythraceae	2	2
Macropodidae	4	10
Maluridae	10	61
Malvaceae	64	157
Marsileaceae	1	1
Megadermatidae	1	2
Meliphagidae	12	199
Menispermaceae	1	1
Meropidae	1	16
Mitosporic fungi	1	1
Molluginaceae	1	1

Molossidae	1	2
Moraceae	1	3
Motacillidae	1	12
Muridae	6	108
Myobatrachidae	1	98
Myrtaceae	14	48
Neosittidae	1	4
Nyctaginaceae	3	5
Otididae	1	9
Pachycephalidae	6	147
Pardalotidae	3	23
Pedaliaceae	1	2
Pelecanidae	1	2
Petroicidae	3	21
Phasianidae	2	6
Phrymaceae	1	2
Phyllanthaceae	1	2
Plantaginaceae	4	11
Plumbaginaceae	1	3
Poaceae	78	171
Podargidae	1	4
Podicipedidae	2	9
Polygalaceae	2	4
Pomatostomidae	3	18
Portulacaceae	4	6
Proteaceae	4	4
Psittacidae	10	120
Pteridaceae	2	3
Ptilonorhynchidae	2	10
Pygopodidae	7	26
Rallidae	1	7
Recurvirostridae	1	6
Rhamnaceae	2	5
Rubiaceae	6	7
Santalaceae	1	4
Sapindaceae	7	15
Scincidae	32	329
Scolopacidae	2	3
Scrophulariaceae	12	18
Solanaceae	17	30
Strigidae	1	2
Sylviidae	4	55
Tachyglossidae	1	2
Threskiornithidae	1	4
Thymelaeaceae	3	14
Turnicidae	1	9
Typhlopidae	5	15
Ustilaginaceae	1	1
Varanidae	8	25
Vespertilionidae	3	7
Zygophyllaceae	6	10
TOTAL	**867**	**3827**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Acanthaceae					
1.	7164	*Dicladanthera forrestii*			
2.	7169	*Dipteracanthus australasicus*			
3.	11320	*Dipteracanthus australasicus subsp. australasicus*			
4.	7174	*Rostellularia adscendens*			
5.	-8090	*Rostellularia adscendens subsp. adscendens*			
6.	12088	*Rostellularia adscendens var. clementii*			
Acanthizidae					
7.	24260	*Acanthiza apicalis (Broad-tailed Thornbill)*			
8.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
9.	24264	*Acanthiza robustirostris (Slaty-backed Thornbill)*			
10.	24265	*Acanthiza uropygialis (Chestnut-rumped Thornbill)*			
11.	24269	*Calamanthus campestris (Rufous Fieldwren)*			
12.	25530	*Gerygone fusca (Western Gerygone)*			
13.	24278	*Pyrrholaemus brunneus (Redthroat)*			
14.	30948	*Smicrornis brevirostris (Weebill)*			
Accipitridae					
15.	25535	*Accipiter cirrocephalus (Collared Sparrowhawk)*			
16.	25536	*Accipiter fasciatus (Brown Goshawk)*			
17.	24283	*Accipiter fasciatus subsp. didimus*			
18.	24285	*Aquila audax (Wedge-tailed Eagle)*			
19.	24289	*Circus assimilis (Spotted Harrier)*			
20.	-384	*Elanus axillaris*			
21.	24295	*Haliastur sphenurus (Whistling Kite)*			
22.	24296	*Hamirostra isura (Square-tailed Kite)*			
23.	-385	*Hieraaetus morphnoides*			
24.	25542	*Milvus migrans (Black Kite)*			
Aegothelidae					
25.	25544	*Aegotheles cristatus (Australian Owlet-nightjar)*			
Agamidae					
26.	30833	*Amphibolurus longirostris*			
27.	25458	*Ctenophorus caudicinctus (Ring-tailed Dragon)*			
28.	24865	*Ctenophorus caudicinctus subsp. caudicinctus*			
29.	24869	*Ctenophorus caudicinctus subsp. mensarum*			
30.	24874	*Ctenophorus isolepis subsp. citrinus*			
31.	24876	*Ctenophorus isolepis subsp. isolepis*			
32.	24886	*Ctenophorus reticulatus (Western Netted Dragon)*			
33.	24899	*Diporiphora valens*			
34.	24902	*Lophognathus longirostris*			
35.	25510	*Pogona minor*			
36.	24905	*Pogona minor subsp. minima (Dwarf Bearded Dragon)*		T	
37.	24907	*Pogona minor subsp. minor*			
38.	30814	*Tympanocryptis cephalus (Pebble Dragon)*			
Aizoaceae					
39.	2825	*Trianthema cussackiana*			
40.	2826	*Trianthema glossostigma*			
41.	11300	*Trianthema oxycalyptra var. oxycalyptra*			
42.	2829	*Trianthema pilosa*			
43.	2832	*Trianthema triquetra (Red Spinach)*			
44.	2834	*Zaleya galericulata (Hogweed)*			
45.	29095	*Zaleya galericulata subsp. galericulata*			
Alaudidae					
46.	25545	*Mirafra javanica (Horsfield's Bushlark)*			
47.	24302	*Mirafra javanica subsp. horsfieldii*			
Amaranthaceae					
48.	2648	*Alternanthera denticulata (Lesser Joyweed)*			
49.	2651	*Alternanthera nana (Hairy Joyweed)*			
50.	2652	*Alternanthera nodiflora (Common Joyweed)*			
51.	-11994	*Alternanthera sp.*			
52.	2660	*Amaranthus cuspidifolius*			
53.	2666	*Amaranthus mitchellii (Boggabri Weed)*			
54.	20018	*Amaranthus undulatus*			
55.	2676	*Gomphrena canescens (Batchelors Buttons)*			
56.	18363	*Gomphrena canescens subsp. canescens*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
57.	2680	*Gomphrena cunninghamii*			
58.	18367	*Gomphrena kanisii*			
59.	18372	*Gomphrena lanata*			
60.	2690	*Ptilotus aervoides*			
61.	2696	*Ptilotus astrolasius*			
62.	2698	*Ptilotus auriculifolius*			
63.	2699	*Ptilotus axillaris (Mat Mulla Mulla)*			
64.	2706	*Ptilotus carinatus*			
65.	2708	*Ptilotus chamaecladus*			
66.	2711	*Ptilotus clementii (Tassel Top)*			
67.	11225	*Ptilotus exaltatus var. exaltatus (Tall Mulla Mulla)*			
68.	2725	*Ptilotus fusiformis*			
69.	2727	*Ptilotus gaudichaudii*			
70.	11577	*Ptilotus gaudichaudii var. gaudichaudii*			
71.	2728	*Ptilotus gomphrenoides*			
72.	11236	*Ptilotus gomphrenoides var. gomphrenoides*			
73.	2730	*Ptilotus helichrysoides*			
74.	2731	*Ptilotus helipteroides (Hairy Mulla Mulla)*			
75.	2734	*Ptilotus incanus*			
76.	2741	*Ptilotus macrocephalus (Featherheads)*			
77.	2744	*Ptilotus mollis*		P4	
78.	2747	*Ptilotus obovatus (Cotton Bush)*			
79.	2751	*Ptilotus polystachyus (Prince of Wales Feather)*			
80.	2754	*Ptilotus roei*			
81.	2755	*Ptilotus rotundifolius (Royal Mulla Mulla)*			
82.	31596	*Ptilotus subspinescens*		P3	
Anatidae					
83.	24312	*Anas gracilis (Grey Teal)*			
84.	24316	*Anas superciliosa (Pacific Black Duck)*			
85.	24318	*Aythya australis (Hardhead)*			
86.	24321	*Chenonetta jubata (Australian Wood Duck)*			
87.	24326	*Malacorhynchus membranaceus (Pink-eared Duck)*			
Apiaceae					
88.	6218	*Daucus glochidiatus (Australian Carrot)*			
Apocynaceae					
89.	6584	*Cynanchum floribundum (Dumara Bush)*			
90.	14315	*Cynanchum sp. Hamersley (M. Trudgen 2302)*			
91.	6599	*Rhyncharrhena linearis (Bush Bean)*			
Apodidae					
92.	25554	*Apus pacificus (Fork-tailed Swift)*			
Araliaceae					
93.	6202	*Astrotricha hamptonii (Ironplant)*			
94.	19043	*Trachymene oleracea subsp. oleracea*			
Ardeidae					
95.	-362	*Ardea modesta*			
96.	24341	*Ardea pacifica (White-necked Heron)*			
97.	-361	*Egretta novaehollandiae*			
Artamidae					
98.	25566	*Artamus cinereus (Black-faced Woodswallow)*			
99.	24352	*Artamus cinereus subsp. melanops*			
100.	24355	*Artamus minor (Little Woodswallow)*			
101.	24356	*Artamus personatus (Masked Woodswallow)*			
Asphodelaceae					
102.	14312	*Bulbine pendula*			
Asteraceae					
103.	7822	*Angianthus acrohyalinus (Hook-leaf Angianthus)*			
104.	7854	*Bidens bipinnata (Bipinnate Beggartick)*	Y		
105.	7866	*Blumea tenella*			
106.	7871	*Brachyscome ciliaris*			
107.	-4777	*Brachyscome sp.*			
108.	20427	*Brachyscome sp. Wanna Munna Flats (S. van Leeuwen 4662)*		P1	
109.	14090	*Calocephalus beardii*			
110.	7893	*Calocephalus knappii*			
111.	-5283	*Calocephalus sp.*			
112.	16525	*Calocephalus sp. Wittenoom (A.S. George 1082)*			
113.	7903	*Calotis hispidula (Bindy Eye)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
114.	7904	*Calotis latiuscula*		P3	
115.	7905	*Calotis multicaulis (Many-stemmed Burr-daisy)*			
116.	7906	*Calotis plumulifera*			
117.	7907	*Calotis porphyroglossa*			
118.	19759	*Centipeda crateriformis subsp. crateriformis*			
119.	7919	*Centipeda minima (Spreading Sneezewood)*			
120.	19762	*Centipeda minima subsp. macrocephala*			
121.	33516	*Chrysocephalum gilesii*			
122.	35558	*Flaveria trinervia (Speedy Weed)*	Y		
123.	7988	*Gnephosis arachnoidea (Cobwebby-headed Gnephosis)*			
124.	8030	*Helichrysum oligochaetum*		P1	
125.	19594	*Iotasperma sessilifolium*		P3	
126.	8109	*Minuria integerrima (Smooth Minuria)*			
127.	12635	*Olearia fluvialis*			
128.	8153	*Olearia xerophila*			
129.	13494	*Pentalepis trichodesmoides*			
130.	34997	*Peripleura arida*			
131.	8167	*Pluchea dentex*			
132.	8191	*Pterocaulon serrulatum*			
133.	8192	*Pterocaulon sphacelatum (Apple Bush)*			
134.	8193	*Pterocaulon sphaeranthoides*			
135.	13308	*Rhodanthe charsleyae*			
136.	13301	*Rhodanthe floribunda*			
137.	13246	*Rhodanthe humboldtiana*			
138.	13310	*Rhodanthe margarethae*			
139.	13299	*Rhodanthe tietkensii*			
140.	8198	*Rutidosis helichrysoides (Grey Wrinklewort)*			
141.	8213	*Senecio magnificus (Showy Groundsel)*			
142.	8235	*Streptoglossa bubakii*			
143.	8236	*Streptoglossa cylindriceps*			
144.	8237	*Streptoglossa decurrens*			
145.	8238	*Streptoglossa liatroides*			
146.	8241	*Streptoglossa tenuiflora*			
147.	11788	*Vittadinia dissecta var. hirta*			
148.	8265	*Vittadinia eremaea*			
149.	8270	*Vittadinia obovata*			
Boidae					
150.	25318	*Antaresia perthensis (Pygmy Python)*			
151.	25448	*Antaresia stimsoni (Stimson's Python)*			
Boraginaceae					
152.	6704	*Heliotropium conocarpum*			
153.	6705	*Heliotropium crispatum*			
154.	6712	*Heliotropium heteranthum*			
155.	6713	*Heliotropium ovalifolium*			
156.	17309	*Heliotropium pachyphyllum*			
157.	6718	*Heliotropium tenuifolium (Mamukata)*			
158.	11401	*Trichodesma zeylanicum var. latisepalum*			
159.	11750	*Trichodesma zeylanicum var. zeylanicum*			
Brassicaceae					
160.	3025	*Lepidium echinatum*			
161.	3032	*Lepidium muelleri-ferdinandii*			
162.	3035	*Lepidium pedicellosum*			
163.	3037	*Lepidium phlebopetalum (Veined Peppercress)*			
164.	3038	*Lepidium pholidogynum*			
165.	3074	*Stenopetalum anfractum*			
166.	3078	*Stenopetalum nutans*			
Burhinidae					
167.	24359	*Burhinus grallarius (Bush Stone-curlew)*		P4	
Campanulaceae					
168.	7403	*Lobelia heterophylla (Wing-seeded Lobelia)*			
169.	-9186	*Wahlenbergia sp.*			
170.	7393	*Wahlenbergia tumidifructa*			
Campephagidae					
171.	24361	*Coracina maxima (Ground Cuckoo-shrike)*			
172.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
173.	24362	*Coracina novaehollandiae subsp. novaehollandiae*			
174.	24363	*Coracina novaehollandiae subsp. subpallida*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
175.	-334	*Lalage sueurii*			
176.	24367	*Lalage tricolor (White-winged Triller)*			
Canidae					
177.	24039	*Canis lupus subsp. dingo (Dingo)*			
Capparaceae					
178.	2976	*Capparis lasiantha (Split Jack)*			
179.	2978	*Capparis mitchellii (Wild Orange)*			
180.	-12971	*Capparis sp.*			
181.	11670	*Capparis spinosa var. nummularia (Coastal Caper)*			
182.	2982	*Capparis umbonata (Wild Orange)*			
Caprimulgidae					
183.	24368	*Eurostopodus argus (Spotted Nightjar)*			
Carphodactylidae					
184.	25498	*Nephrurus wheeleri*			
185.	24972	*Nephrurus wheeleri subsp. cinctus*			
Caryophyllaceae					
186.	2901	*Polycarpaea holtzei*			
187.	2903	*Polycarpaea longiflora*			
Casuariidae					
188.	24470	*Dromaius novaehollandiae (Emu)*			
Celastraceae					
189.	4731	*Stackhousia intermedia*			
190.	-4918	*Stackhousia sp.*			
191.	18405	*Stackhousia sp. swollen gynophore (W.R. Barker 2041)*			
Centropodidae					
192.	25600	*Centropus phasianinus (Pheasant Coucal)*			
Charadriidae					
193.	-357	*Elseyornis melanops*			
Chenopodiaceae					
194.	11632	*Dysphania glomulifera subsp. eremaea*			
195.	33479	*Dysphania melanocarpa (Black Crumbweed)*			
196.	11653	*Dysphania rhadinostachya subsp. inflata*			
197.	12064	*Enchylaena tomentosa var. tomentosa (Barrier Saltbush)*			
198.	2538	*Maireana carnosa (Cottony Bluebush)*			
199.	2543	*Maireana eriosphaera*			
200.	2544	*Maireana georgei (Satiny Bluebush)*			
201.	2551	*Maireana melanocoma (Pussy Bluebush)*			
202.	2556	*Maireana planifolia (Low Bluebush)*			
203.	2565	*Maireana suaedifolia*			
204.	2566	*Maireana thesioides (Lax Bluebush)*			
205.	2571	*Maireana villosa*			
206.	2582	*Rhagodia eremaea (Thorny Saltbush)*			
207.	20168	*Rhagodia sp. Hamersley (M. Trudgen 17794)*		P3	
208.	18599	*Salsola tragus*			
209.	18601	*Salsola tragus subsp. tragus*			
210.	2602	*Sclerolaena convexula*			
211.	2603	*Sclerolaena cornishiana (Cartwheel Burr)*			
212.	2604	*Sclerolaena costata*			
213.	2608	*Sclerolaena deserticola*			
214.	2611	*Sclerolaena eriacantha (Tall Bindii)*			
215.	2619	*Sclerolaena lanicuspis (Spinach Burr)*			
216.	31492	*Tecticornia disarticulata*			
Cinclosomatidae					
217.	25580	*Cinclosoma castaneothorax (Chestnut-breasted Quail-thrush)*			
218.	24390	*Psophodes occidentalis (Western Wedgebill)*			
Cleomaceae					
219.	2988	*Cleome viscosa (Tickweed)*			
Climacteridae					
220.	25582	*Climacteris melanura (Black-tailed Treecreeper)*			
221.	24395	*Climacteris melanura subsp. wellsi*			
Columbidae					
222.	24401	*Geopelia cuneata (Diamond Dove)*			
223.	25585	*Geopelia striata (Peaceful Dove)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
224.	24403	*Geopelia striata subsp. placida*			
225.	24404	*Geophaps plumifera (Spinifex Pigeon)*			
226.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
227.	24409	*Phaps chalcoptera (Common Bronzewing)*			
Commelinaceae					
228.	1165	*Commelina ensifolia (Wandering Jew)*			
Convolvulaceae					
229.	6609	*Bonamia rosea (Felty Bellflower)*			
230.	19880	*Convolvulus angustissimus*			
231.	6612	*Convolvulus clementii*			
232.	31274	*Duperreya commixta*			
233.	11200	*Evolvulus alsinoides var. villosicalyx*			
234.	6631	*Ipomoea lonchophylla (Cowvine)*			
235.	6633	*Ipomoea muelleri (Poison Morning Glory)*			
236.	6636	*Ipomoea plebeia (Bellvine)*			
237.	6653	*Polymeria ambigua (Morning Glory)*			
238.	9232	*Polymeria distigma*		P3	
239.	13966	*Polymeria longifolia*			
240.	-9839	*Polymeria sp.*			
241.	14325	*Polymeria sp. Hamersley (M.E. Trudgen 11353)*			
Corvidae					
242.	24416	*Corvus bennetti (Little Crow)*			
243.	25593	*Corvus orru (Torresian Crow)*			
244.	24418	*Corvus orru subsp. cecilae (Western Crow)*			
245.	-419	*Corvus sp.*			
Cracticidae					
246.	24420	*Cracticus nigrogularis (Pied Butcherbird)*			
247.	25595	*Cracticus tibicen (Australian Magpie)*			
248.	24423	*Cracticus tibicen subsp. tibicen (Black-backed Magpie)*			
249.	25596	*Cracticus torquatus (Grey Butcherbird)*			
Cuculidae					
250.	-374	*Cacomantis pallidus*			
251.	-408	*Chalcites basalis*			
252.	24431	*Chrysococcyx basalis (Horsfield's Bronze Cuckoo)*			
253.	24435	*Cuculus pallidus (Pallid Cuckoo)*			
Cucurbitaceae					
254.	33030	*Austrobryonia pilbarensis*			
255.	33031	*Cucumis maderaspatanus*			
256.	12039	*Cucumis melo subsp. agrestis (Ulcardo Melon)*	Y		
Cyperaceae					
257.	750	*Bulbostylis barbata*			
258.	774	*Cyperus bifax (Downs Nutgrass)*			
259.	12811	*Cyperus cunninghamii subsp. cunninghamii*			
260.	788	*Cyperus dactylotes*			
261.	862	*Fimbristylis microcarya*			
262.	12159	*Fimbristylis simulans*			
263.	962	*Schoenoplectus dissachanthus*			
Dasyuridae					
264.	24091	*Dasykaluta rosamondae (Little Red Kaluta)*			
265.	24095	*Ningaui timealeyi (Pilbara Ningaui)*			
266.	24101	*Planigale ingrami (Long-tailed Planigale)*			
267.	24106	*Pseudantechinus woolleyae (Woolley's Pseudantechinus)*			
268.	24115	*Sminthopsis longicaudata (Long-tailed Dunnart)*		P4	
269.	24116	*Sminthopsis macroura (Stripe-faced Dunnart)*			
Dicaeidae					
270.	25607	*Dicaeum hirundinaceum (Mistletoebird)*			
271.	24441	*Dicaeum hirundinaceum subsp. hirundinaceum*			
Dicruridae					
272.	24443	*Grallina cyanoleuca (Magpie-lark)*			
273.	-347	*Rhipidura albiscapa*			
274.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
275.	24454	*Rhipidura leucophrys subsp. leucophrys*			
Dilleniaceae					
276.	5128	*Hibbertia glaberrima*			

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Diplodactylidae					
277.	25456	*Crenadactylus ocellatus (Clawless Gecko)*			
278.	24926	*Diplodactylus conspicillatus (Fat-tailed Gecko)*			
279.	24944	*Diplodactylus savagei*			
280.	30933	*Lucasium stenodactylum*			
281.	30934	*Lucasium wombeyi*			
282.	24976	*Oedura marmorata (Marbled Velvet Gecko)*			
283.	24982	*Rhynchoedura ornata (Beaked Gecko)*			
284.	24927	*Strophurus elderi*			
285.	24949	*Strophurus wellingtonae*			
Elapidae					
286.	25332	*Acanthophis wellsi (Pilbara Death Adder)*			
287.	25331	*Brachyurophis approximans*			
288.	25468	*Demansia psammophis (Yellow-faced Whipsnake)*			
289.	25295	*Demansia psammophis subsp. cupreiceps*			
290.	25297	*Demansia rufescens (Rufous Whipsnake)*			
291.	25301	*Furina ornata (Moon Snake)*			
292.	25261	*Pseudechis australis (Mulga Snake)*			
293.	25263	*Pseudonaja modesta (Ringed Brown Snake)*			
294.	25307	*Suta punctata (Spotted Snake)*			
Elatinaceae					
295.	5186	*Bergia trimera*			
Emballonuridae					
296.	24175	*Taphozous georgianus (Common Sheathtail-bat)*			
297.	24176	*Taphozous hilli (Hill's Sheathtail-bat)*			
Equidae					
298.	24257	*Equus asinus (Donkey)*			
Estrilidae					
299.	24631	*Emblema pictum (Painted Finch)*			
300.	25685	*Neochmia ruficauda (Star Finch)*			
301.	30870	*Taeniopygia guttata (Zebra Finch)*			
302.	30871	*Taeniopygia guttata subsp. castanotis*			
Euphorbiaceae					
303.	4583	*Adriana tomentosa*			
304.	4614	*Euphorbia alsiniflora (Namana)*			
305.	4617	*Euphorbia australis (Namana)*			
306.	35303	*Euphorbia australis var. subtomentosa*			
307.	4619	*Euphorbia biconvexa*			
308.	4620	*Euphorbia boophthona (Gascoyne Spurge)*			
309.	4626	*Euphorbia drummondii (Caustic Weed)*			
310.	4642	*Euphorbia schultzii*			
311.	-5300	*Euphorbia sp.*			
312.	12097	*Euphorbia tannensis subsp. eremophila (Desert Spurge)*			
Fabaceae					
313.	11215	*Acacia adoxa var. adoxa*			
314.	-11266	*Acacia aneura group*			
315.	19505	*Acacia aneura var. pilbarana*			
316.	37260	*Acacia aptaneura*			
317.	3228	*Acacia atkinsiana*			
318.	3232	*Acacia ayersiana*			
319.	3241	*Acacia bivenosa*			
320.	29571	*Acacia bromilowiana*		P4	
321.	3260	*Acacia citrinoviridis*			
322.	17013	*Acacia colei var. colei*			
323.	13500	*Acacia coriacea subsp. coriacea*			
324.	3272	*Acacia cowleana (Halls Creek Wattle)*			
325.	15280	*Acacia cuthbertsonii subsp. cuthbertsonii*			
326.	3300	*Acacia dictyophleba (Sandhill Wattle)*			
327.	16174	*Acacia elachantha*			
328.	-9851	*Acacia elachantha (Golden hairy variant)*			
329.	3329	*Acacia exilis*			
330.	3360	*Acacia hamersleyensis*			
331.	3370	*Acacia hilliana*			
332.	3377	*Acacia inaequilatera (Baderi)*			
333.	36418	*Acacia incurvaneura*			
334.	3399	*Acacia kempeana (Witchetty Bush)*			
335.	3434	*Acacia maitlandii (Maitland's Wattle)*			

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336.	3447	*Acacia monticola (Gawar)*			
337.	3471	*Acacia orthocarpa (Needleleaf Wattle)*			
338.	3500	*Acacia pruinocarpa (Gidgee)*			
339.	3501	*Acacia ptychophylla*			
340.	29015	*Acacia pyrifolia var. pyrifolia*			
341.	-12444	*Acacia ramulosa (hybrid)*			
342.	15215	*Acacia retivenea subsp. clandestina*			
343.	8949	*Acacia sibirica (Bastard Mulga)*			
344.	-6840	*Acacia sp. (Pilbara Region)*			
345.	3553	*Acacia spondylophylla*			
346.	3573	*Acacia tenuissima*			
347.	3577	*Acacia tetragonophylla (Kurara)*			
348.	20319	*Acacia tumida var. pilbarensis*			
349.	3606	*Acacia xiphophylla*			
350.	17147	*Alysicarpus muelleri*			
351.	3684	*Alysicarpus rugosus (Rough Chainpea)*			
352.	3649	*Cassia oligophylla (Bloodbush)*			
353.	3775	*Crotalaria dissitiflora (Grey Rattlepod)*			
354.	19378	*Crotalaria dissitiflora subsp. benthamiana*			
355.	20179	*Crotalaria medicaginea var. neglecta*			
356.	3785	*Crotalaria novae-hollandiae (New Holland Rattlepod)*			
357.	11231	*Crotalaria novae-hollandiae subsp. novae-hollandiae*			
358.	17117	*Cullen cinereum*			
359.	17417	*Cullen discolor*			
360.	17436	*Cullen graveolens*			
361.	17439	*Cullen lachnostachys*			
362.	17118	*Cullen leucanthum*			
363.	17119	*Cullen leucochaites*			
364.	17120	*Cullen pogonocarpum*			
365.	3852	*Desmodium campylocaulon*			
366.	3903	*Gastrolobium grandiflorum (Wallflower Poison)*			
367.	3938	*Glycine canescens (Silky Glycine)*			
368.	3940	*Glycine falcata*		P3	
369.	20856	*Gompholobium karijini*		P2	
370.	10995	*Gompholobium polyzygum*			
371.	35336	*Gompholobium sp. Pilbara (N.F. Norris 908)*			
372.	17961	*Indigofera fractiflexa*			
373.	3980	*Indigofera linifolia*			
374.	3982	*Indigofera monophylla*			
375.	3985	*Indigofera rugosa*			
376.	20317	*Indigofera sp. Bungaroo Creek (S. van Leeuwen 4301)*		P3	
377.	3987	*Indigofera trita*			
378.	31035	*Indigofera trita subsp. trita*			
379.	3989	*Isotropis atropurpurea (Poison Sage)*			
380.	4043	*Kennedia prorepens*			
381.	4061	*Lotus cruentus (Redflower Lotus)*			
382.	-10427	*Lotus sp.*			
383.	4105	*Mirbelia viminalis*			
384.	3614	*Neptunia dimorphantha (Sensitive Plant)*			
385.	3675	*Petalostylis labicheoides (Slender Petalostylis)*			
386.	4190	*Rhynchosia australis (Rhynchosia)*			
387.	4191	*Rhynchosia minima (Rhynchosia)*			
388.	12276	*Senna artemisioides subsp. filifolia*			
389.	12279	*Senna artemisioides subsp. helmsii*			
390.	-11018	*Senna artemisioides subsp. helmsii x oligophylla*			
391.	12280	*Senna artemisioides subsp. oligophylla*			
392.	12283	*Senna artemisioides subsp. x sturtii*			
393.	18443	*Senna ferraria*			
394.	12305	*Senna glutinosa subsp. chatelainiana*			
395.	12307	*Senna glutinosa subsp. glutinosa*			
396.	12309	*Senna glutinosa subsp. pruinosa*			
397.	12308	*Senna glutinosa subsp. x luerssenii*			
398.	18451	*Senna hamersleyensis*			
399.	12312	*Senna notabilis*			
400.	12315	*Senna pleurocarpa var. angustifolia*			
401.	18445	*Senna stricta*			
402.	18450	*Senna symonii*			
403.	12319	*Senna venusta*			
404.	4196	*Sesbania cannabina (Sesbania Pea)*			
405.	4223	*Swainsona decurrens*			

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406.	12356	*Swainsona formosa*			
407.	4234	*Swainsona maccullochiana (Ashburton Pea)*			
408.	4235	*Swainsona microphylla (Small-leaf Swainsona)*			
409.	17030	*Swainsona sp. Hamersley Station (A.A. Mitchell 196)*		P3	
410.	4244	*Swainsona stenodonta*			
411.	4252	*Templetonia egena (Round Templetonia)*			
412.	4263	*Tephrosia clementii*			
413.	17770	*Tephrosia densa*			
414.	19531	*Tephrosia rosea var. clementii*			
415.	17789	*Tephrosia rosea var. glabrior*			
416.	-11151	*Tephrosia sp.*			
417.	17768	*Tephrosia sp. Bungaroo Creek (M.E. Trudgen 11601)*			
418.	15444	*Tephrosia sp. Cathedral Gorge (F.H. Mollemans 2420)*			
419.	4283	*Tephrosia stipuligera*			
420.	4285	*Tephrosia supina*			
421.	4287	*Tephrosia virens*			
422.	30716	*Vachellia farnesiana (Mimosa Bush)*	Y		
Falconidae					
423.	25621	*Falco berigora (Brown Falcon)*			
424.	24471	*Falco berigora subsp. berigora*			
425.	25622	*Falco cenchroides (Australian Kestrel)*			
426.	24472	*Falco cenchroides subsp. cenchroides*			
427.	25623	*Falco longipennis (Australian Hobby)*			
428.	24474	*Falco longipennis subsp. longipennis*			
Frankeniaceae					
429.	5203	*Frankenia hispidula*			
Gekkonidae					
430.	24956	*Gehyra pilbara*			
431.	24958	*Gehyra punctata*			
432.	24959	*Gehyra variegata*			
433.	24961	*Heteronotia binoei (Bynoe's Gecko)*			
434.	24962	*Heteronotia spelea (Desert Cave Gecko)*			
Gentianaceae					
435.	17799	*Centaurium clementii*			
Geraniaceae					
436.	4334	*Erodium crinitum (Corkscrew)*			
437.	4335	*Erodium cygnorum (Blue Heronsbill)*			
Goodeniaceae					
438.	20381	*Dampiera anonyma*		P3	
439.	7424	*Dampiera candicans*			
440.	7433	*Dampiera dentata*			
441.	12517	*Goodenia cusackiana*			
442.	7509	*Goodenia forrestii*			
443.	7515	*Goodenia heterochila*			
444.	7526	*Goodenia microptera*			
445.	12552	*Goodenia muelleriana*			
446.	7530	*Goodenia nuda*		P4	
447.	12571	*Goodenia pascua*			
448.	12574	*Goodenia prostrata*			
449.	-4248	*Goodenia sp.*			
450.	29381	*Goodenia sp. East Pilbara (A.A. Mitchell PRP 727) (O'Meara's Goodenia)*		P3	
451.	7550	*Goodenia stellata*			
452.	10982	*Goodenia stobbsiana*			
453.	7556	*Goodenia tenuiloba*			
454.	12578	*Scaevola acacioides*			
455.	13178	*Scaevola amblyanthera var. centralis*			
456.	13172	*Scaevola parvifolia subsp. pilbarae*			
457.	-7412	*Scaevola sp.*			
458.	20263	*Scaevola sp. Hamersley Range basalts (S. van Leeuwen 3675)*		P2	
459.	7654	*Velleia connata (Cup Velleia)*			
460.	7658	*Velleia discophora (Cabbage Poison)*			
Gyrostemonaceae					
461.	2778	*Codonocarpus cotinifolius (Native Poplar)*			
Halcyonidae					
462.	25547	*Dacelo leachii (Blue-winged Kookaburra)*			
463.	24308	*Todiramphus pyrrhopygia (Red-backed Kingfisher)*			

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464.	-397	*Todiramphus pyrrhopygius*			
465.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
Haloragaceae					
466.	6174	*Haloragis gossei*			
467.	23464	*Haloragis gossei var. inflata*			
468.	20669	*Haloragis maierae*			
469.	6176	*Haloragis odontocarpa (Mulga Nettle)*			
Hemerocallidaceae					
470.	29483	*Tricoryne sp. Hamersley Range (S. van Leeuwen 915)*			
Hirundinidae					
471.	24492	*Hirundo nigricans subsp. nigricans*			
472.	-331	*Petrochelidon ariel*			
473.	-333	*Petrochelidon nigricans*			
Hylidae					
474.	25375	*Cyclorana maini (Sheep Frog)*			
Lamiaceae					
475.	13692	*Clerodendrum floribundum var. angustifolium*			
476.	13689	*Clerodendrum tomentosum var. lanceolatum*			
477.	12707	*Prostanthera albiflora*			
478.	6826	*Spartothamnella puberula*		P2	
Lauraceae					
479.	2949	*Cassytha capillaris*			
Loranthaceae					
480.	2372	*Amyema fitzgeraldii (Pincushion Mistletoe)*			
481.	2374	*Amyema hilliana*			
482.	2380	*Amyema miquelii (Stalked Mistletoe)*			
483.	2385	*Amyema sanguinea*			
484.	29080	*Amyema sanguinea var. pulchra*			
485.	14307	*Amyema sp. Fortescue (M.E. Trudgen 5358)*			
486.	2395	*Diplatia grandibractea*			
487.	2396	*Lysiana casuarinae*			
Lythraceae					
488.	5277	*Ammannia baccifera*			
489.	5286	*Rotala mexicana*			
Macropodidae					
490.	24122	*Lagorchestes conspicillatus subsp. leichardti (Spectacled Hare-wallaby)*		P3	
491.	25489	*Macropus robustus*			
492.	24135	*Macropus robustus subsp. erubescens (Euro)*			
493.	24136	*Macropus rufus (Red Kangaroo)*			
Maluridae					
494.	25647	*Amytornis striatus (Striated Grasswren)*			
495.	24539	*Amytornis striatus subsp. striatus*		P4	
496.	24540	*Amytornis striatus subsp. whitei*			
497.	25651	*Malurus lamberti (Variegated Fairy-wren)*			
498.	24544	*Malurus lamberti subsp. assimilis*			
499.	24546	*Malurus lamberti subsp. rogersi*			
500.	25652	*Malurus leucopterus (White-winged Fairy-wren)*			
501.	24548	*Malurus leucopterus subsp. leucopterus*		T	
502.	25656	*Stipiturus ruficeps (Rufous-crowned Emu-wren)*			
503.	24556	*Stipiturus ruficeps subsp. ruficeps*			
Malvaceae					
504.	4886	*Abutilon amplum*			
505.	4889	*Abutilon cryptopetalum*			
506.	19589	*Abutilon dioicum*			
507.	4891	*Abutilon fraseri (Lantern Bush)*			
508.	4895	*Abutilon lepidum*			
509.	-9786	*Abutilon lerpidum*			
510.	4898	*Abutilon macrum*			
511.	4899	*Abutilon malvifolium (Bastard Marshmallow)*			
512.	4901	*Abutilon otocarpum (Desert Chinese Lantern)*			
513.	16918	*Abutilon oxycarpum subsp. prostratum*			
514.	-6559	*Abutilon sp.*			
515.	4907	*Alyogyne pinoniana (Sand Hibiscus)*			
516.	12716	*Brachychiton acuminatus*			
517.	4999	*Brachychiton gregorii (Desert Kurrajong)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
518.	13560	*Corchorus crozophorifolius*			
519.	25838	*Corchorus incanus subsp. lithophilus*			
520.	17405	*Corchorus lasiocarpus*			
521.	18409	*Corchorus lasiocarpus subsp. lasiocarpus*			
522.	18408	*Corchorus lasiocarpus subsp. parvus*			
523.	4862	*Corchorus parviflorus*			
524.	4864	*Corchorus sidoides (Flannel Weed)*			
525.	-7356	*Corchorus sp.*			
526.	20244	*Corchorus sp. Hamersley Range (S. van Leeuwen 3586)*			Y
527.	17661	*Corchorus tectus*			
528.	4865	*Corchorus tridens*			
529.	13467	*Corchorus trilocularis*			
530.	4910	*Gossypium australe (Native Cotton)*			
531.	4918	*Gossypium robinsonii (Wild Cotton)*			
532.	4923	*Hibiscus brachysiphonius*			
533.	4924	*Hibiscus burtonii*			
534.	4925	*Hibiscus coatesii*			
535.	4930	*Hibiscus goldsworthii*			
536.	4931	*Hibiscus haynaldii*			
537.	4933	*Hibiscus leptocladus*			
538.	-7546	*Hibiscus sp.*			
539.	11651	*Hibiscus sturtii var. campylochlamys*			
540.	11477	*Hibiscus sturtii var. platychlamys*			
541.	5024	*Keraudrenia nephrosperma*			
542.	19636	*Keraudrenia velutina subsp. elliptica*			
543.	4962	*Malvastrum americanum (Spiked Malvastrum)*	Y		
544.	5062	*Rulingia loxophylla*			
545.	5063	*Rulingia luteiflora (Yellow-flowered Rulingia)*			
546.	4966	*Sida arenicola*			
547.	31758	*Sida arsiniata*			
548.	4971	*Sida cardiophylla*			
549.	4972	*Sida clementii*			
550.	4976	*Sida echinocarpa*			
551.	4977	*Sida fibulifera (Silver Sida)*			
552.	-8825	*Sida sp.*			
553.	31859	*Sida sp. Articulation below (A.A. Mitchell PRP 1605)*			
554.	15225	*Sida sp. B Kimberley Flora (A.A. Mitchell 2745)*			
555.	16616	*Sida sp. Barlee Range (S. van Leeuwen 1642)*		P3	
556.	33697	*Sida sp. Hamersley Range (K. Newbey 10692)*		P1	
557.	33698	*Sida sp. Pilbara (A.A. Mitchell PRP 1543)*			
558.	20253	*Sida sp. Shovelanna Hill (S. van Leeuwen 3842)*			
559.	31852	*Sida sp. Supplejack Station (T.S. Henshall 2345)*			
560.	16617	*Sida sp. spiciform panicles (E. Leyland s.n. 14/8/90)*			
561.	16948	*Sida sp. verrucose glands (F.H. Mollemans 2423)*			
562.	4989	*Sida spinosa (Spiny Sida)*			
563.	16923	*Sida trichopoda*			
564.	4873	*Triumfetta appendiculata*			
565.	4879	*Triumfetta leptacantha*			
566.	14942	*Triumfetta maconochieana*			
567.	5107	*Waltheria virgata*			
Marsileaceae					
568.	76	*Marsilea hirsuta (Nardoo)*			
Megadermatidae					
569.	24180	*Macroderma gigas (Ghost Bat)*		P4	
Meliphagidae					
570.	24559	*Acanthagenys rufogularis (Spiny-cheeked Honeyeater)*			
571.	24564	*Certhionyx variegatus (Pied Honeyeater)*			
572.	24570	*Epthianura tricolor (Crimson Chat)*			
573.	24572	*Lacustroica whitei (Grey Honeyeater)*			
574.	24575	*Lichenostomus keartlandi (Grey-headed Honeyeater)*			
575.	24578	*Lichenostomus penicillatus (White-plumed Honeyeater)*			
576.	24579	*Lichenostomus plumulus (Grey-fronted Honeyeater)*			
577.	24581	*Lichenostomus virescens (Singing Honeyeater)*			
578.	25661	*Lichmera indistincta (Brown Honeyeater)*			
579.	24583	*Manorina flavigula (Yellow-throated Miner)*			
580.	25665	*Melithreptus gularis (Black-chinned Honeyeater)*			
581.	-370	*Sugomel niger*			
Menispermaceae					

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
582.	2942	*Tinospora smilacina (Snakevine)*			
Meropidae					
583.	24598	*Merops ornatus (Rainbow Bee-eater)*			
Mitosporic fungi					
584.	-8826	*Cercosporidium graminis*			
Molluginaceae					
585.	29851	*Mollugo molluginea*			
Molossidae					
586.	24182	*Mormopterus beccarii (Beccari's Freetail-bat)*			
Moraceae					
587.	19648	*Ficus brachypoda*			
Motacillidae					
588.	-396	*Anthus novaeseelandiae*			
Muridae					
589.	24217	*Leggadina lakedownensis (Short-tailed Mouse)*		P4	
590.	24223	*Mus musculus (House Mouse)*			
591.	24233	*Pseudomys chapmani (Western Pebble-mound Mouse)*		P4	
592.	24235	*Pseudomys desertor (Desert Mouse)*			
593.	24237	*Pseudomys hermannsburgensis (Sandy Inland Mouse)*			
594.	24248	*Zyzomys argurus (Common Rock-rat)*			
Myobatrachidae					
595.	25445	*Uperoleia russelli (Northwest Toadlet)*			
Myrtaceae					
596.	5446	*Calytrix carinata*			
597.	17083	*Corymbia deserticola subsp. deserticola*			
598.	17077	*Corymbia ferriticola*			
599.	17093	*Corymbia hamersleyana*			
600.	5655	*Eucalyptus gamophylla (Twin-leaf Mallee)*			
601.	13528	*Eucalyptus kingsmillii subsp. kingsmillii*			
602.	5698	*Eucalyptus leucophloia (Snappy Gum)*			
603.	18088	*Eucalyptus leucophloia subsp. leucophloia*			
604.	5703	*Eucalyptus lucasii (Barlee Box)*			
605.	18058	*Eucalyptus repullulans*			
606.	19576	*Eucalyptus socialis subsp. eucentrica*			
607.	29675	*Eucalyptus sp. Mt Nameless (D. Nicolle 1191)*			
608.	29733	*Eucalyptus trivalva (Victoria Spring Mallee)*			
609.	5908	*Melaleuca eleuterostachya*			
Neosittidae					
610.	25673	*Daphoenositta chrysoptera (Varied Sittella)*			
Nyctaginaceae					
611.	2770	*Boerhavia coccinea (Tar Vine)*			
612.	2773	*Boerhavia paludosa*			
613.	2774	*Boerhavia repleta*			
Otididae					
614.	24610	*Ardeotis australis (Australian Bustard)*		P4	
Pachycephalidae					
615.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
616.	24611	*Colluricincla harmonica subsp. brunnea*			
617.	24613	*Colluricincla harmonica subsp. rufiventris*			
618.	24618	*Oreoica gutturalis (Crested Bellbird)*			
619.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
620.	24624	*Pachycephala rufiventris subsp. rufiventris*			
Pardalotidae					
621.	24627	*Pardalotus rubricatus (Red-browed Pardalote)*			
622.	25682	*Pardalotus striatus (Striated Pardalote)*			
623.	24629	*Pardalotus striatus subsp. uropygialis*			
Pedaliaceae					
624.	14322	*Josephinia sp. Marandoo (M.E. Trudgen 1554)*		P1	
Pelecanidae					
625.	24648	*Pelecanus conspicillatus (Australian Pelican)*			
Petroicidae					
626.	-354	*Melanodryas cucullata*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
627.	24658	*Petroica cucullata (Hooded Robin)*			
628.	24659	*Petroica goodenovii (Red-capped Robin)*			
Phasianidae					
629.	25701	*Coturnix ypsilophora (Brown Quail)*			
630.	24672	*Coturnix ypsilophora subsp. cervina*			
Phrymaceae					
631.	7082	*Mimulus gracilis*			
Phyllanthaceae					
632.	4680	*Phyllanthus maderaspatensis*			
Plantaginaceae					
633.	34760	*Plantago cunninghamii*			
634.	14324	*Plantago sp. Hamersley (M.E. Trudgen 11207)*			
635.	7098	*Stemodia grossa (Marsh Stemodia)*			
636.	7099	*Stemodia kingii*			
Plumbaginaceae					
637.	6491	*Plumbago zeylanica (Native Plumbago)*			
Poaceae					
638.	19835	*Amphipogon sericeus*			
639.	204	*Aristida burbidgeae*			
640.	207	*Aristida contorta (Bunched Kerosene Grass)*			
641.	209	*Aristida exserta*			
642.	12063	*Aristida holathera var. holathera*			
643.	215	*Aristida latifolia (Feathertop Wiregrass)*			
644.	-11849	*Aristida sp.*			
645.	227	*Astrebla elymoides (Weeping Mitchell Grass)*			
646.	228	*Astrebla lappacea*		P3	
647.	229	*Astrebla pectinata (Barley Mitchell Grass)*			
648.	239	*Bothriochloa bladhii (Forest Bluegrass)*			
649.	240	*Bothriochloa ewartiana (Desert Bluegrass)*			
650.	241	*Brachyachne convergens (Spider Grass)*			
651.	242	*Brachyachne prostrata*			
652.	258	*Cenchrus ciliaris (Buffel Grass)*	Y		
653.	269	*Chloris pectinata (Comb Chloris)*			
654.	272	*Chloris virgata (Feathertop Rhodes Grass)*	Y		
655.	273	*Chrysopogon fallax (Golden Beard Grass)*			
656.	279	*Cymbopogon ambiguus (Scentgrass)*			
657.	281	*Cymbopogon obtectus (Silkyheads)*			
658.	303	*Dichanthium fecundum (Curly Bluegrass)*			
659.	13741	*Dichanthium sericeum subsp. humilius*			
660.	11964	*Dichanthium sericeum subsp. sericeum*			
661.	310	*Digitaria brownii (Cotton Panic Grass)*			
662.	356	*Enneapogon avenaceus (Bottle Washers)*			
663.	357	*Enneapogon caerulescens (Limestone Grass)*			
664.	360	*Enneapogon lindleyanus (Wiry Nineawn)*			
665.	365	*Enneapogon polyphyllus (Leafy Nineawn)*			
666.	20377	*Enneapogon robustissimus*			
667.	-4310	*Enneapogon sp.*			
668.	368	*Enteropogon ramosus (Windmill Grass)*			
669.	375	*Eragrostis cumingii (Cuming's Love Grass)*			
670.	380	*Eragrostis eriopoda (Woollybutt Grass)*			
671.	388	*Eragrostis leptocarpa (Drooping Lovegrass)*			
672.	392	*Eragrostis pergracilis*			
673.	393	*Eragrostis setifolia (Neverfail Grass)*			
674.	-10147	*Eragrostis sp.*			
675.	38505	*Eragrostis surreyana*		P3	
676.	398	*Eragrostis tenellula (Delicate Lovegrass)*			
677.	399	*Eragrostis xerophila (Knotty-butt Neverfail)*			
678.	403	*Eriachne benthamii (Swamp Wanderrie)*			
679.	413	*Eriachne mucronata (Mountain Wanderrie Grass)*			
680.	16486	*Eriachne pulchella subsp. pulchella*			
681.	421	*Eriachne tenuiculmis*			
682.	12663	*Ischaemum albovillosum*			
683.	458	*Iseilema dolichotrichum*			
684.	459	*Iseilema eremaeum*			
685.	461	*Iseilema fragile*			
686.	463	*Iseilema macratherum (Bull Flinders Grass)*			
687.	464	*Iseilema membranaceum (Small Flinders Grass)*			

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688.	-8074	*Iseilema sp.*			
689.	465	*Iseilema vaginiflorum (Red Flinders Grass)*			
690.	471	*Leptochloa digitata (Whorled Cane Grass)*			
691.	503	*Panicum decompositum (Native Millet)*			
692.	504	*Panicum effusum (Hairy Panic Grass)*			
693.	505	*Panicum laevinode*			
694.	515	*Paraneurachne muelleri (Northern Mulga Grass)*			
695.	518	*Paspalidium clementii (Clements Paspalidium)*			
696.	523	*Paspalidium rarum (Rare Paspalidium)*			
697.	599	*Schizachyrium fragile (Senale Redgrass)*			
698.	606	*Setaria dielsii (Diels' Pigeon Grass)*			
699.	613	*Setaria verticillata (Whorled Pigeon Grass)*	Y		
700.	619	*Sorghum plumosum (Plume Canegrass)*			
701.	629	*Sporobolus australasicus (Fairy Grass)*			
702.	672	*Themeda avenacea (Native Oatgrass)*			
703.	17820	*Themeda sp. Hamersley Station (M.E. Trudgen 11431)*		P3	
704.	673	*Themeda triandra*			
705.	679	*Triodia angusta*			
706.	17886	*Triodia biflora*			
707.	681	*Triodia brizoides*			
708.	17877	*Triodia melvillei*			
709.	704	*Triodia wiseana (Limestone Spinifex)*			
710.	705	*Tripogon loliiformis (Five Minute Grass)*			
711.	706	*Triraphis mollis (Needle Grass)*			
712.	29268	*Urochloa occidentalis*			
713.	29269	*Urochloa occidentalis var. occidentalis*			
714.	717	*Urochloa piligera*			
715.	727	*Whiteochloa capillipes*		P3	

Podargidae

716.	25703	*Podargus strigoides (Tawny Frogmouth)*			

Podicipedidae

717.	24681	*Poliocephalus poliocephalus (Hoary-headed Grebe)*			
718.	25705	*Tachybaptus novaehollandiae (Australasian Grebe)*			

Polygalaceae

719.	4572	*Polygala isingii*			
720.	4574	*Polygala longifolia*			

Pomatostomidae

721.	24683	*Pomatostomus superciliosus (White-browed Babbler)*			
722.	25706	*Pomatostomus temporalis (Grey-crowned Babbler)*			
723.	24684	*Pomatostomus temporalis subsp. rubeculus*			

Portulacaceae

724.	2864	*Calandrinia ptychosperma*			
725.	2879	*Portulaca cyclophylla*			
726.	2884	*Portulaca oleracea (Purslane)*	Y		
727.	2886	*Portulaca pilosa (Djanggara)*			

Proteaceae

728.	2079	*Grevillea pyramidalis (Caustic Bush)*			
729.	19570	*Grevillea pyramidalis subsp. leucadendron*			
730.	2099	*Grevillea striata (Beefwood)*			
731.	19478	*Grevillea wickhamii subsp. hispidula*			

Psittacidae

732.	-326	*Barnardius zonarius*			
733.	25715	*Cacatua roseicapilla (Galah)*			
734.	24726	*Cacatua roseicapilla subsp. roseicapilla*			
735.	25716	*Cacatua sanguinea (Little Corella)*			
736.	-353	*Eolophus roseicapillus*			
737.	24736	*Melopsittacus undulatus (Budgerigar)*			
738.	-323	*Neopsephotus bourkii*			
739.	24742	*Nymphicus hollandicus (Cockatiel)*			
740.	25721	*Platycercus zonarius (Australian Ringneck)*			
741.	24751	*Platycercus zonarius subsp. zonarius*			

Pteridaceae

742.	37	*Cheilanthes lasiophylla (Woolly Cloak Fern)*			
743.	12818	*Cheilanthes sieberi subsp. sieberi*			

Ptilonorhynchidae

744.	-378	*Ptilonorhynchus guttatus*			

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745.	24757	*Ptilonorhynchus maculatus subsp. guttatus (Western Bowerbird)*			
Pygopodidae					
746.	24998	*Delma elegans*			
747.	25000	*Delma haroldi*			
748.	25001	*Delma nasuta*			
749.	25002	*Delma pax*			
750.	25004	*Delma tincta*			
751.	25005	*Lialis burtonis*			
752.	25009	*Pygopus nigriceps*			
Rallidae					
753.	25727	*Fulica atra (Eurasian Coot)*			
Recurvirostridae					
754.	25734	*Himantopus himantopus (Black-winged Stilt)*			
Rhamnaceae					
755.	16189	*Cryptandra monticola*			
756.	-9558	*Cryptandra sp.*			
Rubiaceae					
757.	7338	*Oldenlandia crouchiana*			
758.	7339	*Oldenlandia galioides*			
759.	19640	*Oldenlandia sp. Hamersley Station (A.A. Mitchell PRP 1479)*		P3	
760.	18154	*Psydrax latifolia*			
761.	13575	*Spermacoce brachystema*			
762.	7363	*Synaptantha tillaeacea*			
Santalaceae					
763.	2359	*Santalum spicatum (Sandalwood)*			
Sapindaceae					
764.	4740	*Atalaya hemiglauca (Whitewood)*			
765.	4745	*Diplopeltis eriocarpa (Hairy Pepperflower)*			
766.	12023	*Diplopeltis stuartii var. stuartii (Desert Pepperflower)*			
767.	4759	*Dodonaea coriacea*			
768.	11406	*Dodonaea lanceolata var. lanceolata*			
769.	4772	*Dodonaea pachyneura*			
770.	4773	*Dodonaea petiolaris*			
Scincidae					
771.	25015	*Carlia munda*			
772.	25017	*Carlia triacantha*			
773.	30893	*Cryptoblepharus buchananii*			
774.	30892	*Cryptoblepharus ustulatus*			
775.	25036	*Ctenotus duricola*			
776.	25462	*Ctenotus grandis*			
777.	25043	*Ctenotus grandis subsp. titan*			
778.	25045	*Ctenotus helenae*			
779.	25463	*Ctenotus pantherinus (Leopard Ctenotus)*			
780.	25060	*Ctenotus pantherinus subsp. acripes*			
781.	25064	*Ctenotus pantherinus subsp. ocellifer*			
782.	25070	*Ctenotus robustus*			
783.	25072	*Ctenotus rubicundus*			
784.	25071	*Ctenotus rutilans*			
785.	25073	*Ctenotus saxatilis (Rock Ctenotus)*			
786.	25074	*Ctenotus schomburgkii*			
787.	25466	*Cyclodomorphus melanops (Slender Blue-tongue)*			
788.	25090	*Cyclodomorphus melanops subsp. melanops*			
789.	25094	*Egernia formosa*			
790.	25108	*Eremiascincus fasciolatus (Narrow-banded Sand Swimmer)*			
791.	25109	*Eremiascincus richardsonii (Broad-banded Sand Swimmer)*			
792.	25135	*Lerista flammicauda*			
793.	25155	*Lerista muelleri*			
794.	30925	*Lerista verhmens*			
795.	25184	*Menetia greyii*			
796.	25187	*Menetia surda subsp. surda*			
797.	25495	*Morethia ruficauda*			
798.	25193	*Morethia ruficauda subsp. exquisita*			
799.	25196	*Notoscincus butleri*		P4	
800.	25197	*Notoscincus ornatus subsp. ornatus*			
801.	25199	*Proablepharus reginae*			
802.	25202	*Tiliqua multifasciata (Central Blue-tongue)*			

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Scolopacidae					
803.	-360	*Actitis hypoleucos*			
804.	24792	*Gallinago megala (Swinhoe's Snipe)*			
Scrophulariaceae					
805.	18053	*Eremophila cryptothrix*			
806.	7192	*Eremophila cuneifolia (Pinyuru)*			
807.	7208	*Eremophila forrestii (Wilcox Bush)*			
808.	16696	*Eremophila fraseri subsp. fraseri*			
809.	16940	*Eremophila lanceolata*			
810.	7230	*Eremophila latrobei (Warty Fuchsia Bush)*			
811.	17597	*Eremophila latrobei subsp. filiformis*			
812.	17576	*Eremophila latrobei subsp. latrobei*			
813.	7234	*Eremophila longifolia (Berrigan)*			
814.	16363	*Eremophila maculata subsp. brevifolia (Native Fuchsia)*			
815.	14894	*Eremophila magnifica subsp. velutina*		P3	
816.	23997	*Eremophila tietkensii*			
Solanaceae					
817.	6962	*Datura leichhardtii (Native Thornapple)*	Y		
818.	6971	*Nicotiana benthamiana (Tjuntiwari)*			
819.	6976	*Nicotiana occidentalis (Native Tobacco)*			
820.	11331	*Nicotiana occidentalis subsp. obliqua*			
821.	11856	*Nicotiana occidentalis subsp. occidentalis*			
822.	6977	*Nicotiana rosulata (Rosetted Tobacco)*			
823.	-6328	*Nicotiana sp.*			
824.	6999	*Solanum coactiliferum (Western Nightshade)*			
825.	7002	*Solanum diversiflorum*			
826.	7008	*Solanum ferocissimum*			
827.	7009	*Solanum gabrielae*			
828.	7014	*Solanum horridum*			
829.	7018	*Solanum lasiophyllum (Flannel Bush)*			
830.	7029	*Solanum phlomoides*			
831.	-4402	*Solanum sp.*			
832.	-4193	*Solanum sp. (1)(MET 378)*			
833.	7036	*Solanum sturtianum (Thargomindah Nightshade)*			
Strigidae					
834.	25748	*Ninox novaeseelandiae (Boobook Owl)*			
Sylviidae					
835.	25755	*Acrocephalus australis (Australian Reed Warbler)*			
836.	24833	*Cincloramphus cruralis (Brown Songlark)*			
837.	24834	*Cincloramphus mathewsi (Rufous Songlark)*			
838.	24837	*Eremiornis carteri (Spinifex-bird)*			
Tachyglossidae					
839.	24207	*Tachyglossus aculeatus (Echidna)*			
Threskiornithidae					
840.	24845	*Threskiornis spinicollis (Straw-necked Ibis)*			
Thymelaeaceae					
841.	5230	*Pimelea ammocharis*			
842.	5245	*Pimelea forrestiana*			
843.	5250	*Pimelea holroydii*			
Turnicidae					
844.	24851	*Turnix velox (Little Button-quail)*			
Typhlopidae					
845.	25270	*Ramphotyphlops ammodytes*			
846.	25276	*Ramphotyphlops ganei*		P1	
847.	25277	*Ramphotyphlops grypus*			
848.	25279	*Ramphotyphlops hamatus*			
849.	25315	*Ramphotyphlops pilbarensis*			
Ustilaginaceae					
850.	-8756	*Sporisorium mitchellii*			
Varanidae					
851.	25209	*Varanus acanthurus (Spiny-tailed Monitor)*			
852.	25210	*Varanus brevicauda (Short-tailed Pygmy Monitor)*			
853.	30825	*Varanus bushi (Pilbara Mulga Monitor)*			
854.	25211	*Varanus caudolineatus*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
855.	25212	*Varanus eremius (Pygmy Desert Monitor)*			
856.	25224	*Varanus pilbarensis (Pilbara Rock Monitor)*			
857.	25526	*Varanus tristis (Racehorse Monitor)*			
858.	25227	*Varanus tristis subsp. tristis (Racehorse Monitor)*			
Vespertilionidae					
859.	24186	*Chalinolobus gouldii (Gould's Wattled Bat)*			
860.	24200	*Scotorepens greyii (Little Broad-nosed Bat)*			
861.	24205	*Vespadelus finlaysoni (Finlayson's Cave Bat)*			
Zygophyllaceae					
862.	4377	*Tribulus hirsutus*			
863.	4379	*Tribulus macrocarpus*			
864.	4381	*Tribulus platypterus (Cork Hopbush)*			
865.	-10165	*Tribulus sp.*			
866.	18072	*Tribulus suberosus*			
867.	4392	*Zygophyllum iodocarpum*			

Conservation Codes
T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

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

Appendix Five: Relevé and Quadrat Data

Site	MR1101	
Described by	JN, MM	12/07/2011
MGA Zone	GDA94 50	563856 **mE** 7531330 **mN**
Landform	Flat	
Soil	Red brown loamy clay	
Rock Type	None	
Vegetation Description	*Acacia xiphophylla* shrubland over *Sporobolus australasicus* sparse grassland	
Vegetation Condition	Very good	
Notes	Some fire scars; 3-5 years since fire	
Photo		

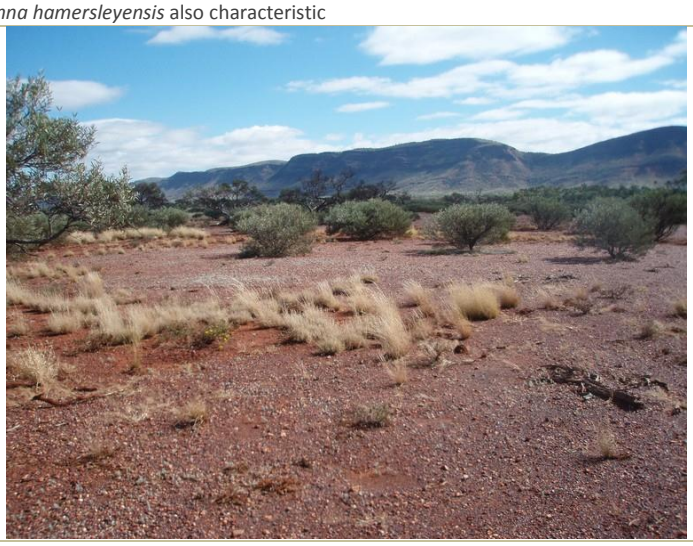
Site	MR1102	
Described by	JN, MM	12/07/2011
MGA Zone	GDA94 50	563823 **mE** 7531591 **mN**
Landform	Creekbed and outwash	
Soil	Red brown clay	
Rock Type	-	
Vegetation Description	*Eucalyptus victrix* and *Acacia citrinoviridis* woodland over **Vachellia farnesiana* sparse shrubland over *Eulalia aurea, Eriachne benthamii* and *Chrysopogon fallax* closed tussock grassland	
Vegetation Condition	Good	
Notes	Disturbance; grazing and weeds. 2-5 years since fire	
Photo		

Site	MR1103	
Described by	JN, MM	12/07/2011
MGA Zone	GDA94 50	564041 **mE**, 7531360 **mN**
Landform	Flat	
Soil	Red brown clay; some cracking	
Rock Type	-	
Vegetation Description	*Astrebla pectinata* tussock grassland with *Acacia victoriae* sparse shrubland	
Vegetation Condition	Very good	
Notes		
Photo		

Site	MR1104	
Described by	JN, MM	12/07/2011
MGA Zone	GDA94 50	563709 **mE**, 7531130 **mN**
Landform	Flat	
Soil	Red brown clay	
Rock Type	-	
Vegetation Description	*Acacia xiphophylla* and *A. aptaneura* open woodland over *Sporobolus australasicus, Eriachne mucronata* and *Eragrostis xerophylla* tussock grassland	
Vegetation Condition	Very good	
Notes	Grazed	
Photo		

Site	MR1105	
Described by	JN, MM	12/07/2011
MGA Zone	GDA94 50	563663 **mE** 7530918 **mN**
Landform	Flat	
Soil	Red brown clay	
Rock Type	-	
Vegetation Description	*Astrebla pectinata, Polymeria longifolia* and *Stemodia kingii* tussock grassland/sparse herbland with *Acacia victoriae* and *A. xiphophylla* scattered shrubs	
Vegetation Condition	Good	
Notes		
Photo		

Site	MR1106	
Described by	JN, MM	12/07/2011
MGA Zone	GDA94 50	564138 **mE** 7530764 **mN**
Landform	Creek bed	
Soil	Red brown loamy sand	
Rock Type	-	
Vegetation Description	*Acacia citrinoviridis* and *Eucalyptus victrix* woodland over *Eulalia aurea, Themeda* sp. Hamersley Station and *Eriachne benthamii* open tussock grassland	
Vegetation Condition	Very good	
Notes	*Centipeda minima* subsp. *macrocephala* also characteristic	
Photo		

Site	MR1107	
Described by	JN, MM	12/07/2011
MGA Zone	GDA94 50	564159 **mE** 7530480 **mN**
Landform	Flat	
Soil	Red brown clay loam	
Rock Type	-	
Vegetation Description	*Acacia xiphophylla* sparse shrubland over *Eriachne mucronata*, *Sclerolaena cornishiana* and *Sporobolus australasicus* sparse tussock grassland/sparse herbland	
Vegetation Condition	Very good	
Notes	Grazed. *Senna hamersleyensis* also characteristic	
Photo		

Site	MR1108	
Described by	JN, MM	12/07/2011
MGA Zone	GDA94 50	563864 **mE** 7530507 **mN**
Landform	Flat	
Soil	Red brown clay loam	
Rock Type	-	
Vegetation Description	*Acacia xiphophylla* sparse shrubland over *Eragrostis benthamii, Astrebla pectinata* and *Eremophila maculata* var. *brevifolia* and sparse tussock grassland/sparse shrubland	
Vegetation Condition	Very good	
Notes	*Sclerolaena cornishiana* also characteristic	
Photo		

Site	MR1109	
Described by	JN, MM	12/07/2011
MGA Zone	GDA94 50	563136 **mE**, 7529692 **mN**
Landform	Crest	
Soil	Red brown loamy sand	
Rock Type	Banded ironstone	
Vegetation Description	*Eucalyptus leucophloia* subsp. *leucophloia* open woodland over *Acacia monticola, A. pyrifolia* var. *pyrifolia* and *Senna glutinosa* subsp. *glutinosa* sparse shrubland over *Triodia wiseana* open tussock grassland	
Vegetation Condition	Excellent	
Notes	No obvious signs of fire. *A. atkinsiana* also characteristic	
Photo		

Site	MR1110	
Described by	JN, MM	12/07/2011
MGA Zone	GDA94 50	562678 **mE**, 7529870 **mN**
Landform	Lower slope	
Soil	Red brown loam	
Rock Type	-	
Vegetation Description	*Eucalyptus gamophylla* and *Corymbia hamersleyana* open woodland over *Acacia maitlandii, Senna artemisioides* subsp. *oligophylla* and *A. atkinsiana* open shrubland over *Triodia epactia* and *Themeda triandra* hummock grassland/tussock grassland	
Vegetation Condition	Excellent	
Notes	No signs of fire.. *A. exilis* also characteristic	
Photo		

Site	MR1111	
Described by	JN, MM	12/07/2011
MGA Zone	GDA94 50	562555 **mE**, 7530364 **mN**
Landform	Flat	
Soil	Red brown loamy clay	
Rock Type	-	
Vegetation Description	*Acacia aptaneura* open woodland over *Acacia bivenosa* sparse shrubland over *Triodia epactia* and *T. wiseana* hummock grassland	
Vegetation Condition	Very good	
Notes		
Photo		

Site	MR1112	
Described by	JN, MM	12/07/2011
MGA Zone	GDA94 50	563178 **mE**, 7530288 **mN**
Landform	Flat	
Soil	Red brown clay	
Rock Type	-	
Vegetation Description	*Acacia aptaneura* woodland over *Sporobolus australasicus, *Bidens bipinnata* and *Chrysopogon fallax* sparse tussock grassland/sparse herbland	
Vegetation Condition	Very poor	
Notes	Grazed, 3-5 years since fire	
Photo		

Site	MR1113	
Described by	JN, MM	12/07/2011
MGA Zone	GDA94 50	563522 **mE**, 7528867 **mN**
Landform	Lower slope	
Soil	Sandy loam	
Rock Type	Ironstone	
Vegetation Description	*Acacia aptaneura, A. pruinocarpa* and *A. bivenosa* open shrubland over *Triodia wiseana* and *T. epactia* hummock grassland	
Vegetation Condition	Excellent	
Notes	Minimal grazing noted. *A. inaequilatera* and *Senna glutinosa* subsp. *glutinosa* also characteristic	
Photo		

Site	MR1114	
Described by	JN, MM	12/07/2011
MGA Zone	GDA94 50	563040 **mE**, 7527319 **mN**
Landform	Flat	
Soil	Red brown loamy clay	
Rock Type	-	
Vegetation Description	*Acacia aptaneura* woodland over *Chrysopogon fallax, Centipeda minima* subsp. *macrocephala* and *Sporobolus australasicus* open tussock grassland/sparse herbland	
Vegetation Condition	Good	
Notes	No signs of fire. *Chloris pectinata* and **Bidens bipinnata* also characteristic	
Photo		

Site	MR1115	
Described by	JN, MM	12/07/2011
MGA Zone	GDA94 50	563999 **mE**, 7527730 **mN**
Landform	Flat	
Soil	Red brown light clay	
Rock Type	-	
Vegetation Description	*Astrebla pectinata, Chrysopogon fallax* and *Eulalia aurea* closed tussock grassland with *Acacia synchronicia* scattered shrubs	
Vegetation Condition	Good	
Notes	Grazed	
Photo		

Site	MR1116	
Described by	JN, MM	13/07/2011
MGA Zone	GDA94 50	565448 **mE**, 7528784 **mN**
Landform	Flat	
Soil	Red brown clay	
Rock Type	-	
Vegetation Description	*Astrebla pectinata, Stemodia kingii* and *Sporobolus australasicus* tussock grassland/open herbland	
Vegetation Condition	Good	
Notes		
Photo		

Site	MR1117	
Described by	JN, MM	13/07/2011
MGA Zone	GDA94 50	558583 **mE**, 7530869 **mN**
Landform	Lower slope	
Soil	Red brown clay loam	
Rock Type	-	
Vegetation Description	*Acacia atkinsiana, Eucalyptus gamophylla* and *A. exilis* open shrubland/open woodland over *Triodia wiseana* open hummock grassland	
Vegetation Condition	Excellent	
Notes	*A. bivenosa* and *Senna glutinosa* subsp. *pruinosa* also characteristic	
Photo		

Site	MR1118	
Described by	JN, MM	13/07/2011
MGA Zone	GDA94 50	558688 **mE**, 7530337 **mN**
Landform	Crest	
Soil	Red brown loamy sand	
Rock Type	Ironstone	
Vegetation Description	*Eucalyptus leucophloia* subsp. *leucophloia* open woodland *over Acacia atkinsiana, Petalostylis labicheoides* and *Hakea chordophylla* sparse shrubland over *Triodia wiseana, Eriachne ciliata* and *Bulbostylis barbata* open hummock grassland/sparse grassland/sparse sedgeland	
Vegetation Condition	Excellent	
Notes		
Photo		

Site	MR1119	
Described by	JN, MM	13/07/2011
MGA Zone	GDA94 50	561985 **mE**, 7528091 **mN**
Landform	Flat	
Soil	Red brown clay loam	
Rock Type	-	
Vegetation Description	*Acacia aptaneura, Corymbia deserticola* subsp. *deserticola* and *C. hamersleyana* open woodland over *Triodia epactia* hummock grassland with *Acacia bivenosa* scattered shrubs	
Vegetation Condition	Excellent	
Notes		
Photo		

Site	MR1120	
Described by	JN, MM	13/07/2011
MGA Zone	GDA94 50	560323 **mE**, 7527513 **mN**
Landform	Mid-upper slope	
Soil	Red brown clay loam	
Rock Type	Ironstone	
Vegetation Description	*Eucalyptus leucophloia* subsp. *leucophloia* and *Corymbia hamersleyana* open woodland over *Indigofera monophylla, Triodia wiseana* and *Eriachne mucronata* sparse shrubland/sparse hummock grassland/sparse tussock grassland with *Acacia bivenosa* scattered shrubs	
Vegetation Condition	Excellent	
Notes	*Cymbopogon ambiguus* also characteristic	
Photo		

Site	MR1121	
Described by	JN, MM	13/07/2011
MGA Zone	GDA94 50	559711 **mE**, 7529265 **mN**
Landform	Upper slope	
Soil	Red brown loamy sand	
Rock Type	Ironstone	
Vegetation Description	*Eucalyptus leucophloia* subsp. *leucophloia* and *Hakea chordophylla* open woodland/scattered shrubs over *Acacia atkinsiana* sparse shrubland over *Triodia wiseana* hummock grassland	
Vegetation Condition	Excellent	
Notes	No evidence of fire	
Photo		

Site	MR1122	
Described by	JN, MM	13/07/2011
MGA Zone	GDA94 50	559467 **mE**, 7529680 **mN**
Landform	Lower slope	
Soil	Red brown clay loam	
Rock Type	-	
Vegetation Description	*Eucalyptus gamophylla, Corymbia hamersleyana* and *E. xerothermica* open woodland over *Acacia bivenosa* and *Senna artemisioides* subsp. *oligophylla* open shrubland over *Triodia epactia* and *T. wiseana* sparse hummock grassland	
Vegetation Condition	Excellent	
Notes		
Photo		

Site	MR1123	
Described by	JN, MM	13/07/2011
MGA Zone	GDA94 50	560947 **mE**, 7529160 **mN**
Landform	Flat	
Soil	Red brown clay loam	
Rock Type	-	
Vegetation Description	*Acacia aptaneura, A. bivenosa* and *A. ancistrocarpa* sparse shrubland over *Triodia epactia* and *T. wiseana* open hummock grassland with *Corymbia deserticola subsp. deserticola* isolated trees	
Vegetation Condition	Excellent	
Notes	*A. pruinocarpa* also characteristic	
Photo		

Site	MR1124	
Described by	JN, MM	13/07/2011
MGA Zone	GDA94 50	561199 **mE**, 7528536 **mN**
Landform	Crest	
Soil	Red brown loamy sand	
Rock Type	Ironstone	
Vegetation Description	*Eucalyptus leucophloia* subsp. *leucophloia* open woodland over *Acacia atkinsiana* and *Senna glutinosa* subsp. *glutinosa* sparse shrubland over *Triodia wiseana, Indigofera monophylla* and *Goodenia cusackiana sparse* hummock grassland/sparse shrubland/sparse herbland.	
Vegetation Condition	Excellent	
Notes	No evidence of fire	
Photo		

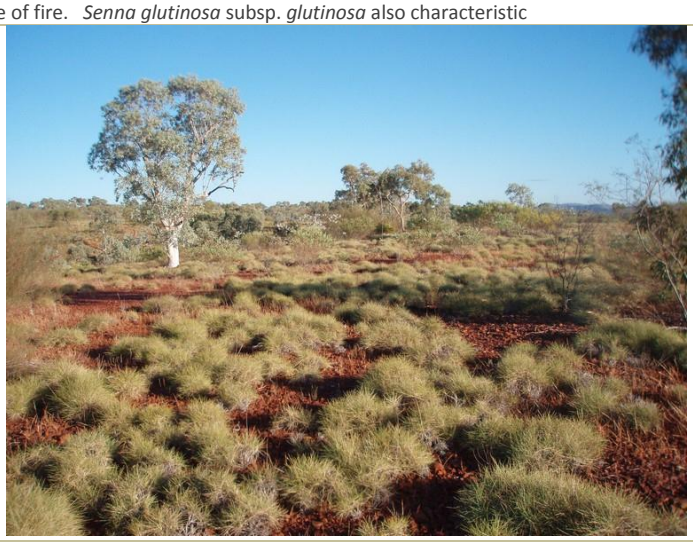
Site	MR1125	
Described by	JN, MM	13/07/2011
MGA Zone	GDA94 50	562070 **mE**, 7527195 **mN**
Landform	Upper slope	
Soil	Red brown loamy sand	
Rock Type	Ironstone	
Vegetation Description	*Acacia atkinsiana* and *Senna glutinosa* subsp. *glutinosa* sparse shrubland over *Triodia wiseana* open hummock grassland with *Eucalyptus leucophloia* subsp. *leucophloia* and *Hakea chordophylla* scattered trees	
Vegetation Condition	Excellent	
Notes		
Photo		

Site	MR1126	
Described by	JN, MM	13/07/2011
MGA Zone	GDA94 50	562183 **mE**, 7527543 **mN**
Landform	Lower slope	
Soil	Red brown loam	
Rock Type	-	
Vegetation Description	*Acacia pruinocarpa* and *A. aptaneura* sparse shrubland over *A. bivenosa* sparse shrubland over *Triodia epactia, T. wiseana* and *Aristida latifolia* open hummock grassland/sparse tussock grassland	
Vegetation Condition	Excellent	
Notes		
Photo		

Site	MR1127	
Described by	JN, MM	13/07/2011
MGA Zone	GDA94 50	562773 **mE**, 7527520 **mN**
Landform	Flat	
Soil	Red brown clay	
Rock Type	-	
Vegetation Description	*Acacia aptaneura* open shrubland over *Triodia epactia* and *Ptilotus obovatus* open hummock grassland/sparse shrubland	
Vegetation Condition	Very good	
Notes	Grazed, weeds noted	
Photo		

Site	MR1128	
Described by	JN, MM	13/07/2011
MGA Zone	GDA94 50	560123 **mE**, 7526414 **mN**
Landform	Flat	
Soil	Red brown clay	
Rock Type	-	
Vegetation Description	*Acacia aptaneura* open shrubland over *Triodia epactia, Eriachne* sp. and *Chloris pectinata* hummock grassland/open tussock grassland	
Vegetation Condition	Good	
Notes	*A. aptaneura* recovering following fire 2-3 years previously	
Photo		

Site	MR1129	
Described by	JN, MM	13/07/2011
MGA Zone	GDA94 50	560388 **mE**, 7525943 **mN**
Landform	Flat	
Soil	Red brown loamy clay	
Rock Type	-	
Vegetation Description	*Acacia pruinocarpa* and *A. aptaneura* open woodland over *Triodia epactia* hummock grassland with *A. bivenosa* and *Senna glutinosa* subsp. *glutinosa* scattered shrubs	
Vegetation Condition	Very good	
Notes	~ 3 years since fire	
Photo		

Site	MR1130	
Described by	JN, MM	14/07/2011
MGA Zone	GDA94 50	560664 **mE**, 7527376 **mN**
Landform	Crest	
Soil	Red brown loamy sand	
Rock Type	Ironstone	
Vegetation Description	*Triodia wiseana* and *Eriachne ciliata* open hummock grassland/sparse grassland with *Eucalyptus leucophloia* subsp. *leucophloia, Corymbia hamersleyana* and *Hakea chordophylla* scattered trees and *Acacia atkinsiana, A. exilis* and *A. bivenosa* scattered shrubs	
Vegetation Condition	Excellent	
Notes	No evidence of fire. *Senna glutinosa* subsp. *glutinosa* also characteristic	
Photo		

Site	MR1131	
Described by	JN, MM	14/07/2011
MGA Zone	GDA94 50	559350 **mE**, 7526845 **mN**
Landform	Flat	
Soil	Red brown loamj	
Rock Type	-	
Vegetation Description	*Acacia aptaneura*, *A. pruinocarpa* and *A. ancistrocarpa* sparse shrubland over *Triodia wiseana* open hummock grassland with *Corymbia deserticola* subsp. *deserticola* scattered trees	
Vegetation Condition	Very good	
Notes	*A. aptaneura* regenerating from fire 2-3 years earlier	
Photo		

Site	MR1132	
Described by	JN, MM	14/07/2011
MGA Zone	GDA94 50	558634 **mE**, 7526580 **mN**
Landform	Flat	
Soil	Red brown clay loam	
Rock Type	-	
Vegetation Description	*Acacia aptaneura* open woodland over *Triodia epactia, Ptilotus obovatus* and *Chrysopogon fallax* sparse tussock grassland/sparse shrubland/sparse tussock grassland	
Vegetation Condition	Very good	
Notes	*A. aptaneura* regenerating from fire 2-3 years earlier	
Photo		

Site	MR1133	
Described by	JN, MM	14/07/2011
MGA Zone	GDA94 50	558440 **mE**, 7527037 **mN**
Landform	Flat	
Soil	Red brown clay loam	
Rock Type	-	
Vegetation Description	*Acacia aptaneura* and *A. pruinocarpa* open woodland over *A. bivenosa* sparse shrubland over *Triodia wiseana* hummock grassland	
Vegetation Condition	Excellent	
Notes		
Photo		

Site	MR1134	
Described by	JN, MM	14/07/2011
MGA Zone	GDA94 50	557589 **mE**, 7527574 **mN**
Landform	Flat	
Soil	Red brown loam	
Rock Type	-	
Vegetation Description	*Eucalyptus gamophylla, E. xerothermica, Corymbia hamersleyana, C. deserticola* subs. *deserticola* and *Acacia aptaneura* open woodland over *A. bivenosa, A, tenuissima* and *A. tumida* var. *pilbarensis* sparse shrubland over *Triodia epactia* hummock grassland	
Vegetation Condition	Excellent	
Notes	*Senna artemisioides* subsp. *oligophylla* also characteristic	
Photo		

Site	MR1135	
Described by	JN, MM	14/07/2011
MGA Zone	GDA94 50	557719 **mE**, 7528098 **mN**
Landform	Upper slope	
Soil	Red brown loamy sand	
Rock Type	Ironstone	
Vegetation Description	*Eucalyptus leucophloia* subsp. *leucophloia* and *Corymbia hamersleyana* open woodland over *Acacia monticola, A. maitlandii* and *A. pyrifolia* var. *pyrifolia* open shrubland over *Triodia wiseana* open hummock grassland	
Vegetation Condition	Excellent	
Notes		
Photo		

Site	MR1136	
Described by	JN, MM	14/07/2011
MGA Zone	GDA94 50	557789 **mE**, 7528286 **mN**
Landform	Crest	
Soil	Red brown loamy sand	
Rock Type	Ironstone	
Vegetation Description	*Eucalyptus leucophloia* subsp. *leucophloia* open woodland over *Acacia maitlandii* and *A. atkinsiana* sparse shrubland over *Triodia wiseana* open hummock grassland	
Vegetation Condition	Excellent	
Notes		
Photo		

Site	MR1137	
Described by	JN, MM	14/07/2011
MGA Zone	GDA94 50	558544 **mE**, 7525999 **mN**
Landform	Flat	
Soil	Red brown clay loam	
Rock Type	-	
Vegetation Description	*Acacia aptaneura, A. pruinocarpa* and *A. bivenosa* sparse shrubland over *Triodia epactia* open hummock grassland	
Vegetation Condition	Good	
Notes	A. aptaneura regenerating after fire 3-5 years previously	
Photo		

Site	MR1138	
Described by	JN, MM	14/07/2011
MGA Zone	GDA94 50	558759 **mE**, 7525267 **mN**
Landform	Flat	
Soil	Red brown clay loam	
Rock Type	-	
Vegetation Description	*Acacia aptaneura* and *Corymbia deserticola* subsp. *deserticola* open woodland over *Triodia epactia* open hummock grassland with *A. bivenosa* and *A. pruinocarpa* scattered shrubs	
Vegetation Condition	Very good	
Notes	Some old burnt stags and stumps	
Photo		

Site	MR1139	
Described by	JN, MM	14/07/2011
MGA Zone	GDA94 50	557509 **mE**, 7526144 **mN**
Landform	Lower slope	
Soil	Red brown loam	
Rock Type	-	
Vegetation Description	*Acacia atkinsiana, A. bivenosa* and *A. tenuissima* shrubland over *Triodia wiseana* hummock grassland with *Corymbia deserticola* subsp. *deserticola* scattered trees	
Vegetation Condition	Excellent	
Notes	Occasional burnt stump. *A. ancistrocarpa* also characteristic	
Photo		

Site	MR1140	
Described by	JN, MM	14/07/2011
MGA Zone	GDA94 50	557219 **mE**, 7526676 **mN**
Landform	Mid-slope	
Soil	Red brown sandy loam	
Rock Type	Ironstone	
Vegetation Description	*Eucalyptus leucophloia* open woodland over *Acacia atkinsiana, A. maitlandii* and *A. exilis* open shrubland over *Triodia wiseana, Eriachne pulchella* subsp. *dominii* and *Bulbostylis barbata* open hummock grassland/sparse grassland/sparse sedgeland	
Vegetation Condition	Excellent	
Notes	Some burnt marks on tree trunks	
Photo		

Site	MR1141	
Described by	JN, MM	14/07/2011
MGA Zone	GDA94 50	557015 **mE**, 7526276 **mN**
Landform	Lower slope	
Soil	Red brown loam	
Rock Type	-	
Vegetation Description	*Eucalyptus gamophylla* and *Corymbia deserticola* subsp. *deserticola* open woodland over *Acacia bivenosa, A. exilis* and *A. ancistrocarpa* sparse shrubland over *Triodia epactia* hummock grassland	
Vegetation Condition	Excellent	
Notes		
Photo		

Site	MR1142	
Described by	JN, MM	14/07/2011
MGA Zone	GDA94 50	557035 **mE**, 7525006 **mN**
Landform	Flat	
Soil	Red brown loamy clay	
Rock Type	-	
Vegetation Description	*Acacia aptaneura* and *Eucalyptus xerothermica* woodland over *Triodia epactia* hummock grassland with *Ptilotus obovatus* scattered shrubs	
Vegetation Condition	Excellent	
Notes		
Photo		

Site	MR1143	
Described by	JN, MM	14/07/2011
MGA Zone	GDA94 50	557489 **mE**, 7524791 **mN**
Landform	Mid-slope	
Soil	Red brown loamy sand	
Rock Type	Ironstone	
Vegetation Description	*Eucalyptus leucophloia* subsp. *leucophloia* open woodland over *Acacia tenuissima* and *Grevillea wickhamii* subsp. *hispidula* sparse shrubland over *Triodia wiseana* hummock grassland	
Vegetation Condition	Excellent	
Notes		
Photo		

Site	MR1144	
Described by	JN, MM	15/07/2011
MGA Zone	GDA94 50	557505 **mE**, 7525310 **mN**
Landform	Flat	
Soil	Red brown loam	
Rock Type	-	
Vegetation Description	*Acacia aptaneura* and *A. pruinocarpa* sparse shrubland over *A. ancistrocarpa* and *A. bivenosa* sparse shrubland over *Triodia wiseana* open hummock grassland	
Vegetation Condition	Excellent	
Notes		
Photo		

Site	MR1145	
Described by	JN, MM	15/07/2011
MGA Zone	GDA94 50	564068 **mE**, 7529105 **mN**
Landform	Crest	
Soil	Red brown loamy sand	
Rock Type	Ironstone	
Vegetation Description	*Eucalyptus leucophloia* subsp. *leucophloia* open woodland over *Acacia atkinsiana* and *A. bivenosa* sparse shrubland over *Triodia wiseana* hummock grassland	
Vegetation Condition	Excellent	
Notes		
Photo		

Site	MR1146	
Described by	JN, MM	15/07/2011
MGA Zone	GDA94 50	562939 **mE**, 7528597 **mN**
Landform	Crest	
Soil	Red brown sandy loam	
Rock Type	Ironstone	
Vegetation Description	*Eucalyptus leucophloia* subsp. *leucophloia* open woodland over *Acacia atkinsiana, Senna glutinosa* subsp. *glutinosa* and *A. monticola* sparse shrubland over *Triodia wiseana* open hummock grassland	
Vegetation Condition	Excellent	
Notes		
Photo	No Photo	

Site	CP11021		
Described by	SOK, AT	09/04/2011	Quadrat 50 m x 50 m
Re-score	LJA, AT	26/08/2011	
MGA Zone	GDA94 50	7524748 **mN** 556868 **mE**	
Season	Excellent		
Habitat	Flat		
Soil	Reddish brown clay loam cracking at surface		
Rock Type	-		
Vegetation Description	*Acacia aptaneura* shrubland over *Triodia epactia* and *Ptilotus obovatus* hummock grassland/sparse shrubland with *Eucalyptus xerothermica* scattered trees		
Vegetation Condition	Good		
Notes	3% leaf litter, litter 1 cm deep, 55% bare ground, <1 weed cover Disturbance: No evidence Fire Age: >5 yrs Fire Notes: Black dead stags		
Photo			

Species	Cover (%)	Height (m)
Acacia pteraneura	7	3
Alternanthera nana	<1	0.3
Aristida contorta	<1	0.2
Aristida holathera var. *holathera*	<1	0.3
Aristida latifolia	<1	0.4
**Bidens bipinnata*	<1	0.4
Boerhavia coccinea	<1	0.2
Chrysopogon fallax	<1	0.9
Cleome viscosa	<1	0.5
Commelina ensifolia	<1	0.5
Convolvulus clementii	<1	0.2
Corchorus tridens	<1	0.3
Cucumis maderaspatanus	<1	climber
Cymbopogon ambiguus	<1	0.8
Dactyloctenium radulans	<1	0.2
Dysphania kalpari	<1	0.1
Enneapogon polyphyllus	<1	0.4
Eragrostis cumingii	<1	0.2
Eucalyptus xerothermica	1	3
Euphorbia aff. *myrtoides*	<1	0.3
Euphorbia sp.	<1	0.4
Evolvulus alsinoides var. *villosicalyx*	2	0.2
Goodenia microptera	<1	0.2
Goodenia stellata	<1	0.2
Hakea lorea subsp. *lorea*	<1	1.3

Species	Cover (%)	Height (m)
***Hibiscus sturtii* var. *grandiflorus* RXw**	<1	0.3
Iseilema membranaceum	<1	0.2
Maireana villosa	<1	0.3
**Malvastrum americanum*	<1	0.3
Paspalidium rarum	<1	0.1
Perotis rara	1	0.2
Polycarpaea holtzei	<1	0.2
Polycarpaea longiflora	<1	0.3
Pterocaulon sphacelatum	<1	0.3
Ptilotus exaltatus var. *exaltatus*	<1	0.4
Ptilotus gaudichaudii var. *gaudichaudii*	<1	0.4
Ptilotus macrocephalus	<1	0.4
Ptilotus obovatus	2	0.6
***Rutidosis helichrysoides* subsp. *helichrysoides* RXw**	<1	0.3
Spermacoce brachystema	<1	0.4
Sporobolus australasicus	<1	0.2
Streptoglossa bubakii	<1	0.2
Tragus australianus	<1	0.1
Triodia epactia	40	0.6

Site	CP11023		
Described by	SOK, AT	09/04/2011	Quadrat 50 m x 50 m
Re-score	LJA,AT	26/08/2011	
MGA Zone	GDA94 50	7525023 **mN** 557510 **mE**	
Season	Excellent		
Habitat	Gentle north-easterly mid slope		
Soil	Red brown silty loam		
Rock Type	Ironstone		
Vegetation Description	*Acacia aptaneura* shrubland over *Triodia epactia* and *Ptilotus obovatus* hummock grassland/sparse shrubland with *Eucalyptus xerothermica* scattered trees		
Vegetation Condition	Excellent		
Notes	1% leaf litter, litter 0 cm deep, 35% bare ground, no weed cover Disturbance: No evidence Fire Age: >5 yrs Fire Notes: No evidence		
Photo			

Species	Cover (%)	Height (m)
Acacia atkinsiana	1	1.2
Acacia maitlandii	<1	1.8
Acacia monticola	<1	2
Acacia pyrifolia var. *pyrifolia*	<1	1
Acacia tenuissima	1	2
Bulbostylis barbata	<1	0.1
***Eriachne ciliata* REs**	<1	0.2
Eriachne mucronata	2	0.4
Eriachne pulchella subsp. *dominii*	1	0.2
Eucalyptus leucophloia subsp. *leucophloia*	2	5
Gompholobium sp. Pilbara (N.F. Norris 908)	<1	0.5
Goodenia microptera	<1	0.3
Goodenia stobbsiana	<1	0.1
Grevillea berryana	<1	1.5
Grevillea wickhamii subsp. *hispidula*	<1	1.8
Hakea chordophylla	<1	3
Haloragis gossei var. *inflata*	<1	0.1
Indigofera monophylla	<1	0.6
Keraudrenia velutina subsp. *elliptica*	<1	0.5
Phyllanthus erwinii	<1	0.1
Polycarpaea corymbosa	<1	0.3
Polycarpaea holtzei	<1	0.1
**Portulaca oleracea*	<1	0.1
Ptilotus calostachyus	<1	0.4
Scaevola browniana subsp. *browniana*	<1	0.4

Species	Cover (%)	Height (m)
Schizachyrium fragile	<1	0.3
Senna glutinosa subsp. *glutinosa*	1	1.5
Senna glutinosa subsp. *pruinosa*	<1	1.5
Senna glutinosa subsp. *x luerssenii*	<1	1.3
Stackhousia intermedia	<1	0.2
Triodia wiseana	50	0.5

Site	CP11024		
Described by	SOK, AT	09/04/2011	Quadrat 50 m x 50 m
Re-score	LJA, AT	26/08/2011	
MGA Zone	GDA94 50	7525685 **mN** 557984 **mE**	
Season	Excellent		
Habitat	Flat		
Soil	Red brown silty loam		
Rock Type	-		
Vegetation Description	*Eucalyptus xerothermica* open woodland over *Acacia aptaneura* sparse shrubland over *Triodia ?epactia, Aristida inaequiglumis* and *Chrysopogon fallax* hummock grassland/open tussock grassland		
Vegetation Condition	Good		
Notes	1% leaf litter, litter 0 cm deep, 55% bare ground, no weed cover Disturbance: No evidence Fire Notes: Eucalyptus sapling present, dead stags, many dead mulgas		
Photo			

Species	Cover (%)	Height (m)
Acacia bivenosa	<1	1
Acacia cowleana	<1	1
Acacia pteraneura	3	2.5
Acacia tenuissima	<1	0.4
Alternanthera nana	<1	0.3
Aristida contorta	<1	0.4
Aristida inaequiglumis	5	1
Boerhavia coccinea	<1	0.2
Bulbostylis turbinata	<1	0.1
Chloris pectinata	<1	0.8
Chrysopogon fallax	2	1
Cleome viscosa	<1	0.5
Commelina ensifolia	<1	0.2
Corchorus tridens	<1	0.1
Cymbopogon ambiguus	<1	1
Dactyloctenium radulans	<1	0.2
Enneapogon caerulescens	<1	0.2
Eragrostis cumingii	<1	0.1
Eremophila longifolia	<1	1
Eucalyptus xerothermica	2	6
Eulalia aurea	<1	1
Euphorbia australis	<1	0.2
Euphorbia boophthona	<1	0.3
Euphorbia sp.	<1	0.4
Evolvulus alsinoides var. *villosicalyx*	<1	0.2

Species	Cover (%)	Height (m)
Goodenia stellata	<1	0.1
Hakea lorea subsp. *lorea*	<1	1
Haloragis trigonocarpa	<1	0.3
***Hibiscus sturtii* var. *grandiflorus* RXw**	<1	0.3
Indigofera monophylla	<1	0.5
Iseilema membranaceum	<1	0.2
Keraudrenia nephrosperma	<1	0.5
Mimulus gracilis	<1	0.1
Panicum effusum	<1	0.3
Paraneurachne muelleri	<1	0.4
Perotis rara	<1	0.1
Pterocaulon sphacelatum	<1	0.3
Ptilotus exaltatus var. *exaltatus*	<1	0.3
Ptilotus obovatus	1	0.5
Rhyncharrhena linearis	<1	1
***Rutidosis helichrysoides* subsp. *helichrysoides* RXw**	<1	0.3
Senna notabilis	<1	0.2
Sida sp. spiciform panicles (E. Leyland s.n. 14/8/90)	<1	1
Sida sp. verrucose glands (F.H. Mollemans 2423)	<1	0.3
Solanum diversiflorum	<1	0.3
Solanum ferocissimum	<1	0.2
Spermacoce brachystema	<1	0.2
Themeda triandra	<1	0.8
Triodia epactia	25	0.4

Site	CP11025		
Described by	SOK, AT	10/04/2011	Quadrat 50 m x 50 m
Re-score	JKN, AL	27/08/2011	
MGA Zone	GDA94 50	7526742 **mN** 559367 **mE**	
Season	Excellent		
Habitat	Flat		
Soil	Red brown silty loam		
Rock Type	Ironstone pebbles		
Vegetation Description	*Corymbia deserticola* subsp. *deserticola* open woodland over *Acacia ?aptaneura* and *A. bivenosa* sparse shrubland over *Triodia wiseana* and *T. epactia* tussock grassland		
Vegetation Condition	Very good		
Notes	2% leaf litter, litter 1 cm deep, 60% bare ground, no weed cover Disturbance: No evidence Fire: 3-5 yrs		
Photo			

Species	Cover (%)	Height (m)
Abutilon otocarpum	<1	0.5
Acacia ancistrocarpa	<1	0.8
Acacia atkinsiana	<1	0.6
Acacia bivenosa	1	1
Acacia maitlandii	<1	0.5
Acacia monticola	<1	0.6
Acacia pruinocarpa	<1	1
Acacia pteraneura	3	1.5
Acacia tenuissima	<1	0.8
Anthobolus leptomerioides	<1	1.8
Aristida holathera var. *holathera*	<1	0.3
Aristida latifolia	<1	0.8
Bonamia rosea	<1	0.3
Codonocarpus cotinifolius	<1	1.2
Corchorus lasiocarpus subsp. *parvus*	<1	0.4
Corymbia deserticola subsp. *deserticola*	2	4
Cucumis maderaspatanus	<1	1.5
Duperreya commixta	<1	0.8
Enneapogon polyphyllus	<1	0.3
Eriachne aristidea	<1	0.2
Eriachne mucronata	<1	0.4
Eriachne pulchella subsp. *dominii*	<1	0.2
Euphorbia australis	<1	0.02
Gomphrena kanisii	<1	0.3
Goodenia microptera	<1	0.4

Species	Cover (%)	Height (m)
Goodenia stobbsiana	<1	0.2
Gossypium australe (Burrup Peninsula form)	<1	0.6
Haloragis gossei var. *gossei*	<1	0.1
Hibiscus burtonii	<1	0.8
Hibiscus sturtii var. *campylochlamys*	<1	0.3
***Hibiscus sturtii* var. *grandiflorus* RXw**	<1	0.4
Hibiscus sturtii var. *platychlamys*	<1	0.5
Indigofera monophylla	<1	0.5
Keraudrenia nephrosperma	<1	0.4
Keraudrenia velutina subsp. *elliptica*	2	0.6
Paraneurachne muelleri	<1	0.4
Phyllanthus erwinii	<1	0.1
Polycarpaea holtzei	<1	0.1
Ptilotus astrolasius	<1	0.3
Ptilotus calostachyus	<1	0.4
Ptilotus exaltatus var. *exaltatus*	<1	0.3
Ptilotus fusiformis	<1	0.4
Rhyncharrhena linearis	<1	1
Senna artemisioides subsp. *helmsii*	<1	0.5
Senna glutinosa subsp. *glutinosa*	<1	1
Sida arenicola	<1	1.9
Sida cardiophylla	<1	0.3
Sida sp. Supplejack Station (T.S. Henshall 2345)	<1	0.4
Sida sp. verrucose glands (F.H. Mollemans 2423)	<1	0.1
Solanum diversiflorum	<1	0.3
Solanum sturtianum	<1	0.6
Sporobolus australasicus	<1	0.15
Tephrosia sp. *Bungaroo Creek* (M.E. Trudgen 11601)	<1	0.4
Themeda triandra	<1	0.7
Triodia epactia	20	0.3
Triodia wiseana	20	0.3

Site	CP11026		
Described by	HEH, RD	09/04/2011	Quadrat 50 m x 50 m
Re-score	JKN, AL	26/08/2011	
MGA Zone	GDA94 50	7527232 **mN** 560487 **mE**	
Season	Excellent		
Habitat	Moderate south facing midslope of ironstone ridge		
Soil	Red brown clay loam		
Rock Type	-		
Vegetation Description	*Eucalyptus leucophloia* subsp. *leucophloia* open woodland over *Acacia exilis* sparse shrubland over *Triodia wiseana* sparse tussock grassland		
Vegetation Condition	Excellent		
Notes	4% leaf litter, litter <1-2 cm deep, 85% bare ground, no weed cover Disturbance: No evidence Fire Notes: Quite shrubby though a bit of burnt wood on the ground as well as charred tree trunks and branches		
Photo			

Species	Cover (%)	Height (m)
Acacia adoxa var. *adoxa*	<1	0.2
Acacia aptaneura	<1	1.6
Acacia atkinsiana	1	1.7
Acacia bivenosa	<1	1.6
Acacia exilis	6	2.2
Acacia maitlandii	<1	1.5
Acacia monticola	<1	2
Acacia pruinocarpa	<1	1.8
Acacia pyrifolia var. *pyrifolia*	<1	2
Aristida holathera var. *holathera*	<1	0.1
***Aristida ingrata* RXw**	<1	1.1
Boerhavia coccinea	<1	0.1
Bonamia sp. Dampier (A.A. Mitchell PRP 217)	<1	prostrate
Bulbostylis barbata	<1	0.05
Corchorus lasiocarpus subsp. *parvus*	<1	0.4
Cymbopogon ambiguus	<1	0.6
Duperreya commixta	<1	climber
Dysphania rhadinostachya subsp. *rhadinostachya*	<1	0.3
Enneapogon polyphyllus	<1	0.15
Eremophila latrobei subsp. *filiformis*	<1	1.7
Eriachne aristidea	<1	0.1
***Eriachne ciliata* REs**	<1	0.1
Eriachne mucronata	<1	0.5
Eriachne pulchella subsp. *dominii*	<1	0.1
Eucalyptus leucophloia subsp. *leucophloia*	4	6

Species	Cover (%)	Height (m)
Evolvulus alsinoides var. *villosicalyx*	<1	0.05
Gompholobium sp. Pilbara (N.F. Norris 908)	<1	0.5
Goodenia cusackiana	<1	0.1
Hakea chordophylla	<1	2
Hibiscus sturtii var. *campylochlamys*	<1	0.3
Indigofera monophylla	1	0.35
Jasminum didymum subsp. *lineare*	<1	climber
Keraudrenia velutina subsp. *elliptica*	<1	0.6
Paraneurachne muelleri	<1	0.3
Polycarpaea holtzei	<1	prostrate
Polycarpaea longiflora	<1	0.1
Ptilotus calostachyus	<1	0.4
Ptilotus exaltatus var. *exaltatus*	<1	0.05
Ptilotus fusiformis	<1	0.3
Ptilotus obovatus	<1	0.3
Schizachyrium fragile	<1	0.2
Senna artemisioides subsp. *oligophylla*	<1	0.7
Senna glutinosa subsp. *glutinosa*	<1	1.7
Senna glutinosa subsp. *glutinosa x luerssenii*	<1	1.7
Sida sp.	<1	0.2
Solanum lasiophyllum	<1	0.4
Sporobolus australasicus	<1	0.1
Themeda triandra	<1	0.6
Trachymene oleracea subsp. *oleracea*	<1	0.1
Triodia wiseana	6	0.2-0.3

Site	CP11027		
Described by	SOK, AT	10/04/2011	Quadrat 50 m x 50 m
Re-score	JKN, AL	26/08/2011	
MGA Zone	GDA94 50	7526453 **mN** 560163 **mE**	
Season	Excellent		
Habitat	Flat		
Soil	Red brown cracking clay loam		
Rock Type	-		
Vegetation Description	*Acacia pteraneura* sparse shrubland over *Triodia epactia* and *Eriachne tenuiculmis* hummock grassland/sparse tussock grassland		
Vegetation Condition	Good		
Notes	2% leaf litter, litter 1 cm deep, 35% bare ground Disturbance: Fire and grazing Fire: 3-5 yrs Fire notes: Many of mulga stags		
Photo			

Species	Cover (%)	Height (m)
Abutilon otocarpum	<1	0.2
Acacia bivenosa	<1	1.2
Acacia cowleana	<1	1.6
Acacia pteraneura	2	1.6
Acacia synchronicia	<1	0.4
Acacia tenuissima	<1	0.8
Alternanthera angustifolia	<1	0.1
Alternanthera nana	<1	0.2
Aristida inaequiglumis	<1	1.2
**Bidens bipinnata*	<1	0.4
Blumea tenella	<1	0.3
Brachyscome iberidifolia **REn**	<1	0.2
Bulbostylis turbinata	5	0.2
Calandrinia pumila	<1	0.01
Centaurium clementii	<1	0.15
Centipeda minima subsp. *macrocephala*	<1	0.1
Chloris pectinata	<1	0.5
Chrysopogon fallax	<1	1.3
Cleome viscosa	<1	0.5
Corchorus tridens	<1	0.2
Cucumis maderaspatanus	<1	climber
Cymbopogon obtectus	<1	1.3
Cyperus squarrosus	<1	0.2
Dactyloctenium radulans	<1	0.2
Dichanthium sericeum subsp. *humilius*	1	0.4

Species	Cover (%)	Height (m)
Enneapogon polyphyllus	<1	0.4
Eragrostis cumingii	1	0.1
Eragrostis pergracilis	<1	0.1
Eragrostis tenellula	1	0.4
Eremophila lanceolata	<1	0.4
Eriachne tenuiculmis	2	0.8
Eucalyptus leucophloia subsp. *leucophloia*	<1	1.5
Euphorbia aff. *myrtoides*	<1	0.3
Evolvulus alsinoides var. *villosicalyx*	<1	0.2
Hakea lorea subsp. *lorea*	<1	1.5
Haloragis gossei var. *inflata*	<1	0.15
Ipomoea polymorpha	<1	0.2
Iseilema membranaceum	<1	0.2
**Malvastrum americanum*	<1	0.4
Mimulus gracilis	<1	0.2
Panicum effusum	<1	0.4
Paspalidium rarum	<1	0.3
Perotis rara	2	0.2
Pluchea dunlopii	<1	0.3
**Portulaca oleracea*	<1	0.4
Pterocaulon sphacelatum	<1	0.4
Ptilotus obovatus	<1	0.4
Rhodanthe charsleyae	<1	0.4
***Rutidosis helichrysoides* subsp. *helichrysoides* RXw**	<1	0.3
Senna notabilis	<1	0.3
Sida sp. verrucose glands (F.H. Mollemans 2423)	<1	0.3
Spermacoce brachystema	<1	0.3
Stemodia grossa	<1	0.4
Synaptantha tillaeacea var. *tillaeacea*	<1	0.1
Triodia epactia	55	0.8
Urochloa occidentalis var. *ciliata*	<1	0.3
***Vigna* sp. central (M.E. Trudgen 1626) P2**	<1	0.2
Wahlenbergia tumidifructa	<1	0.1

Site	CP11028		
Described by	HEH, RD	09/04/2011	Quadrat 50 m x 50 m
Re-score	SOK, HEH	10/08/2011	
MGA Zone	GDA94 50	7527210 **mN** 561915 **mE**	
Season	Excellent		
Habitat	Upper slope of ridge		
Soil	Red brown loam		
Rock Type	-		
Vegetation Description	*Triodia wiseana* open hummock grassland		
Vegetation Condition	Excellent		
Notes	2% leaf litter, litter <1-3 cm deep, 70% bare ground, no weed cover Disturbance: No evidence Fire Notes: No sign of recent fire		
Photo			

Species	Cover (%)	Height (m)
Acacia aptaneura	<1	2
Acacia atkinsiana	<1	2.5
Acacia bivenosa	<1	1.2
Acacia exilis	<1	1.65
Acacia pyrifolia var. *pyrifolia*	<1	1.6
Amphipogon sericeus	<1	0.25
Aristida holathera var. *holathera*	<1	0.25
Bonamia sp. Dampier (A.A. Mitchell PRP 217)	<1	prostrate
Capparis lasiantha	<1	climber
Enneapogon polyphyllus	<1	0.2
Eriachne aristidea	<1	0.1
***Eriachne ciliata* REs**	<1	0.1
Eriachne mucronata	<1	0.25
Eriachne pulchella subsp. *dominii*	<1	0.05
Eucalyptus leucophloia subsp. *leucophloia*	<1	7
Goodenia cusackiana	<1	0.1
Goodenia stobbsiana	<1	prostrate
Hakea chordophylla	<1	2
Haloragis gossei var. *gossei*	<1	0.3
Indigofera monophylla	<1	0.3
Keraudrenia nephrosperma	<1	0.4
Polycarpaea holtzei	<1	prostrate
Ptilotus calostachyus	<1	0.2
Ptilotus clementii	<1	0.1
Ptilotus exaltatus var. *exaltatus*	<1	prostrate
Ptilotus fusiformis	<1	0.25
Schizachyrium fragile	<1	0.1

Species	Cover (%)	Height (m)
Senna glutinosa subsp. *glutinosa*	<1	1.5
Senna glutinosa subsp. *pruinosa*	<1	2.2
Senna glutinosa subsp. *x luerssenii*	<1	1.5
Solanum lasiophyllum	<1	0.3
Trachymene oleracea subsp. *oleracea*	<1	0.2
Triodia wiseana	25	0.2-0.4

Site	CP11029		
Described by	SOK, AT	09/04/2011	Quadrat 50 m x 50 m
Re-score	SOK, HEH	10/08/2011	
MGA Zone	GDA94 50	7527983 **mN** 562706 **mE**	
Season	Excellent		
Habitat	Flat		
Soil	Red brown sandy loam		
Rock Type	Abundant small ironstone pebbles		
Vegetation Description	*Acacia aptaneura* sparse shrubland over *Triodia epactia* hummock grassland		
Vegetation Condition	Good		
Notes	<1 % leaf litter, litter <1 cm deep, 50% bare ground, no weed cover Disturbance: No evidence Fire Notes: Regrowth, burnt stags / logs on ground		
Photo			

Species	Cover (%)	Height (m)
Acacia aptaneura	5	2.5
Alternanthera nana	<1	0.15
**Bidens bipinnata*	<1	0.25
Chrysopogon fallax	<1	0.5
Corymbia hamersleyana	<1	5
Cucumis maderaspatanus	<1	climber
Cymbopogon ambiguus	<1	0.5
Eragrostis cumingii	<1	semi
Eragrostis xerophila	<1	0.2
Eulalia aurea	<1	0.7
Euphorbia biconvexa	<1	0.1
Euphorbia boophthona	<1	0.3
Evolvulus alsinoides var. *villosicalyx*	<1	0.15
Goodenia stellata	<1	prostrate
Goodenia triodiophila	<1	0.2
Iseilema membranaceum	<1	0.3
Polycarpaea corymbosa	<1	0.2
Psydrax suaveolens	<1	0.6
Ptilotus exaltatus var. *exaltatus*	<1	0.1
Ptilotus macrocephalus	<1	0.35
Ptilotus obovatus	<1	0.5
Rhyncharrhena linearis	<1	climber
Senna notabilis	<1	0.2
Sporobolus australasicus	<1	prostrate
Streptoglossa bubakii	<1	0.7
Triodia epactia	50	0.3-0.7

Site	CP11037		
Described by	SOK, AT	10/04/2011	Quadrat 50 m x 50 m
Re-score	SOK, HEH	10/08/2011	
MGA Zone	GDA94 50	7529075 **mN** 565352 **mE**	
Season	Excellent		
Habitat	Flat		
Soil	Red brown clay loam		
Rock Type	Very few large ironstone pebbles		
Vegetation Description	*Astrebla pectinata, Dichanthium fecundum* and *Eragrostis setifolia* tussock grassland		
Vegetation Condition	Poor		
Notes	Litter cover: 5% at 1 cm deep Bare ground: 55% Disturbance Type: Heavily grazed and trampling Fire: No evidence of fire		
Photo			

Species	Cover (%)	Height (m)
Acacia synchronicia	1	1.5
Acacia xiphophylla	<1	0.9
Aristida latifolia	<1	0.5
Astrebla pectinata	40	0.8
Bergia pedicellaris	<1	0.2
Boerhavia coccinea	<1	0.3
Boerhavia paludosa	<1	0.5
Brachyachne convergens	<1	0.4
Bulbostylis turbinata	<1	0.2
Chloris pectinata	<1	0.4
Chrysopogon fallax	<1	0.7
Cleome viscosa	<1	0.4
Commelina ensifolia	1	0.3
Corchorus tridens	<1	0.2
Crotalaria dissitiflora subsp. *benthamiana*	<1	0.3
**Cucumis melo* subsp. *agrestis*	<1	0.3
Dactyloctenium radulans	<1	0.2
Dichanthium fecundum	4	0.4
Dichanthium sericeum subsp. *humilius*	<1	0.4
Eragrostis setifolia	2	0.4
Eragrostis xerophila	<1	0.3
Euphorbia aff. *myrtoides*	<1	0.2
Hibiscus trionum var. *vesicarius*	<1	0.3
Iseilema membranaceum	<1	0.3
Lotus cruentus	<1	0.2

Species	Cover (%)	Height (m)
Mimulus gracilis	<1	0.2
Minuria integerrima	<1	0.2
Operculina aequisepala	1	0.3
Panicum effusum	<1	0.5
Polymeria longifolia	<1	0.05
Rostellularia adscendens var. *clementii*	<1	0.2
Senna hamersleyensis	<1	0.3
Sporobolus australasicus	1	0.3
Stemodia kingii	<1	0.3
Urochloa occidentalis var. *ciliata*	1	0.4
**Vachellia farnesiana*	<1	2

Site	CP11038		
Described by	LJA, CM	08/04/2011	Quadrat 50 m x 50 m
Re-score	SOK, HEH	09/08/2011	
MGA Zone	GDA94 50	7531448 **mN** 563837 **mE**	
Season	Excellent		
Habitat	Valley flat		
Soil	Red clay loam		
Rock Type	Mixed (alluvium)		
Vegetation Description	*Acacia xiphophylla* open shrubland over mixed Poaceae spp. sparse tussock grassland		
Vegetation Condition	Good		
Notes	Fire: >5 yrs Vegetation type on small rises within grassland		
Photo			

Species	Cover (%)	Height (m)
Acacia synchronicia	<1	1
Acacia xiphophylla	25	1.3
Amaranthus cuspidifolius	<1	0.4
Aristida contorta	<1	0.4
***Astrebla lappacea* P3**	<1	0.3
Boerhavia coccinea	<1	0.1
**Cenchrus ciliaris*	<1	0.3
Chrysopogon fallax	<1	1
Cleome viscosa	<1	0.1
Corchorus tridens	<1	0.3
Cucumis maderaspatanus	<1	climber
Dactyloctenium radulans	<1	0.2
Dichanthium fecundum	<1	0.4
Dichanthium sericeum subsp. *humilius*	<1	0.4
Dipteracanthus australasicus subsp. *australasicus*	<1	0.2
Enchylaena tomentosa var. *tomentosa*	<1	1.2
Enneapogon polyphyllus	<1	0.4
Enneapogon polyphyllus	<1	0.3
Enteropogon ramosus	<1	0.5
Eragrostis setifolia	<1	0.3
Eragrostis xerophila	<1	
Eremophila longifolia	<1	1.2
Eremophila maculata subsp. *brevifolia*	<1	0.2
Eriachne benthamii	<1	0.4
Eriachne pulchella subsp. *dominii*	<1	0.2
Maireana georgei	<1	0.2
Neptunia dimorphantha	<1	0.1

Species	Cover (%)	Height (m)
Ptilotus exaltatus var. *exaltatus*	<1	0.1
Rhagodia eremaea	<1	0.6
Rostellularia adscendens var. *clementii*	<1	0.2
Sclerolaena costata	<1	0.4
Senna artemisioides subsp. *oligophylla*	<1	0.4
Senna hamersleyensis	<1	0.4
Senna notabilis	<1	0.1
Solanum sturtianum	<1	1.6
Sporobolus australasicus	<1	0.3
Triodia epactia	<1	0.3
Triodia wiseana	<1	0.3
Urochloa occidentalis var. *ciliata*	<1	
Urochloa occidentalis var. *occidentalis*	<1	0.2

Site	CP11105		
Described by	HEH, RD	08/04/2011	Quadrat 50 m x 50 m
Re-score	JKN, AL	26/08/2011	
MGA Zone	GDA94 50	7529894 **mN** 559784 **mE**	
Season	Excellent		
Habitat	Valley floor / floodplain		
Soil	Red brown stony loam		
Rock Type	Abundant small ironstone pebbles		
Vegetation Description	*Acacia bivenosa, A. tenuissima* and *A. aptaneura* open shrubland over *Triodia epactia/pungens* hummock grassland with *Eucalyptus xerothermica* scattered mallee		
Vegetation Condition	Very good		
Notes	1.5 % leaf litter, litter <1-10 cm deep, 96% bare ground, <1% weed cover Disturbance: No evidence Fire Notes: Burnt stumps, wood on the ground, stags and regrowth Notes: A lot of dead plants, may be result of drought		
Photo			

Species	Cover (%)	Height (m)
Acacia aptaneura	1	1.5-2.5
Acacia atkinsiana	<1	1.6
Acacia bivenosa	1	1-2
Acacia dictyophleba	1	1.8
Acacia pruinocarpa	<1	2
Acacia pyrifolia var. *pyrifolia*	1	1.4
Acacia tenuissima	1	2
Alternanthera nana	1	0.05
Aristida latifolia	<1	1.2
**Bidens bipinnata*	1	0.3
Boerhavia coccinea	1	prostrate
Bonamia rosea	1	0.15
Capparis lasiantha	<1	0.9
Cucumis maderaspatanus	<1	climber
Cymbopogon ambiguus	<1	0.7
Cymbopogon obtectus	<1	0.3
Digitaria brownii	<1	0.3
Duperreya commixta	<1	climber
Dysphania rhadinostachya subsp. *rhadinostachya*	<1	0.05
Enneapogon polyphyllus	<1	0.15
Eremophila longifolia	<1	2
Eucalyptus gamophylla	<1	3.5
Eucalyptus xerothermica	1.5	5
Euphorbia australis	<1	0.1
Euphorbia boophthona	<1	0.2

Species	Cover (%)	Height (m)
Evolvulus alsinoides var. *villosicalyx*	<1	0.1
Gomphrena cunninghamii	<1	0.4
Goodenia muelleriana	<1	0.2
Goodenia stellata	<1	prostrate
Gossypium australe	<1	0.8
Hakea chordophylla	<1	2
Indigofera monophylla	<1	0.4
Jasminum didymum subsp. *lineare*	<1	climber
Paraneurachne muelleri	<1	0.3
Polycarpaea corymbosa	0.15	
Polycarpaea longiflora	<1	0.15
Pterocaulon sphacelatum	<1	0.2
Ptilotus astrolasius	<1	0.15
Ptilotus obovatus	<1	0.3
Rhynchosia minima	<1	climber
***Rutidosis helichrysoides* subsp. *helichrysoides* RXw**	<1	0.4
Santalum lanceolatum	<1	1.5
Senna artemisioides subsp. *oligophylla*	<1	0.7
Senna notabilis	<1	0.05
Sida sp. verrucose glands (F.H. Mollemans 2423)	<1	0.1
Solanum sturtianum	<1	0.35
Streptoglossa bubakii	<1	0.15
Trachymene oleracea subsp. *oleracea*	<1	0.25
Triodia epactia/pungens	35	0.35-0.7
Triodia wiseana	<1	0.3

Site	CP11123		
Described by	LJA, CM	09/04/2011	Quadrat 50 m x 50 m
Re-score	HEH, SOK	09/08/2011	
MGA Zone	GDA94 50	7531654 **mN** 563828 **mE**	
Season	Excellent		
Habitat	Very gentle north facing valley and drainage line		
Soil	Red brown clayey sand		
Rock Type	Few medium ironstone pebbles		
Vegetation Description	*Eucalyptus victrix* open woodland over *Eriachne benthamii* and *Cyperus bifax* tussock grassland/sparse sedges		
Vegetation Condition	Good		
Notes	1% leaf litter, litter <1 cm deep, 65% bare ground, no weed cover Disturbance: Grazing Fire Notes: No evidence Notes: Minor drainage line; banks and floodplain		
Photo	 From north-west corner  From south-east corner		

Species	Cover (%)	Height (m)
Acacia citrinoviridis	72	3-4
Acacia sclerosperma subsp. *sclerosperma*	<1	2
Acacia synchronicia	<1	2
Alternanthera nana	<1	0.1
Alternanthera nodiflora	<1	0.1

Species	Cover (%)	Height (m)
Astrebla elymoides	<1	0.5
Blumea tenella	<1	0.2
Boerhavia coccinea	<1	0.1
Brachyachne convergens	<1	
Calotis porphyroglossa	<1	0.25
**Cenchrus ciliaris*	<1	0.2
Centaurium clementii	<1	0.2
Centipeda minima subsp. *macrocephala*	<1	0.1
Chloris pectinata	<1	0.3
Chrysopogon fallax	<1	1.2
Cleome viscosa	<1	0.4
Commelina ensifolia	<1	0.4
Corchorus tridens	<1	0.2
Cucumis maderaspatanus	<1	climber
**Cucumis melo* subsp. *agrestis*	<1	0.1
Cyperus bifax	5	0.5
Dichanthium sericeum subsp. *humilius*	<1	0.4
Dichanthium sericeum subsp. *sericeum*	2	0.7
Duperreya commixta	<1	climber
Eragrostis tenellula	<1	0.2
Eremophila longifolia	<1	1.2
Eriachne benthamii	30	0.5
Eucalyptus victrix	1.5	8
Euphorbia drummondii	<1	0.1
Goodenia lamprosperma	<1	0.3
Hakea lorea subsp. *lorea*	<1	1.5
Hibiscus trionum var. *vesicarius*	<1	0.6
***Iotasperma sessilifolium* P3**	<1	0.15
Lepidium phlebopetalum	<1	0.25
**Malvastrum americanum*	<1	0.5
Marsilea exarata	<1	0.1
Mimulus gracilis	<1	0.2
Panicum decompositum	<1	1
Pimelea holroydii	<1	0.5
Pluchea dentex	<1	0.2
Pterocaulon sphacelatum	<1	0.1
Ptilotus gomphrenoides var. *gomphrenoides*	<1	0.3
Rostellularia adscendens var. *clementii*	<1	0.3
Senna artemisioides subsp. *oligophylla*	<1	1
Sida fibulifera	<1	0.2
Sida spinosa	<1	0.4
Sporobolus australasicus	<1	0.3
Stemodia grossa	<1	0.2
Stemodia kingii	<1	0.3
Streptoglossa bubakii	<1	0.3
**Vachellia farnesiana*	<1	1.2

Appendix Six: Flora Species List

Table 23: Flora species list (dominant and characteristic species from relevés and full list from quadrats)

Family	Int	Cons Code	Species
Acanthaceae			*Dipteracanthus australasicus* subsp. *australasicus*
			Rostellularia adscendens var. *clementii*
Amaranthaceae			*Alternanthera angustifolia*
			Alternanthera nana
			Alternanthera nodiflora
			Amaranthus cuspidifolius
			Gomphrena cunninghamii
			Gomphrena kanisii
			Ptilotus astrolasius
			Ptilotus calostachyus
			Ptilotus clementii
			Ptilotus exaltatus var. *exaltatus*
			Ptilotus fusiformis
			Ptilotus gaudichaudii var. *gaudichaudii*
			Ptilotus gomphrenoides var. *gomphrenoides*
			Ptilotus macrocephalus
			Ptilotus obovatus
Apocynaceae			*Rhyncharrhena linearis*
Araliaceae			*Trachymene oleracea* subsp. *oleracea*
Asteraceae	*		*Bidens bipinnata*
			Blumea tenella
			Brachyscome iberidifolia
			Calotis porphyroglossa
			Centipeda minima subsp. *macrocephala*
			Chrysocephalum gilesii
		P3	*Iotasperma sessilifolium*
			Minuria integerrima
			Pluchea dentex
			Pluchea dunlopii
			Pterocaulon sphacelatum
			Rhodanthe charsleyae
			Rutidosis helichrysoides subsp. *helichrysoides*
			Streptoglossa bubakii
Brassicaceae			*Lepidium phlebopetalum*
Campanulaceae			*Wahlenbergia tumidifructa*
Capparaceae			*Capparis lasiantha*
Caryophyllaceae			*Polycarpaea corymbosa*
			Polycarpaea holtzei
			Polycarpaea longiflora
Celastraceae			*Stackhousia intermedia*
Chenopodiaceae			*Dysphania kalpari*
			Dysphania rhadinostachya subsp. *rhadinostachya*
			Enchylaena tomentosa
			Maireana georgei

Family	Int	Cons Code	Species
			Maireana villosa
Chenopodiaceae			*Rhagodia eremaea*
			Rhagodia sp. Hamersley (M. Trudgen 17794)
			Sclerolaena cornishiana
			Sclerolaena costata
Cleomaceae			*Cleome viscosa*
Commelinaceae			*Commelina ensifolia*
Convolvulaceae			*Bonamia rosea*
			Bonamia sp. Dampier (A.A. Mitchell PRP 217)
			Convolvulus clementii
			Duperreya commixta
			Evolvulus alsinoides var. *villosicalyx*
			Ipomoea polymorpha
			Operculina aequisepala
			Polymeria longifolia
Cucurbitaceae			*Cucumis maderaspatanus*
	*		*Cucumis melo* subsp. *agrestis*
Cyperaceae			*Bulbostylis barbata*
			Bulbostylis turbinata
			Cyperus bifax
			Cyperus squarrosus
Elatinaceae			*Bergia pedicellaris*
Euphorbiaceae			*Euphorbia* aff. *myrtoides*
			Euphorbia australis
			Euphorbia biconvexa
			Euphorbia boophthona
			Euphorbia drummondii
			Euphorbia sp.
Fabaceae			*Acacia adoxa* var. *adoxa*
			Acacia ancistrocarpa
			Acacia aptaneura
			Acacia atkinsiana
			Acacia bivenosa
			Acacia citrinoviridis
			Acacia cowleana
			Acacia dictyophleba
			Acacia exilis
			Acacia inaequilatera
			Acacia maitlandii
			Acacia monticola
			Acacia pruinocarpa
			Acacia pteraneura
			Acacia pyrifolia var. *pyrifolia*
			Acacia sclerosperma subsp. *sclerosperma*
			Acacia synchronicia
			Acacia tenuissima
			Acacia tumida var. *pilbarensis*
			Acacia victoriae
			Acacia xiphophylla

Family	Int	Cons Code	Species
			Crotalaria dissitiflora subsp. *benthamiana*
Fabaceae			*Gompholobium* sp. Pilbara (N.F. Norris 908)
			Indigofera monophylla
			Lotus cruentus
			Neptunia dimorphantha
			Petalostylis labicheoides
			Rhynchosia minima
			Senna artemisioides subsp. *helmsii*
			Senna artemisioides subsp. *oligophylla*
			Senna glutinosa subsp. *glutinosa*
			Senna glutinosa subsp. *glutinosa x luerssenii*
			Senna glutinosa subsp. *pruinosa*
			Senna glutinosa subsp. *x luerssenii*
			Senna hamersleyensis
			Senna notabilis
			Tephrosia sp. Bungaroo Creek (M.E. Trudgen 11601)
	*		*Vachellia farnesiana*
		P2	*Vigna* sp. central (M.E. Trudgen 1626)
Gentianaceae			*Centaurium clementii*
Goodeniaceae			*Goodenia cusackiana*
			Goodenia lamprosperma
			Goodenia microptera
			Goodenia muelleriana
			Goodenia stellata
			Goodenia stobbsiana
			Goodenia triodiophila
			Scaevola browniana subsp. *browniana*
Gyrostemonaceae			*Codonocarpus cotinifolius*
Haloragaceae			*Haloragis gossei* var. *gossei*
			Haloragis gossei var. *inflata*
			Haloragis trigonocarpa
Malvaceae			*Abutilon otocarpum*
			Corchorus lasiocarpus subsp. *parvus*
			Corchorus tridens
			Gossypium australe
			Gossypium australe (Burrup Peninsula form)
			Hibiscus burtonii
			Hibiscus sturtii var. *campylochlamys*
			Hibiscus sturtii var. *grandiflorus*
			Hibiscus sturtii var. *platychlamys*
			Hibiscus trionum var. *vesicarius*
			Keraudrenia nephrosperma
			Keraudrenia velutina subsp. *elliptica*
	*		*Malvastrum americanum*
			Sida arenicola
			Sida cardiophylla
			Sida fibulifera
			Sida sp.
			Sida sp. spiciform panicles (E. Leyland s.n. 14/8/90)

Family	Int	Cons Code	Species
			Sida sp. Supplejack Station (T.S. Henshall 2345)
Malvaceae			*Sida* sp. verrucose glands (F.H. Mollemans 2423)
			Sida spinosa
Marsileaceae			*Marsilea exarata*
Myrtaceae			*Corymbia deserticola* subsp. *deserticola*
			Corymbia hamersleyana
			Eucalyptus gamophylla
			Eucalyptus leucophloia subsp. *leucophloia*
			Eucalyptus victrix
			Eucalyptus xerothermica
Nyctaginaceae			*Boerhavia coccinea*
			Boerhavia paludosa
Oleaceae			*Jasminum didymum* subsp. *lineare*
Phrymaceae			*Mimulus gracilis*
Phyllanthaceae			*Phyllanthus erwinii*
Plantaginaceae			*Stemodia grossa*
			Stemodia kingii
Poaceae			*Amphipogon sericeus*
			Aristida contorta
			Aristida holathera var. *holathera*
			Aristida inaequiglumis
			Aristida ingrata
			Aristida latifolia
			Astrebla elymoides
		P3	*Astrebla lappacea*
			Astrebla pectinata
			Brachyachne convergens
	*		*Cenchrus ciliaris*
			Chloris pectinata
			Chrysopogon fallax
			Cymbopogon ambiguus
			Cymbopogon obtectus
			Dactyloctenium radulans
			Dichanthium fecundum
			Dichanthium sericeum subsp. *humilius*
			Dichanthium sericeum subsp. *sericeum*
			Digitaria brownii
			Enneapogon caerulescens
			Enneapogon polyphyllus
			Enteropogon ramosus
			Eragrostis cumingii
			Eragrostis pergracilis
			Eragrostis setifolia
			Eragrostis tenellula
			Eragrostis xerophila
			Eriachne aristidea
			Eriachne benthamii
			Eriachne ciliata
			Eriachne mucronata

Family	Int	Cons Code	Species
			Eriachne pulchella subsp. *dominii*
Poaceae			*Eriachne sp.*
			Eriachne tenuiculmis
			Eulalia aurea
			Iseilema membranaceum
			Panicum decompositum
			Panicum effusum
			Paraneurachne muelleri
			Paspalidium rarum
			Perotis rara
			Schizachyrium fragile
			Sporobolus australasicus
		P3	*Themeda* sp. Hamersley Station (M.E. Trudgen 11431)
			Themeda triandra
			Tragus australianus
			Triodia epactia
			Triodia epactia/pungens
			Triodia wiseana
			Urochloa occidentalis var. *ciliata*
			Urochloa occidentalis var. *occidentalis*
Polygonaceae	*		*Acetosa vesicaria*
Portulacaceae			*Calandrinia pumila*
	*		*Portulaca oleracea*
Proteaceae			*Grevillea berryana*
			Grevillea wickhamii subsp. *hispidula*
			Hakea chordophylla
			Hakea lorea subsp. *lorea*
Rubiaceae			*Psydrax suaveolens*
			Spermacoce brachystema
			Synaptantha tillaeacea var. *tillaeacea*
Santalaceae			*Anthobolus leptomerioides*
			Santalum lanceolatum
Scrophulariaceae			*Eremophila lanceolata*
			Eremophila latrobei subsp. *filiformis*
			Eremophila longifolia
			Eremophila maculata subsp. *brevifolia*
Solanaceae			*Solanum diversiflorum*
			Solanum ferocissimum
			Solanum lasiophyllum
			Solanum sturtianum
Thymelaeaceae			*Pimelea holroydii*

Appendix Seven: Fauna species list and photographs

Table 24: Fauna species recorded during survey

Family	Species	Common Name	Cons. status	Plate
Frogs				
Hylidae	*Litoria rubella*	Little Red Tree Frog		
Mammals				
Macropodidae	*Macropus robustus*	Euro		
Muridae	*Notomys alexis*	Spinifex Hopping-mouse		26
	Pseudomys chapmani	Western Pebble-mound Mouse	*P 4*	27
Bovidae	*Bos taurus*	Cow		
Canidae	*Canis lupus dingo*	Dingo		28
Felidae	*Felis catus*	Cat		29
Reptiles				
Agamidae	*Ctenophorus caudicinctus*	Ringtailed Dragon		30
	Pogona minor mitchelli	Northwest Bearded Dragon		31
Carphodactylidae	*Nephrurus wheeleri cinctus*	Banded Knobtail Gecko		32
Diplodactylidae	*Strophurus wellingtonae*	Western Shield Spiny-tail Gecko		32
Pygopodidae	*Lialis burtonis*	Burton's Snake-lizard		33
Scincidae	*Carlia munda*	Shaded-litter Rainbow Skink		
	Ctenotus rubicundus	Ruddy Ctenotus		
	Ctenotus saxatilis	Rock Ctenotus		34
	Morethia ruficauda exquisita	Fire-tailed Skink		
Varanidae	*Varanus giganteus*	Perentie		35
Pythonidae	*Antaresia stimsoni*	Stimson's Python		36
	Liasis olivaceus barroni	Pilbara Olive Python	*VU, S1*	
Elapidae	*Pseudechis australis*	Mulga Snake		37
Birds				
Columbidae	*Phaps chalcoptera*	Common Bronzewing		40
	Ocyphaps lophotes	Crested Pigeon		40
	Geopelia cuneata	Diamond Dove		
Eurostopodidae	*Eurostopodus argus*	Spotted Nightjar		
Ardeidae	*Ardea pacifica*	White-necked Heron		
Accipitridae	*Haliastur sphenurus*	Whistling Kite		41
	Circus assimilis	Spotted Harrier		
	Aquila audax	Wedge-tailed Eagle		
Otididae	*Ardeotis australis*	Australian Bustard	*P 4*	38,39
Cacatuidae	*Eolophus roseicapillus*	Galah		42
	Cacatua sanguinea	Little Corella		42
	Nymphicus hollandicus	Cockatiel		
Psittacidae	*Barnardius zonarius*	Australian Ringneck		43
	Melopsittacus undulatus	Budgerigar		
Cuculidae	*Cacomantis pallidus*	Pallid Cuckoo		
Halcyonidae	*Todiramphus pyrrhopygia*	Red-backed Kingfisher		

Family	Species	Common Name	Cons. status	Plate
Meropidae	*Merops ornatus*	Rainbow Bee-eater	*M*	44
Climacteridae	*Climacteris melanura*	Black-tailed Treecreeper		
Acanthizidae	*Smicrornis brevirostris*	Weebill		
Pardalotidae	*Pardalotus striatus*	Striated Pardalote		
Meliphagidae	*Lichenostomus virescens*	Singing Honeyeater		
	Manorina flavigula	Yellow-throated Miner		
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		
	Lalage sueurii	White-winged Triller		
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler		
	Colluricincla harmonica	Grey Shrike-thrush		
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		
	Cracticus torquatus	Grey Butcherbird		
	Cracticus nigrogularis	Pied Butcherbird		
	Cracticus tibicen	Australian Magpie		45
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail		
Corvidae	*Corvus orru*	Torresian Crow		38,46
Monarchidae	*Grallina cyanoleuca*	Magpie-Lark		
Estrildidae	*Taeniopygia guttata*	Zebra Finch		

Plate 26: Track of Spinifex Hopping Mouse (*Notomys alexis*) hopping

Plate 27: Site of traps M06-10, and inactive Pebble-mound Mouse (*Pseudomys chapmani*) mound

Plate 28: Dead dingo (*Canis lupus dingo*) (and cattle scat), close-up showing dentition, and tracks of dingo

Plate 29: Resting trace and tracks of feral Cat (*Felis catus*), near trapsite M16

Plate 30: Ringtailed dragon (*Ctenophorus caudicinctus*) near trapsite M06

Plate 31: Track of Bearded Dragon (*Pogona minor*), crossing those of smaller lizards

Plate 32: Tracks attributed to large geckoes, Banded Knobtail (*Nephrurus wheeleri cinctus*, left) and Western Shield Spiny-tail (*Strophurus wellingtonae*, right). Bounding track of small mammal at far left.

Plate 33: Burton's Legless Lizard (*Lialis burtonis*) found dead at locality shown in Plate 27

Plate 34: Rock Ctenotus (*Ctenotus saxatilis*) found dead in drill-track spoil heap

Plate 35: Tracks of Perentie (*Varanus giganteus*)

Plate 36: Stimson's Python (*Antaresia stimsoni*) on Mt Brockman road directly north of Mt Macleod study area, and track probably of the same species

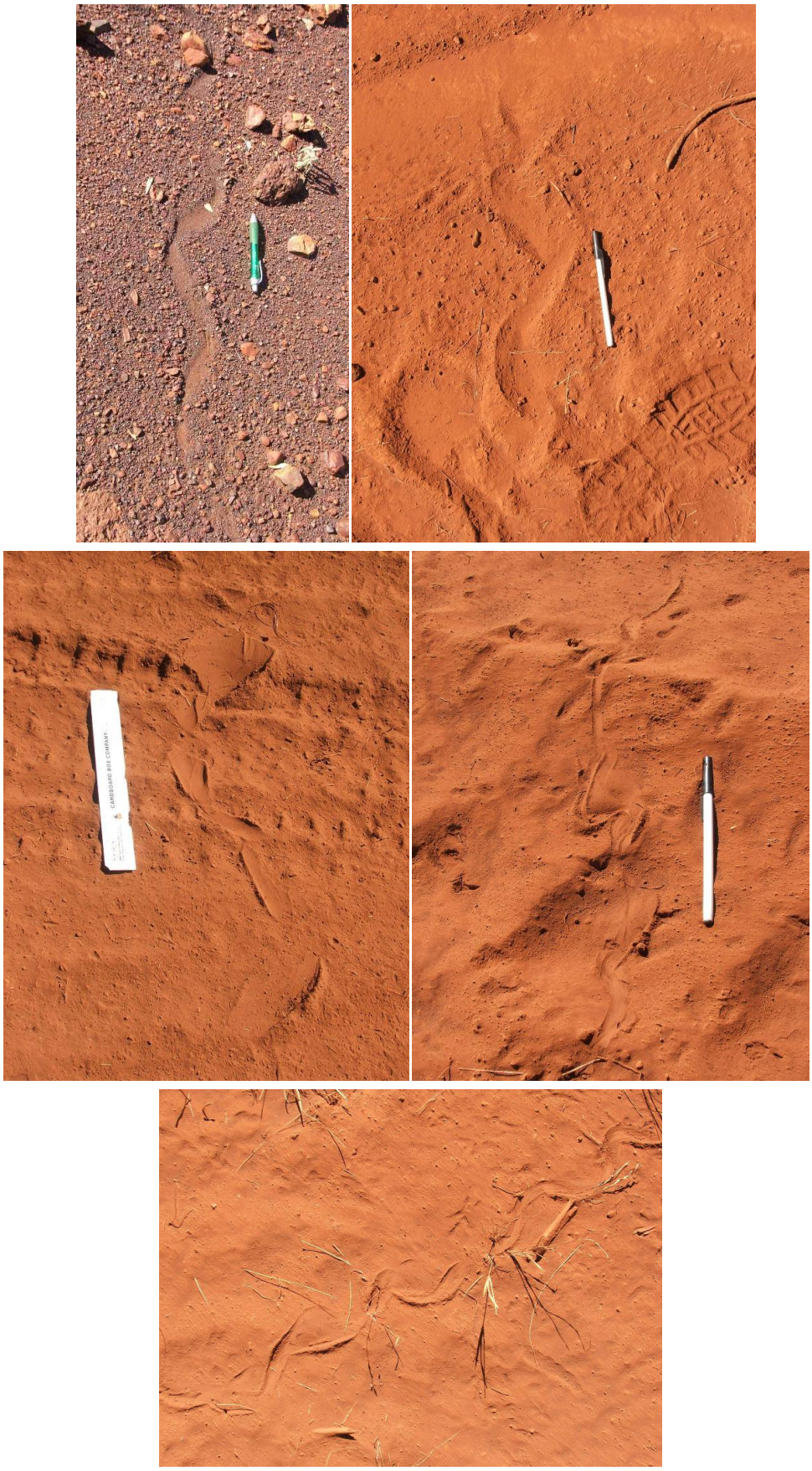


Plate 37: Assorted 'snake' tracks: three Mulga Snake (*Pseudechis australis*), one small Elapidae indet. (e.g. *Brachyurophis* or *Suta* sp.), one probable Burton's Snake-lizard (*Lialis burtonis,* Pygopodidae)

Plate 38: Tracks of Bustard (*Ardeotis australis*, left) and probable Torresian Crow (*Corvus orru*, right)

Plate 39: Feathers of Bustard (*Ardeotis australis*) caught on wire fence at eastern end of study area

Plate 40: Common Bronzewing (*Phaps chalcoptera*) and Crested Pigeon (*Ocyphaps lophotes*), MCAM1

Plate 41: Whistling Kite (*Haliastur sphenurus*), two individuals differing in colour, MCAM1

Plate 42: Galah (*Eolophus roseicapillus*, left) and Little Corellas (*Cacatua sanguinea*, right), MCAM1

Plate 43: Australian Ringneck (*Barnardius zonarius*) (and Crested Pigeon), MCAM1

Plate 44: Rainbow Bee-eater (*Merops ornatus*) near MCAM4

Plate 45: Australian Magpie (*Cracticus tibicen*), MCAM1

Plate 46: Torresian Crow (*Corvus orru*) near, and at, camera site MCAM4

Table 25: Vertebrate taxa known or potentially present in the Mount Macleod study areas.

Family	Species	Common Name	EPBC status	WCA status	DEC status	DEC Threatened fauna database	EPBC Protected Matters report	Hamersley PIL3		Raven	Mt Farquhar	Eliwanna/FF	Delphine	Mt MacLeod	Mt MacL N-Map	Mesa A and G	Mesa J	WPIOP	Blacksmith	Karijini NP	Solomon	Solomon Rail	V. Kings	Firetail South	Firetail North	West Turner	Brockman Sync 4	Fortescue River
FISH																												
Anguillidae	*Anguilla bicolor*	Indian Short-finned Eel																										+
Clupeidae	*Nematalosa erebi*	Bony Bream															+											+
Gobiidae	*Glossogobius giurus*	Flathead Goby																										+
Melanotaeniidae	*Melanotaenia australis*	Western Rainbowfish											+				+				+		+					+
Plotosidae	*Neosilurus hyrtli*	Hyrtl's Tandan											+				+				+		+					
	Neosilurus sp.(**1**)	(Eel-tailed Catfish, Tandan)																										+
	Neoarius graeffei	Lesser Salmon Catfish																										+
Terapontidae	*Amniataba percoides*	Barred Grunter															+						+					+
	Leiopotherapon unicolor	Spangled Perch															+				+		+					+
	Leiopotherapon aheneus	Fortescue Grunter			*P 4*			+									+											+
	Unnamed sp.																											+
AMPHIBIANS																												
Hylidae	*Cyclorana maini*	Sheep Frog													+			5		79	13		+			1	14	
	Cyclorana platycephala	Water-holding Frog																		5								
	Litoria rubella	Little Red Tree Frog											+	1				84	2	c	1		+	2			1	
Myobatrachidae	*Pseudophryne douglasi*	Gorge Toadlet																+		4								
	Uperoleia glandulosa	Glandular Toadlet																	2				+	3				
	Uperoleia russelli	Northwest Toadlet													+			6			62		+				1	
	Uperoleia sp. (one of preceding)																			16								
Limnodynastidae	*Limnodynastes spenceri*	Desert Burrowing Frog																		1								
MAMMALS																												
Tachyglossidae	*Tachyglossus aculeatus*	Echidna													+	5				+			+	1				
Dasyuridae	*Dasykaluta rosamondae*	Kaluta													+		+	10	2	20	14		+	1		17	3	
	Dasyurus hallucatus	Northern Quoll	*E N*	*S1*	*EN*	+	L	+								1	+	4	1		1		+	2	3		(+)	
	Ningaui timealeyi	Pilbara Ningaui													+	10		47	2	156	7		+		4	33	27	
	Planigale ingrami	Long-tailed Planigale													+			13		1	112				8	3		
	Planigale maculata	Common Planigale																		3	3				1			
	Planigale sp. (**2**)																	+	4					20			(+)	
	Pseudantechinus macdonnellensis	Fat-tailed Pseudantechinus																		1								

Family	Species	Common Name	EPBC status	WCA status	DEC status	DEC Threatened fauna database	EPBC Protected Matters report	Hamersley PIL3		Raven	Mt Farquhar	Eliwanna/FF	Delphine	Mt MacLeod	Mt MacL N-Map	Mesa A and G	Mesa J	WPIOP	Blacksmith	Karijini NP	Solomon	Solomon Rail	V. Kings	Firetail South	Firetail North	West Turner	Brockman Sync 4	Fortescue River
	Pseudantechinus roryi	Rory's Pseudantechinus																										
	Pseudantechinus woolleyae	Woolley's Pseudantechinus										1			+				1					+			2	(+)	
	Sminthopsis macroura	Stripe-faced Dunnart													+			6		25	101		+		5	7	(+)	
	Sminthopsis longicaudata	Long-tailed Dunnart			P 4	+		+							+			1									(+)	
	Sminthopsis ooldea	Ooldea Dunnart																		5								
Macropodidae	*Macropus robustus*	Euro, Biggada								+	+	1	3	+	+	13		46	1	+	+	+	+	14	10	27	5	
	Macropus rufus	Red Kangaroo, Marlu													+			5		+			+			3	n	
	Petrogale "penicillata"	Brush-tailed Rock-wallaby																		+								
	Petrogale rothschildi	Rothschild's Rock-wallaby																									(+)	
	Petrogale sp.	Rock-wallaby										4	2						1						1			
	Lagorchestes conspicillatus leichardti	Spectacled Hare-wallaby			P 3										+													
Phalangeridae	*Trichosurus vulpecula*	Brush-tailed Possum									1	1	1					+	1					2				
Megadermatidae	*Macroderma gigas*	Ghost Bat			P 4	+		+							+	+		2	+	+			+				(+)	
Hipposideridae	*Rhinonicteris aurantia*	Pilbara Leaf-nosed Bat	V U	S1	VU	+	L	+										7										
Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat																1		6	24		+	+	+	2		
	Taphozous georgianus	Common Sheathtail-bat								20					+		+	83		18	25		+	+	+	14	+	
	Taphozous hilli	Hill's Sheathtail-bat													+					46			+				(+)	
Molossidae	*Chaerephon jobensis*	Northern Freetail-bat														+		+		17	7		+					
	Mormopterus beccarii	Beccari's Freetail-bat													+					58	7		+	+	+			
	Mormopterus loriae cobourgiana	Western Little Freetail-bat																		+							+	
	Mormopterus sp.	South-western Freetail-bat																	+									
	Tadarida australis	White-striped Freetail-bat																3		1							+	
Vespertilionidae	*Nyctophilus bifax*	Northwestern Long-eared Bat																		1								
	Nyctophilus geoffroii	Lesser Long-eared Bat																		1								
	Nyctophilus gouldii	Gould's Long-eared Bat																		+								
	Nyctophilus arnhemensis	Arnhem Land Long-eared Bat																									?	
	Nyctophilus sp. indet.																				+		+					
	Chalinolobus gouldii	Gould's Wattled Bat													+	+		7	1	75	27		+	+	+	6	+	
	Chalinolobus morio	Chocolate Wattled Bat																								6		
	Scotorepens greyii	Little Broad-nosed Bat													+	+		5	1	34	25		+	+	+	2	+	
	Scotorepens balstoni	Inland Broad-nosed Bat																1										
	Vespadelus finlaysoni (**3**)	Finlayson's Cave Bat													+	+	+	70	1	39	27		+	+	+	50	+	
Muridae	*Leggadina lakedownensis*	Short-tailed Mouse			P 4	+									+												(+)	
	Mus musculus	House Mouse			Y										+			+		127	13		+			2	1	
	Notomys alexis	Spinifex Hopping-mouse									1			2						1								
	Pseudomys chapmani	Western Pebble-mound Mouse			P 4			+		2			2	2	+		(+)	9	+	15			+			12	1	

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	Pseudomys delicatulus	Delicate Mouse														2		1										
	Pseudomys desertor	Desert Mouse													+			7	1		146		+	10	1	6	3	
	Pseudomys hermannsburgensis	Sandy Inland Mouse													+			49		62	156		+		3	23	2	
	Zyzomys argurus	Common Rock-rat										1			+	1		49	1	16			+	8	4	161	13	
Leporidae	*Oryctolagus cuniculus*	Rabbit			*Y*		L																					
Bovidae	*Bos taurus*	Cow									+	22	26	+				5		+	+		+					
Equidae	*Equus asinus*	Donkey			*Y*										+			1		+							n	
	Equus caballus	Horse										3	3														6	
Canidae	*Canis lupus dingo*	Dingo			*Y*						+	1		3	+	11		11	3	+	9	+	+	3	1	8	1	
	Canis lupus familiaris	Dog											4															
	Vulpes vulpes	Fox			*Y*		M													+								
Felidae	*Felis catus*	Cat			*Y*		L					1	1	1				1	1	+	2	+	+	2	1	1	2	
REPTILES																												
Cheluidae	*Chelodina steindachneri*	Flat-shelled Turtle															+			2								
Agamidae	*Amphibolurus gilberti*	Gilbert's Dragon																		+								
	Amphibolurus longirostris	Long-nosed Dragon													+	1		11	3	vc	81		+	1		16	4	
	Caimanops amphiboluroides	Mulga Dragon																1		(2)		+						
	Ctenophorus caudicinctus	Ringtailed Dragon								1	2	2	+	10	+	17		48	6	vc	111		+	4	12	41	47	
	Ctenophorus isolepis	Military Dragon													+	8		45	2	7	64		+			8	31	
	Ctenophorus nuchalis	Central Netted Dragon														5		8										
	Ctenophorus reticulatus	Western Netted Dragon													+			+		3								
	Ctenophorus scutulatus	Lozenge-marked Dragon																+										
	Diporiphora valens	Pilbara Two-lined Dragon													+					6						4	5	
	Diporiphora winneckei	Blue-lined Dragon																		+							(?)	
	Pogona minor (**4**)	Western Bearded Dragon													+			2		mc			+			3	2	
	Pogona minor mitchelli	Northwest Bearded Dragon								1			+	5					3		41			1	3			
	Tympanocryptis cephalus	Pebble Dragon													+			+									(+)	
Gekkonidae	*Gehyra pilbara*	Pilbara Dtella													+				1	6	2		+				(+)	
	Gehyra punctata	Spotted Dtella													+			25	38	mc	1		+	2	2	1	4	
	Gehyra purpurascens	Purple Dtella																16					+					
	Gehyra variegata	Common Dtella											+		+			+		c	17		+	3	4	24	6	
	Heteronotia binoei	Bynoe's Prickly Gecko								1	1				+	9		44	9	mc	98		+	3	13	14	40	
	Heteronotia planiceps	North-west Prickly Gecko						+																				
	Heteronotia spelea	Desert Cave Gecko													+			2	2	2			+				(+)	
Carphodactylidae	*Underwoodisaurus seorsus* (**3**)	Pilbara Barking Gecko																	2				+	1	1			
	Nephrurus laevis pilbarensis	Pilbara Smooth Knobtail Gecko														2												
	Nephrurus wheeleri cinctus	Banded Knob-tailed gecko													+			1	2	mc	13		+	1			1	

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Diplodactylidae	*Crenadactylus ocellatus*	Clawless gecko													+			2	1				+					
	Diplodactylus conspicillatus	Fat-tailed gecko													+	6		29	1	+	234		+			7	50	
	Diplodactylus mitchelli	Pilbara Stone Gecko																+										
	Diplodactylus savagei	Yellow-spotted Pilbara Gecko													+			14	1		2		+		1	2	5	
	Lucasium squarrosum (3)	Spotted Ground Gecko																		+								
	Lucasium stenodactylum	Sand-plain Gecko													+	6		7		4			+				140	
	Lucasium wombeyi	Pilbara Ground Gecko													+			2		(3)	49		+		5		21	
	Oedura marmorata	Marbled Velvet Gecko								2	2				+			5	17	3			+	1	1		(+)	
	Rhynchoedura ornata	Beaked Gecko													+	2		1		(2)						2	88	
	Strophurus elderi	Jewelled Gecko													+			6		1	4		+			3	8	
	Strophurus jeanae	Southern Phasmid Gecko																		(2)	26		+					
	Strophurus strophurus	Western Spiny-tail gecko																					+					
	Strophurus wellingtonae	Western Shield Spiny-tail Gecko									1				+				2	2	17		+	2	1	5	4	
Pygopodidae	*Delma butleri*																		1					1				
	Delma elegans														+			2	1	(2)	2		+	1			(+)	
	Delma haroldi														+													
	Delma nasuta														+	3		6	1	7	6		+	3	2	6	16	
	Delma pax														+			6	1		14		+	8	2	1	6	
	Delma tincta														+			+		2			+			3	2	
	Lialis burtonis	Burton's Legless lizard												1	+	2		3	1	mc	10		+	1	2	4	10	
	Pygopus nigriceps	Hooded Scaly-foot													+	1		2		mc	12		+		3		2	
Scincidae	*Carlia munda*	Shaded-litter Rainbow Skink									3			1	+	5		8	7	11	268		+	5	16	7	14	
	Carlia triacantha	Rainbow Skink													+					1	80		+		2			
	Cryptoblepharus buchananii														+													
	Cryptoblepharus carnabyi (3)															4				6							3	
	Cryptoblepharus plagiocephalus (3)																			9						3	1	
	Cryptoblepharus ustulatus	Russet Snake-eyed Skink													+			1	1				+	2				
	Ctenotus duricola	Pilbara Ctenotus								1					+	4		16	1	c	111		+		14	3	19	
	Ctenotus grandis	Grand Ctenotus									1				+	2		24	23		234		+	12		1	22	
	Ctenotus hanloni	Nimble Ctenotus														10		8								4		
	Ctenotus helenae	Clay-soil Ctenotus													+	2		6		13	467		+	1	13	1		
	Ctenotus "aff. helenae"																	8									37	
	Ctenotus leonhardii	Leonhard's Ctenotus																			5		+					
	Ctenotus mimetes	Checker-sided Ctenotus																+										
	Ctenotus pantherinus	Leopard Ctenotus									1				+	8		36	4	15	330		+	2	16	27	40	
	Ctenotus piankai	Coarse Sands Ctenotus																		+							(?)	
	Ctenotus quattuordecimlineatus	Fourteen-lined Ctenotus						+																				

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	Ctenotus aff. *robustus*														+			+									(+)	
	Ctenotus rubicundus	Ruddy Ctenotus												1	+			2		2				1		2	(+)	
	Ctenotus rutilans	Rusty-shouldered Ctenotus													+			+		uc	4		+				4	
	Ctenotus saxatilis	Rock Ctenotus											+	1	+	14		96	13	26	326		+	36	61	3	6	
	Ctenotus schomburgkii	Barred Wedge-snout Ctenotus													+			+		7						4	8	
	Ctenotus serventyi	Sandy-loam Ctenotus																+										
	Ctenotus severus	Stern Ctenotus																+										
	Ctenotus uber uber	Spotted Ctenotus																+										
	Cyclodomorphus melanops	Spinifex Slender Bluetongue													+			1	1	c	36		+	1	1	1	12	
	Egernia cygnitos (**3**)	West Pilbara Spiny-tail Skink																+										
	Egernia formosa	Goldfields Crevice-skink													+			+		2	1		+				3	
	Eremiascincus fasciolatus	Narrow-banded Sandswimmer													+				1		1		+					
	Eremiascincus isolepis	Northern Bar-lipped Skink																+										
	Eremiascincus richardsonii	Broad-banded Sandswimmer													+	1				uc							(+)	
	Eremiascincus sp. (=*musivus*?)																	+								1		
	Lerista bipes	Northwestern Sandslider														47		+										
	Lerista clara																	2										
	Lerista sp.															4												
	Lerista flammicauda (incl. "*frosti*")	Pilbara Flame-tailed Slider													+			4	3	6						2		
	Lerista jacksoni	Jackson's Lerista																+						1		2		
	Lerista muelleri (3)	Wood-mulch Slider													+			6	5	1			+				5	
	Lerista rolfei	Rolfe's Slider																+										
	Lerista verhmens	Powerful Lerista													+			+			36		+					
	Lerista zietzi	Blue-tailed Skink						+										1			4		+	2	4			
	Menetia greyii	Common Dwarf Skink											+		+	4		5	3		42		+	8	4	2	11	
	Menetia surda	Western Dwarf Skink													+			+		uc						1	18	
	Morethia ruficauda exquisita	Fire-tailed Skink								1	4			1	+	1		10	5	mc	3		+		3	4	2	
	Notoscincus butleri	Lined Soil-crevice Skink			*P4*	+									+		+	+			1		+			1	2	
	Notoscincus ornatus	Ornate Soil-crevice Skink													+			4										
	Proablepharus reginae	Western Soil-crevice Skink													+					1	1		+					
	Tiliqua multifasciata	Central Blue-tongue								1					+			2	5	c	42		+	1		2	2	
Varanidae	*Varanus acanthurus*	Ridge-tailed Monitor													+			9	8	mc	102		+	2	13	4	7	
	Varanus brevicauda	Short-tailed Pygmy Monitor													+			9	3	mc	248		+			1	7	
	Varanus bushi	Pilbara Mulga Monitor													+			+			18	+	+	2		1		
	Varanus caudolineatus	Stripe-tailed Monitor													+					c								
	Varanus eremius	Pygmy Desert Monitor													+	2		6	4		91		+		1		8	
	Varanus giganteus	Perentie												1				3	1	(2)			+	1			1	

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	Varanus gilleni	Pigmy Mulga Monitor																3									(+)	
	Varanus gouldii	Sand Monitor																		(1)								
	Varanus panoptes	Yellow-spotted Monitor																+	2	1+	21		+	1			2	
	Varanus pilbarensis	Pilbara Rock Monitor													+			+		3			+				1	
	Varanus tristis	Black-tailed Monitor													+			+	1	1	2		+	1	1	1	2	
	Varanus sp. (unidentified juv.)																				7							
Typhlopidae	*Ramphotyphlops ammodytes*														+			9		(1)	2		+			3		
	Ramphotyphlops "australis"																			+								
	Ramphotyphlops "bituberculatus"																			+								
	Ramphotyphlops ganei				*P1*	+		+							+			+	1				+					
	Ramphotyphlops grypus														+			10	5	mc	25		+	1	4	6	6	
	Ramphotyphlops hamatus														+			+		5								
	Ramphotyphlops pilbarensis							+							+			1			6		+		2		4	
	Ramphotyphlops waitii																			4								
Pythonidae	*Antaresia perthensis*	Pigmy Python													+			+		2			+	1			(+)	
	Antaresia stimsoni	Stimson's Python												1	+			+	4	(1)	64		+	1			(+)	
	Aspidites melanocephalus	Black-headed Python																	1	(1)	2		+	1				
	Liasis olivaceus barroni	Pilbara Olive Python	*V U*	*S1*	*VU*			+						(1)				3	1	2			+			1		
Elapidae	*Acanthophis wellsi*	Pilbara Death Adder													+	2		3		(1)			+	1		1	(+)	
	Brachyurophis approximans	Pilbara Shovel-nosed Snake													+			2	1	5	34		+	1	5	1	4	
	Demansia psammophis	Yellow-faced Whipsnake													+	1		2		uc	5		+				2	
	Demansia rufescens	Rufous Whipsnake													+			+		c	20		+	3	1	2		
	Furina ornata	Moon Snake													+	1		5	1	3	12		+	1		1	2	
	Parasuta monachus	Monk Snake																2		mc	5		+			6	4	
	Pseudechis australis	Mulga Snake										+		1	+			1	1	c	45		+	1			1	
	Pseudonaja modesta	Ringed Brown Snake													+			1		2	7		+			1		
	Pseudonaja mengdeni (**3**)	Gwardar																		3	6		+		3	1	1	
	Suta fasciata	Desert Banded Snake																		mc	4		+			2	(+)	
	Suta punctata	Spotted Snake													+	1		+		(1)								
	Vermicella snelli	Pilbara Bandy Bandy																	1	(1)			+			1		
BIRDS																												
Casuariidae	*Dromaius novaehollandiae*	Emu								1					+	3		24	2	uc	1	+	+				2	
Phasianidae	*Coturnix pectoralis*	Stubble Quail																+			2				2			
	Coturnix ypsiliophora	Brown Quail													+			2			2		+	4				
Anatidae	*Cygnus atratus*	Black Swan																		s								
	Chenonetta jubata	Australian Wood Duck													+					s								
	Malacorhynchus membranaceus	Pink-eared Duck													+					s								

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	Anas gracilis	Grey Teal													+					uc							5	
	Anas superciliosus	Pacific Black Duck													+			+		uc	2						3	
	Aythya australis	Hardhead													+					s								
Podicipedidae	*Tachybaptus novaehollandiae*	Australasian Grebe													+			+		uc								
	Poliocephalus poliocephalus	Hoary-headed Grebe													+					uc								
Columbidae	*Phaps chalcoptera*	Common Bronzewing									1	1	1	1	+	1		11	2	mc	3		1	1	1	18	12	
	Phaps elegans	Brush Bronzewing														3												
	Phaps histrionica	Flock Bronzewing																		(+)								
	Ocyphaps lophotes	Crested Pigeon								1	1	10	+	55	+			223	1	mc	16	+	7	2		83	91	
	Geophaps plumifera	Spinifex Pigeon								2	4	16	5		+			320	1	mc	51		13	18	22	170	72	
	Geopelia cuneata	Diamond Dove								9	21	33	12	5	+	5		69	1	c	35		12		11	65	304	
	Geopelia striata	Peaceful Dove													+	1		15		uc	40	+	1	15	33	6		
Podargidae	*Podargus strigoides*	Tawny Frogmouth													+					s			+	1			1	
Eurostopodidae	*Eurostopodus argus*	Spotted Nightjar										1		1	+			12		c	45		+	1			8	
Aegothelidae	*Aegotheles cristatus*	Owlet Nightjar										4	1		+			1		s			+	2				
Apodidae	*Apus pacificus*	Fork-tailed Swift	*M*				M								+			+		mc			+					
Anhingidae	*Anhinga melanogaster*	Australasian Darter																		uc								
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant																		s	2				2			
	Phalacrocorax carbo	Great Cormorant																		s								
Pelecanidae	*Pelecanus conspicillatus*	Australian Pelican													+					(2)								
Ardeidae	*Ardea pacifica*	White-necked Heron												3	+			2		uc			+				2	
	Ardea modesta (=*alba*)	Great Egret	*M*				M								+					s								
	Ardea ibis	Cattle Egret	*M*				M																					
	Egretta novaehollandiae	White-faced Heron											1		+	1		+	1	uc							6	
	Nycticorax caledonicus	Nankeen Night-heron																		uc								
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis													+			4		uc								
Accipitridae	*Elanus axillaris*	Black-shouldered Kite													+					uc	4		1			2		
	Lophoictinia isura	Square-tailed Kite													+					+			+					
	Hamirostra melanosternon	Black-breasted Buzzard																+		s								
	Haliaeetus leucogaster	White-bellied Sea-eagle	*M*				L																					
	Haliastur sphenurus	Whistling Kite								1				3	+			1		mc	1		+			2	2	
	Milvus migrans	Black Kite													+					mc								
	Accipiter fasciatus	Brown Goshawk													+	2		3	1	uc	2		+	2			1	
	Accipiter cirrocephalus	Collared Sparrowhawk													+			+		mc	1		+		1			
	Circus assimilis	Spotted Harrier												1	+			7		c						1	3	
	Aquila audax	Wedge-tailed Eagle										1	+	1	+			18	1	mc			+			4	3	

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	Hieraeetus morphnoides	Little Eagle													+	2		+		uc						2	2	
	Pandion cristatus	Eastern Osprey																		(1)								
Falconidae	*Falco cenchroides*	Australian Kestrel								1		2	4		+	1		10	1	c	1		+	1		3	6	
	Falco berigora	Brown Falcon								3	1		6		+	1		21	1	c	5	+	3	2		17	9	
	Falco longipennis	Australian Hobby													+			1		uc		+	+			1	1	
	Falco hypoleucos	Grey Falcon			*P4*													1		+								
	Falco peregrinus	Peregrine Falcon	*M*	*S4*	*S*			+					1					+		uc								
Rallidae	*Gallirallus philippensis*	Buff-banded Rail																		(1)								
	Porzana tabuensis	Spotless Crake																		mc								
	Porzana fluminea	Spotted Crake																		(+)								
	Tribonyx ventralis	Black-tailed Native-hen																		s								
	Fulica atra	Eurasian Coot													+					s								
Otididae	*Ardeotis australis*	Australian Bustard			*P4*	+						1	10	2	+			23		mc		+	+			1	17	
Burhinidae	*Burhinus grallarius*	Bush Stone-curlew			*P4*			+			1				+					s				1			1	
Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt													+					(3)								
Charadriidae	*Charadrius veredus*	Oriental Plover	*M*				M																					
	Elseyornis melanops	Black-fronted Dotterel											2		+	1				mc							3	
	Erythrogonys cinctus	Red-kneed Dotterel																		(+)								
Turnicidae	*Turnix velox*	Little Button-quail								1		2	+		+			6	1	mc	4		1	2			3	
Scolopacidae	*Gallinago megala*	Swinhoe's Snipe	*M*												+													
	Numenius minutus	Little Curlew																1										
	Tringa glareola	Wood Sandpiper																		(2)								
	Actitis hypoleucos	Common Sandpiper													+					(1)								
	Calidris ferruginea	Curlew Sandpiper																		+								
Glareolidae	*Glareola maldivarum*	Oriental Pratincole	*M*				(M)																					
Laridae	*Chlidonias hybrida*	Whiskered Tern																		(3)								
Cacatuidae	*Eolophus roseicapillus*	Galah									2	11	7	31	+	2		274	7	uc		+	+	4		39	42	
	Cacatua sanguinea	Little Corella								1	4		4	82	+	1		34		mc	5		+	12	5	35	63	
	Nymphicus hollandicus	Cockatiel												71	+	3		45		mc	10		+	12	10	2	79	
	Calyptorhynchus banksii	Red-tailed Black Cockatoo																		(+)								
Psittacidae	*Barnardius zonarius*	Australian Ringneck									3	7	3	7	+	1		26	6	c	52	+	7	15	19	64	58	
	Psephotus varius	Mulga Parrot																		(1)								
	Melopsittacus undulatus	Budgerigar								30	70	34	28	15	+	8		275		mc	104		46	20		6	266	
	Neopsephotus bourkii	Bourke's Parrot													+					uc								
Cuculidae	*Centropus phasianinus*	Pheasant Coucal													+			+			2		+		2			
	Chalcites osculans	Black-eared Cuckoo										1								(1)						1		
	Chalcites basalis	Horsfield's Bronze-Cuckoo													+	2		11		mc	30		4		6	8	3	

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	Cacomantis pallidus	Pallid Cuckoo									1			1	+	2		10		mc	7		+		1	23	15	
Strigidae	*Ninox connivens*	Barking Owl																		1?								
	Ninox novaeseelandiae	Boobook Owl													+					uc	1		+	1				
Tytonidae	*Tyto javanica*	Eastern Barn Owl																		(2)							1	
Halcyonidae	*Dacelo leachii*	Blue-winged Kookaburra								1					+	1		5		mc	29		5	2	22		4	
	Todiramphus sanctus	Sacred Kingfisher											1		+	1		+	1	mc	73		+	2	72			
	Todiramphus pyrrhopygia	Red-backed Kingfisher												1	+			8		mc			+	1		4	15	
Meropidae	*Merops ornatus*	Rainbow Bee-eater	*M*				M			2	4	18	7	2	+	5		109	10	c	53	+	7	26	12	30	32	
Climacteridae	*Climacteris melanura*	Black-tailed Treecreeper								2	2			1	+					mc	2						1	
Ptilonorhynchidae	*Ptilonorhynchus guttatus*	Western Bowerbird								2	12				+			2	2	uc	21		2	2	1	1	16	
Maluridae	*Malurus leucopterus* (**4**)	White-winged Fairy-wren										4	+		+			13	1	uc	17		15			24	36	
	Malurus lamberti	Variegated Fairy-wren								8	21				+	4		96	3	c	136	+	46	21	31	236	147	
	Stipiturus ruficeps	Rufous-crowned Emu-wren													+	2		2		uc						25	21	
	Amytornis striatus (**4**)	Striated Grasswren													+	2		4			12		5		6	17	6	
	Amytornis striatus whitei	Striated Grasswren													+			+		r								
Acanthizidae	*Sericornis magnirostris*	Large-billed Scrubwren																		+								
	Calamanthus campestris	Rufous Fieldwren													+													
	Pyrrholaemus brunneus	Redthroat													+					s								
	Smicrornis brevirostris	Weebill									5	1	+	1	+	1		78	8	mc	261		69	11	37	370	431	
	Gerygone fusca fusca	Western Gerygone													+	4		5		c	2		+	2		15	3	
	Acanthiza robustirostris	Slaty-backed Thornbill													+					s								
	Acanthiza uropygialis	Chestnut-rumped Thornbill													+					c						31	18	
	Acanthiza apicalis	Broad-tailed (Inland) Thornbill													+				+	mc						34	3	
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill										4	3		+				1	s		+		4				
Pardalotidae	*Pardalotus rubricatus*	Red-browed Pardalote													+	2		5	2	mc	30		4		7	4	21	
	Pardalotus striatus	Striated Pardalote								9	1	2	+	27	+	1		3	1	c	12		1		2	10	21	
Meliphagidae	*Certhionyx variegates*	Pied Honeyeater										6	+		+					s			+			1		
	Lichenostomus virescens	Singing Honeyeater								6	4	52	13	4	+			259	3	mc	107	+	20	5	1	98	277	
	Lichenostomus keartlandi	Grey-headed Honeyeater								3	33	5	2		+	3		148	3	mc	90		5	26	22	41	26	
	Lichenostomus plumulus	Grey-fronted Honeyeater													+			2		+								
	Lichenostomus penicillatus	White-plumed Honeyeater								4		6	8		+	1		96	1	c	97	+	1	9	85	20	3	
	Purnella albifrons	White-fronted Honeyeater																5		uc							3	
	Manorina flavigula	Yellow-throated Miner								8	3	26	11	10	+			139	15	mc	73		9	26	12	36	188	
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater													+			40	1	c	6		+	9	1	46	133	
	Conopophila whitei	Grey Honeyeater													+			2		uc						1		
	Sugomel niger	Black Honeyeater													+	6		12		mc			+					
	Ephthianura tricolor	Crimson Chat													+			11		mc							16	

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	Ephthianura aurifrons	Orange Chat																		(+)								
	Lichmera indistincta	Brown Honeyeater									5				+	4		131	1	mc	10		2	2		46	27	
	Melithreptus gularis	Black-chinned Honeyeater								2					+			3		mc	3		+	2			1	
Pomatostomidae	*Pomatostomus temporalis*	Grey-crowned Babbler										11	8		+	1		14	1	uc	30		5	3	23	145	23	
	Pomatostomus superciliosus	White-browed Babbler													+												5	
Eupetidae	*Cinclosoma castaneothorax*	Chestnut-breasted Quail-thrush													+			1									3	
	Psophodes occidentalis	Chiming Wedgebill								2	1				+													
Neosittidae	*Daphoenositta chruysoptera*	Varied Sittella													+					mc	7							
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike								4	11	11	27	10	+	3		23		c	44	+	9	4	10	25	55	
	Coracina maxima	Ground Cuckoo-shrike													+					s			+			2	8	
	Lalage tricolor [sueurii]	White-winged Triller								1	3		5	1	+	1		4		c	21		1		4	1	43	
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler								11	9	3	7	11	+	2		20	2	c	119	+	13	4	65	56	76	
	Colluricincla harmonica	Grey Shrike-thrush									8	1	4	1	+			14	5	mc	126		30	12	63	47	37	
	Oreoica gutturalis	Crested Bellbird										4	+		+	2		91	3	mc	71		21	6	16	58	36	
Artamidae	*Artamus personatus*	Masked Woodswallow													+			1118	1	uc			+			3		
	Artamus cinereus	Black-faced Woodswallow								2	5			9	+	1		51	4	mc	36		4	8		95	88	
	Artamus minor	Little Woodswallow								4	5	19	4		+	2		10		mc	10		2	23	4	12	24	
	Cracticus torquatus	Grey Butcherbird												1	+			1	1	mc	7		+	4	4	6	21	
	Cracticus nigrogularis	Pied Butcherbird								6	1	1	+	2	+	2		27	3	mc	35		2	12	8	36	43	
	Cracticus tibicen	Australian Magpie								3		13	9	1	+			17	3	mc	7	+	2			9	11	
Rhipiduridae	*Rhipidura fuliginosa*	Grey Fantail													+	1				s						7		
	Rhipidura leucophrys	Willie Wagtail								3	11	16	7	4	+	5		108	4	mc	37		3	10	15	89	97	
Corvidae	*Corvus bennetti*	Little Crow													+			4		(+)		+	+	2		2		
	Corvus orru	Torresian Crow								6	3	6	6	6	+	2		59	3	mc	12	+	1	6	1	75	36	
Monarchidae	*Grallina cyanoleuca*	Magpie-Lark									1	2	6	4	+	1		22	2	mc	9	+	+	8	6	24	23	
Petroicidae	*Petroica goodenovii*	Red-capped Robin								2					+			+		mc						3	4	
	Melanodryas cucullata	Hooded Robin									1	6	2		+			16	2	mc	8		2	1		16	10	
	Poecilodryas superciliosa	White-browed Robin																		+								
Alaudidae	*Mirafra javanica horsfieldii*	Horsfield's (Singing) Bushlark								1	1				+			+		s								
Acrocephalidae	*Acrocephalus australis*	Australian Reed-warbler																		s								
Megaluridae	*Cincloramphus mathewsi*	Rufous Songlark													+	1		2		mc	8		+				16	
	Cincloramphus cruralis	Brown Songlark													+			3		uc			+			3	2	
	Eremiornis carteri	Spinifexbird								2		5	2		+	3		14	3	mc	71		8	8	2	13	19	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow																+										
	Petrochelidon ariel	Fairy Martin													+	2				(+)			+				1	
	Petrochelidon nigricans	Tree Martin													+			1		c	9		+				2	
Nectariniidae	*Dicaeum hirundinaceum*	Mistletoebird													+	1		1		mc	30		+		21	6	8	

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Estrildidae	*Taeniopygia guttata*	Zebra Finch								33	15		4	235	+	6		309	20+	vc	67	+	7	32	6	817	2051	
	Neochmia ruficauda subclarescens	Star Finch (western)			P4										+					c								
	Emblema pictum	Painted Finch								12	4	20	+		+	10		35		c	88		12	6	2	139	282	
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit													+			1		s							7	

Notes to Table:

(**1**) Morgan et al. (2009) consider *Neosilurus* sp. in Fortescue River as distinct from *N. hyrtlii* (type locality Fitzroy River, Qld)

(**2**) *Planigale* is represented by two undescribed species in the Pilbara, which have often been conflated with *P. ingrami* and *P. maculate* (Gibson & McKenzie 2009).

(**3**) Some extralimital species records have been deleted (e.g. *Litoria spenceri*) or assigned to the similar (or similarly-named) species likely to be intended, if it is unique (e.g. Yellow-throated Honeyeater [Tasmanian endemic] => Yellow-throated Miner; *Vespadelus pumilus* [Eastern Forest Bat] scored as *V. finlaysoni*). In some cases this is not possible, e.g. former *Cryptoblepharus plagiocephalus* includes *C. ustulatus* and *C. buchanani* (Horner 2007); former *Lerista muelleri* includes *L. clara* and *L. verhmens* as well as *L. muelleri* sensu stricto (Smith & Adams 2007). Pilbara specimens previously identified as *Underwoodisaurus milii* (or *Nephrurus milii*) are now recognised as *Underwoodisaurus seorsus*, which 'may be of conservation concern' (Doughty & Oliver 2011); *Egernia cygnitos* is the western Pilbara species formerly included in *E. depressa* (Doughty *et al.* 2011). *Lucasium squarrosum* record retained, but likely to represent *L. wombeyi*.

(**4**) Mainland WA records of *Malurus leucopterus* are mostly identified as *M. leucopterus leuconotus* (blue with white wings), but the few records from the western Hamersley range on NatureMap (DEC & Western Australian Museum 2011) are identified as *M. leucopterus leucopterus*, the black-plumaged subspecies of Dirk Hartog Island. The Hamersley records come from fauna survey returns and the identifications are listed as 'certain'. A similar situation applies to two other conservation-listed subspecies. Peter Mawson (DEC; email 26 Aug 2011) states: "*Amytornis striatus striatus* – is restricted to the DEC Midwest and Goldfields regions. Any records from the Pilbara are most likely *Amytornis striatus whitei* (not threatened or Priority listed). *Malurus leucopterus leucopterus* – is restricted to Dirk Hartog Island, and so any Pilbara records should be *M. l. leuconotus*. *Pogona minor minima* – is restricted to the Abrolhos Islands and any records in the Pilbara are most likely *Pogona minor minor*."

Appendix Eight: Conservation Significant Flora Risk Assessment Matrix

Table 26: Conservation significant flora risk assessment matrix

Species	Cons Code	Soil	Landform	Vegetation	Soil Type Present	Landform Present	Associated Vegetation Present	Known from Nearby	Likelihood of Occurring in Mt Macleod West
Lepidium catapycnon	T	Skeletal soils	Hillsides	*Eucalyptus leucophloia*, *Triodia* spp.	N	N	Y	N	Unlikely
Thryptomene wittweri	T	Skeletal red stony soils	Breakaways, stony creek beds	*Eucalyptus kingsmillii*	N	N	N	N	None (Rare)
Bothriochloa decipiens var. *cloncurrensis*	P1	Clay, loam	Damp depression; clay plain	Mulga, *Eucalyptus camaldulensis*	Y	Y	Y	N	Likely
Calotis squamigera	P1	Pebbly loam	Plain	Mulga, *Acacia xiphophylla*	Y	Y	Y	N	Likely
Eragrostis sp. Mt Robinson (S.van Leeuwen 4109)	P1	Red-brown skeletal soils, ironstone	Steep slopes, summits	*Eucalyptus kingsmillii*	N	N	N	N	None (Rare)
Eremophila sp. West Angelas (S. van Leeuwen 4086)	P1	Banded ironstone	High hills; summits	*Eucalyptus kingsmillii*, Mulga	N	N	N	N	None (Rare)
Eremophila sp. Snowy Mountain (S. van. Leeuwen 3737)	P1	Ironstone	High hills; summits	*Eucalyptus leucophloia*	N	N	Y	N	None (Rare)
Eremophila spongiocarpa	P1	Weakly saline alluvium	Alluvial plain on margins of marsh	Samphire	N	N	N	N	None (Rare)
Eucalyptus lucens	P1	Ironstone rocks	Rocky slopes and mountain tops, high in the landscape	*Eucalyptus kingsmillii*	N	N	N	N	None (Rare)
Genus sp. Hamersley Range hilltops (S van Leeuwen 4345*)*	P1	Skeletal, brown gritty soil over ironstone	Hill summit	*Eucalyptus leucophloia*, *Triodia* spp.	N	N	Y	N	None (Rare)
Helichrysum oligochaetum	P1	Red clay loam, alluvial rocky soil	Creekline, floodplain	*Eucalyptus camaldulensis*, *E. victrix*	Y	Y	Y	Y	Likely
Josephinia sp. Marandoo (M.E. Trudgen 1554)	P1	Gritty soil, granite	Plains	Mixed shrubland of *Senna* and *Acacia*	N	Y	U	N	Unlikely
Lepidium amelum	P1	Sandy loams & stony, calcareous, alkaline soils.	Hillside, calcrete plain, valley floor	Hummock grassland, low open woodland, disturbed sites	Y	Y	Y	N	Unlikely

Species	Cons Code	Soil	Landform	Vegetation	Soil Type Present	Landform Present	Associated Vegetation Present	Known from Nearby	Likelihood of Occurring in Mt Macleod West
Sida sp. Hamersley Range (K. Newbey 10692)	P1	Skeletal soil; ironstone	Hilltops, cliffs, scree	*Eucalyptus leucophloia* , *Eucalyptus gamophylla*	Y	N	Y	Y	Unlikely
Tetratheca fordiana ms	P1	Shale pocket amongst ironstone	Midslope	*Eucalyptus kingsmillii*	N	N	N	N	None (Rare)
Teucrium pilbaranum	P1	Clay	Crab hole plain in a river floodplain, margin of calcrete table	*Eucalyptus camaldulensis, Eucalyptus victrix, Chrysopogon fallax*	Y	N	Y	N	Unlikely
Vittadinia sp. Coondewanna Flats (s. van Leeuwen 4684)	P1	Clay loam soils	Plain	Mulga	Y	Y	Y	N	Likely
Adiantum capillus-veneris	P2	Rocky	Moist, sheltered sites in gorges and on cliff walls	Unknown	N	N	U	N	None (Rare)
Cladium procerum	P2	Loam, gravel	Perennial pools	Unknown	Y	N	U	N	None (Rare)
Eremophila forrestii subsp. Pingandy (M.E. Trudgen 2662)	P2	Stony soil	Slopes, low in landscape	Mulga	Y	Y	Y	N	Likely
Gompholobium karijini	P2	Ironstone	Hilltop, hillslope, plateau.	*Eucalyptus* woodland, *Triodia wiseana*	Y	N	Y	Y	Unlikely
Indigofera ixocarpa	P2	Skeletal red soils over massive ironstone	Creekline, high hills, summits, low in landscape, disturbed areas	*Acacia rhodophloia*, *Eucalyptus kingsmillii*, *E. leucophloia*	Y	Y	N	N	Unlikely
Oxalis sp. Pilbara (M.E. Trudgen 12725)	P2	Red-brown pebbly/rocky loam amongst boulders	Gullies	*Acacia* spp, *Eucalyptus leucophloia*	Y	N	Y	N	Unlikely
Paspalidium retiglume	P2	Clay; cracking	Plain	Grassland/herbland	Y	Y	Y	N	Likely
Pilbara trudgenii	P2	Skeletal, red stony soil over ironstone	Hill summits, steep slopes, screes, cliff faces	*Eucalyptus kingsmillii*	N	N	N	N	None (Rare)
Scaevola sp. Hamersley Range basalts (S. van Leeuwen 3675)	P2	Skeletal, brown gritty soil over basalt	Summits of hills, steep hills	*Eucalyptus kingsmillii*	N	N	N	N	None (Rare)
Spartothamnella puberula	P2	Rocky loam, sandy or skeletal soils, clay	Gorge, gully	*Acacia* spp.	Y	N	Y	N	Unlikely
Vigna sp. central (M.E. Trudgen 1626)	P2	Sandy plain; sand over compacted hardpan and limestone rock; claypan of fine cracking clays	Plain, claypan (valleys in CPP)	*Triodia epactia*, Mulga, *Eucalyptus camaldulensis*	Y	Y	Y	Y	Almost certain

Species	Cons Code	Soil	Landform	Vegetation	Soil Type Present	Landform Present	Associated Vegetation Present	Known from Nearby	Likelihood of Occurring in Mt Macleod West
Acacia daweana	P3	Stony red loamy soils	Low rocky rises, along drainage lines	*Acacia* spp, *Eucalyptus* spp.	Y	Y	Y	N	Likely
Acacia subtiliformis	P3	Rocky calcrete plateau	Plateau	*Triodia* spp.	N	N	Y	N	Unlikely
Astrebla lappacea	P3	Clay loam, calcrete	Plain	*Astrebla* grassland; *Acacia xiphophylla*	Y	Y	Y	Y	Recorded
Calotis latiuscula	P3	Sand, loam	Plain	Mulga	Y	Y	Y	Y	Almost certain
Dampiera anonyma ms	P3	Skeletal red-brown to brown gravelly soil over banded ironstone, basalt, shale and jaspilite	Hill summits, upper slopes	*Eucalyptus kingsmillii*, *Acacia hamersleyana*	N	N	N	Y	None (Rare)
Dampiera metallorum ms	P3	Skeletal red-brown gravely soils over banded ironstone	Steep slopes and summits	*Eucalyptus kingsmillii*	N	N	N	N	None (Rare)
Eragrostis crateriformis	P3	Clayey loam or clay	Creek banks, depressions	*Triodia epactia*, *Eucalyptus victrix*	Y	Y	Y	N	Likely
Eragrostis surreyana	P3	Red-brown clay	Drainage line	*Eucalyptus victrix*, *Eucalyptus camaldulensis*, *Cyperus vaginatus*	Y	Y	Y	Y	Almost certain
Eremophila forrestii subsp. *viridis*	P3	Unknown	Sandplain	Unknown	U	N	U	N	Unlikely
Eremophila magnifica subsp. *velutina*	P3	Skeletal soils over ironstone	Summits	*Eucalyptus kingsmillii*	N	N	N	Y	Unlikely
Fimbristylis sieberiana	P3	Mud, skeletal soil pockets	Pool edges, sandstone cliffs	*Cyperus vaginatus*	N	N	N	N	None (Rare)
Geijera salicifolia	P3	Skeletal soils, stony soils	Massive rock scree, gorges	Mulga	N	N	Y	N	None (Rare)
Glycine falcata	P3	Black clayey sand	Floodplains; depressions in crabhole plains on river	Grassland; *Eriachne* spp.	N	Y	Y	Y	Likely
Goodenia sp. East Pilbara (A.A. Mitchell PRP 727)	P3	Red-brown clay soil, calcrete pebbles	Low undulating plain, swampy plains	*Eucalyptus victrix*, *E. xerothermica*, *Corymbia ferriticola*, grasslands, *Triodia* spp.	Y	Y	Y	Y	Recorded
Gymnanthera cunninghamii	P3	Saline soils, calcrete, river sands	Marsh, drainage lines	*Triodia* grasslands, *Eucalyptus camaldulensis*	Y	Y	Y	N	Unlikely

Species	Cons Code	Soil	Landform	Vegetation	Soil Type Present	Landform Present	Associated Vegetation Present	Known from Nearby	Likelihood of Occurring in Mt Macleod West
Indigofera gilesii subsp. *gilesii*	P3	Pebbly loam amongst boulders & outcrops	Hills	*Eucalyptus leucophloia*, *Corymbia hamersleyana*, *Corymbia ferriticola*	Y	Y	N	N	Unlikely
Indigofera sp. Bungaroo Creek (S. van Leeuwen 4301)	P3	Alluvium, skeletal ironstone	Creeks and gorges	Not given	Y	Y	Y	Y	Unlikely
Iotasperma sessilifolium	P3	Cracking clay, black loam	Edges of waterholes, plains	Grassland, *Eriachne* spp., *Astrebla* spp., *Eucalyptus victrix*	Y	Y	Y	Y	Recorded
Oldenlandia sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3	Cracking clay, basalt	Gently undulating plain with large surface rocks, flat crabholed plain	*Astrebla* grassland; Mulga	Y	Y	Y	Y	Almost certain
Olearia mucronata	P3	Schist	Schistose hills, along drainage channels	Mulga; grassland	N	Y	Y	N	Unlikely
Phyllanthus aridus	P3	Sandstone, gravel, red sand	Sandplain, hills	Coastal	N	N	N	N	None (Rare)
Polymeria distigma	P3	Sandy soils, cracking clay	Plain	Disturbed areas, *Triodia* grasslands, *Astrebla* grasslands	Y	Y	Y	Y	Almost certain
Ptilotus subspinescens	P3	Rocky	Gentle rocky slopes, screes and the bases of screes	Unknown	Y	Y	U	N	Unlikely
Rhagodia sp. Hamersley (M. Trudgen 17794)	P3	Clay loam, sand loam, colluvium	Floodplain / lower slopes	Mulga; *Triodia* grassland	Y	Y	Y	N	Recorded
Rostellularia adscendens var. *latifolia*	P3	Ironstone soils	Near creeks, rocky hills	Mulga; *Eucalyptus kingsmillii*	Y	Y	N	Y	Likely
Sida sp. Barlee Range (S van Leeuwen 1642)	P3	Skeletal red soils pockets	Steep slope	*Ficus brachypoda*, *Corymbia ferriticola*, *Eucalyptus victrix*, *Eucalyptus kingsmillii*	N	N	N	Y	Unlikely
Swainsona sp. Hamersley Station (A.A. Mitchell 196)	P3	Clay loam (cracking)	Flat crabholed plain	*Astrebla* grassland; Mulga	Y	Y	Y	Y	Almost certain
Themeda sp. Hamersley Station (M.E. Trudgen 11431)	P3	Red cracking clay, clay loam, alluvium	Plain, creeklines	*Themeda* and *Astrebla* grasslands, Mulga, *Acacia* spp.	Y	Y	Y	N	Recorded
Triodia sp. Mt. Ella (ME Trudgen 12739)	P3	Light orange-brown, pebbly loam. Amongst rocks & outcrops, gully slopes	Hilltops, gorges, gullies	*Eucalyptus leucophloia*, *Corymbia ferriticola*, Mulga	Y	N	Y	N	Unlikely

Species	Cons Code	Soil	Landform	Vegetation	Soil Type Present	Landform Present	Associated Vegetation Present	Known from Nearby	Likelihood of Occurring in Mt Macleod West
Triodia sp. Robe River (M.E. Trudgen et al. MET 12367)	P3	Banded ironstone, Robe pisolite	Rocky hills and mesas	*Eucalyptus leucophloia*, *Acacia pruinocarpa*, *Acacia bivenosa*, *Acacia inaequilatera*	N	N	Y	N	Unlikely
Acacia bromilowiana	P4	Red skeletal stony loam, orange-brown pebbly, gravel loam, laterite, banded ironstone, basalt	Rocky hills, breakaways, scree slopes, gorges, creek beds	*Eucalyptus leucophloia*, *Eucalyptus kingsmillii*, *Corymbia ferriticola*, *Acacia hamersleyensis*	N	N	N	Y	Unlikely
Eremophila magnifica subsp. *magnifica*	P4	Skeletal soils over ironstone	Rocky screes	*Corymbia hamersleyana*, *Eucalyptus leucophloia*, *Eucalyptus kingsmillii*	N	N	N	Y	Unlikely
Goodenia nuda	P4	Alluvium, loam, clay (various)	Adjacent to drainage, floodplain, hills	Various	Y	Y	Y	Y	Almost certain
Livistona alfredii	P4	Stony loam, limestone	Edges of permanent pools	*Eucalyptus camaldulensis* , *Eucalyptus victrix*, *Corymbia opaca*	N	N	Y	Y	Unlikely
Ptilotus mollis	P4	Rocky	Stony hills and screes	*Eucalyptus leucophloia*, Mulga, *Triodia* spp.	Y	N	Y	N	Unlikely
Rhynchosia bungarensis	P4	Pebbly, coarse sand	Banks of flow line	Various	Y	Y	Y	Y	Almost certain