Metals X Ltd

Wingellina Nickel Project

Level 2 Flora and Vegetation

Assessment of the Wingellina Mine

June 2011

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Level 2 Flora and Vegetation Assessment of the Wingellina Mine

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Executive Summary

Outback Ecology was commissioned by Metals X Limited to conduct a Level 2 Flora and Vegetation Assessment of the Wingellina Nickel Project, within exploration tenement E69/535 in Western Australia. The Study Area is located in the vicinity of the Wingellina Hills, which are part of the Central Ranges region that stretches from Warburton in the west to the Mann Ranges in SA. The Study Area lies eight kilometres southwest of the Surveyor Generals' Corner, the junction between WA, the Northern Territory (NT) and South Australian (SA). To date, two field surveys have been undertaken by Outback Ecology for this Level 2 assessment. In addition, results of an earlier survey of the site have also been incorporated into this report.

The objectives of this flora and vegetation assessment included the following:

- Produce a comprehensive flora species list for the Study Area;
- Search for conservation significant flora including 1) species listed as threatened under the Commonwealths *Environment Protection and Biodiversity Conservation Act (1999)*; 2) species listed as Declared Rare Flora (DRF) under the WA *Wildlife Conservation Act 1950*, and species listed as Priority Flora in the WA Department of Conservation and Environment's (DEC) database; 3) Endangered, Vulnerable and Rare species listed in Schedules 7-9 under the South Australian *National Parks and Wildlife Act 1972*; 3) significant plant species identified in the Northern Territories *Territory Parks and Wildlife Conservation Act* and 4) plant species with highly disjunct populations in the Study Area.
- Search for conservation significant ecological communities including: 1) Threatened Ecological Communities (TECs) and Priority Ecological Communities (PECs) as listed in the WA DEC database; and 2) South Australian threatened and poorly conserved plant communities as listed in Davies (1982), and Neagle (1995).
- Describe and map vegetation associations over the Study Area; and
- Discuss the potential impacts of the proposed development on the flora and vegetation of the Study Area.

This report documents the results of the flora and vegetation survey conducted across the Study Area in April 2008 and in October 2010. The survey gathered flora data from 33 quadrats and 44 relevé points. The initial survey identified a total of 154 taxa. The latest survey identified a total of 358 taxa, recorded from 46 families and 131 genera. Dominant families include Poaceaea (55 taxa), Fabaceae (54 taxa) Chenopodiaceae (31 taxa), Malvaceae (29 taxa) and Scrophulariaceae (17 taxa). Dominant genera include *Acacia* (28 taxa)*, Eremophila* (17 taxa), *Senna* (14 taxa), *Eucalyptus* (12 taxa), *Ptilotus* (11 taxa), *Sclerolaena* (10 taxa), and *Solanum* (10 taxa).

Outback Ecology conducted surveys in the Study Area in a manner that was sensitive to the traditional owners. During the field survey, an elder of the Wingellina community accompanied field surveyors during all surveys.

No Threatened Flora (also called Declared Rare Flora) (TF) listed under the WA *Wildlife Conservation Act (1950)*, or threatened flora species listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999*, the South Australian *National Parks and Wildlife Act 1972* or the Northern Territories *Territory Parks and Wildlife Conservation Act* 2000 were recorded within the Study Area. Based upon the field survey undertaken, together with a habitat assessment of the likely occurrence of these species, none are expected to occur.

Four Priority taxa were recorded within the Study Area during the October 2010 survey: *Menkea lutea* (Priority 1), *Goodenia lunata* (Priority 1), *Euphorbia inappendiculata* (Priority 3) and *Calotis latiuscula* (Priority 3). Large numbers of *Menkea lutea* were recorded in the Mitchell Grass dominated southern sections of the Study Area. There is limited likelihood that this species may be impacted by the construction of the proposed accommodation camp. This species was found extensively throughout the southern sections of the Study Area, and the proposed development is likely to impact only a small percentage of the whole local population.

One individual *Euphorbia inappendiculata* was recorded adjacent to the western boundary of the Study Area while one individual of *Goodenia lunata* and *Calotis latiuscula* were recorded during the survey in the southern sections of the Study Area. It is unlikely that any of these priority species will be impacted by the proposed mining activities, as they were not found within or adjacent to the proposed disturbance footprint.

Fourteen vegetation communities from 11 broad floristic formations were mapped and described within the Study Area. None of the vegetation communities mapped and described are listed as Threatened Ecological Communities (TEC's) or Priority Ecological Communities (PEC's) in Western Australia. Vegetation condition across the majority of the Study Area was rated as being generally in excellent condition.

Eight introduced species, **Cenchrus ciliaris* (Buffel Grass), **Cenchrus pennisetiformis* (Cloncurry Buffel Grass), **Acetosa vesicaria* (Ruby Dock), **Capsella bursa-pastoris* (Shepherd's Purse), **Malvastrum americanum* (Spiked Malvastrum), **Tribulus terrestris* (Caltrop), **Citrullus colocynthis* (Camel Melon) and **Citrullus lanatus* (Pie Melon) were recorded within the Study Area. **Portulaca oleracea* (Common Purslane) was also recorded. This species is considered in Western Australia to have indigenous and introduced forms (DEC 2011) but to be indigenous in South Australia (Barker et al. 2005). None of these nine species are Declared Plants under the *Agriculture and Related Resources Protection Act, 1976.* Eight are however, classified as an 'Environmental Weeds' by the *Environmental Weed Strategy for Western Australia* (WA Department of Environment and Conservation [DEC] 1999). **Cenchus ciliaris* (Buffel Grass) was located throughout the north-eastern sections of the Study Area, recorded in 15 quadrats and 12 relevé sites in this area. Low density, scattered occurrences of the remaining weed species were detected in the Study Area. *Cenchrus pennisetiformis* (Cloncurry Buffel Grass) has not previously been recorded from Western Australia (DEC 2011)

The Project would result in the removal of approximately 2,543 hectares of vegetation. The majority of the clearance would be of vegetation community 5b: Sparse Tall Shrubland of *Acacia aneura*. Approximately 1,134 ha of this community will be cleared for the proposed mine site infrastructure.

Managed appropriately, the proposed mine will have only a localised direct impact on the flora and vegetation of the Study Area or region. However, indirect impacts could affect a larger area and requires special consideration. Of particular concern are the potential spread of Buffel Grass during road contruction and other earth works; associated increases in the frequencies and intensity of fire; spread of new species of weeds from any new gardens or landscaping established at the site; increased rabbit and camel numbers due to increased availability of water and feed (e.g., lawns); the potential impact of dust on native vegetation; and potential damage to native vegetation and spread of weeds by offroad vehicles driven by mine staff and contractors for work or recreational purposes.

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1. INTRODUCTION

1.1 Project Background and Location

The Wingellina Nickel Project (the Project) is located in the vicinity of the Wingellina Hills, which are part of the Central Ranges region that stretches from Warburton in the west to the Mann Ranges in SA (**Figure 1**). Outback Ecology was commissioned by Metals X Ltd to undertake a Level 2 flora and vegetation survey for the mining proposal.

The proposed total area of disturbance required for the development of the Project is approximately 2,543 hectares. The Project involves mining and mineral processing activities aimed primarily at the recovery of nickel and cobalt from large nickeliferous limonite deposits. Conventional open pit drilling, blast, load and haul methods will be utilised. Waste from subsequent pits may be backfilled into voids created by earlier stages of mining to the extent that it is compatible with safe and efficient mining operations. Ore will be loaded into haul trucks for delivery to the Ore ROM Pad where it will be stockpiled.

The processing plant is planned to be located some 500 m east of and central to the overall strike of the ore body. A dry crushing and screening plant will be established adjacent to the ROM Pad and ore will be fed by a front-end loader into a feed hopper. The ore from the mine will initially be crushed through a primary crusher (ore sizer), before processing via HPAL. The proposed central thickened discharge (CTD) tailing storage facility (TSF) and water storage facility (WSF) location is approximately 500 m to the north-east of the processing plant

The Project disturbance area and the Study Area used for this flora and vegetation assessment are presented in **Figure 2.**

1.2 Report Scope and Objectives

This report documents the results of a desktop survey, two field assessments and a targeted conservation significant flora search conducted in April 2008 and October 2010. The survey was designed and conducted as far as practicable in accordance with the WA Environmental Protection Authority's (EPA's) Position Statement No. 3 Terrestrial Biological Surveys as an Element of Biodiversity Protection (EPA 2002), and Guidance Statement No. 51 Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (EPA 2004). According to Guidance Statement 51, the methodology used qualifies as a Level 2 flora and vegetation survey.

The overall objectives of the flora and vegetation survey were to:

- Produce a comprehensive species list for the Study Area;
- Search for conservation significant flora (including Declared Rare Flora (DRF), Threatened Flora listed in Commonwealth, Northern Territory and South Australian legislation, WA Priority Flora, and other conservation significant flora);

- Search for conservation significant ecological communities (WA Threatened Ecological Communities (TECs) and Priority Ecological Communities (PECs); plant communities considered significant in SA & NT)
- Describe and map vegetation associations over the Study Area; and
- Discuss the potential impacts of the proposed development on the flora and vegetation within the Study Area.

The flora and vegetation assessment involved:

- A desktop review of:
  - A search of the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* Protected Matters database for flora of conservation significance and Threatened Ecological Communities (TEC) known, or likely, to occur within the survey areas;
  - A search of the Department of Environment and Conservation (DEC) *Threatened (Declared Rare) Flora* database, the *Western Australian Herbarium (WAHERB)* database and the *Declared Rare and Priority Flora List* for Rare and Priority flora collected from the Study Area and surrounds;
  - Review of the National Virtual Herbarium to determine significant range extension of flora species;
  - A search of the DEC Threatened Ecological Communities (TEC) database for listings of communities recorded within the Study Area and surrounds;
  - A search of the South Australian herbarium databases for information regarding flora of conservation significance collected from the area within South Australia adjacent to the Study Area;
  - A search of the Northern Territory Department of Natural Resources, Environment and the Arts (NRETA) for flora of conservation significance collected from the area within the Northern Territory adjacent to the Study Area;
  - A limited review of publicly available ecological information pertaining to the Study Area and surrounds.
    - flora species and vegetation communities of conservation significance, potentially present in the Study Area (including species and communities considered to be rare or threatened in WA, or adjacent NT and SA, and species with population in the study area which are highly disjunct from other known populations); and
    - previous flora and vegetation studies conducted in the Study Area and surrounding areas.

- Field surveys incorporating the identification of:
  - all flora species in the Study Area;
  - Conservation significant flora species; and

  - vegetation communities and condition.
- An assessment of the conservation value of flora and vegetation in a local, regional and national context.
- Development of management recommendations for any flora or vegetation identified as being of local, regional or national conservation significance.

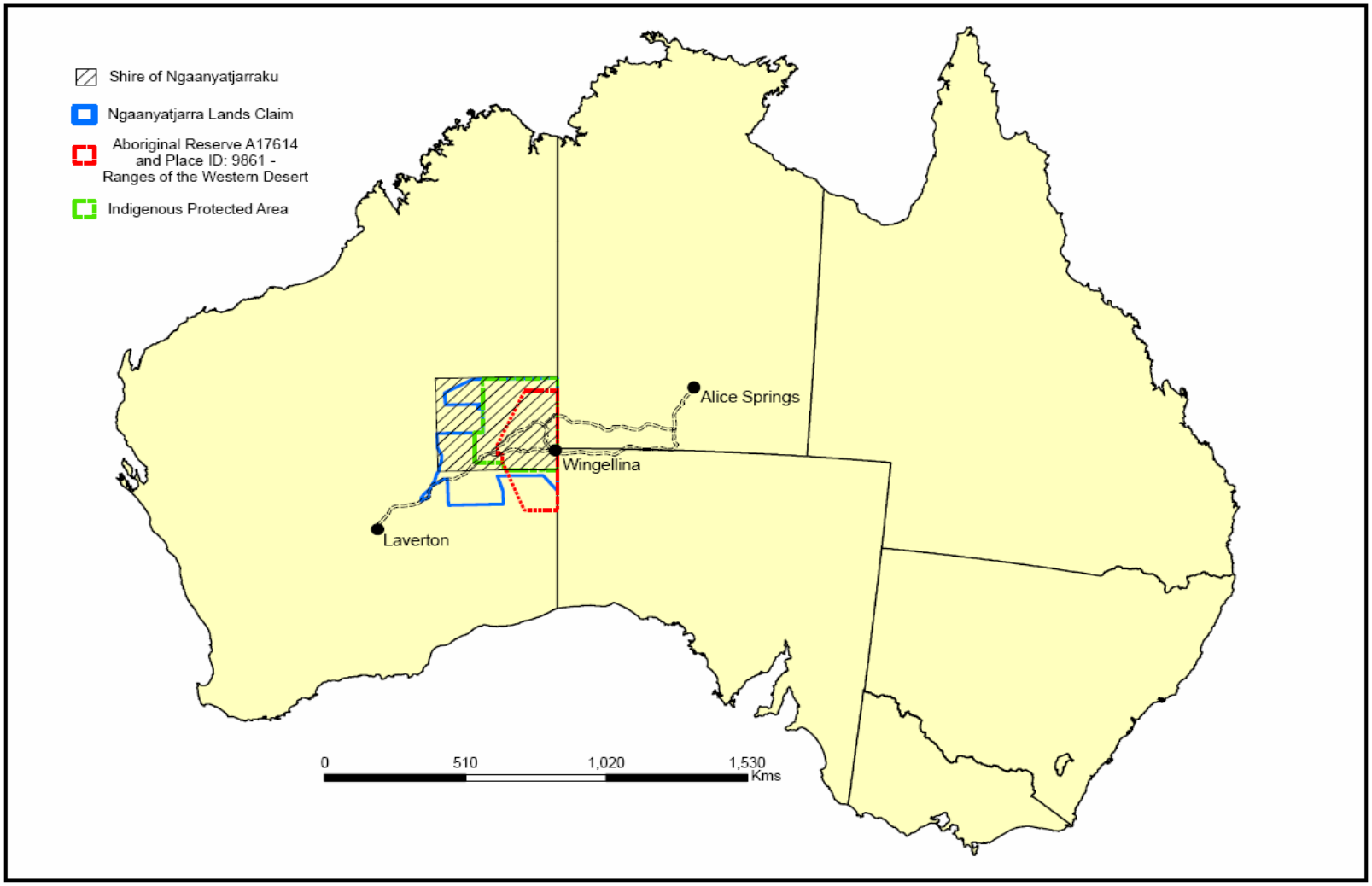


Figure 1: Regional Location of the Wingellina Project

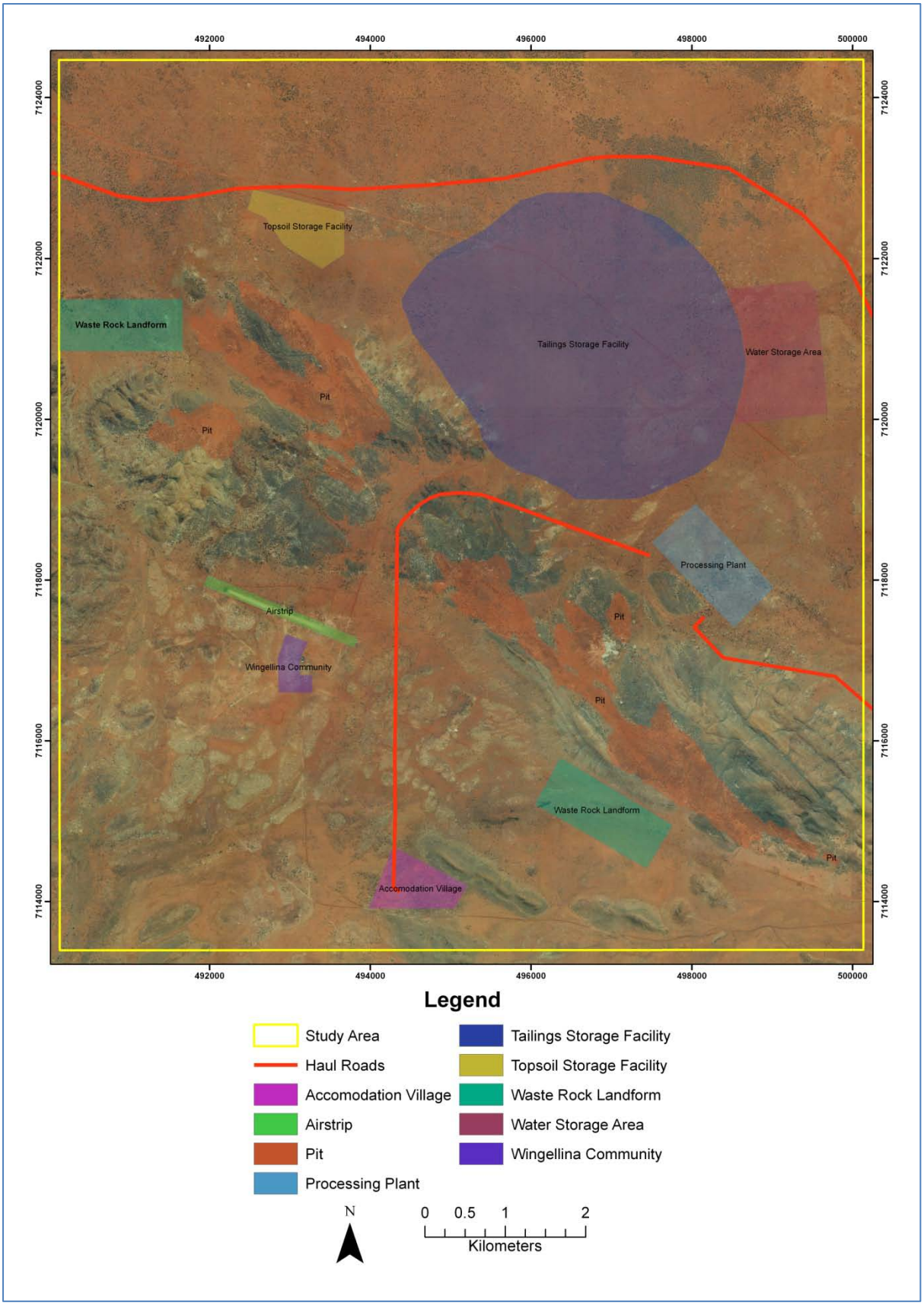


Figure 2: Study Area and Project Conceptual Layout

2. EXISTING ENVIRONMENT

2.1 Biogeographic Region

Thackway and Cresswell (1995) described a system of 85 'biogeographic regions' (bioregions) covering the whole of Australia; the result of collaboration between all state conservation agencies and the Australian Government Department of Environment and Heritage (now the Department of Environment and Water Resources). Bioregions are defined on the basis of climate, geology, landforms, vegetation and fauna.

The Project is located within the Central Ranges Bioregion of the Interim Biogeographic Regionalisation for Australia (or IBRA) (Thackway and Cresswell 1995). The Central Ranges includes three major components, or sub-regions; Mann-Musgrave (CR1), Wataru (CR2) and Everard (CR3). The Wingellina Project is located within the Mann-Musgrave subregion of the Central Ranges bioregion. The Mann-Musgrave subregion is located in WA and the southwest corner of the NT (Graham and Cowan 2001). This subregion is characterised by a high proportion of Proterozoic ranges (both volcanic and quartzites) and derived soil plains, interspersed with red Quaternary sandplains with some Permian exposure (Graham and Cowan 2001).

The sandplains support low open woodlands of either Desert Oak or Mulga over *Triodia basedowii* hummock grasslands, while low open woodlands of Ironwood and Corkwoods over tussock or hummock grasses often fringe the ranges (Graham and Cowan 2001). The ranges support mixed wattle scrub or *Callitris glaucophylla* woodlands over hummock and tussock grasslands.

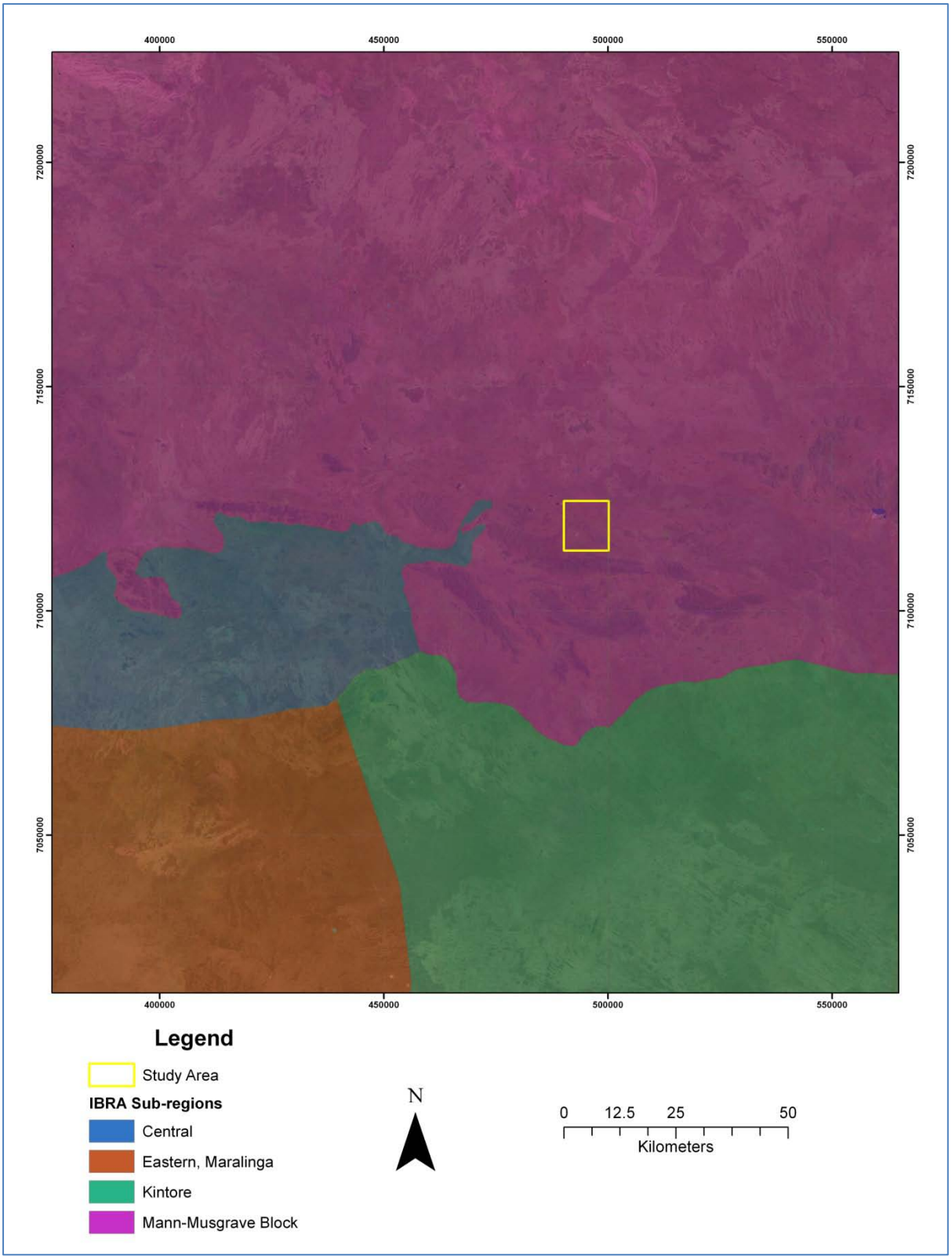


Figure 3: Location of Study Area in relation to the IBRA Sub-regions of Western Australia.

The Study Area lies in the Mann-Musgrave Sub-region of the Central Ranges Bioregion

2.2 Climate

The climate of the Central Ranges is characterised as a true arid desert, with hot summers and mild winters. The region is influenced by a northern tropical/summer climatic pattern with easterly or south easterly prevailing winds. Rainfall is variable, however the majority is received during summer, largely due to the movement of low pressure troughs and tropical lows associated with monsoon troughs moving south in the region. Winters are mild and associated with a high pressure subtropical ridge (BOM 2010).

The closest meteorological station to the Study Area is the Giles station which lies approximately 130 km to the northwest of the Project. Mean annual rainfall recorded at Giles is 283 millimetres (mm), with the majority received between November and March (**Figure 4**). Mean maximum daily temperature of 37.3°C is recorded during January, with the minimum mean temperature of 6.9 °C recorded during July (BOM 2010).

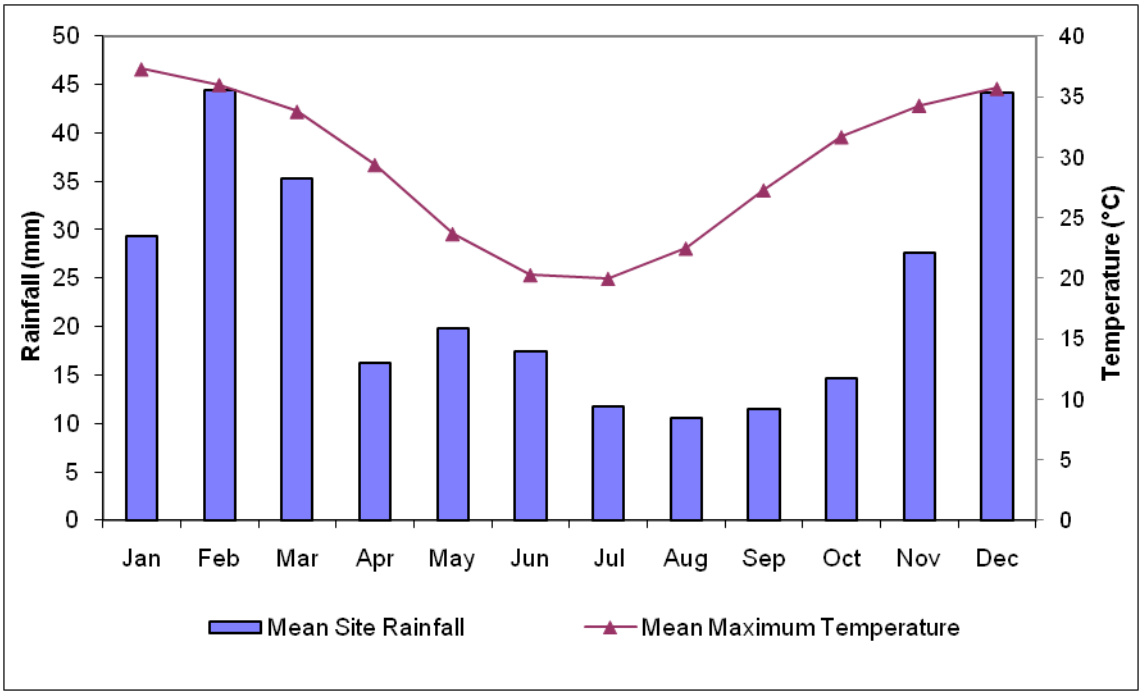


Figure 4: Climate Data for the Giles (013017) Weather Station (BOM 2010)

2.3 Landscape Zones

Tille (2006) described Soil-landscape zones of the Musgrave Range Zone within the Central Australian Ranges Region. Zones within this area include:

- Sandplains and dunes - hills, ranges, plains and some wash plains on Musgrave Complex granite and gneiss (with some volcanic and sedimentary rocks); and
- Red sandy earths - red deep sands, red loamy earths and some stony soils and self-mulching cracking clays.

2.4 Beard Vegetation Mapping within the Study Area

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

The Study Area is located in the Giles Botanical District (Beard 1974). The Giles Botanical District is approximately equivalent to the Central Ranges 1 (Mann-Musgrave Block Subregion) IBRA region. Beard (1974) broadly describes the vegetation of this region in relation to the underlying topography as being very varied, from low rounded quartzite ranges, sandy plains, confused dune systems, to salt lakes and kopi dunes.

Beard (1974) noted that the sandhills of the Giles Botanical District are often vegetated by *Grevillea stenobotrya, Acacia* spp., *Gyrostemon ramulosus, Crotalaria cunninghamii* and *Triodia melvillei.* Interdunal vegetation is typically a shrub steppe including *Hakea lorea* subsp. *suberea* (syn. *Hakea lorea* subsp. *lorea*), *Acacia pruinocarpa, A. aneura, A. cuthbertsonii, A. coriacea, Eucalyptus gamophylla, E. oxymitra, Eremophila forrestii* and *Triodia basedowii.* Beard (1974) also observed groves of *Allocasuarina decaisneana* throughout the region with no apparent pattern in their distribution or density.

Two of the vegetation communities described by Beard (1974) occur within the Study Area consisting of:

- Vegetation Association 19 (a1Li) Low woodland; mulga between sand-ridges (75% of Study Area); and
- Vegetation Association 92 (e24Lb/t2Hi) Hummock grasslands, sparse tree steppe; bloodwood over hard spinifex *Triodia basedowii* (25% of the Study Area).

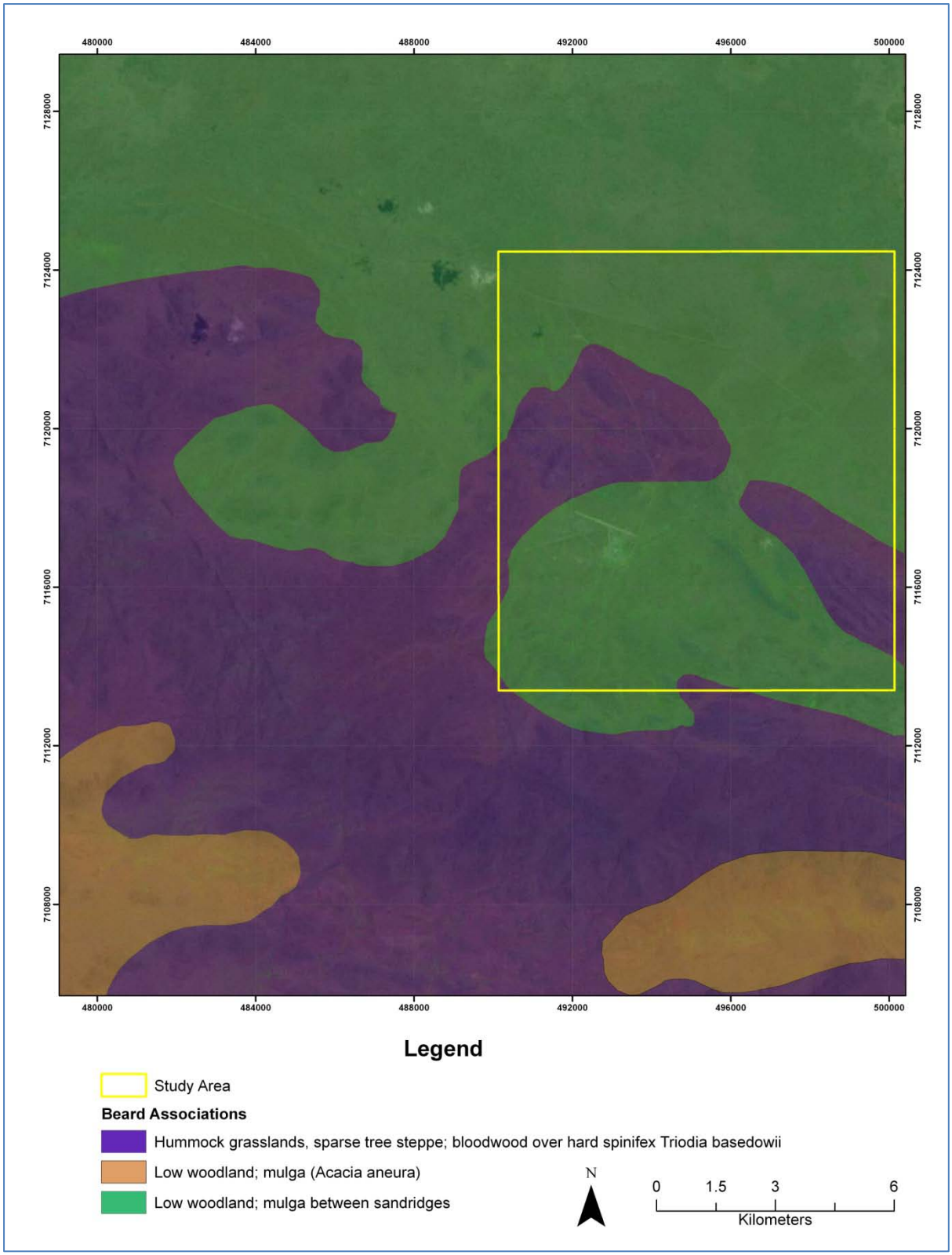


Figure 5: Beard Vegetation Units within and adjacent to the Study Area

2.5 Land Use

2.5.1 Study Area

The Study Area is entirely within Aboriginal Reserve A17614, leased for 99 years to the Ngaanyatjarra Land Council (NLC), and on granted Native Title Land which is managed for and on behalf of the Traditional Owners by the Ngaanyatjarra Council. Metals X has signed a landmark mining agreement with the Traditional Owners and the granted Native Title holders of the Project providing consent for the grant of a Mining Lease and subsequent development of mining operations, subject to State regulatory approvals.

2.5.2 Study Area Surrounds

The Study Area lies within the Western Australian portion of the Mann-Musgrave Block sub-bioregion. The dominant land use for this area is Aboriginal Reserve (94.33%), with other minor land uses including freehold grazing (0.03%), leasehold grazing (1.36%) and Unallocated Crown Land and Crown Reserves (4.28%) (Graham and Cowan 2001).

2.6 Landforms and Landscape Positions

Landforms typically have unique environmental parameters such as slope, surface hydrology, erosion and consequently vegetation. Vegetation types are not always wholly confined to a landform with several types often occurring on the one landform. For the purpose of describing the vegetation, landscape position was used in conjunction with the landform to describe the vegetation.

The landscape positions identified for use in the field assessment included:

- Plains;
- Slopes;
- Hill tops/ridge lines; and
- Drainage lines.

3. SURVEY ASSESSMENT AND METHODOLOGY

A Level 2 survey was undertaken within the Study Area in accordance with the EPA Guidance Statement No 51 (EPA 2004). This level of survey requires a desktop review, incorporating a literature review, database searches and reviews of maps of proposed area of disturbance. The Level 2 survey further describes the flora and vegetation through a series of quadrats (50 m x 50 m) placed within identified vegetation units.

3.1 Desktop review

A review of databases and publicly available information was conducted prior to the field survey, to determine flora species and vegetation types of conservation significance known‘ or likely‘ to occur within the Study Area and surrounds.

3.1.1 Database Searches

A search of the WA Department of Environment and Conservation (DEC) databases, the South Australian Herbarium Records and the Northern Territory Department of Natural Resources, Environment, The Arts and Sports databases was undertaken for a 50 km radius surrounding the co-ordinate 26°02'54''S, 128°57'03''E (GDA94). A 40km radius search was undertaken for the Naturemap and Protected Matters Search Tool from the central point 26°02'54''S, 128°57'03''E as these tools limit the search option to a maximum radius of 40km.

3.1.1.1 Conservation Significant Flora

The following databases and public information sources were searched and reviewed for conservation significant flora:

- DEC Threatened Ecological Communities (TEC) and Priority Ecological Communities (PEC) database (DEC 2010a); and
- Department of Environment and Conservation (DEC) Threatened Flora database (DEC 2010b);
- Declared Rare and Priority Flora List (DEC 2010c);
- Western Australian Herbarium (WAH) Specimen database for Priority species (WAH 2010);
- NatureMap database for all flora species records occurring within the Study Area (DEC 2010d);
- Adelaide Herbarium database (South Australia) (ADHERB 2010);
- Department of Natural Resources, Environment, The Arts and Sports (Northern Territory) database (NRETA 2010); and
- Protected Matters Database Search Tool for Threatened Species and Threatened Ecological Communities (TEC) listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (DSEWPC 2010).

3.1.1.2 Conservation Significant Vegetation Communities

In Western Australia, the DEC recognizes four categories of Threatened Ecological Communities (TECs), as developed by English and Blyth (1997). These include – 'Presumed Totally Destroyed', 'Critically Endangered', 'Endangered' and 'Vulnerable' (**Appendix A**). Other ecological communities that are considered to possibly be under threat but do not meet the survey criteria associated with TECs, are listed under the Department's Priority Ecological Community List under Priorities 1, 2 and 3 (**Appendix A**). Priority communities that are considered to be adequately known, and are rare but not threatened, or which have been recently removed from the threatened list, are classified as Priority 4 and require regular monitoring. Conservation-dependent ecological communities are placed in Priority 5 (**Appendix A**).

In addition to TECs and PEC's, ecosystems may also be described as being 'at risk'. The status of 'at risk' is recognised by the DEC and the Commonwealth Department of Sustainability, Environment,

Water, Population and Communities (DSEWPC). While not conferring any form of legislative protection, the application of the 'at risk' status is a useful tool that highlights ecosystems that may be subject to threatening processes and as such, could potentially become a TEC or PEC in the future.

3.1.2 Literature Review

Previous flora surveys completed in the broader Wingellina Study Area included in this review are;

- Halpern Glick Maunsell. (2002) Acclaim Exploration NL Wingellina Baseline Biological Survey; and
- Robinson, A.C., Copley, P.B., Canty, P.D., Baker, L.M., and Nesbitt, B.J. (2003) A Biological survey of the Anangu Pitjantjatjara Lands, South Australia 1991-2001.

A previous general study which has been conducted around the Study Area was also reviewed as a component of this assessment. This study was:

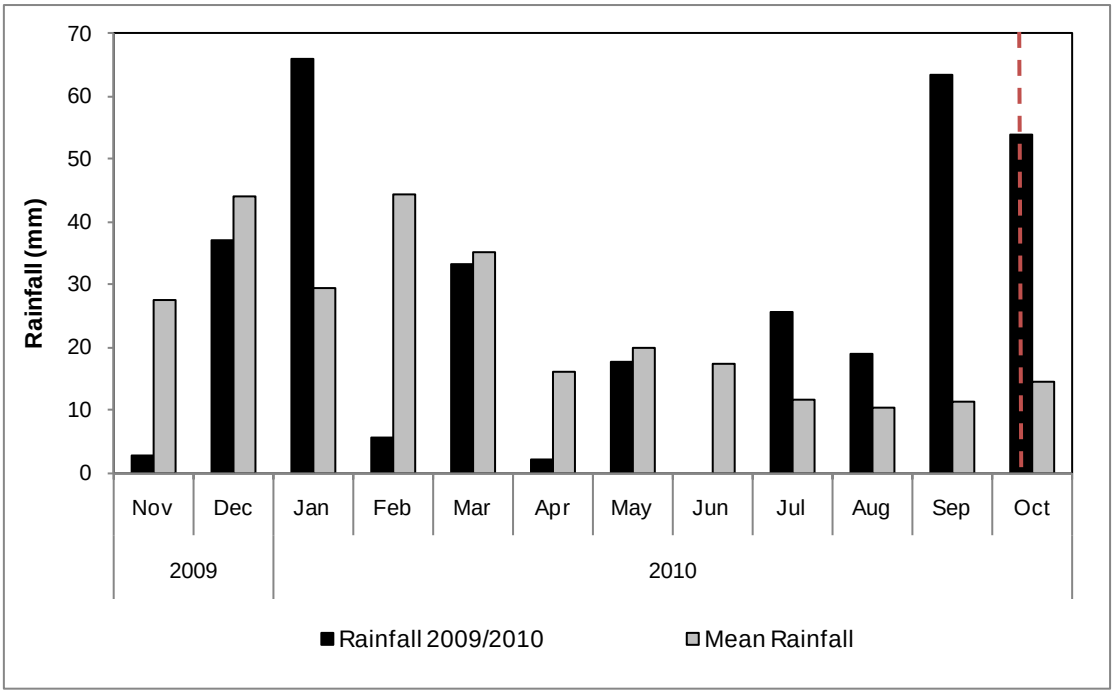
- Graham, D. and Cowan, M. (2001). A Biodiversity Audit of Western Australia's 53 Biogeographic Subregions in 2002. Central Ranges 1 (CR1 – Mann-Musgrave Block subregion). Department of Environment and Conservation, Western Australia.

3.2 Field Survey

3.2.1 Survey Timing and Weather

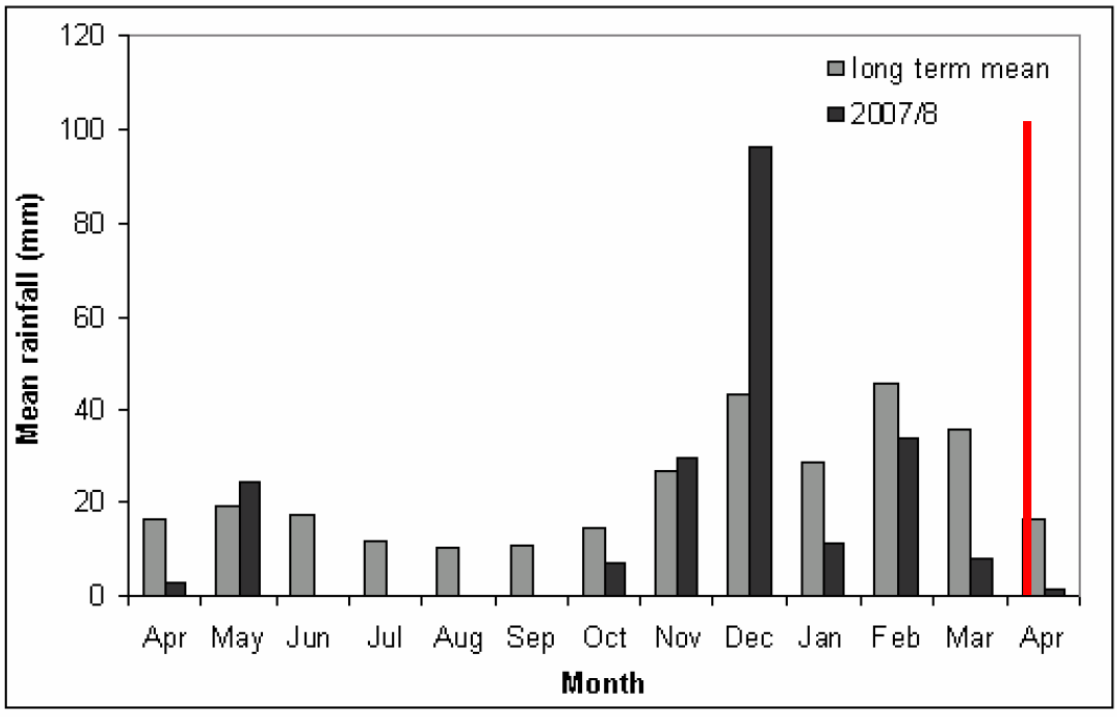
Long-term average monthly rainfall data (Giles Weather Station) shows that a large proportion (64%) of rainfall falls between the months of November and March, with an average of 283 mm of rainfall per year (**Figure 6**).

This report documents the results of flora and vegetation surveys conducted across the Study Area in April 2008 and in October 2010. In the twelve months leading up to the October 2010 survey, an above average rainfall of 326 mm was recorded, with much higher than expected rainfall events occurring in January 2010 and September/October 2010. Rainfall in the three months immediately preceding the survey was higher than average. The higher levels of rain are expected to have triggered germination growth in many species, producing flowers and fruiting bodies enabling greater accuracy in identifications. This compares with below average rainfall leading up to the April 2008 survey (**Figure** 6).



Red Line indicates 2010 Survey Time

Figure 6: 2009/2010 Monthly and Mean Long-term Monthly Rainfall recorded at Giles Weather Station (BOM 2010).



Red Line indicates 2008 Survey Time

Figure 7: 2007/2008 Monthly and Mean Long-term Monthly Rainfall recorded at Giles Weather Station (BOM 2009).

3.2.2 Survey Design and Rationale

Prior to the field surveys, relevant supporting information was reviewed, which included database searches (**Section 3.1.1**), previous vegetation surveys/mapping in the general area (**Section 3.1.2**), topography, and soil landscape mapping (Tille 2006).

The distribution of vegetation communities and subsequent establishment of survey quadrats was planned using aerial photography, with alterations made following an on-ground review of the Study Area. During the 2008 survey, data was collected from thirty quadrats (30 m x 30 m) (Appendix B). Where a quadrat was not suitable for the location, appropriate dimensions where used ensuring the same total area searched. Twenty six of these quadrats were re-surveyed in 2010 but using an enlarged quadrat size (50 m x 50 m) to enable more comprehensive sampling (Appendix B). A further seven new quadrats were also set up and sampled in 2010 (Figure 10, Appendix B). Where possible, a minimum of two quadrats were established within each vegetation community. Each quadrat was orientated in a north-south east-west direction with a GPS reading taken at each corner.

For each quadrat, the following information was recorded:

- GPS Location (recorded in GDA94 UTM 50K) (**Appendix B**);
- a photograph taken of the vegetation taken from the NW corner;
- habitat type;
- vegetation condition, based on the Keighery scale (Keighery 1994) (**Appendix C**);
- vegetation description, based on the vegetation structural classification by Keighery (1994)(**Appendix D**);
- species present with estimated height and percentage foliage cover;
- topographic position;
- slope and aspect;
- soil type;
- presence of outcropping and exposed rock type;
- bare ground and litter percentages;
- estimated time since fire; and
- disturbance level and description.

Relevé data was also collected from 47 sites, in 2010 (**Appendix B**). A relevé is a description of a homogenous stand of vegetation without the boundaries imposed by a quadrat, the results of which are not used in statistical analysis. Relevés allow for the dominant species and unique features of a site to be captured quickly, allowing for a more accurate representation of the vegetation to be mapped and anomalies across the site to be captured. Relevé data provides more data for the description and mapping of vegetation.

Datasheets with the quadrat and relevé information are included in **Appendix E**.

Other flora species of interest were opportunistically observed/collected within the Study Area and recorded. These species were entered into Outback Ecology's Site Species database as an opportunistic record.

3.2.3 Identification of Flora Specimens

Plants were collected and pressed for verification and identification. Specimens were identified with reference to taxonomic guides and WA Herbarium or NT Herbarium samples. A species list was compiled using nomenclature from Paczkowska and Chapman (2000) (**Appendix F**).

3.2.4 Survey for Flora of Conservation Significance

A targeted flora search was conducted for Priority (P) and Declared Rare Flora (DRF) identified as potentially occurring in the Study Area (**Section 4.1.3**). Locations of conservation significant flora identified in the database searches were plotted on aerial photography to identify any occurring within the Study Area. Likely habitat of listed priority and DRF species were identified prior to undertaking the field survey ensuring that all habitats potentially occurring within the Study Area were searched. Where known Priority Flora was located, the GPS position and photographs were taken and population counts conducted.

3.2.5 Vegetation Mapping and Condition

Prior to the survey, vegetation units were identified as far as practicable on aerial photographs of the Study Area in conjunction with relevant supporting information (listed in **Section 3.1**). Quadrat data and field observations were used to refine mapped vegetation community boundaries. Vegetation communities were described using the Keighery (1994) vegetation classification (**Appendix D**).

3.2.6 Statistical Analysis

Data was entered into PRIMER 6 with all taxa included in the analysis. Analysis was carried out on a presence/absence basis, producing a dendrogram of site relationships that were used to validate broad floristic formations and vegetation communities observed during the field survey.

3.2.7 Survey Personnel

Vegetation and flora field survey and reporting was undertaken by the following personnel

2010 Field Surveys

- Richard Floyd (Outback Ecology);
- Andrew Mitchell (Pilbara Flora);
- Charles Newland(Pilbara Flora); and
- Shane Chalwell (Pilbara Flora).

2008 Field Surveys

- Brett Neasham (Outback Ecology); and
- Belinda Newman (Outback Ecology).

Specimen identifications were undertaken by:

2010 Field Surveys

- David Albrecht (Alice Springs Herbarium);
- Andrew Mitchell (Pilbara Flora) and
- Jayden O'Brien (Outback Ecology).

2008 Field Surveys

- Brett Neasham (Outback Ecology);
- Belinda Newman (Outback Ecology);
- Aleida Williams (Outback Ecology);
- David Leach (Outback Ecology); and
- Helen Vonow (SA Herbarium).

3.2.8 Constraints and Limitations

The EPA (2004) lists a number of possible limitations and constraints that can impinge on the adequacy of flora surveys. These are listed in **Table 1** with an assessment relating to the 2010 survey. All factors identified by the EPA (2004) were considered in the design of this survey, and none were determined to be a significant constraint.

Table 1: Summary of Potential Flora Survey Constraints

Aspect	Constraint	Comment regarding the flora and vegetation survey
Competency/experience of consultants	No	Members of the survey team were flora specialists employed by Outback Ecology, or sub-consultants, and have many years experience undertaking flora surveys of this kind within Western Australia.
Scope	No	The scope was clearly defined and realistically achievable within the designated timeframe.
Proportion of flora identified	No	Of the 358 taxa collected only 31 taxa could not be identified to species level. Unidentifiable taxa were compared to conservation significant species in order to remove the possibility of a missed significant species.
Information sources (e.g. historic or recent)	No	A number of local and regional studies have been carried out. Available data was reviewed prior to commencement of the survey.

Aspect	Constraint	Comment regarding the flora and vegetation survey
Proportion of task achieved, and further work which might be needed	No	Proposed sites were re-assessed on the ground, and all vegetation communities were examined.
Timing / weather / season / cycle	No	High rainfall event two months prior to the initial survey (May) increased flowering and growth of short lived species, and rainfall shortly before the second survey (July) would have induced further growth. A survey may have been beneficial either late or early in the year to detect summer flowering however is unlikely to have significantly affected vegetation types.
Disturbances	No	Disturbance as a result of exploration activities was in some areas high and was not able to mapped, rating as Degraded. A small area (approx. 34 ha) along the south-eastern boundary was 'Completely Degraded' from previous mining activities. The area remaining rated, 'Good' to 'Excellent' with the disturbances not posing an issue for the mapping of vegetation types or the targeted DRF and priority search.
Intensity	No	Survey intensity was in accordance with Guidance Statement 51.
Completeness	No	The majority of the area was traversed on foot with at least two quadrats placed within each vegetation community. Surveys were undertaken in both a peak flowering period (spring 2010) and in Autumn 2008. The survey is considered complete.
Resources	No	WAH specimens, taxonomic guides, DEC, SA Herbarium and NT Herbarium Database Searches and the Florabase database, were all used to prepare for the fleld surveys and used for the confirmation of any species where their identification was uncertain. Resources were adequate to carry out the survey.
Remoteness / access problems	No	All survey quadrats were accessible by 4WD vehicle and/or on foot. While terrain was difficult to traverse all areas were covered and access was not considered a limitation.
Availability of contextual information	No	Information was available for the Interim Biogeographic Regionalisation for Australia (IBRA) Chichester subregion, FloraBase, DEC lists, SA and NT Herbarium data and BoM.

4. RESULTS AND DISCUSSION

4.1 Desktop Review

4.1.1 EPBC Protected Matters Database Search

No threatened plant species or Threatened Ecological Communities (TECs) as defined under the EPBC Act 1999 (DSEWPC 1999) were identified as occurring within the Study Area (DSEWPC 2010).

4.1.2 DEC Database Search – Threatened and Priority Ecological Communities

A search of the DEC TEC-PEC database (Reference: 16-0910) for an area bound by a radius of 50 km from the co-ordinates 26°02'54''S and 128°57'03''E (GDA94) was undertaken. This search identified no Threatened or Priority Ecological Communities. No 'at risk' ecosystems have been identified in the Western Australian part of the CR1 bioregion (Graham and Cowan 2001).

4.1.3 Database Searches – Declared Rare, Priority Flora, and Threatened Flora

A total of 64 taxa ascribed a conservation code have been collected in the search area in Western Australia, South Australia and the Northern Territory (**Table 3**). None of these taxa are considered Declared Rare Flora, as defined under the Western Australian *Wildlife Conservation Act 1950*. Four Priority taxa (as defined by the DEC) have been lodged with the Western Australian Herbarium from the Study Area in WA, and six other species that are ranked as Priority species in Western Australia have been collected close by in the Northern Territory and/or South Australia, but not in Western Australia in the search area. Based upon habitat preferences of these species, there is potential that they may be present in Western Australia.

Conservation codes and their application differed between WA, SA and NT databases. Five Priority species in WA, *Calotis latiuscula* (P3), *Acacia calcicola* (P4), *Eucalyptus sparsa* (P3), *Euphorbia parvicaruncula* (P1), and *Stackhousia clementii* (P1), do not have conservation codes in SA or NT, and two of them (the *Calotis* and *Stackhousia*) hold a ranking of LC (Least Concern) in the NT. Three species, *Samolus eremaeus, Dampiera roycei* and *Ophioglossum polyphyllum,* are considered rare by SA but are not assigned conservation codes in either WA or NT.

A number of species that have been listed as occurring within the 50 km search area are unknown in the Western Australian Flora, not having been collected in this State.

For the purpose of this report, conservation codes are applied according to the situation in Western Australia. For this reason the nine species that have Western Australian Conservation Codes are considered of primary importance. Species with conservation rankings in other States are also treated as significant.

No DRF (Reference: 48-1010), as defined under the Western Australian Wildlife Conservation Act 1950, have been collected from within 50 km of the Study Area. Six Priority (P) Flora have previously been collected and vouchered at the WA Herbarium from within 50 km of the Study Area (**Table 2**). Of these, two were Priority 1, one was Priority 2 and three were Priority 3

All known locations of Priority flora were assessed to determine if any occurred inside or within close proximity to the Study Area. One conservation significant flora species, *Menkea lutea* (Priority 1) had previously been recorded within the Study Area adjacent to the Wingellina Airstrip (WAHERB 2010). No other conservation significant flora species have previously been recorded within the Study Area.

The habitat for each DRF and Priority taxa previously recorded within 50 km of the Study Area was reviewed to determine the likelihood of occurrence within the Study Area. Three species were identified as potentially occurring within the Study Area:

- *Calotis latiuscula;*
- *Menkea lutea*; and
- *Euphorbia parvicaruncula.*

Table 2: Summary of Database Search Results for Flora of Conservation Significance collected in the Region within which the Wingellina Project is located.

The table summarises the results of DEC, SA herbarium (South Australia) and NRETA (Northern Territory) database searches based on a centre of 26º03'16"S, 128º56'53"E and a radius of 50 km. Definitions of conservation codes for each state/territory are given in **Appendix A**; NT= near threatened, V=vulnerable' R=rare; P=priority, DD= Data Defficient; LC= least concern, No code=no conservation code assigned. No record= species not listed from search area, in database search results, Unknown=unknown from state flora.

Family	Species	Western Australia		South Australia		Northern Territory	
		Conservation code	Number of records	Conservation code	Number of records	Conservation code	Number of records
APIACEAE	*Trachymene bialata*	No code				NT	4
ASTERACEAE	*Calotis latiuscula*	P3	4	No code	4	LC	
ASTERACEAE	*Chthonocephalus pseudevax*	No code				NT	3
ASTERACEAE	*Minuria multiseta*	No code				NT	1
ASTERACEAE	*Rhodanthe laevis*	No code				NT	1
BRASSICACEAE	*Arabidella nasturtium*	No code				NT	1
BRASSICACEAE	*Cuphonotus andraeanus*	No code				NT	1
BRASSICACEAE	*Menkea lutea*	P1	1	R	5	Unknown	
BRASSICACEAE	*Menkea sphaerocarpa*	No code				NT	1
CAMPANULACEAE	*Lobelia gibbosa* var. *gibbosa*	No code				NT	2
CELASTRACEAE	*Stackhousia clementii*	P1	No record	No code	1	LC	3

Family	Species	Western Australia		South Australia		Northern Territory	
		Conservation code	Number of records	Conservation code	Number of records	Conservation code	Number of records
CHENOPODIACEAE	*Dysphania sphaerosperma*	No code				NT	1
CHENOPODIACEAE	*Einadia nutans* subsp. *nutans*	No code				NT	3
CHENOPODIACEAE	*Maireana lanosa*	No code				NT	1
CHENOPODIACEAE	*Maireana pentatropis*	No code				NT	1
CHENOPODIACEAE	*Tecticornia pruinosa*	No code				NT	2
EPACRIDACEAE	*Leucopogon sonderensis*	Unknown				NT	3
EUPHORBIACEAE	*Euphorbia parvicaruncula*	P1	No record	No code	1	No code	
EUPHORBIACEAE	*Monotaxis luteiflora*	No code				NT	2
EUPHORBIACEAE	*Poranthera leiosperma*	No code				NT	2
FABACEAE	*Sida calyxhymenia*	No code				NT	5
FABACEAE	*Acacia abbreviata*	Unknown				NT	1
FABACEAE	*Acacia ammobia*	Unknown				NT	21
FABACEAE	*Acacia auricoma*	P3	No record	Unknown	No record	NT	18
FABACEAE	*Acacia calcicola*	P4	No record	No code	1	Unknown	
FABACEAE	*Senna artemisioides* subsp. *glaucifolia*	No code				NT	1
FRANKENIACEAE	*Frankenia punctata*	No code				NT	2
GOODENIACEAE	*Dampiera dentata*	No code				NT	5
GOODENIACEAE	*Dampiera roycei*	No code		R	1	LC	
GOODENIACEAE	*Goodenia brunnea*	Unknown		R	1	NT	1

Family	Species	Western Australia		South Australia		Northern Territory	
		Conservation code	Number of records	Conservation code	Number of records	Conservation code	Number of records
GOODENIACEAE	*Goodenia glandulosa*	No code				NT	1
GOODENIACEAE	*Goodenia occidentalis*	No code				NT	2
GOODENIACEAE	*Goodenia rupestris*	Unknown				NT	1
HALORAGACEAE	*Glischrocaryon aureum* var. *angustifolium*	No code				NT	2
JUNCACEAE	*Juncus continuus*	Unknown				NT	4
LAMIACEAE	*Microcorys macredieana*	P3	No record	Unknown	No record	NT	1
LAMIACEAE	*Prostanthera wilkieana*	No code				NT	2
LAMIACEAE	*Teucrium grandiusculum* subsp. *grandiusculum*	P2	1	V	4	NT	1
LILIACEAE	*Arthropodium strictum*	Unknown				NT	2
LILIACEAE	*Caesia chlorantha*	No code				NT	1
LILIACEAE	*Tricoryne elatior*	No code				NT	3
LILIACEAE	*Wurmbea centralis* subsp. *centralis*	No code				NT	11
LILIACEAE	*Wurmbea deserticola*	No code				NT	1
LYTHRACEAE	*Lythrum paradoxum*	P3	1	Unknown		Unknown	
MALVACEAE	*Hibiscus brachychlaenus*	No code				NT	1
MYRTACEAE	*Eucalyptus sparsa*	P3	No record	No code	5	DD	13
MYRTACEAE	*Melaleuca faucicola*	Unknown				NT	4
MYRTACEAE	*Melaleuca fulgens* subsp. *corrugata*	No code				NT	2

Family	Species	Western Australia		South Australia		Northern Territory	
		Conservation code	Number of records	Conservation code	Number of records	Conservation code	Number of records
OPHIOGLOSSACEAE	*Ophioglossum lusitanicum*	No code				NT	2
OPHIOGLOSSACEAE	*Ophioglossum polyphyllum*	No code		R	1		
POACEAE	*Enneapogon caerulescens*	No code				NT	3
POACEAE	*Eragrostis sterilis*	Unknown				NT	5
POACEAE	*Eriachne scleranthoides*	Unknown				NT	7
PRIMULACEAE	*Samolus eremaeus*	No code		R	2		
PROTEACEAE	*Grevillea pterosperma*	No code				NT	2
PROTEACEAE	*Hakea standleyensis*	Unknown				NT	1
RHAMNACEAE	*Stenanthemum petraeum*	No code				NT	11
SANTALACEAE	*Santalum acuminatum*	No code				V	5
SCROPHULARIACEAE	*Eremophila alternifolia*	No code				NT	9
SCROPHULARIACEAE	*Eremophila clarkei*	No code				NT	4
SCROPHULARIACEAE	*Eremophila maculata* subsp. *brevifolia*	No code				NT	1
STERCULIACEAE	*Rulingia luteiflora*	No code				NT	3
VERBENEACEAE	*Pityrodia loxocarpa*	No code				NT	1
XANTHORRHOEACEAE	*Xanthorrhoea thorntonii*	No code				NT	4
ZYGOPHYLLACEAE	*Zygophyllum ovatum*	No code				NT	1

4.1.4 Review of Existing Reports

HGM Maunsell 2002; Wingellina Baseline Biological Survey.

This report included an inventory of all the flora and fauna recorded during a Level 1 survey of the surrounds of the Wingellina community in April 2002 (an area of approx. 100km^2). This survey was undertaken in the Central Ranges (CR1 – Mann-Musgrave Block IBRA subregion) Central Ranges Bioregion (Graham and Cowan 2001).

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

Seven vegetation communities were identified during the survey, none of which were restricted to the survey area. None of the plant communities recorded in the survey are nationally listed as Threatened Ecological Communities under the *EPBC Act*.

Three communities were considered to be regionally significant consisting of:

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

These vegetation communities were considered to be regionally significant due to their apparent isolation and underlying geomorphology. This study consisted predominantly of desk-top assessment with limited ground truthing of the remotely captured data.

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

This report includes an inventory of all the flora and fauna recorded during a survey of the Anangu-Pitjantjatjara (AP) lands of South Australia. It forms part of a comprehensive biological survey of South Australia spanning 10 years. A total of 14,132 plants were recorded in the Anangu-Pitjantjatjara lands with only 38% of those records represented as vouchered specimens in the South Australian State herbarium, attesting to the paucity of documented botanical information of the area. A number of species recorded in this survey are also known from collections within Western Australia. It is possible that the distribution of some of the species recorded in the South Australian survey would extend to the area of tenement E69/535.

In terms of comparable vegetation associations, the relevance of the South Australian survey to tenement E69/535 is likely to be limited as areas in closest proximity to tenement E69/535, were highly restricted due to cultural sensitivities and restricted access. Sites that were visited in close proximity to tenement E69/535 were limited to the tops of ranges and midslope areas. Opportunistic records from the nearby Mann Range, Tomkinson and Musgrave Ranges suggest that vegetation associations in this region are largely the product of underlying geology and topography.

Outback Ecology (2009) Wingellina Nickel Project; Baseline Vegetation and Flora Assessment.
A total of 176 specimens were collected during the April 2008 survey of the Wingellina Project Area, of which 154 were identified to species level. Of the identified flora, there were 100 taxa (including subspecies and variants) from 40 genera and 24 families. The flora was dominated by Fabaceae, with 17 taxa from one genus and Poaceae, with 16 taxa from 11 genera recorded.

Seven vegetation units were described from this survey of the Wingellina Project Area. While the majority of the vegetation was *Acacia aneura* (Mulga) Woodland, a number communities dominated by *Eucalyptus* Shrub Mallee occurred on the hills in the Project Area,. Vegetation condition in the Wingellina area varied from Excellent to Degraded. The main sources of disturbance were considered to be human activities (including repeated fires) and grazing by feral camels. One alien taxon, **Cenchrus ciliaris* (Buffel grass), was recorded during the survey.

No Declared Rare or Priority Flora were recorded during the survey. No Threatened or Priority Ecological Communities were recorded from the survey area.

Graham, D. and Cowan, M. (2001). A Biodiversity Audit of Western Australia's 53 Biogeographic Subregions in 2002. Central Ranges 1 (CR1 – Mann-Musgrave Block subregion). Department of Environment and Conservation, Western Australia.

The Biodiversity Audit prepared by Graham and Cowan (2001) identified that a high proportion of Proterozoic ranges including both volcanic and quartzites and derived soil plains, interspersed with red Quaternary sandplains with some permian exposure, occur within the Mann-Musgrave subregion.

Described as the 'Giles Botanical District', the sandplains support low open woodlands of either Desert Oak or Mulga over *Triodia basedowii* hummock grasslands. Low open woodlands of Ironwood (*Acacia estrophiolata*) and Corkwoods (*Hakea* spp.) over tussock and hummock grasses often fringe ranges. The ranges support mixed wattle scrub or *Callitris glaucophylla* woodlands over hummock and tussock grasslands.

The climate is Arid, with a mean rainfall of 200mm comprising summer and winter rain.

Graham and Cowan (2001) did not identify any Threatened Ecological Communities (TECs) in CR1 bioregion. Further to this, no "at risk" ecosystems were identified in CR1. The authors did however find that altered fire regimes and the potential for intense wildfires pose the greatest risk to ecosystems of this region. Introduced grazers (e.g. camels) and predators (cats) pose the next greatest risk to flora and fauna of the bioregion. Introduction of weeds along roadsides and water courses also threaten pristine ecosystems of the region.

The following conservation significant flora species were identified as present in the CR1 Bioregion: *Acacia auricoma*, *A. calcicola*, *Calotis latiuscula*, *Comesperma viscidulum*, *Dicrastylis gilesii*, *Eucalyptus sparsa*, *Fuirena nudiflora*, *Grevillea* sp. Rawlinson Range, *Isotropis winneckei*, *Menkea lutea*, *Neurachne lanigera*, *Prostanthera centralis* and *Schoenus centralis.*

4.2 Field Survey Results

4.2.1 Flora Composition

A total of 324 species were collected during the April 2008 and October 2010 surveys of the Wingellina Study Area, representing 45 families and 130 genera. Dominant families include Poaceae (55 taxa), Fabaceae (54 taxa) Chenopodiaceae (31 taxa), Malvaceae (29 taxa) and Scrophulariaceae (17 taxa) (**Table 3**). Dominant genera include *Acacia* (27 taxa)*, Eremophila* (15 taxa), *Senna* (10 taxa), *Eucalyptus* (11 taxa), *Sclerolaena* (9 taxa), *Solanum* (9 taxa), and *Ptilotus* (8 taxa) (**Table 4**). The floristic makeup of flora recorded in the Study Area is indicative of vegetation found in rocky and arid central Australian habitats, particularly the high number of Grasses, Eremophilas, Malvaceae and Eucalypts. The relatively high number of Asteraceae is indicative of good winter and spring rainfall prior to the 2010 survey.

The full species list can be found in **Appendix F.**

Table 3: Numbers of Taxa from each Family recorded within the Wingellina Study Area during April 2008 and October 2010 Surveys

Family	# taxa	Family	# taxa
Poaceae	55	Apocynaceae	2
Fabaceae	54	Campanulaceae	2
Chenopodiaceae	31	Geraniaceae	2
Malvaceae	29	Nyctaginaceae	2
Asteraceae	25	Rubiaceae	2
Scrophulariaceae	17	Santalaceae	2
Myrtaceae	15	Apiaceae	1
Amaranthaceae	12	Araliaceae	1
Brassicaceae	12	Asparagaceae	1
Solanaceae	12	Celastraceae	1
Euphorbiaceae	8	Chloanthaceae	1
Goodeniaceae	8	Colchicaceae	1
Zygophyllaceae	8	Cyperaceae	1
Loranthaceae	5	Gyrostemonaceae	1
Proteaceae	5	Hemerocallidaceae	1
Sapindaceae	5	Moraceae	1
Boraginaceae	4	Oleaceae	1
Convolvulaceae	4	Pittosporaceae	1
Cucurbitaceae	4	Plantaginaceae	1
Lamiaceae	4	Polygalaceae	1
Portulacaceae	4	Polygonaceae	1
Haloragaceae	3	# taxa	324
Pteridaceae	3	# genera	130
Acanthaceae	2	# families	45

Table 4: Number of Taxa from each Genus recorded within the Wingellina Study Area during April 2008 and October 2010 Surveys

Genera	# taxa	Genera	# taxa
Acacia	27	Corymbia	2
Eremophila	15	Dysphania	2
Eucalyptus	11	Enchylaena	2
Senna	10	Eriachne	2
Sclerolaena	9	Erodium	2
Solanum	9	Grevillea	2
Ptilotus	8	Hakea	2
Triodia	8	Haloragis	2
Abutilon	7	Leiocarpa	2
Euphorbia	7	Menkea	2
Maireana	7	Panicum	2
Sida	7	Paraneurachne	2
Aristida	5	Portulaca	2
Dodonaea	5	Psydrax	2
Enneapogon	5	Pterocaulon	2
Euphorbia	5	Rhagodia	2
Goodenia	5	Santalum	2
Hibiscus	5	Scaevola	2
Dichanthium	4	Schoenia	2
Digitaria	4	Senecio	2
Eragrostis	4	Stenopetalum	2
Zygophyllum	4	Wahlenbergia	2
Amyema	3	Acetosa	1
Chrysocephalum	3	Aluta	1
Indigofera	3	Alyogyne	1
Lepidium	3	Amaranthus	1
Swainsona	3	Amphipogon	1
Tribulus	3	Arabidella	1
Zygophyllum	3	Austrostipa	1
Astrebla	2	Bonamia	1
Atriplex	2	Bothriochloa	1
Boerhavia	2	Brachyachne	1
Brachyscome	2	Brachychiton	1
Calotis	2	Caesia	1
Cenchrus	2	Calandrinia	1
Cheilanthes	2	Capsella	1
Citrullus	2	Chamaesyce	1
Convolvulus	2	Codonocarpus	1
Crotalaria	1	Paraceterach	1

Table 4 (cont.): Number of Taxa from each Genus recorded within the Wingellina Study Area during October 2010

Genera	# species	Genera	# species
Cucumis	1	*Paspalidium*	1
Cymbopogon	1	*Petalostylis*	1
Daucus	1	*Pimelea*	1
Dicrastylis	1	*Pittosporum*	1
Duboisia	1	*Plantago*	1
Einadia	1	*Rhodanthe*	1
Eleocharis	1	*Rhyncharrhena*	1
Evolvulus	1	*Rhynchosia*	1
Ficus	1	*Rostellularia*	1
Glycine	1	*Rulingia*	1
Gossypium	1	*Rulingia*	1
Halgania	1	*Salsola*	1
Harmsiodoxa	1	*Sarcostemma*	1
Heliotropium	1	*Sauropus*	1
Hibbertia	1	*Sigesbeckia*	1
Hydrocotyle	1	*Sisymbrium*	1
Jasminum	1	*Sonchus*	1
Leucochrysum	1	*Spartothamnella*	1
Lysiana	1	*Stackhousia*	1
Malvastrum	1	*Templetonia*	1
Micromyrtus	1	*Themeda*	1
Minuria	1	*Thyridolepis*	1
Monachather	1	*Thysanotus*	1
Mukia	1	*Trichodesma*	1
Nicotiana	1	*Wurmbea*	1
Olearia	1	# taxa	324
Omphalolappula	1	# genera	130

4.2.2 Introduced Species

Eight introduced species, **Cenchrus ciliaris* (Buffel Grass), **Cenchrus pennisetiformis* (Cloncurry Buffel Grass), **Acetosa vesicaria* (Ruby Dock), **Capsella bursa-pastoris* (Shepherd's Purse), **Malvastrum americanum* (Spiked Malvastrum), **Citrullus colocynthis* (Camel Melon) **Citrullus lanatus* (Pie Melon) and **Tribulus terrestris* (Caltrop) were recorded within the Study Area. **Portulaca oleracea* (Common Purslane) was also recorded. This species is considered in Western Australia to have indigenous and introduced forms (DEC 2011) but to be indigenous in South Australia (Barker et al. 2005). None of these nine species are Declared Plants under the *Agriculture and Related Resources Protection Act, 1976.* Eight are however, classified as an 'Environmental Weeds' by the *Environmental Weed Strategy for Western Australia* (WA Department of Environment and

Conservation [DEC] 1999). **Cenchus ciliaris* (Buffel Grass) was located throughout the north-eastern sections of the Study Area, recorded in 15 quadrats and 12 relevé sites in this area. Low density, scattered occurrences of the remaining weed species were detected in the Study Area. *Cenchrus pennisetiformis* (Cloncurry Buffel Grass) has not previously been recorded from Western Australia (DEC 2011).

4.2.3 Threatened and Priority Flora

Four Priority taxa were recorded within the Study Area during the survey. *Menkea lutea* (Priority 1), *Goodenia lunata* (Priority 1), *Euphorbia inappendiculata* (Priority 3) and *Calotis latiuscula* (Priority 3) were identified. Large numbers of *Menkea lutea* were recorded in the Mitchell Grass dominated southern sections of the Study Area. While the proposed Accommodation Camp may impact on a small number of individuals, this potential loss is expected to be minor considering the extensive distribution of this species throughout the Mitchell Grass Grasslands in the southern sections of the Study Area. Australian distribution of the four priority species is shown in **Figure 8.**

***Menkea lutea* (Priority 1)**

*Menkea lutea (*Brassicaceae) is an erect or prostrate herb found in the Central Ranges region of Western Australia and South Australia, with outlying populations recorded in the north Murchison region of WA and eastern South Australia (**Figure 8**). The species is listed as rare in South Australia. (Barker et al. 2005).

Within the Study Area, *M. lutea* was recorded predominantly in the southwest corner in Mitchell grass plains (Veg type 5a) (**Figure 10**). Relatively extensive populations were recorded away from proposed pit and infrastructure areas. It is therefore considered likely that mining activities will have minimal direct impact on the majority of populations within the Study Area. Since the species is rare throughout its range in Australia, priority should be given to protecting the main populations of the species in the study area from off-road vehicles and uneccessary damage during road construction activities.

***Goodenia lunata* (Priority 1)**

Goodenia lunata (Goodeniaceae) is a slender, erect or ascending perennial herb recorded sparingly in Western Australia but extensively throughout the Northern Territory, South Australia, New South Wales and Victoria, and a presence in the Study Area can be considered to be at the western extent of its range (**Figure 8**). *Goodenia lunata* is common (and has no conservation rating) in northern South Australia and southern Northern Territory (Barker et al. 2005; Albrecht et al. 2007)

Within the Study Area *Goodenia lunata* was recorded from a single location in the south of the Study Area, on Mitchell grass plains (Veg type 5a) (**Figure 10**). Since this location is away from proposed

pit and infrastructure areas, it is unlikely that that mining activities will have a direct impact on the species in the study area.

***Euphorbia inappendiculata* (Priority 3)**

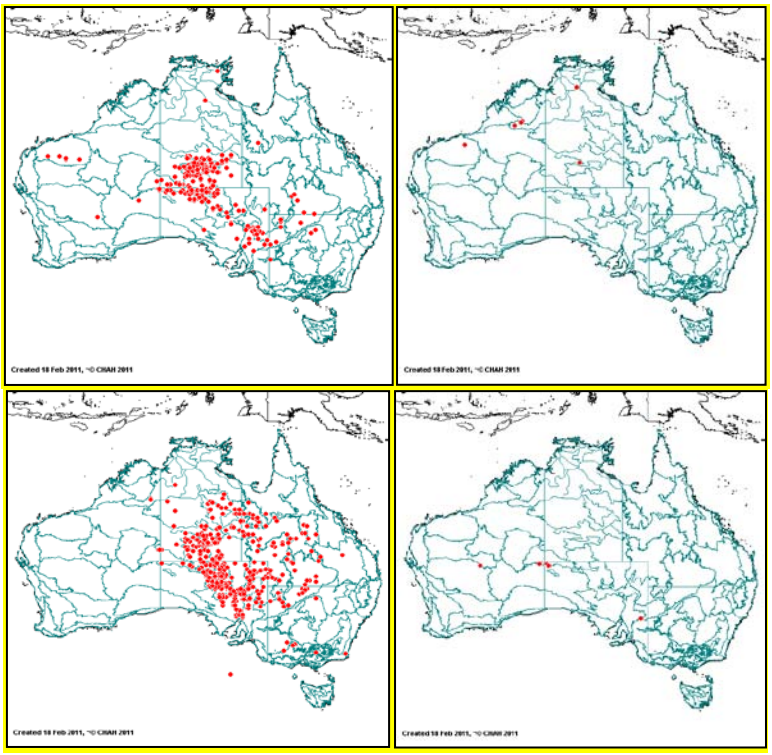
Euphorbia inappendiculata (Euphorbiaceae) is a spreading, procumbent herb found in the Pilbara and Kimberley regions of Western Australia and extensively throughout central and south east central Australia. *Euphorbia inappendiculata* is widespread in South Australia where it occurs in the NW, LE and FU regions **(Figure 8)**. The species is referred to as *Chamaesyce inappendiculata* in that state and has no conservation rating (Barker et al. 2005). Northern Territory populations mapped in the Australian Virtual Herbarium maybe another undescribed taxa (*Euphorbia* sp. Beddome Range; Albrecht et al 2007).

Within the Study Area *E. inappendiculata* has been recorded in a single location on the western border on Mitchell grass plains (Veg type 5a) (**Figure 10**), and is therefore considered unlikely to be affected by the proposed pit and infrastructure footprints.

***Calotis latiuscula* (Priority 3)**

Calotis latiuscula (Asteraceae) is an erect herb found in the Pilbara and several scattered locations around the Murchison region of Western Australia, and extensively throughout central and eastern central Australia **(Figure 8)**. *Calotis latiuscula* is widespread in northwestern and eastern South Australia and southern Northern Territory where it has no conservation rating (Barker et al. 2005; Albrecht et al. 2007).

Within the Study Area it was recorded from a two locations in the southwest and southeast corners on Mitchell grass plains (Veg type 5a) (**Figure 10**), and much like other priority flora is unlikely to be affected by pit and infrastructure footprints.



Clockwise from Top Right: *Euphorbia inappendiculata*[1], *Menkea lutea*, *Goodenia lunata*, and *Calotis latiuscula*

Figure 8: Australia-wide Distribution of Priority Species recorded within Wingellina Study Area.

[1]NB: First map does not show distribution of *Euphorbia inappendiculata* in South Australia where it widespread in the NW, LE and FU regions. The species is referred to as *Chamaesyce inappendiculata* in that state.

Figure 9: Location of Priority Flora found within the Wingellina Study Area during the October 2010 Survey.

4.2.4 Broad Floristic Formations and Vegetation Communities

Nine broad floristic formations were identified following the field survey. These formations were identified based upon 1) dominant species composition of top strata and understorey, 2) vegetation structure (height and projected canopy cover of top stratum), and 3) landforms and soil types on which the vegetation occurs. In total, 13 vegetation communities were delineated from the nine broad floristic formations

On the plains of the Study Area seven communities were identified consisting of:

- 3a Open Low Woodland of *Acacia aneura* and *A. pruinocarpa* over Hummock Grassland;
- 3b Open Low Woodland of *Acacia aneura* over Low to Tall Shrubland;
- 4a Open Low Mallee Woodland of *Eucalyptus socialis* and/or *E. gamophylla*;
- 5a Sparse Tall Shrubland of *Acacia aneura* over a Mitchell Grass Tussock Grassland;
- 5b Sparse Tall Shrubland of *Acacia aneura* over Aristida Tussock Grassland;
- 8 Open Low Mallee Woodland of *Eucalyptus socialis* or *E. gamophylla*; and
- 9 Sparse Low to Open Tall Shrubland of *Senna artemisioides*.

The slopes of the Study Area were dominated by the following communities:

- 1a Open Low Woodland of *Eucalyptus socialis* and/or *E. gypsophila*;
- 2a Open Mid Mallee Woodland of *Eucalyptus socialis* and/or *E. gypsophila;*
- 2b Open Mid Mallee Woodland of *Eucalyptus socialis* and/or *E. gypsophila* over Shrubland;
- 4b Open Low Woodland of *Eucalyptus gamophylla* and *Corymbia eremaea*; and
- 6a Low Mallee Woodland of *Eucalyptus socialis* and *E. gypsophila*

The Hill Tops and Ridgelines of the Study Area were dominated by community 7 Sparse Tall Shrublands of *Hakea lorea*.

The broad floristic formations and vegetation communities identified in the Study Area are quantified in **Table 5** and detailed descriptions of the communities are provided in the following text. The distribution of the identified communities together with the locations of survey sites are shown in **Figure 10**.

Table 5: Broad Floristic Formations and Vegetation Communities mapped and described within the WingellinaStudy Area. The Approximate Area (ha) of each Vegetation Community, the Area to be cleared and the Percentage of the Vegetation Community to be cleared within the Study Area is also detailed.

	Broad Floristic Formation *(and Vegetation Communities)*	**Landform**	**Total area (ha) across the Study Area**	**Area (ha) within the disturbance footprint**	**% to be disturbed**	**Significance of Disturbance**	**Quadrat Number**
1a	**Eucalyptus Open Low Woodland** Open Low Woodland of *Eucalyptus socialis* and or *E. gypsophila*	Slopes	325.8	126.2	38.7%	Aerial Photograph Interpretation (API) suggests this community is extensively distributed throughout the bioregion.	WIN002, WIN006, WIN015, WIN016
2a	**Eucalyptus Open Mid Mallee Woodland** Open Mid Mallee Woodland of *Eucalytpus socialis* and/or *E. gypsophila*	Slopes	76.3	40.4	52.9%	This community occurs as a sub-type of the extensively distributed Eucalyptus Open Mid Mallee Woodland present in the bioregion.	WIN004 and WIN022
2b	**Eucalyptus Open Mid Mallee Woodland** Open Mid Mallee Woodland of *Eucalyptus socialis* and/or *E. gypsophila* over Shrubland	Slopes	49.3	3.0	6.1%	This community occurs as a sub-type of the extensively distributed Eucalyptus Open Mid Mallee Woodland present in the bioregion.	WIN026 and WIN005
3a	**Mulga Open Low Woodland** Open Low Woodland of *Acacia aneura* and *A. pruinocarpa*	Slopes	564.8	42.5	7.5%	API suggests this community is extensively distributed throughout the bioregion.	WIN007 and WIN008
3b	**Mulga Open Low Woodland** Open Low woodland of *Acacia aneura* over either a Low or Tall Shrubland	Plains	350.7	58.8	16.8%	API suggests this community is extensively distributed throughout the bioregion.	WIN027 and POI060
4a	**Eucalyptus Open Low Mallee Woodland** Open Low Mallee Woodland of *Eucalyptus socialis* and/or *E. gamophylla*	Plains	296.7	23.6	8.0%	API suggests this community is extensively distributed throughout the bioregion.	WIN010, WIN011 and WIN012

	Broad Floristic Formation *(and Vegetation Communities)*	**Landform**	**Total area (ha) across the Study Area**	**Area (ha) within the disturbance footprint**	**% to be disturbed**	**Significance of Disturbance**	**Quadrat Number**
4b	**Eucalyptus Open Low Mallee Woodland** Open Low Woodland of *Eucalyptus gamophylla* and *Corymbia eremaea*	Plains	684.7	8.4	1.2%	API suggests this community is extensively distributed throughout the bioregion.	WIN003, WIN021 and WIN024
5a	**Mulga Sparse Tall Shrubland** Sparse Tall Shrubland of *Acacia aneura over Astrebla Tussock Grassland*	Plains	2,594.2	199.7	7.7%	API suggests this community is extensively distributed throughout the bioregion.	OO5, WIN009 and WIN013
5b	**Mulga Sparse Tall Shrubland** Sparse Tall Shrubland of *Acacia aneura over Aristida Tussock Grassland*	Plains	4,882.3	1,825.1	37.4%	API suggests this community is extensively distributed throughout the bioregion.	POI053
6a	**Eucalyptus Low Mallee Woodland** Low Mallee Woodland of *Eucalyptus socialis* and *E. gypsophila*	Slopes	740.1	195.4	26.4%	This community occurs as a sub-type of the extensively distributed Eucalyptus Low Mallee Woodland present in the bioregion.	WIN022, WIN014, WIN023 WIN025, WIN029 and WIN030
7	**Hakea Sparse Tall Shrubland** Sparse Tall Shrubland of *Hakea lorea*	Hill Top/Ridge Line	52.4	0	0%	This community appears to be of limited distribution. No impacts will result in this community from the proposed mine development.	WIN019 and WIN020
8	**Eucalyptus Open Low Mallee Woodland** Open Low Mallee Woodland of *Eucalyptus socialis* or *E. gamophylla*	Plains	157.9	7.0	4.4%	API suggests this community is extensively distributed throughout the bioregion.	SPR1
9	**Senna Sparse Low to Tall Open Shrubland** Sparse Low to Open Tall Shrubland of *Senna artemisioides*	Plains	291.7	41.3	14.2%	API suggests this community is extensively distributed throughout the bioregion.	WIN001, WIN028 and POI033

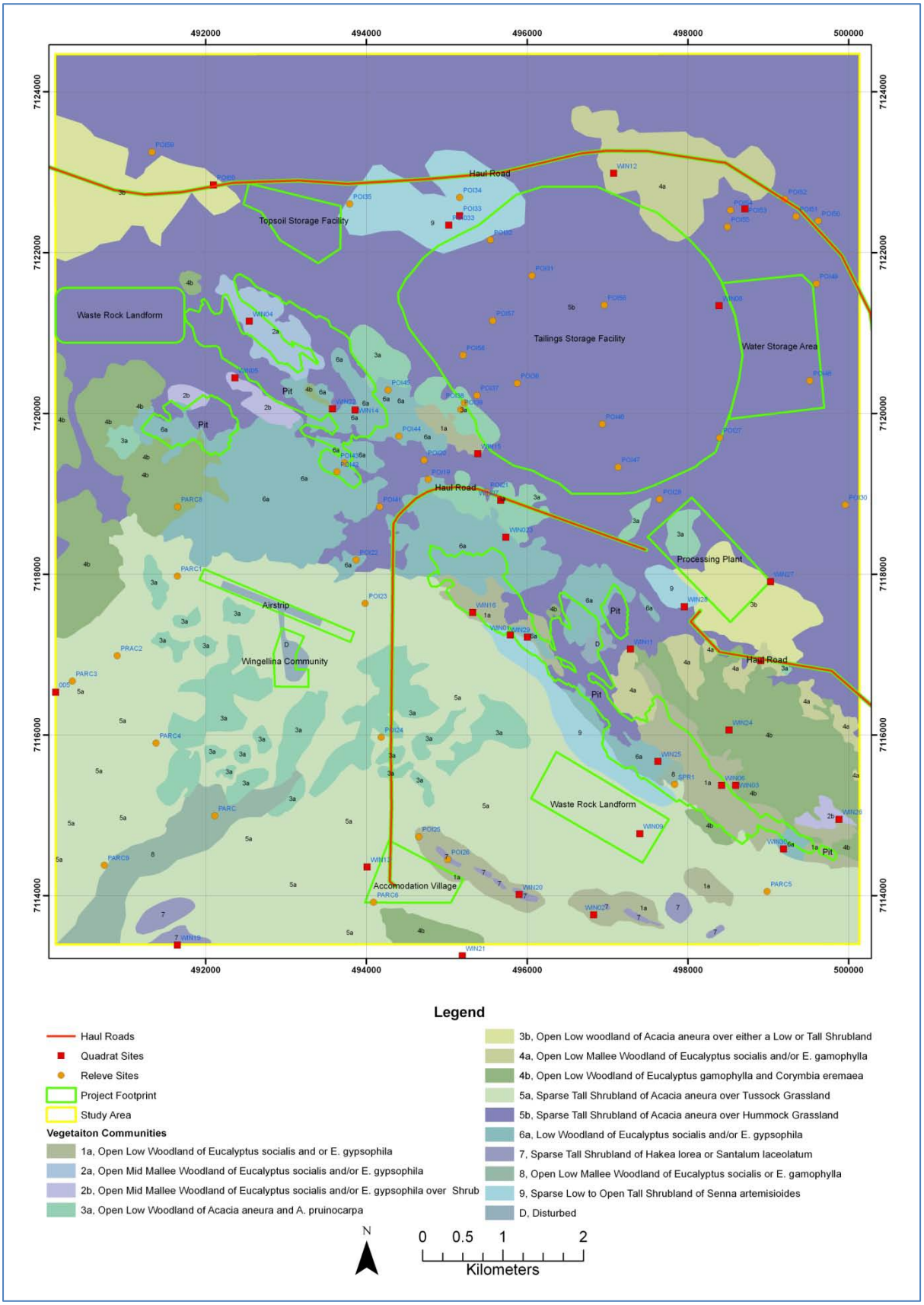


Figure 10: Vegetation Communities and Survey Sites of the Study Area

1 *Eucalyptus* Open Low Woodland

1a Open Low Woodland of *Eucalyptus socialis* and/or *E. gypsophila*

Area Mapped: 326 hectares. **Quadrats Sampled:** Win02,Win06, Win15 and Win16

Location and Landform: Present on Slopes throughout the Study Area.

Vegetation Structure and Floristics: Open Low Woodland of *Eucalyptus socialis* and/or *E. gypsophila* and/or *Acacia aneura* over a Sparse Low to Mid Shrubland of *Ptilotus obovatus*, or *Acacia validinervia* or *Salsola tragus* over Sparse Low Hummock Grassland of *Triodia scariosa* on gravel or clay loams.

Vegetation Condition: Excellent.

Conservation Status: Aerial photograph analysis of this community outside of the Study Area suggests that this community is extensively distributed throughout the local region.

Plate 1: Vegetation Community 1a

2 *Eucalyptus* Open Mid Mallee Woodland

2a Open Mid Mallee Woodland of *Eucalyptus socialis* and/or *E. gypsophila*

Area Mapped: 76 hectares **Quadrats Sampled: Win04 and Win22**

Location and Landform: Present on Slopes

Vegetation Structure and Floristics: Open Mid Mallee Woodland of *Eucalytpus socialis* and/or *E. gypsophila* over a Sparse Mid Shrubland of *Ptilotus exaltatus* and *P. obovatus* over an Open Hummock Grassland of *Triodia scariosa*.

Vegetation Condition: Excellent.

Plate 2: Vegetation Community 2a

2b Open Mid Mallee Woodland of *Eucalyptus socialis* and/or *E. gypsophila* over Shrubland

Area Mapped: 49 hectares **Quadrats Sampled: Win26 and Win05**

Location and Landform: Present on Slopes

Vegetation Structure and Floristics: Open Mid Mallee Woodland of *Eucalyptus socialis* or *E. gypsophila* over either a Sparse Tall Shrubland of *Acacia validinervis* and *A. nyssophylla* or Sparse Shrubland of *Ptilotus obovatus* over an Open Low Hummock Grassland of *Triodia scariosa* on red gravel on Plains.

Vegetation Condition: Excellent.

Plate 3: Vegetation Community 2b

3 Mulga Open Low Woodland

3a Open Low Woodland of *Acacia aneura* and *A. pruinocarpa*

Area Mapped: 565 hectares **Quadrats Sampled: Win07 and Win08**

Location and Landform: Present on Plains

Vegetation Structure and Floristics: Open Low Woodland of *Acacia aneura* and *A. pruinocarpa* over a Sparse Mid Shrubland of *Eremophila latrobei* subsp. *glabra* over a Low Sparse Hummock Grassland of *Triodia scariosa* on orange clay loam.

Vegetation Condition: Excellent.

Plate 4: Vegetation Community 3a

3b Open Low woodland of *Acacia aneura* over either a Low or Tall Shrubland

Area Mapped: 351 Hectares **Quadrats Sampled: Win27 and POI060**

Location and Landform: Present on Plains.

Vegetation Structure and Floristics: Open Low Woodland of *Acacia aneura* over an Open Tall Shrubland of *A. kempeana*, *Senna artemisioides* subsp. *filifolia* or a Low Sparse Chenopod Shrubland of *Maireana planifolia* over a Sparse Low Tussock Grassland of *Enneapogon cylindricus* on red sand.

Vegetation Condition: Good.

Plate 5: Vegetation Community 3b

4 *Eucalyptus* Open Low Mallee Woodland

4a Open Low Mallee Woodland of *Eucalyptus socialis* and/or *E. gamophylla*

Area Mapped: 297 Hectares **Quadrats Sampled: Win10, Win11 and Win12**

Location and Landform: Present on Plains.

Vegetation Structure and Floristics: Open Low Mallee Woodland of *Eucalyptus socialis* over a Sparse Mid Shrubland of *Senna artemisioides* subsp *petiolaris* or *Acacia cuthbersonii*, *A. prainii* and *A. melleodora* over a Sparse Low Hummock Grassland of *Triodia scariosa* on calcrete.

Vegetation Condition: Excellent.

Plate 6: Vegetation Community 4a

4b Open Low Woodland of *E. gamophylla* and *Corymbia eremea*

Area Mapped: 685 Hectares. **Quadrats Sampled: Win03, Win21 and Win24**

Location and Landform: Present on Slopes and Hill Tops.

Vegetation Structure and Floristics: Open Mid Mallee Woodland or Low Woodland of *Eucalyptus gamophylla* and *Corymbia eremaea* over Isolated Tall Shrubs of *Acacia sibirica* and *Acacia tetragonophylla* over a Sparse Low Hummock Grassland of *Triodia scariosa*.

Vegetation Condition: Excellent.

Plate 7: Vegetation Community 4b

5 *Mulga Sparse Tall Shrubland*

5a Sparse Tall Shrubland of *Acacia aneura* over Tussock Grassland

Area Mapped: 2,594 Hectares **Quadrats Sampled: 005, Win09 and Win13**

Location and Landform: Present on Plains.

Vegetation Structure and Floristics: Sparse Tall Shrubland of *Acacia aneura* over an Open Tussock Grassland of *Astrebla pectinata* and *Eragrostis xerophila* on sandy loam.

Vegetation Condition: Excellent.

Plate 8: Vegetation Community 5a

5b Sparse Tall Shrubland of *Acacia aneura* over Hummock Grassland

Area Mapped: 4,882 Hectares. **Quadrats Sampled: POI053**

Location and Landform: Present on Plains

Vegetation Structure and Floristics: Sparse Tall Shrubland of *Acacia aneura* over an Open Tussock Grassland of *Triodia pungens* on red sand.

Vegetation Condition: Degraded to Excellent.

Plate 9: Vegetation Community 5b

6 *Eucalyptus* Open Low Mallee Woodland

6a Low Woodland of *Eucalyptus socialis* and *E. gypsophila*

Area Mapped: 740.1 Hectares. **Quadrats Sampled: Win22, Win14, Win23, Win25, Win29 and Win30**

Location and Landform: Present on Slopes.

Vegetation Structure and Floristics: Low Woodland of *Eucalyptus socialis* and *E. gypsophila* over a Sparse Low Shrubland of *Ptilotus obovatus* over an Open Tussock Grassland of *Triodia scariosa* on red gravel.

Vegetation Condition: Excellent.

Plate 10: Vegetation Community 6a

7 *Hakea* Sparse Tall Shrubland

7 Sparse Tall Shrubland of *Hakea lorena*

Area Mapped: **Quadrats Sampled:**

Location and Landform: Present on Hill Tops

Vegetation Structure and Floristics: Sparse Tall Shrubland of *Hakea lorea* over a Low Sparse Hummock Grassland of *Triodia scariosa* and a Low Sparse Tussock Grassland of *Eriachne mucronata* and *Cymbopogon obtectus* on red gravel.

Vegetation Condition: Excellent.

Plate 11: Vegetation Community 7

8 *Eucalyptus* Open Low Mallee Woodland

8 Open Low Mallee Woodland of *Eucalyptus socialis or E. gamophylla*

Area Mapped: 158 ha **Quadrats Sampled:** SPR1

Location and Landform: Present on the Plains within Drainage lines.

Vegetation Structure and Floristics: Open Low Mallee Woodland of *Eucalyptus socialis* and/or *E. gamophylla* over a Sparse Low Shrubland of *Senna artemisioides* subsp. *artemisioides* over a Sparse Low Tussock Grassland of *Aristida contorta* on sandy loam.

Vegetation Condition: Good to Excellent.

Plate 12: Vegetation Community 8

9 *Senna* Sparse Low to Tall Open Shrubland

9 Sparse Low to Open Tall Shrubland of *Senna artemisioides*

Area Mapped: 292 ha **Quadrats Sampled:** Win01, Win28 and POI033

Location and Landform: Present on the Plains.

Vegetation Structure and Floristics: Sparse Low Shrubland of *Senna artemisioides* subsp. *artemisioides*, *Acacia pruinocarpa* and *Ptilotus obovatus* over an Open Low Hummock Grassland of *Triodia scariosa* on brown clay loam Plains.

Vegetation Condition: Good to Excellent.

Plate 13: Vegetation Community 9

4.2.5 Statistical Analysis

Only quadrats sampled both in 2008 and 2010 were used. Data from both years was combined for each quadrat and transformed into presence/absence data. Dendrograms were then created using the Primer 6 statistical analysis program to perform a Bray-Curtis similarity analysis. Dendrograms provide a graphical representation of the differences and similarities in floristic makeup of sites, providing a useful tool in identifying vegetation communities. However there are a number of issues which can impede their usefulness particularly that they do not take into consideration vegetation structure, and sites with very similar dominant species can be separated due to species that occurring at low frequencies across the landscape.

To reduce the impact of highly infrequent species on the similarity analysis, species found at only one quadrat were removed from the dataset. Even then, the resulting dendrogram did not show highly distinct groupings. This was probably due to the the complexity of the vegetation at the site reflecting the complex geology and the highly variable fire history, feral animal grazing and weed invasion patterns in the study area. For this reason, the dendogram has been used only as a guide in the delination of vegetation communities as described in this report. The dendrogram is shown in **Appendix H**.

4.2.6 Threatened and Priority Ecological Communities

No threatened or Priority Ecological Communities have been identified within the Central Ranges Bioregion.

4.2.7 Range Extensions

Range extensions were identified by cross examining taxa recorded in the Study Area against Florabase and the Australian Virtual Herbarium websites. As the Central Ranges bioregion is poorly surveyed, the threshold for consideration of taxa recorded in the Study Area as range extensions was where the nearest recorded incidence of that taxa was outside the Central Ranges bioregion.

Thirty-two species were identified as having range extensions (**Table 6**). The high number of range extensions identified during this latest field survey is likely to be a result of the exceptionally good condition experienced during the field survey and the lack of floristic knowledge of the area in the vicinity of the Study Area. It is anticipated that the majority of the species identified as having range extensions would be found to the south, east and west of the Study Area should these areas be subject to similarly intensive surveys.

Table 6: Species Exhibiting Range Extensions Identified from the Wingellina Study Area ('Range Ext' = distance to closest record)

Genus and Species	Range Ext WA	Range Ext SA	Range Ext NT
Eucalyptus sheathiana	670km SW	No Record	No Record
Acacia ampliceps	750km NW	No Record	600km NE
Acacia synchronicia	780km NW	No Record	600km NNE
Aristida burbidgeae	960km NW	No Record	No Record
Astrebla elymoides	960km NW	800km E	500km NE
Atriplex semibaccata	860km SW	700km E	700km ENE
Corymbia hamersleyana	340km SW	No Record	No Record
Digitaria ctenantha	746km NW	800km E	450km NE
Dodonaea lanceolata	600km N	No Record	350km NE
Dodonaea lobulata	360km SW	220 km SSE	No Record
Dodonaea viscosa subsp*. spatulata*	600km SW	140km SE	340km NE
Eleocharis pallens	440km NW	600km ESE	200km E
Enneapogon lindleyanus	960km WNW	700km E	400km ENE
Eragrostis desertorum	800km W	No Record	400km E
Eremophila cuneifolia	200km W	No Record	No Record
Eremophila paisleyi	380km SW	300km SE	300km NE
Euphorbia inappendiculata	1100km NNW	600km NE	No Record
Hibiscus brachysiphonius	670km N	600km ESE	500km ENE
Hibiscus coatesii	630km NW	No Record	No Record
Maireana erioclada	600Km SW	280km S	400km ENE
Maireana eriosphaera	220Km SW	No Record	No Record
Micromyrtus fimbrisepala	200km W	300km SE	No Record
Paraceterach muelleri	980km NNW	No Record	600km NE

Table 6 (cont.): Species Exhibiting Range Extension Identified from the Wingellina Study Area

Genus and Species	Range Ext WA	Range Ext SA	Range Ext NT
Psydrax attenuata	*Psydrax attenuata* var. *tenella* 950km N	No Record	*Psydrax attenuata* var. *attenuata* 200km to ENE
Santalum spicatum	400km W	450km SE	No Record
Sida trichopoda	800km N	520km E	400km NE
Solanum esuriale	90km N	700km E	400km NE
Swainsona campylantha	900km NNW	700km ESE	400km NE
Triodia brizoides	850km NNW	No Record	200km E
Triodia lanigera	890km W	No Record	No Record
Triodia secunda	1020km NW	No Record	No Record

The majority of range extensions found related to taxa recorded in the Pilbara and Kimberley bioregions of Western Australia and the MacDonald ranges of the Northern Territory. Data in the Australian Virtual Herbarium suggests that a number of these may be confined to ranges and thus may have disjunct distributions. Others (e.g., *Sida trichopoda*) are known to occur in a broad range of habitats in other regions and may have continuous distributions on the plains, linking populations in the study area with other known population further north or south. Given the paucity of surveys in the region, it is difficult to predict which of these species occur as truly disjunct populations and which are just poorly collected in surrounding areas. This can only be clarified with further target searches aimed at determine the range of habitats in which these species occur in central Australia.

4.2.8 Vegetation Condition

Vegetation condition was typically Very Good to Excellent throughout the Study Area, with localised areas which are more degraded (**Table 7**; **Figure 13**). Disturbance was evident around the Wingellina community and airstrip with clearing and weed ingress evident. Vegetation communities in the northern sections of the Study Area also showed recent impacts from fire and localised invasion by Buffel Grass.

Buffel Grass invasion and associated increased fire frequency pose a significant threat to areas in the north half of the study area. While Mallee communities (and to lesser extent Mulga communities) are adapted to regenerate from fire, high frequency burning is of concern. This particularly applies to perennial species which are killed by fire and rely on seedling regeration after fire ("obligate seed regenerators"). Loss of obligate seed regenerators can occur if fire frequency increases to the extent that seedlings of such species are unable to reach maturity and set seed. Buffel Grass can increase fuel loads in Mulga woodland and thus increase fire risk, as well as outcompeting many native understorey species.

Table 7: Approximate Area (hectares) of each Vegetation Condition within the Wingellina Study Area

Vegetation Condition	Quadrats	Area (Ha)
Completely Degraded	-	38.3
Degraded	-	0
Good	WIN010, WIN029, WIN027	162.4
Very Good	WIN001, WIN002, WIN003, WIN004, WIN005, WIN006, WIN008, WIN009, WIN011, WIN014, WIN015, WIN020, WIN022,	7,838.5
Excellent	WIN007, WIN012, WIN013, WIN015, WIN019, WIN021, WIN023, WIN024, WIN025, WIN026, WIN028, WIN030	3,047.9
	Total	**11,087.1**

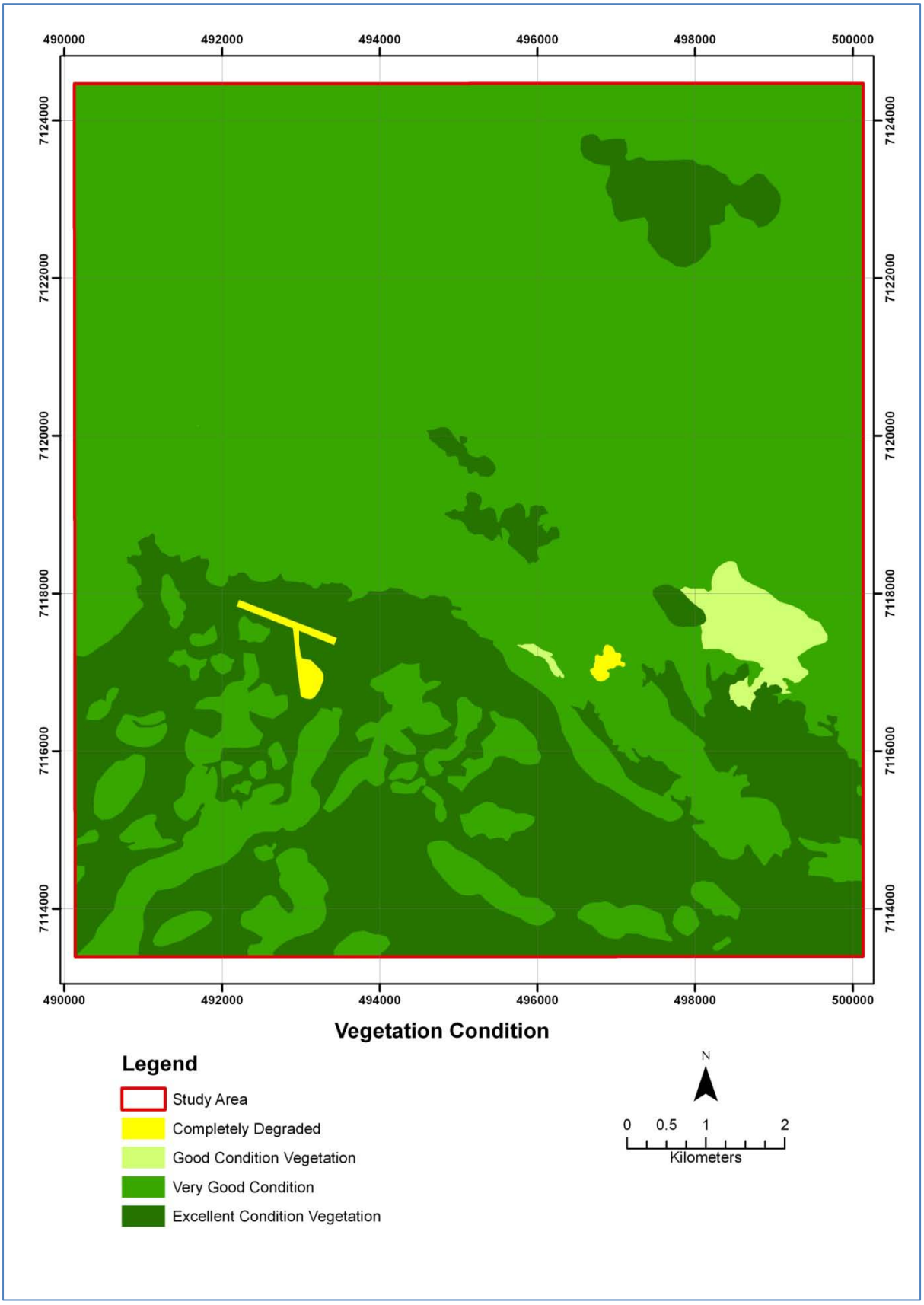


Figure 11: Condition of the Vegetation within the Wingellina Study Area

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Significant Flora

Four Priority taxa were recorded during the October 2010 survey period within the Study Area: *Menkea lutea* (Priority 1), *Goodenia lunata* (Priority 1), *Euphorbia inappendiculata* (Priority 3), and *Calotis latiuscula* (Priority 3).

One individual *Euphorbia inappendiculata* was recorded adjacent to the western boundary of the Study Area and one individual of *Goodenia lunata* and a *Calotis latiuscula* were recorded respectively during the survey in the western and southern sections of the Study Area. It is unlikely that any of these priority species detected within the Study Area will be impacted by the proposed mining related activities as they were not found within the proposed disturbance footprint or immediately adjacent to the disturbance footprint. While large numbers of *Menkea lutea* were recorded in the Mitchell Grass dominated, southern sections of the Study Area, the species appears to be rare throughout its range, both in Western Austrlia and South Australia. This suggests that protection of the population in the study area may be important for the survival of the species as a whole. While largely occurring outside the area directly affected by the main mine development, the species could potentially be significantly affected by off-site works such as road construction activities and by offroad recreational vehicles use by staff and contractors working at the mine. Both these activities may result in the spread of buffel grass, a species which is well able to outcompete *Menkea lutea*.

No TEC or PEC communities were identified in the study area. However, one vegetation community, *Hakea* Sparse Tall Shrubland, appeared to have a restricted distribution within the Study Area. However, this community will not be impacted by the proposed mining activities.

5.2 Introduced Species

Eight introduced species, **Cenchrus ciliaris* (Buffel Grass), **Cenchrus pennisetiformis* (Cloncurry Buffel Grass), **Acetosa vesicaria* (Ruby Dock), **Capsella bursa-pastoris* (Shepherd's Purse), **Malvastrum americanum* (Spiked Malvastrum), **Citrullus colocynthis* (Camel Melon), **Citrullus lanatus* (Pie Melon) and **Tribulus terrestris* (Caltrop) were recorded within the Study Area. **Portulaca oleracea* (Common Purslane) was also recorded. This species is considered in Western Australia to have indigenous and introduced forms (DEC 2011) but to be indigenous in South Australia (Barker et al. 2005).

While none of these nine species are Declared Plants under the *Agriculture and Related Resources Protection Act, 1976*, eight are classified as an 'Environmental Weeds' by the *Environmental Weed Strategy for Western Australia* (WA Department of Environment and Conservation [DEC] 1999). Of particular concern is **Cenchrus ciliaris* (Buffel Grass) which is located throughout the north-eastern sections of the Study Area (recorded from 15 quadrats and 12 relevé sites). Low density, scattered occurrences of the remaining weed species were detected in the Study Area. Also of concern is the further spread of *Cenchrus pennisetiformis* (Cloncurry Buffel Grass) a species not previously been recorded from Western Australia (DEC 2011).

Buffel grass seed is readily spread both in soil and along roadsides by wind. While some parts of the Study Area are already infested with Buffel Grass, other areas are largely weed free. A significant threat to these latter areas is the transport of seed of Buffel Grass and other weeds on uncleaned earthmoving equipment and vehicles after they have been used in infested areas. This is of concern given the ability of Buffel Grass to outcompete native understorey species and to increase the flamability of vegetation (discussed below). The spread of Buffel Grass and other weeds as a result off unrestricted work or recreational use of off-road-vehicles by mine worker and contractors is also a potential threat. Also of concern is the potential spread of new species of weeds (e.g., **Pennisetum setaceum*) from gardens or landscaping being established at the site, where non indigenous species are used.

5.3 Alterations to Site Hydrology

No major creek systems or water dependant plant conmunities were recorded in the study area. Therefore any changes in hydrology resulting from the development are likely to have minimal impact on above-ground vegetation.

5.4 Feral Animals

Impacts from feral camels were observed throughout the Study Area and database studies suggest that rabbits are also present in the area. Of concern are potential increases in numbers of these species due to increased availability of water and feed (e.g. lawns). If unmanaged this has the potential to increase degradation of native vegetation and prevent regeneration of mine reclaimation sites.

5.5 Dust

Unmanaged, mine generated dust has the potential to have a detrimental impact upon native vegetation health. Where leaves are heavily coated by dust this can potentially reduce photosynthesis and gas exchange necessary for plant growth.

5.6 Fire

Increased fire frequency has the potential to detrimentally impact native vegetation within the Study Area. While Mallee communities (and to lesser extent Mulga communities) are adapted to regenerate from fire, of concern is the potential for increased fire frequency due to a significantly increased human population at the site and the further spread of Buffel Grass (resulting in increased fuel loads). Particularly vulnerable to increased fire frequency are fire sensitive perennial species (e.g. Hakeas) which rely on seedling regeration after fire (“obligate seed regenerators”). Loss of obligate seed regenerators can occur if fire frequency increases to the extent that seedlings of such species are unable to reach maturity and set seed. Buffel Grass invasion and associated increased fire frequency pose a particularly significant potential risk in the north half of the study area around the mine site and associated infrastructure.

6. REFERENCES

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Appendix A

Definitions: Threatened and Priority Flora and Ecological Communities

Definitions for Threatened Flora (TF) and Priority Flora (PF) (DEC 2011)

Under the Wildlife Conservation Act, the Minister for the Environment may declare species of flora to be protected if they are considered to be in danger of extinction, rare or otherwise in need of special protection.

T: Threatened Flora (Declared Rare Flora — Extant)

Taxa[1] which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such (Schedule 1 under the Wildlife Conservation Act 1950).

Threatened 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.
-

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.

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

1. 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.

2. 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.
3. 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 taxon becoming threatened within five years.

Definitions for Threatened Ecological Communities (TEC) (DEC 2010)

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):

A) Records within the last 50 years have not been confirmed despite thorough searches of known or likely habitats or

B) 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):

   i) 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);

ii) 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.

B) Current distribution is limited, and one or more of the following apply (i, ii or iii):

i) 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);

ii) 0there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes;

iii) 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.

C) 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):

A) 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):

i) 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);

ii) 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.

B) Current distribution is limited, and one or more of the following apply (i, ii or iii):

i) 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);

ii) there are few occurrences, each of which is small and/or isolated and all or most occurrences are very vulnerable to known threatening processes;

iii) 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.

C) 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):

A) The ecological community exists largely as modified occurrences that are likely to be capable of being substantially restored or rehabilitated.

B) 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.

C) 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.

Definitions for PriorityEcological Communities (PEC) (DEC 2010)

Possible threatened ecological communities that do not meet survey criteria or that are not adequately defined are added to the Priority Ecological Community List under priorities 1, 2 and 3. These three categories are ranked in order of priority for survey and/or definition of the community, and evaluation of conservation status, so that consideration can be given to their declaration as threatened ecological communities. Ecological communities that are adequately known, and are rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

Priority One: Poorly-known ecological communities

Ecological communities that are known from very few occurrences with a very restricted distribution (generally =5 occurrences or a total area of = 100ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. 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: Poorly-known ecological communities

Communities that are known from few occurrences with a restricted distribution (generally =10 occurrences or a total area of =200ha). At least some occurrences are not believed to be under immediate 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: Poorly known ecological communities

(i) 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: (ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or; (iii) 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 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:

i) ***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.

(ii) ***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.

(iii) ***Ecological communities that have been removed from the list of threatened communities during the past five years***.

These communities require regular monitoring.

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 B
GPS Location of Quadrats (Q) (including Irregular Sized Quadrats (IQ)) and Relevés (R) Surveyed across the Study Area.

All sites are in located in Zone 52 K and are recorded in GDA94

Site	Easting	Northing	Q/IQ/R	Year(s) surveyed	Vegetation community
POI33	495024	7122342	Q	2010	Mulga low woodland/dwarf shrubland
POI26	495012	7114448	Q	2010	Santalum over Amphipogon
POI53	498710	7122544	Q	2010	Mallee over Triodia
SPR1	497835	7115382	Q	2010	Acacia-Senna shrubland
WIN001	495791	7117243	Q	2010	*Senna* Shrubland with *Triodia*
WIN001a[1]	495723	7117117	Q	2008	Mallee over Triodia
WIN002	496828	7113762	Q	2010	Mallee over Triodia
WIN002a[1]	496682	7116302	Q	2008	Mallee over Dodonaea
WIN003	498595	7115374	Q	2008, 2010	Mallee over Triodia
WIN004	492544	7121147	Q	2008, 2010	Mallee over Triodia
WIN005	492365	7120442	Q	2008, 2010	Mallee over Triodia
WIN006	498419	7115374	Q	2008, 2010	Mallee over Triodia
WIN007	495671	7118919	Q	2008, 2010	Mulga woodland
WIN008	498388	7121339	Q	2008, 2010	Mulga woodland
WIN009	497402	7114772	Q	2008, 2010	Mulga open-shruband
WIN010	498906	7116923	Q	2008, 2010	Mallee over Triodia
WIN011	497285	7117067	Q	2008, 2010	Mallee over Triodia
WIN012	497076	7122988	Q	2008, 2010	Mallee over Triodia
WIN013	494009	7114357	Q	2008, 2010	Mulga open-shruband
WIN014	493859	7120042	Q	2008, 2010	Mallee over Triodia
WIN015	495386	7119500	Q	2008, 2010	Mallee/Mulga over Triodia
WIN016	495322	7117525	Q	2008, 2010	Mallee over Triodia
WIN017	490448	7116028	Q	2008	Hakea shrubland
WIN018[2]			Q	2008	Redgum over Themeda
WIN019	491647	7113386	Q	2008, 2010	Triodia hummock grassland
WIN020	495901	7114015	Q	2008, 2010	Senna/Hakea sparse-shrubland
WIN021	495193	7113253	Q	2008, 2010	Mallee over Triodia
WIN022	493578	7120057	Q	2008, 2010	Mallee over Triodia
WIN023	495735	7118461	Q	2008, 2010	Mallee over Triodia

[1] Renamed since quadrats moved to avoid significant cultural sites; 2010 quadrats not comparable with 2008 quadrats since in different vegetation communities; [2] SW corner of tenement

Site	Easting	Northing	Q/IQ/R	Year(s) surveyed	Vegetation community
WIN024	498511	7116061	Q	2008, 2010	Mallee over Triodia
WIN025	497627	7115670	Q	2008, 2010	Mallee over Triodia
WIN026	499880	7114949	Q	2008, 2010	Mallee over Triodia
WIN027	499028	7117907	Q	2008, 2010	Degraded Mulga
WIN028	497956	7117595	Q	2008, 2010	*Triodia* hummock grassland ± Acacia
WIN029	496004	7117217	Q	2008, 2010	Mallee over Triodia
WIN030	499191	7114581	Q	2008, 2010	Mallee over Triodia
005	490133	7116532	Q	2010	Astrebla grassland
PARC1	491649	7117976	R	2010	Astrebla grassland
PARC2	490900	7116985	R	2010	Themeda grassland
PARC3	490342	7116669	R	2010	Astrebla grassland
PARC4	491383	7115898	R	2010	Astrebla grassland
PARC5	498986	7114051	R	2010	Astrebla-Aristida grassland
PARC6	494089	7113918	R	2010	Mulga
PARC7	492114	7114993	R	2010	Open Mulga
PARC8	491650	7118839	R	2010	Mallee over Triodia
PARC9	490739	7114379	R	2010	Dicanthium grassland
POI19	494770	7119179	R	2010	Mulga low woodland/dwarf shrubland
POI20	494719	7119419	R	2010	Mulga over Eragrostis
POI21	495499	7119019	R	2010	Mallee over Triodia
POI22	493872	7118177	R	2010	Mallee over Triodia
POI23	493984	7117636	R	2010	Mulga over Astrebla and Aristida
POI24	494185	7115971	R	2010	Mulga over Digitaria
POI25	494651	7114734	R	2010	Triodia hummock grassland
POI27	498396	7119696	R	2010	Mulga over Aristida
POI28	497646	7118931	R	2010	Aristida tussock grassland
POI30	499958	7118862	R	2010	Mulga over Buffel Grass
POI31	496059	7121713	R	2010	Mulga over Aristida
POI32	495543	7122158	R	2010	Degraded Mulga
POI33	495160	7122459	R	2010	Mulga
POI34	495159	7122687	R	2010	Mulga
POI35	493791	7122606	R	2010	Mulga
POI36	495877	7120374	R	2010	Mulga over Aristida
POI37	495375	7120222	R	2010	Grassland ± Mulga
POI38	495221	7120130	R	2010	Mulga
POI39	495174	7120047	R	2010	
POI41	494164	7118837	R	2010	Mulga plain

Site	Easting	Northing	Q/IQ/R	Year(s) surveyed	Vegetation community
POI42	493632	7119272	R	2010	Mallee over Triodia
POI43	493729	7119385	R	2010	Mallee over Triodia
POI44	494403	7119715	R	2010	Mulga
POI45	494270	7120292	R	2010	Mallee over Triodia
POI46	496934	7119866	R	2010	Mulga plain
POI47	497131	7119330	R	2010	Degraded Mulga
POI48	499516	7120407	R	2010	Mulga plain
POI49	499596	7121613	R	2010	Mulga plain
POI50	499621	7122392	R	2010	Mulga plain
POI51	499347	7122449	R	2010	Triodia hummock grassland
POI52	499205	7122663	R	2010	Mallee
POI54	498529	7122527	R	2010	Mallee over Triodia
POI55	498492	7122321	R	2010	Sandplain Mallee
POI56	496960	7121347	R	2010	Mulga plain
POI57	495571	7121151	R	2010	Mulga plain
POI58	495202	7120722	R	2010	Mulga plain
POI60	491331	7123252	R	2010	Mulga plain
POI60	492096	7122843	R	2010	Mulga plain

[1] **SW corner of tenement**

Appendix C

Vegetation Condition Scale

Vegetation Condition Scale (Keighery 1994)

Code	Description
Pristine	Pristine or nearly so. No obvious signs of disturbance.
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
Very Good	Vegetation structure altered obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as ‘parkland cleared’ with the flora comprising weed or crop species with isolated native trees or shrubs.

Appendix D

Classification of Vegetation Structural Formation & Height Classes

Vegetation Structure Classification (Keighlery 1994)

Lifeform/ Height Class	**Canopy Cover (percentage**			
	100% - 70%	**70% - 30%**	**30% - 10%**	**10% - 2%**
Trees > 30m Trees 10-30m Trees < 10m	Tall Closed Forest Closed Forest Low Closed Forest	Tall Open Forest Open Forest Low Open Forest	Tall Woodland Woodland Low Woodland	Tall Open Woodland Open Woodland Low Open Woodland
Tree Mallee	Closed Tree Mallee	Tree Mallee	Open Tree Mallee	Very Open Tree Mallee
Shrub Mallee	Closed Shrub Mallee	Shrub Mallee	Open Shrub Mallee	Very Open Shrub Mallee
Shrubs > 2m Shrubs 1-2m Shrubs <1m	Closed Tall Scrub Closed Heath Closed Low Heath	Tall Open Scrub Open Heath Open Low Heath	Tall Shrubland Shrubland Low Shrubland	Tall Open Shrubland Open Shrubland Low Open Shrubland
Grasses	Closed Grassland	Grassland	Open Grassland	Very Open Grassland
Herbs	Closed Herbland	Herbland	Open Herbland	Very Open Herbland
Sedges	Closed Sedgeland	Sedgeland	Open Sedgeland	Very Open Sedgeland

Appendix E

Flora Quadrat and Relevé Data Sheets and Images

Wingellina 2010 **Site: 005**

Described by RF **Date:** 9/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 490133E 7116532N
Habitat Open Plain; W aspect
Soil Red sandy loam
Vegetation Mitchell grass tussock grassland
Veg Condition Pristine
Notes Low Disturbance; Litter - 5%;Replacement for site in culturally significant area.

Species List:

Taxa	Cover %	Hgt (m)	Specimen
Abutilon malvifolium	+	0.4	9547
Acacia victoriae	+	0.5	
Arabidella trisecta	+	0.2	
Aristida latifolia	+	0.3	
Astrebla elymoides	+	0.4	
Astrebla pectinata	20	0.4	
Boerhavia schomburgkiana	+	0.05	AM3
Bonamia erecta	+	0.2	
Calotis hispidula	+	0.1	9590
Capsella bursa-pastoris	+	0.1	
Convolvulus clementii	+	0.1	9591
Daucus glochidiatus	+	0.3	
Dichanthium affine	+	0.3	
Digitaria brownii	+	0.3	
Dysphania cristata	+	0.3	9592
Dysphania sp.	+	0.1	AM9
Eragrostis setifolia	1	0.3	
Erodium cygnorum	+	0.3	
Euphorbia inappendiculata	+	0.05	AM4
Goodenia heterochila			
Maireana erioclada	+	0.3	
Malvastrum americanum	+	0.3	
Menkea villosula	+		9587
Plantago drummondii	1	0.3	AM2
Portulaca oleracea	+	0.3	
Rhodanthe floribunda	+	0.4	9589
Rhynchosia minima	1	0.2	
Salsola kali	+	0.2	
Sauropus trachyspermus	+	0.2	
Sida fibulifera	+	0.2	
Sida trichopoda	+	0.3	9546
Swainsona tenuis	+	0.4	9556
Themeda triandra	2	0.5	
Tribulus sp.	+	0.05	
Wahlenbergia communis	+	0.3	

Wingellina 2010 **Site:** PARC1

Described by RF **Date:** 10/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 491649E 7117976N
Habitat Crab holed flow line

Species List:

Taxa	Cover %
Abutilon malvifolium	+
Acacia victoriae	+
Aristida latifolia	+
Astrebla elymoides	3
Astrebla pectinata	10
Calotis hispidula	+
Cenchrus ciliaris	+
Convolvulus erubescens	+
Daucus glochidiatus	+
Dichanthium affine	+
Digitaria brownii	+
Enneapogon cylindricus	+
Eragrostis setifolia	8
Eragrostis setifolia	+
Eragrostis xerophila	+
Erodium cygnorum	+
Hibbertia triandra	+
Maireana eriosphaera	+
Malvastrum spicatum	+
Panicum decompositum	+
Plantago drummondii	+
Portulaca oleracea	+
Salsola kali	+
Sida sp. Limestone (D.E. Abrecht 5748)	+


11.10.2010

Wingellina 2010 **Site:** PARC2

Described by RF **Date:** 10/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 490900E 7116985N
Habitat Crab hole flow line

Species List:

Taxa	Cover %	Specimen
Aristida latifolia	+	
Astrebla elymoides	+	
Astrebla pectinata	+	
Boerhavia schomburgkiana	+	
Cenchrus ciliaris	+	
Convolvulus erubescens	+	
Crotalaria *eremaea*	+	9624
Digitaria brownii	+	
Enneapogon cylindricus	+	
Enteropogon ramosus	+	
Eragrostis setifolia	8	
Eragrostis xerophila	+	
Eremophila longifolia	+	
Erodium cygnorum	+	
Goodenia sp.	+	
Maireana eriosphaera	+	
Panicum decompositum	+	
Rhagodia eremaea	+	
Rhynchosia minima	+	
Sida fibulifera	+	
Solanum esuriale	+	
Swainsona sp.	+	
Themeda triandra	10	
Tribulus sp.	+	
Wahlenbergia communis	+	

Wingellina 2010 **Site:** PARC3

Described by RF **Date:** 10/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 490342E 7116669N
Habitat Crabholed flow line

Species List:

Taxa	Cover %	Specimen
Acacia victoriae	+	
Astrebla elymoides	+	
Astrebla pectinata	+	
Brachyscome ciliaris	+	
Calotis hispidula	+	
Dichanthium affine	+	
Digitaria brownii	+	
Enneapogon cylindricus	+	
Eragrostis setifolia	+	
Goodenia sp.	+	
Maireana eriosphaera	+	
Menkea lutea	+	
Rhynchosia minima	+	
Sida fibulifera	+	
Sida sp.	+	
Swainsona acuticarinata	+	
Wahlenbergia communis	+	

Wingellina 2010 **Site:** PARC4

Described by RF **Date:** 10/10/2010 **Type:** Relevé

Season: Poor **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 491383E 7115898N

Habitat Clay pan

Vegetation Open tussock grassland

Species List:

Taxa	Cover %	Specimen
Abutilon malvifolium	+	
Acacia victoriae	+	
Aristida latifolia	3	
Astrebla pectinata	5	
Capsella bursa-pastoris	+	
Convolvulus erubescens	+	
Dichanthium sericeum	+	
Digitaria brownii	+	
Enneapogon cylindricus	+	
Eragrostis setifolia	+	
Euphorbia boophthona	+	
Goodenia sp.	+	
Menkea lutea	+	
Plantago drummondii	+	
Ptilotus obovatus	+	
Sida fibulifera	+	
Sida trichopoda	+	

Wingellina 2010 **Site:** PARC5

Described by RF **Date:** 10/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 498986E 7114051N
Habitat Cracking claypan
Species List:

Taxa	Cover %	Specimen
Acacia victoriae	+	
Aristida latifolia	7	
Astrebla elymoides	+	
Astrebla pectinata	3	
Calotis latiuscula	+	9627
Capsella bursa-pastoris	+	
Cenchrus ciliaris	+	
Convolvulus erubescens	+	
Daucus glochidiatus	+	
Dichanthium sericeum	+	
Enneapogon cylindricus	+	
Eragrostis xerophila	+	
Erodium cygnorum	+	
Goodenia sp.	+	
Menkea lutea	+	
Panicum decompositum	+	
Plantago drummondii	+	
Portulaca oleracea	+	
Rhagodia eremaea	+	
Salsola kali	+	
Schoenia cassiniana	+	
Sclerolaena cornishiana	+	
Senna artemisioides subsp. *filifolia*	+	
Sida fibulifera	+	
Sida trichopoda	+	
Tribulus occidentalis	+	
Unknown	+	
Wurmbea deserticola	+	

Wingellina 2010 **Site:** PARC6

Described by RF **Date:** 10/10/2010 **Type:** Relevé

Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 494089E 7113918N

Habitat Clay pan

Vegetation Sparse tussock grassland

Species List:

Taxa	Cover %	Specimen
Acacia aneura	+	
Acacia victoriae	1	
Aristida latifolia	2	
Astrebla pectinata	+	
Dichanthium sericeum	+	
Digitaria brownii	+	
Enneapogon caerulescens	+	
Eragrostis xerophila	+	
Menkea lutea	+	
Plantago drummondii	+	
Rhodanthe floribunda	+	
Sida fibulifera	+	
Wahlenbergia communis	+	

Wingellina 2010 **Site:** PARC7

Described by RF **Date:** 10/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 492114E 7114993N
Habitat Calcrete plain
Soil: Red sandy clay.
Vegetation: Open Mulga
Veg Condition: Impacted from Camel grazing.
Species List:

Taxa	Cover %	Specimen
Acacia aneura	+	
Aristida contorta	+	
Boerhavia coccinea	+	
Capsella bursa-pastoris		
Cenchrus ciliaris	+	
Cymbopogon obtectus	+	
Digitaria brownii	+	
Enneapogon cylindricus	+	
Enneapogon polyphyllus	+	
Minuria leptophylla	+	
Panicum decompositum	+	
Ptilotus obovatus	+	
Rhyncharrhena linearis	+	
Sclerolaena divaricata	+	
Senecio magnificus	+	
Sida fibulifera	+	
Tribulus terrestris	+	
Wahlenbergia communis	+	

Wingellina 2010 **Site:** PARC8

Described by RF **Date:** 10/10/2010 **Type:** Relevé

Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 491650E 7118839N

Habitat Hill

Species List:

Taxa	Cover %	Specimen
Abutilon indicum	+	
Acacia tetragonophylla	+	
Cenchrus ciliaris	+	
Cheilanthes lasiophylla	+	
Cymbopogon obtectus	+	
Dichanthium affine	+	
Digitaria ctenantha	+	
Enneapogon polyphyllus	+	
Eucalyptus gamophylla	10	
Eucalyptus gypsophila	+	
Euphorbia tannensis	+	
Hakea lorea	+	
Pittosporum angustifolium	+	
Ptilotus obovatus	+	
Salsola kali	+	
Santalum lanceolatum	+	
Triodia lanigera	+	
Triodia scariosa	30	
Zygophyllum apiculatum	+	

Wingellina 2010 **Site:** PARC9

Described by RF **Date:** 10/10/2010 **Type:** Relevé

Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 490739E 7114379N

Species List:

Taxa	Cover %	Specimen
Aristida contorta	+	
Aristida latifolia	+	
Astrebla pectinata	+	
Atriplex elachophylla	+	
Boerhavia schomburgkiana	+	
Calotis hispidula	+	
Calotis latiuscula	+	9627
Capsella bursa-pastoris	+	
Convolvulus erubescens	+	
Dichanthium sericeum	2	
Digitaria brownii	+	
Dysphania rhadinostachya	+	
Enneapogon cylindricus	+	
Eragrostis xerophila	+	
Erodium cygnorum	+	
Hakea lorea	+	
Maireana eriosphaera	+	
Menkea lutea	+	
Plantago drummondii	+	
Ptilotus obovatus	+	
Rhodanthe floribunda	+	
Salsola kali	+	
Senecio magnificus	+	
Stenopetalum velutinum	+	
Themeda australis	+	
Tribulus occidentalis	+	
Wahlenbergia communis	+	

Wingellina 2010 **Site:** POI33

Described by RF **Date:** 10/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 495024E 7122342N
Habitat Hill flat and top
Soil Light brown sandy loam with gravelly scree
Rock Type

Vegetation Low woodland over shrubland
Veg Condition Excellent
Notes Low Disturbance
Litter - 5%
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Abutilon leucopetalum	+	0.4	
Acacia aneura	2	5	
Acacia aneura var. *intermedia*	+	3	
Acacia kempeana	1	4	
Acacia tetragonophylla	+	0.75	
Aristida contorta	+	0.3	
Cenchrus ciliaris	+	0.4	
Digitaria brownii	+	0.4	
Enneapogon cylindricus	3	0.3	
Eremophea spinosa	+	0.2	
Ptilotus obovatus	15	0.5	
Rhagodia eremaea	+	1.5	
Sclerolaena sp.	+	0.2	
Senna artemisioides subsp. *artemisioides*	10	1.0	
Sida calyxhymenia	+	1.2	
Tribulus sp.	+	0.05	


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Wingellina 2010 **Site:** POI19

Described by RF **Date:** 10/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 494770E 7119179N
Habitat Rocky outcrop, ironstone low hill
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Acacia aneura var. *intermedia*	1	6	CN68
Acacia pruinocarpa	1	3	
Aristida nitidula	2	0.5	CN142
Cenchrus ciliaris	+	0.4	
Corymbia hamersleyana	+	3	
Cymbopogon obtectus	+	0.4	CN87
Eragrostis eriopoda	2	0.4	CN100
Eremophila latrobei subsp. *glabra*	1	1.2	W3
Eriachne mucronata	2	0.3	W14
Ficus brachypoda	1	4	CN140
Ptilotus obovatus	2	0.4	
Senna artemisioides subsp. *artemisioides*	+	0.8	9513
Senna artemisioides subsp. *helmsii*	+	1.2	W13
Solanum lasiophyllum	+	0.3	
Spartothamnella teucriiflora	+	0.6	CN141
Thyridolepis mitchelliana	+	0.3	CN126

Wingellina 2010 **Site:** POI20

Described by RF **Date:** 10/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 494719E 7119419N
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Acacia aneura	2	4	CN68
Acacia aneura	1	2	CN53
Cymbopogon obtectus	1	0.5	CN87
Enchylaena tomentosa	1	0.2	
Eragrostis eriopoda	12	0.3	CN100
Eremophila longifolia	3	1.7	
Solanum cleistogamum	1	0.2	

Wingellina 2010 **Site:** POI21

Described by RF **Date:** 10/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 495499E 7119019N
Species List:

Taxa	Cover %	Specimen
Acacia pruinocarpa	3	
Aristida contorta	5	
Aristida holathera	4	CN75
Cenchrus ciliaris	+	
Eucalyptus gamophylla	4	
Ptilotus obovatus	1	
Senna artemisioides subsp. *filifolia*	+	CN31
Senna pleurocarpa var. *pleurocarpa*	+	CN80
Triodia scariosa	5	CN89

Wingellina 2010 **Site:** POI22

Described by RF **Date:** 10/10/2010 **Type:** Relevé

Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 493872E 7118177N

Species List:

Taxa	Cover %	Hgt (m)	Specimen
Cenchrus ciliaris	1	0.5	
Eremophea spinosa	+	0.1	CN34
Eriachne mucronata	1	0.2	W14
Eucalyptus socialis subsp. *eucentrica*	5	5	W2
Hakea divaricata	+	1	CN143
Hakea lorea subsp. *lorea*	+	2.5	CN23
Ptilotus obovatus	1	0.7	
Sclerolaena cornishiana			
Triodia scariosa	12	0.3	CN89

Wingellina 2010 **Site:** POI23

Described by RF **Date:** 10/10/2010 **Type:** Relevé

Season: Excellent **Uniformity:**

MGA Zone and Coordinate: 52 493984E 7117636N

Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Acacia aneura	1	2.0	CN68	
Acacia aneura	3	4	CN53	terete
Acacia synchronicia	+	1.7	CN144	
Aristida latifolia	20	0.6	CN145	
Astrebla pectinata	15	0.6		
Brachyscome ciliaris	+	0.2	CN28	
Enneapogon cylindricus	1	0.2	CN14	
Eragrostis eriopoda	3	0.3	CN107	
Eragrostis sp.	1	0.4	CN100	
Sida fibulifera	1	0.2	CN33	

Wingellina 2010 **Site:** POI24

Described by CN **Date:** 10/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 494185E 7115971N
Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Acacia aneura	2	6.0	CN68	*intermedia*
Acacia aneura	+	3	CN53	terete
Acacia victoriae var. *victoriae*	+	0.7	CN144	
Aristida contorta	1	0.2		
Digitaria brownii	8	0.4	CN88	
Einadia nutans subsp. *eremaea*	+	0.4	CN147	
Enneapogon polyphyllus	1	0.2	CN14	
Eremophila longifolia	+	1.5		
Glycine canescens	+	climber	CN105	
Ptilotus obovatus	1	0.4		
Scaevola amblyanthera var. centralis	+	0.2	CN146	
Sclerolaena cornishiana	2	0.1	CN112	
Senna artemisioides subsp. *filifolia*	+	0.5	CN31	
Sida fibulifera	1	0.2	CN34	
Solanum cleistogamum	+	0.2		
Tribulus sp.	+	0.01	CN49	
Wahlenbergia communis	+	0.2	CN43	

Wingellina 2010 **Site:** POI25

Described by CN**Date:** 10/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 494651E 7114734N
Fire Age – Recently Burnt

Species List:

Taxa	Cover %	Hgt (m)	Specimen
Acacia pruinocarpa	+	5	
Acacia tetragonophylla	+	1	
Aristida contorta	+	0.2	
Brachyachne ciliaris	+	0.2	CN28
Codonocarpus cotinifolius	+	1.7	
Digitaria brownii	+	0.3	CN88
Euphorbia tannensis	+	0.2	W7
Goodenia sp.	+	0.2	CN59
Ptilotus clementii	+	0.3	CN66
Ptilotus sessilifolius	+	0.3	CN106
Sclerolaena patenticuspis	+	0.1	CN132
Senna pleurocarpa var. *pleurocarpa*	+	0.8	CN80
Sida fibulifera	+	0.3	CN34
Triodia scariosa	15	0.5	CN89

Wingellina 2010 **Site:** POI26

Described by CN **Date:** 10/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 495012E 7114448N
Habitat Rocky ridge
Soil Brown fine sandy loam between boulders, minimal soil
Vegetation Low very open shrubland over hummock grassland
Veg Condition Pristine
Notes Low Disturbance
Litter - 15%
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Acacia kempeana	+	0.7	
Acacia pruinocarpa	+	0.75	
Amphipogon caricinus var. *caricinus*	10	0.3	CN151
Aristida contorta	+	0.2	
Calandrinia eremaea	+	0.1	CN150
Chrysocephalum pterochaetum	+	0.2	
Corymbia eremaea	+	4	
Cucumis sp.	+	0.2	
Cymbopogon obtectus	1	0.5	
Digitaria ctenantha	1	0.4	
Enneapogon polyphyllus	+	0.1	
Eremophila latrobei subsp. *glabra*	1	1	
Eremophila longifolia	+	0.4	
Eriachne mucronata	+	0.3	
Euphorbia tannensis	+	0.3	
Halgania cyanea	+	0.3	
Indigofera sp. MacDonnel Ranges	+	0.2	
Lepidium oxytrichum	+	0.3	CN154
Rhagodia eremaea	+	0.5	
Santalum lanceolatum	10	0.5	CN149
Scaevola spinescens	+	0.2	
Schoenia cassiniana	+	0.1	CN155
Sclerolaena costata	+	0.2	CN153
Stenopetalum velutinum	+	0.3	
Themeda triandra	5	0.3	CN148
Thysanotus sp.	+	0.2	CN152
Zygophyllum apiculatum	+	0.1	


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Wingellina 2010 **Site:** POI27

Described by CN **Date:** 10/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 498396E 7119696N
Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Acacia aneura	1	5	CN53	terete
Aristida contorta	5	0.2		
Cenchrus ciliaris	3	0.5		
Enneapogon polyphyllus	+	0.2	CN14	
Eragrostis eriopoda	3	0.3		
Euphorbia tannensis	+	0.4	W7	
Hakea lorea subsp. *lorea*	+	1.0		
Pterocaulon sphacelatum	+	0.5	CN95	
Sclerolaena patenticuspis	+	0.1		
Sida fibulifera	1	0.3	CN34	
Solanum lasiophyllum	+	0.3		
Tribulus sp.	+	0.01	CN49	

Wingellina 2010 **Site:** POI28

Described by CN **Date:** 10/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 497646E 7118931N
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Acacia tetragonophylla	+	0.7	
Aristida contorta	1	0.2	
Aristida latifolia	5	0.6	CN108
Dichanthium sericeum subsp. *sericeum*	+	0.8	CN159
Dichanthium sericeum subsp. *sericeum*	+	0.5	CN159
Digitaria brownii	1	0.4	CN88
Enneapogon polyphyllus	+	0.2	CN14
Eragrostis xerophila	2	0.3	CN107
Sauropus trachyspermus	+	0.2	CN157
Sida fibulifera	1	0.3	CN34
Solanum lasiophyllum	+	0.4	
Wahlenbergia communis	+	0.5	CN158

Wingellina 2010 **Site:** POI30

Described by CN **Date:** 10/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 499958E 7118862N
Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Acacia aneura	+	2	CN53	terete
Cenchrus ciliaris	5	0.7		
Citrullus lanatus	+	0.05	CN161	
Enneapogon polyphyllus	+	0.2	CN14	
Ptilotus obovatus	+	0.5		
Salsola tragus	+	0.1		
Sida fibulifera	1	0.1	CN34	
Solanum lasiophyllum	+	0.4		
Tribulus sp.	+	0.01	CN49	
Zygophyllum apiculatum	+	0.1	CN01	

Wingellina 2010 **Site:** POI31

Described by CN **Date:** 10/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 496059E 7121713N
Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Acacia aneura	1	6	CN53	terete
Acacia tetragonophylla	+	3		
Aristida contorta	2	0.2		
Aristida latifolia	7	0.6	CN108	
Brachyscome ciliaris	+	0.2	CN28	
Chrysocephalum pterochaetum	+	0.2	CN162	
Cymbopogon obtectus	+	0.6	CN87	
Digitaria brownii	+	0.4	CN88	
Einadia nutans subsp. *eremaea*	+	0.3	CN147	
Enneapogon polyphyllus	+	0.2	CN14	
Eragrostis xerophila	5	0.5	CN107	
Glycine canescens	+	climber	CN105	
Goodenia sp.	+	0.1	CN114	
Maireana villosa			CN163	
Ptilotus obovatus	4	0.5		
Senna artemisioides subsp. *filifolia*	+	0.6	CN31	
Sida fibulifera	+	0.2	CN34	
Solanum lasiophyllum	+	0.3		

Wingellina 2010 **Site:** POI32

Described by CN**Date:** 10/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 495543E 7122158N

Wingellina 2010 **Site:** POI33

Described by RF **Date:** 10/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 495160E 7122459N
Habitat Slight rise
Soil Red brown loam

Wingellina 2010 **Site:** POI34

Described by RF **Date:** 10/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 495159E 7122687N
Habitat Plain to stony rise.

Wingellina 2010 **Site:** POI35

Described by RF **Date:** 10/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 493791E 7122606N

Wingellina 2010 **Site:** POI36

Described by RF **Date:** 11/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 495877E 7120374N
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Acacia aneura	5	5	CN53
Aristida contorta	3	0.3	
Cenchrus ciliaris	+	0.4	
Chrysocephalum pterochaetum	+	0.2	CN162
Cymbopogon obtectus	+	0.5	CN87
Digitaria brownii	3	0.3	CN88
Digitaria brownii	+	0.3	CN102
Einadia nutans subsp. *eremaea*	+	0.4	CN147
Enneapogon polyphyllus	3	0.3	CN14
Euphorbia tannensis	+	0.3	W7
Glycine canescens	+	climber	CN105
Ptilotus obovatus	+	0.4	
Ptilotus sessilifolius	+	0.3	CN106
Sclerolaena patenticuspis	+	0.2	
Senna artemisioides subsp. *filifolia*	+	0.8	CN31
Sida fibulifera	+	0.2	CN34
Solanum lasiophyllum	+	0.4	
Tribulus sp.	+	0.02	CN49

Wingellina 2010 **Site:** POI37

Described by RF **Date:** 11/10/2010 **Type:** Relevé

Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 495375E 7120222N

Wingellina 2010 **Site:** POI38

Described by RF **Date:** 11/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 495221E 7120130N
Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Acacia aneura	5	6	CN53	terete
Acacia kempeana	1	1	CN36	
Aristida contorta	1	0.2		
Digitaria brownii	+	0.4	CN88	
Enneapogon polyphyllus	2	0.2	CN14	
Eremophea spinosa	1	0.1	CN34	
Ptilotus obovatus	20	0.4		
Salsola tragus	1	0.2		
Sclerolaena patenticuspis	+	0.1	CN132	
Senna artemisioides subsp. *artemisioides*	3	1.5	9513	
Sida fibulifera	+	0.3	CN34	

Wingellina 2010 **Site:** POI39

Described by RF **Date:** 11/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 495174E 7120047N
Species List:

Taxa	Cover %	Height	Specimen
Abutilon fraseri			CN164
Acacia nyssophylla			W6
Acacia pruinocarpa			
Acacia tetragonophylla			
Acacia victoriae var. *victoriae*			CN36
Cenchrus ciliaris			
Einadia nutans subsp. *eremaea*			W12
Enneapogon polyphyllus			CN14
Eremophila cuneifolia			CN69
Eucalyptus socialis subsp. *eucentrica*			W2
Euphorbia tannensis			W7
Rulingia sp.			CN81
Salsola tragus			
Sclerolaena patenticuspis			CN132
Senna artemisioides subsp. *artemisioides*			9513
Senna artemisioides subsp. *filifolia*			CN31
Senna artemisioides subsp. x *sturtii*			W4
Sida sp. Limestone (D.E. Abrecht 5748)			CN04
Solanum orbiculatum subsp. *orbiculatum*			CN122
Triodia scariosa			CN89

Wingellina 2010 **Site:** POI41

Described by RF **Date:** 11/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 494164E 7118837N

Wingellina 2010 **Site:** POI42

Described by RF **Date:** 11/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 493632E 7119272N
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Acacia tetragonophylla	+	1	
Enchylaena tomentosa	+	0.7	
Eucalyptus gypsophila	6	5.0	CN03
Eucalyptus socialis subsp. *eucentrica*	8	5	W2
Ptilotus obovatus	2	0.5	
Senna artemisioides subsp. *artemisioides*	+	1.2	9513
Triodia scariosa	20	0.3	CN89
Zygophyllum apiculatum	+	0.2	CN01

Wingellina 2010 **Site:** POI43

Described by RF **Date:** 11/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 493729E 7119385N
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Acacia aneura var. *microcarpa*	+	5	CN104
Acacia kempeana	1	1.5	CN36
Acacia tetragonophylla	+	2.5	
Corymbia hamersleyana	2	5	
Eremophila latrobei subsp. *glabra*	1	1.3	W3
Eriachne mucronata	5	0.3	W14
Eucalyptus gypsophila	10	5	CN03
Eucalyptus socialis subsp. *eucentrica*	2	4	W2
Jasminum didymum subsp. *lineare*	+	1.5	CN165
Psydrax suaveolens	+	1.5	CN166
Ptilotus obovatus	2	0.7	
Sarcostemma sp.	+	1	
Triodia scariosa	20	0.5	CN89

Wingellina 2010 **Site:** POI44

Described by RF **Date:** 11/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 494403E 7119715N
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Abutilon cryptopetalum	+	0.2	CN11
Acacia aneura	30	5	CN167
Eremophila georgei	3	1.3	CN97
Eremophila latrobei subsp. *glabra*	3	1.3	W3
Sida fibulifera			
Thyridolepis mitchelliana	+	0.3	CN126
Triodia scariosa	5	0.5	CN89

Wingellina 2010 **Site:** POI45

Described by RF **Date:** 11/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 494270E 7120292N
Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Acacia aneura	2	4	CN68	*intermedia*
Acacia aneura	2	4	CN53	terete
Acacia kempeana	+	4	CN36	
Acacia pruinocarpa	+	5		
Acacia tetragonophylla				
Einadia nutans subsp. *eremaea*	+	0.8	W12	
Eremophila paisleyi	+	1.3	CN96	
Eucalyptus gypsophila	3	6	CN03	
Eucalyptus socialis subsp. *eucentrica*	7	6	W2	
Ptilotus obovatus	10	0.6		
Scaevola spinescens	1	1	CN168	
Senna artemisioides subsp. *helmsii*	+	1.0	W13	
Senna artemisioides subsp. x *sturtii*	+	1.0	W4	
Sida sp. Limestone (D.E. Abrecht 5748)	+	0.1	CN04	
Triodia scariosa	25	0.5	CN89	

Wingellina 2010 **Site:** POI46

Described by RF **Date:** 11/10/2010 **Type:** Relevé

Season **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 496934E 7119866N

Habitat Mulga Plain

Wingellina 2010 **Site:** POI47

Described by RF **Date:** 11/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 497131E 7119330N
Habitat Mulga plains

Wingellina 2010 **Site:** POI48

Described by RF **Date:** 11/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 499516E 7120407N
Habitat Mulga plain

Wingellina 2010 **Site:** POI49

Described by RF **Date:** 11/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 499596E 7121613N
Habitat Mulga plain

Wingellina 2010 **Site:** POI50

Described by RF **Date:** 11/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 499621E 7122392N
Habitat Mulga plain

Wingellina 2010 **Site:** POI51

Described by RF **Date:** 11/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 499347E 7122449N
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Chrysocephalum apiculatum			CN170
Convolvulus clementii			CN171
Nicotiana occidentalis subsp. *obliqua*			CN169
Solanum centrale			CN172
Triodia pungens			CN173

Wingellina 2010 **Site:** POI52

Described by RF **Date:** 11/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 499205E 7122663N
Habitat Mulga plains

Wingellina 2010 **Site:** POI53

Described by RF **Date:** 11/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 498710E 7122544N
Habitat Sandplain
Soil Red pindan sand
Vegetation Open mallee woodland over *Triodia* hummock grassland
Veg Condition Pristine
Notes Low Disturbance
Litter - 5%
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Acacia melleodora	+	1	CN177
Acacia tetragonophylla	+	1.5	
Aristida contorta	+	0.2	
Aristida holathera	+	0.4	
Cenchrus pennisetiformis	2	0.4	
Enchylaena tomentosa	+	0.75	
Enneapogon cylindricus	+	0.3	
Eremophea spinosa	+	0.2	
Eremophila cuneifolia	+	0.4	
Eucalyptus socialis	10	4	
Grevillea berryana	+	4	CN175
Ptilotus obovatus	+	0.5	
Ptilotus sessilifolius	+	0.4	
Rulingia loxophylla	+	1	
Salsola tragus	+	0.2	
Sclerolaena patenticuspis	+	0.2	
Sclerolaena sp.	+	0.2	
Senna artemisioides subsp. *petiolaris*	2	1.2	
Sida fibulifera	+	0.2	CN176
Stenopetalum velutinum	+	0.3	
Triodia pungens	40	0.5	CN173
Zygophyllum apiculatum	+	0.1	
Zygophyllum eremaeum	+	0.75	CN174


11.10.2010

Wingellina 2010 **Site:** POI54

Described by RF **Date:** 11/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 498529E 7122527N
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Duboisia hopwoodii			CN178
Solanum coactiliferum			CN179

Wingellina 2010 **Site:** POI55

Described by RF **Date:** 11/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 498492E 7122321N
Habitat Sandplain mallee

Wingellina 2010 **Site:** POI56

Described by RF **Date:** 11/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 496960E 7121347N
Habitat Mulga Plains

Wingellina 2010 **Site:** POI57

Described by RF **Date:** 11/10/2010 **Type:** Relevé

Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 495571E 7121151N

Wingellina 2010 **Site:** POI58

Described by RF **Date:** 11/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 495202E 7120722N
Habitat Mulga plain

Wingellina 2010 **Site:** POI59

Described by RF **Date:** 11/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 491331E 7123252N
Habitat Mulga plain

Wingellina 2010 **Site:** POI60

Described by RF **Date:** 11/10/2010 **Type:** Relevé
Season: Excellent **Uniformity:**

Location Wingellina

MGA Zone and Coordinate: 52 492096E 7122843N

Wingellina 2010 **Site:** SPR1

Described by RF **Date:** 6/10/2010 **Type:** Quadrat (20x100m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 497835E 7115382N
Habitat Drainage line
Soil Red sandy loam
Vegetation Very open shrubland/grassland dominated by Panicum
Veg Condition: Evidence of Camel grazing.
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Abutilon sp.	+	0.1	SP30
Acacia aneura	+	2	SP29
Acacia sibirica	2	1.5	SP5
Acacia tetragonophylla	+	1.8	SP31
Aristida contorta	1	0.4	SP3
Aristida holathera			SP51
Atriplex semibaccata	+	0.8	SP9
Boerhavia coccinea	+	ground	SP19
Brassicaceae sp.	+	0.4	SP18
Cenchrus ciliaris	2	0.3	SP7
Chrysocephalum pterochaetum	+	0.3	SP50
Convolvulus clementii	+	0.3	SP34
Cymbopogon obtectus	+	0.3	SP33
Dichanthium sericeum subsp. *sericeum*	+	0.4	SP38
Enchylaena tomentosa	+	0.3	SP49
Enteropogon ramosus	1	0.4	SP44
Eragrostis desertorum	+	0.3	SP21
Eremophila longifolia	+	0.8	SP17
Erodium carolinianum	+	0.4	SP12
Eucalyptus gamophylla	2	2	SP35
Eucalyptus socialis	+	2	SP27
Euphorbia boophthona	+	0.3	SP46
Euphorbia boophthona	+	1.2	SP32
Glycine canescens	+	Twiner	SP8
Hakea divaricata	+	1.5	SP40
Lepidium oxytrichum	+	0.1	SP48
Lepidium oxytrichum	+	0.3	SP45
Malvastrum americanum	+	0.4	SP11
Paspalidium constrictum	2	0.3	SP6
Portulaca oleracea	+	0.4	SP43
Ptilotus exaltatus	+	0.3	SP37
Ptilotus obovatus	+	0.3	SP47
Ptilotus polystachyus	+	0.3	SP36
Ptilotus sessilifolius	+	0.4	SP42
Rhagodia eremaea	+	0.2	SP22
Rhagodia eremaea	+	0.4	SP16
Salsola kali	+	0.3	SP26
Sauropus trachyspermus	+	0.1	SP1
Schoenia ayersii	+	0.4	SP14
Sclerolaena convexula	+	0.3	SP23
Sclerolaena parviflora	+	0.2	SP41
Sclerolaena patenticuspis	1	0.2	SP13
Senna artemisioides subsp. *artemisioides*	2	1	SP2
Senna artemisioides subsp. *filifolia*	1	1.8	SP28
Sida fibulifera	+	0.1	SP20

Solanum esuriale	+	0.4	SP39
Solanum lasiophyllum	+	0.3	SP4
Solanum orbiculatum	1	0.4	SP15
Stenopetalum velutinum	+	0.3	SP24
Wahlenbergia communis	2	0.4	SP10

Wingellina 2010 **Site:** WIN001 (site moved from WIN001a (below) to avoid significant cultural site)

Described by RF **Date:** 8/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 495791E 7117243N
Habitat Hill Slope; N Aspect
Soil Red basalt gravel
Vegetation *Senna* Shrubland with *Triodia* Hummock grassland
Veg Condition Excellent
Notes Low Disturbance

Litter 2%

Species List:

Taxa	Cover %	Hgt (m)	Specimen		
Abutilon lepidum	+	0.3	RF7		
Abutilon leucopetalum	+	0.3	RF16		
Acacia aneura (40x4mm)	+	6	RF3	green	falcate
Acacia brachystachya	+	1.0	RF20		
Acetosa vesicaria	+	0.3			
Amaranthus sp.	+	0.1	RF18		
Aristida burbidgeae	+	0.3	RF21		
Boerhavia coccinea	+	0.1	RF10		
Calotis hispidula	+	0.05	RF22		
Cenchrus ciliaris	+	0.3			
Cheilanthes lasiophylla	+	0.05			
Digitaria ctenantha	+	0.2			
Dysphania sp.	+	0.2	RF17		
Enneapogon polyphyllus	+	0.3	1		
Eremophila latrobei	+	0.4			
Erodium cygnorum	+	0.1	RF13		
Euphorbia boophthona	+	0.3			
Evolvulus alsinoides var. villosicalyx	+	0.1	RF8		
Indigofera linifolia	+	0.2	RF5		
Lepidium oxytrichum	+	0.2	RF12		
Maireana planifolia			RF6		
Nicotiana occidentalis subsp. *obliqua*	+	0.4	RF19		
Ptilotus exaltatus	+	0.4			
Ptilotus obovatus	2	0.3			
Rhagodia eremaea	+	0.5			
Salsola kali					
Santalum spicatum	+	1.5	RF15		
Schoenia ayersii	+	0.2	RF11		
Sclerolaena convexula	+	0.3	RF9		
Senna artemisioides subsp. *filifolia*	+	0.7			
Senna artemisioides subsp. *helmsii*	20	1.5			
Stenopetalum velutinum	+	0.3	RF4		
Themeda triandra	+	0.2			
Tribulus occidentalis	+	0.1	RF14		
Triodia scariosa	5	0.3			
Triodia scariosa	10	0.3			

Wingellina 2008 **Site:** WIN001a

Described by BGN **Date:** 14/04/2008 **Type:** Quadrat (30x30m)
Season: Poor **Uniformity:**

Location Ridge top

MGA Zone and Coordinate: 52 495723E 7117117N
Habitat Spinifex grassland (few emergent eucs and sennas).
Soil Red clay loam
Rock Type Gabro
Veg Condition Excellent
Notes Disturbance low
Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Acacia kempeana			BGN065	Outside quadrat
Acacia oswaldii	2	0.8	BGN051	
Chrysocephalum eremaeum	<1	0.4	BGN056	
Cymbopogon obtectus	<1	0.8	BGN055	
Dodonaea viscosa subsp. *spatulata*	<1	0.8	BGN059	Outside quadrat
Eragrostis sp.	2	0.1	BGN050	
Eremophila alternifolia	<1	0.8	BGN061	
Eremophila duttonii			BGN066	Outside quadrat
Eriachne mucronata			BGN063	Outside quadrat
Eucalyptus gamophylla	4	3	BGN062	Up to 5-10% off ridge
Euphorbia boophthona			BGN150	Outside quadrat
Ptilotus exaltatus var. *exaltatus*	<1	0.3		DEAD
Senna artemisioides subsp. *oligophylla* x *helmsii*	3	1.0	BGN054	
Senna glaucifolia			BGN067	Outside quadrat
Senna glutinosa	<1	0.4	BGN057	
Senna glutinosa	<1	1.2	BGN058	
Sida sp.	<1	0.5	BGN052	
Triodia schinzii			BGN064	Outside quadrat

Wingellina 2010 **Site:** WIN002 (site moved from WIN002a (below) to avoid significant cultural site)

Described by RF **Date:** 8/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform.

Location Wingellina

MGA Zone and Coordinate: 52 496828E 7113762N
Habitat Side slope to low hill; NE aspect
Vegetation Regrowth *Acacia* woodland with *Triodia* Hummock grassland
Veg Condition Excellent
Fire Age Recent
Notes Low Disturbance
Litter - 2%
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Acacia validinervia	15	1.5	
Codonocarpus cotinifolius	+	0.3	RF27
Codonocarpus cotinifolius	+	0.5	RF25
Eucalyptus gamophylla	+	2.5	
Eucalyptus socialis	5	2.0	
Euphorbia boophthona	+	0.3	
Goodenia sp.	+	0.1	RF26
Halgania cyanea	2	0.3	9520
Hibiscus solanifolius	+	0.4	RF24
Sclerolaena diacantha	+	0.2	
Senna artemisioides subsp. *filifolia*	+	0.3	
Senna artemisioides subsp. *petiolaris*	+	0.3	RF23

Wingellina 2008 **Site:** WIN002a

Described by BGN **Date:** 14/04/2008 **Type:** Quadrat (30X30m)
Season: Poor **Uniformity:**

Location Ridge slope

MGA Zone and Coordinate: 52 496682E 7116302N
Habitat Grassland
Soil Red clay loam
Rock Type Gabro
Veg Condition Pristine-Excellent
Fire Age 2
Notes Disturbance low
Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Acacia validinervia	<1	0.4	BGN073	
Cymbopogon obtectus	<1	0.3	BGN055	Dead
Dodonaea viscosa subsp. *spatulata*	70	0.4	BGN059	
Eucalyptus gamophylla	15-20	2	BGN072	
Eucalyptus sp.	7	3	BGN071	Regrowth
Halgania cyanea	<1		BGN068	Dead
Ptilotus exaltatus var. *exaltatus*	<1	0.4		
Sclerolaena parviflora	<1	0.2	BGN069	
Senna artemisioides subsp. *filifolia*	<1	0.5		
Senna glaucifolia	1	1	BGN067	
Sida calyxhymenia	<1	0.1	BGN070	
Sida sp.	<1	0.4	BGN052	

Wingellina 2010 **Site:** WIN003

Described by RF **Date:** 6/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 498595E 7115374N
Habitat Steep upper slopes, rocky outcrop; NE aspect
Soil Orange fine clay loam
Vegetation Low open low mallee woodland over *Triodia* hummock grassland
Veg Condition Pristine
Notes Low Disturbance
Litter 5%
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Abutilon cryptopetalum	+	0.1	CN11
Acacia aneura var. *conifera*	+	1.0	CN11
Acacia sibirica	+	1.5	CN02
Acacia strongylophylla	+	0.3	CN08
Acacia tetragonophylla	+	3	CN07
Cheilanthes lasiophylla	+	0.1	CN10
Corymbia eremaea	+	2.5	W16
Eremophila latrobei subsp. *glabra*	+	1.0	W3
Eucalyptus gamophylla	4	3	CN06
Halgania cyanea	+	0.2	W18
Senna artemisioides subsp. *oligophylla*	+	1.0	W13
Senna glutinosa subsp. *glutinosa*	+	1.5	CN09
Triodia scariosa	15	0.3	W20

Wingellina 2008 **Site:** WIN003

Described by BGN **Date:** 15/04/2008 **Type:** Quadrat (30x30m)
Season: Poor **Uniformity:**

Location Ridge-top, top of slope

MGA Zone and Coordinate: 52 498595E 7115374N
Soil Red clay loam
Rock Type Gabro
Veg Condition Pristine-Excellent
Fire Age None
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Acacia strongylophylla	<1	0.5	BGN075
Acacia validinervia	<1	0.8	BGN073
Eremophila duttonii	5-8	0.4	BGN068
Eucalyptus gamophylla	8	3	BGN062
Eucalyptus mannensis subsp. *mannensis*	5	3	BGN060
Triodia helmsii	20	0.4	BGN074

Wingellina 2010 **Site:** WIN004

Described by RF **Date:** 9/10/2010 **Type:** Quadrat (50 X 50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 492544E 7121147N
Habitat Hillside ,10deg west aspect
Soil Dark brown sandy loam with cobblestone scree
Vegetation Low open mallee woodland over low open shrubland over hummock grassland
Veg Condition Pristine
Notes Low Disturbance
Litter - 50%
Species List:

Taxa	Cover %	Hgt (m)	Specimen		
Acacia aneura (55x2mm)	+	3.5	CN68	Blue	green
Acacia kempeana	+	3			
Acacia nyssophylla	+	2.5			
Acacia pruinocarpa	+	5			
Acacia tetragonophylla	+	4			
Corymbia eremaea	+	4	CN119		
Eriachne mucronata	+	0.3			
Eucalyptus socialis	20	6			
Ptilotus exaltatus	1	2			
Ptilotus obovatus	5	0.4			
Rhagodia eremaea	+	1.5	CN121		
Senna artemisioides	+	1.0	CN120		
Senna artemisioides subsp. *artemisioides*	+	1.5			
Senna artemisioides subsp. *helmsii*	+	1.0			
Sida sp. Limestone (D.E. Abrecht 5748)	+	0.1			
Triodia scariosa	25	0.3	CN118		

Wingellina 2008 **Site:** WIN004

Described by BGN **Date:** 15/04/2008 **Type:** Quadrat (30x30m)
Season: Poor **Uniformity:**

Location Ridge slope

MGA Zone and Coordinate: 52 492544E 7121147N
Soil Red clay loam
Rock Type Gabro
Veg Condition Pristine-Excellent
Fire Age None
Notes No evidence of disturbance
Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Acacia kempeana		2	BGN065	Outside quadrat
Acacia oswaldii		0.6	BGN051	Outside quadrat
Acacia tetragonophylla	<1	1.2		
Cymbopogon obtectus		0.5	BGN055	Outside quadrat
Eragrostis sp.		0.2	BGN084	Outside quadrat
Eremophila duttonii		1.3	BGN066	Outside quadrat
Eremophila latrobei subsp. *latrobei*		2	BGN078	Outside quadrat
Eucalyptus mannensis subsp. *mannensis*		6	BGN081	Outside quadrat
Eucalyptus socialis subsp. *eucentrica*	30	5	BGN076	
Eucalyptus sp.	5-6	6	BGN079	
Ptilotus obovatus var. *obovatus*	10	1	BGN077	
Rhagodia eremaea	2	0.5	BGN083	
Senna artemisioides subsp. *artemisioides*		2	BGN080	Outside quadrat
Senna artemisioides subsp. *oligophylla*		1	BGN085	Outside quadrat
Triodia helmsii	35	0.3	BGN074	
Triodia schinzii		0.5	BGN064	Outside quadrat
Unknown		0.8	BGN082	Outside quadrat

Wingellina 2010 **Site:** WIN005

Described by RF **Date:** 9/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 492365E 7120442N
Habitat Plains, drainage, meadow; NW aspect
Soil Light brown sandy loam
Vegetation Tussock grassland with scattered mallee
Veg Condition Excellent
Notes Low Disturbance
Litter - 10%
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Acacia kempeana	+	1.0	
Acacia sp.	+	3	
Acacia tetragonophylla	+	1.5	
Aristida contorta	5	0.3	
Aristida holathera	3	0.4	
Aristida latifolia	+	0.6	CN108
Bothriochloa ewartiana	+	0.5	CN137
Brachyscome ciliaris	+	0.3	
Cenchrus pennisetiformis	3	0.4	
Chrysocephalum apiculatum sens. lat.	+	0.4	CN111
Chrysocephalum pterochaetum	+	0.4	CN116
Convolvulus clementii	+	0.05	CN115
Cymbopogon obtectus	+	0.5	
Dodonaea lanceolata	+	0.5	
Enchylaena tomentosa	+	0.4	
Enneapogon cylindricus	+	0.2	
Eragrostis eriopoda	2	0.3	
Eragrostis xerophila	2	0.3	CN107
Eremophea spinosa	1	0.1	
Eucalyptus gypsophila	2	5	
Glycine canescens	+	0.3	CN105
Goodenia sp.	+	0.3	CN114
Leiocarpa tomentosa	+	0.6	CN109
Panicum decompositum	+	0.4	
Portulaca oleracea var. Yuendumu	+	0.1	CN110
Pterocaulon sphacelatum	+	0.5	
Ptilotus obovatus	5	0.4	
Ptilotus sessilifolius	+	0.3	CN106
Rhagodia eremaea	+	0.75	
Sclerolaena convexula	+	0.1	CN117
Sclerolaena cornishiana	1	0.1	CN112
Sida fibulifera	+	0.3	
Solanum lasiophyllum	+	0.6	CN104
Tribulus sp.	+	0.1	
Triodia scariosa	15	0.3	

Wingellina 2008 **Site:** WIN005

Described by BGN **Date:** 15/04/2008 **Type:** Quadrat (30x30m)
Season: Poor **Uniformity:**

Location Valley floor

MGA Zone and Coordinate: 52 492364E 7120442N
Soil Red clay loam
Veg Condition Excellent
Fire Age 2-3 yrs
Notes Distubance low
Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Acacia aneura var. *conifera*		2	BGN106	Outside quadrat
Acacia clelandii		3	BGN103	Outside quadrat
Acacia dictyophleba		2	BGN107	Outside quadrat
Acacia tetragonophylla		1		Outside quadrat
Aristida contorta	2	0.2	BGN091	
Aristida holathera var. *holathera*	2	0.5	BGN092	
Cenchrus ciliaris		0.7	BGN098	
Chamaesyce australis	<1	0.15	BGN096	
Chrysocephalum apiculatum		0.3	BGN108	Outside quadrat
Chrysocephalum apiculatum	1	0.4	BGN094	
Cymbopogon obtectus	1	0.5	BGN055	
Digitaria ammophila	2	0.4	BGN088	
Enchylaena tomentosa var. *tomentosa*	<1	0.2	BGN086	
Eragrostis eriopoda	5	0.4	BGN097	
Eragrostis sp.	1	0.2	BGN084	
Eremophea spinosa	<1	0.1	BGN090	
Eucalyptus socialis subsp. *eucentrica*		6	BGN102	Outside quadrat
Lepidium phlebopetalum		0.1	BGN100	Outside quadrat
Maireana scleroptera		0.2	BGN099	
Pterocaulon serrulatum		0.1	BGN104	Outside quadrat
Ptilotus obovatus var. *obovatus*	15	0.8		
Ptilotus sp.	1	0.3		
Ptilotus sp.		0.3	BGN101	
Rhagodia eremaea		1	BGN083	Outside quadrat
Rhodanthe floribunda		0.15	BGN105	Outside quadrat
Salsola tragus	<1	0.2	BGN089	
Salsola tragus	<1	0.3	BGN095	
Sclerolaena convexula	<1	0.3	BGN093	
Sclerolaena sp.	<1	0.2	BGN087	
Sida calyxhymenia	1	0.2	BGN070	
Sida sp.	1	0.2	BGN052	
Triodia helmsii	20	0.4	BGN074	
Unidentified herb	2	0.5	BGN056	

Wingellina 2010 **Site:** WIN006

Described by RF **Date:** 6/10/2010 **Type:** Quadrat (50 x 50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 498419E 7115374N
Habitat Lower slopes; W aspect
Soil Orange light brown fine clay loam with pebble stones
Vegetation Low woodland over hummock grassland
Veg Condition Excellent
Notes Low-Medium Disturbance - some drilling disturbance on edge
Litter - 20%
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Acacia nyssophylla	+	1.5	W6
Acacia sibirica	+	1.5	CN02
Einadia nutans subsp. *eremaea*	+	0.5	W12
Enchylaena tomentosa	+	1	
Eucalyptus gypsophila	15	5	CN03
Ptilotus obovatus	2	0.4	
Salsola tragus	+	0.1	
Sida sp. Limestone (D.E. Abrecht 5748)	+	0.2	CN04
Triodia scariosa	15	0.3	W20
Zygophyllum apiculatum	+	0.4	CN01
Zygophyllum ovatum	+	0.1	CN05

Wingellina 2008 **Site:** WIN006

Described by BGN **Date:** 15/04/2008 **Type:** Quadrat (30x30m)
Season: Poor **Uniformity:**

Location Foot of ridge

MGA Zone and Coordinate: 52 498419E 7115376N
Soil Red clay loam
Rock Type Gabro
Veg Condition Excellent
Notes Disturbance low
Species List:

Taxa	Cover %	Height	Specimen	
Abutilon leucopetalum		0.4	BGN119	Outside quadrat
Acacia kempeana		2	BGN065	Outside quadrat
Acacia nyssophylla		2	BGN111	Outside quadrat
Enchylaena tomentosa var. *tomentosa*	<1	0.1	BGN086	
Eremophila latrobei subsp. *latrobei*		2	BGN112	Outside quadrat
Eucalyptus gypsophila	30	7	BGN109	
Eucalyptus socialis subsp. *eucentrica*			BGN110	
Euphorbia australis		0.15	BGN118	Outside quadrat
Goodenia ramelii		0.2	BGN121	Outside quadrat
Hibiscus leptocladus		1	BGN116	Outside quadrat
Mukia maderaspatana		1	BGN113	Outside quadrat
Petalostylis cassioides		1	BGN117	Outside quadrat
Pterocaulon serrulatum		0.7	BGN114	Outside quadrat
Ptilotus obovatus var. *obovatus*	10	0.6		
Rhagodia eremaea		1	BGN083	Outside quadrat
Sclerolaena sp.		0.15	BGN087	Outside quadrat
Sida calyxhymenia	<1	0.1	BGN070	
Sida sp.		0.2	BGN115	Outside quadrat
Solanum petrophilum		0.4	BGN122	Outside quadrat
Triodia helmsii	35	0.4	BGN074	
Zygophyllum apiculatum		0.3	BGN120	Outside quadrat

Wingellina 2010 **Site:** WIN007

Described by RF **Date:** 9/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 495671E 7118919N
Habitat Gentle slope on hillside, stony mantle; W aspect
Soil Orange light brown clay
Vegetation Mulga woodland over shrubland over hummock grassland
Veg Condition Pristine
Notes Low Disturbance
Litter - 5%
Species List:

Taxa	Cover %	Hgt (m)	Specimen		
Acacia aneura	+	1.5	CN124		
Acacia aneura (60x1mm)	5	5	CN53	Terete	
Acacia aneura (55x2mm)	15	5	CN68	Blue	green
Acacia pruinocarpa	5	6			
Aristida holathera	+	0.4			
Codonocarpus cotinifolius	+	1.0			
Eragrostis eriopoda	3	0.3			
Eremophila latrobei subsp. *glabra*	15	1.5	W3		
Eriachne mucronata	+	0.3			
Eriachne mucronata	2	0.3	CN125		
Eucalyptus gypsophila	+	6			
Euphorbia tannensis	+	0.3	W7		
Maireana villosa sens. lat.	+	0.7	CN127		
Ptilotus obovatus	+	0.5			
Rhagodia eremaea	+	0.3			
Senna artemisioides subsp. *artemisioides*	+	1.5			
Senna artemisioides subsp. *helmsii*	+	1.0			
Sida sp. Excedentifolia (J.L. Egan 1925)	+	0.3	CN123		
Solanum orbiculatum subsp. *orbiculatum*	+	1.0	CN122		
Thyridolepis mitchelliana	+	0.3	CN126		
Triodia scariosa	15	0.3			

Wingellina 2008 **Site:** WIN007

Described by BGN **Date:** 16/04/2008 **Type:** Quadrat (30x30m)
Season: Poor **Uniformity:**

Location VALLEY FLOOR

MGA Zone and Coordinate: 52 495666E 7118929N
Habitat Grassland with mallee
Soil Red clay loam
Rock Type Gabro
Veg Condition Excellent
Fire Age 2-3 yrs
Notes Distubance low
Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Acacia aneura var. *aneura*	<1	2	BGN128	
Acacia aneura var. *aneura*	4	3	BGN125	
Acacia aneura var. *conifera*		0.4	BGN134	Outside quadrat
Acacia aneura var. *intermedia*		1	BGN133	Outside quadrat
Acacia aneura var. *intermedia*	1	2.3	BGN127	
Acacia aneura var. *major*		0.5	BGN132	Outside quadrat
Acacia pruinocarpa		5	BGN131	Outside quadrat
Cenchrus ciliaris	7	0.3	BGN098	
Cymbopogon obtectus	<1	0.8	BGN055	
Enneapogon caerulescens var. *caerulescens*	7	0.4	BGN123	
Eragrostis eriopoda	10	0.4	BGN097	
Eremophila latrobei subsp. *latrobei*	15-20	1.4	BGN112	
Eremophila sp.	2	1.4	BGN126	
Maireana eriosphaera		0.2	BGN130	Outside quadrat
Mukia maderaspatana		0.4	BGN113	
Ptilotus obovatus var. *obovatus*	5	0.6		
Senna glaucifolia	3	1.2	BGN067	
Senna glutinosa	<1	0.8	BGN057	
Sida sp. Excedentifolia (J.L. Egan 1925)	<1	0.2	BGN124	
Solanum ellipticum		0.15	BGN129	Outside quadrat
Solanum petrophilum	<1	0.1	BGN122	
Triodia helmsii	20	0.4	BGN074	

Wingellina 2010 **Site:** WIN008

Described by RF **Date:** 8/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 498388E 7121339N
Habitat Plains; NW aspect
Soil Orange brown sandy loam
Rock Type Limestone pebble stones
Veg Condition Excellent
Fire Age Burnt Recently
Notes Low Disturbance; Litter - 2%
Species List:

Taxa	Cover %	Hgt (m)	Specimen		
Abutilon cryptopetalum	+	0.3	CN86		
Acacia aneura (60x1mm)	5	6	CN53	Terete	
Acacia aneura (55x2mm)	1	6	CN68	Blue	green
Amyema sanguinea	+		W22		
Aristida contorta	+	0.2			
Cenchrus ciliaris	+	0.3			
Cenchrus pennisetiformis	+	0.4			
Cymbopogon obtectus	+	0.3	CN87		
Digitaria brownii	+	0.3	CN88		
Enneapogon polyphyllus	2	0.3	CN14		
Enneapogon polyphyllus	+	0.2	CN84		
Eremophea spinosa	+	0.2	CN34		
Leiocarpa semicalva	+	0.2	CN82		
Ptilotus obovatus	+	0.2			
Salsola tragus	+	0.1			
Sclerolaena patenticuspis	+	0.2	CN83		
Sida fibulifera	+	0.05			
Solanum ellipticum	+	0.2	CN85		
Solanum esuriale	+	0.15			
Solanum lasiophyllum	+	0.5			
Tribulus sp.	+	0.05	CN49		


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Wingellina 2008 **Site:** WIN008

Described by BGN **Date:** 15/04/2008 **Type:** Quadrat (30x30m)
Season: Poor **Uniformity:**

Location Valley floor

MGA Zone and Coordinate: 52 498389E 7121332N
Habitat Dead mulga over grassland
Soil Red clay loam
Rock Type Gabro
Veg Condition Degraded
Fire Age <3 yrs
Notes Repeated fires, total loss of structure. Many rabbit burrows in general area
Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Acacia aneura var. *aneura*	2	5		
Acacia aneura var. *conifera*	1	1	BGN134	
Amyema maidenii subsp. *maidenii*	1	0.3	BGN137	
Aristida contorta	<1	0.15	BGN091	
Cenchrus ciliaris	<1	0.6	BGN098	
Chamaesyce australis	<1	0.1	BGN096	
Cymbopogon obtectus	<1	0.7	BGN055	
Enteropogon ramosus	2	0.4		
Eragrostis eriopoda	1	0.1		Mostly dead
Eragrostis sp.	2	0.2	BGN050	
Ptilotus obovatus var. *obovatus*	1	0.5		
Salsola tragus	<1	0.1	BGN095	
Sclerolaena patenticuspis	<1	0.15	BGN135	
Sida calyxhymenia	<1	0.1	BGN070	
Sida sp. Excedentifolia (J.L. Egan 1925)	1	0.3	BGN124	
Solanum lasiophyllum	<1	0.4	BGN136	

Wingellina 2010 **Site:** WIN009

Described by RF **Date:** 7/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 497402E 7114772N
Habitat Open Plain
Soil Red sand
Vegetation Open Shrubland dominated by *Acacia aneura*
Veg Condition Very Good
Notes Low Disturbance - some camel grazing of trees
Litter - 2%
Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Acacia aneura (90x1mm)	+	4-6	W47	Green
Acacia aneura	5	4-6	W46	
Acacia tetragonophylla	+	1.5		
Acetosa vesicaria	+	0.2	W51	
Atriplex semibaccata				
Brachyscome ciliaris	+	0.3	W39	
Cenchrus ciliaris	+	0.3		
Cymbopogon obtectus	+	0.4	W43	
Digitaria brownii	1.5	0.3		
Digitaria ctenantha	1.5	0.3		
Einadia nutans subsp. *eremaea*	+	0.4	W30	
Enneapogon cylindricus	+	0.3	W48	
Enteropogon ramosus	+	0.2		
Enteropogon ramosus	+	0.4		
Eragrostis desertorum	+	0.3		
Erodium cygnorum	+	0.2		
Euphorbia sp.	+	0.1	W34	
Lepidium oxytrichum	+	0.1	W33	
Maireana planifolia	2	0.3	W32	
Panicum effusum	+	0.4	W42	
Ptilotus exaltatus	+	0.1	W45	
Rhodanthe floribunda	+	0.3	W50	
Rhyncharrhena linearis	+	Climber	W52	
Rhyncharrhena linearis	+	0.3	W44	
Salsola kali	+	0.1		
Schoenia ayersii	+	0.3	W41	
Schoenia cassiniana	+	0.3	W37	
Sclerolaena convexula	+	0.2	W35	
Sclerolaena cornishiana	+	0.3	W31	
Sclerolaena lanicuspis	+	0.3	W49	
Senecio magnificus	+	0.3	W38	
Senna artemisioides subsp. *filifolia*	+	0.5	W36	
Sida fibulifera	+	0.4	W40	
Solanum esuriale	+	0.3		

Wingellina 2008 **Site:** WIN009

Described by BGN **Date:** 15/04/2008 **Type:** Quadrat (30x30m)
Season: Poor **Uniformity:**

Location Valley floor

MGA Zone and Coordinate: 52 497506E 7114763N
Soil Red clay loam
Veg Condition Good
Fire Age >5 yrs
Notes Disturbance low - camels grazing mulga
Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Acacia aneura var. *aneura*	<2	2.5	BGN138	
Acacia aneura var. *aneura*	2	2	BGN128	
Acacia aneura var. *intermedia*	4	3	BGN127	
Acacia oswaldii		1	BGN051	
Aristida contorta	<2	0.1	BGN091	
Cenchrus ciliaris	<2	0.6	BGN098	
Cymbopogon obtectus	1	0.5	BGN055	
Enteropogon ramosus	<2	0.3		
Eragrostis eriopoda	70	0.5		
Maireana eriosphaera	1	0.2	BGN130	
Ptilotus obovatus var. *obovatus*		0.3		
Sclerolaena patenticuspis		0.1	BGN135	Outside quadrat
Senna artemisioides subsp. *filifolia*	1	1.2		
Unknown		1	BGN082	Outside quadrat

Wingellina 2010 **Site:** WIN010

Described by RF **Date:** 7/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 498906E 7116923N
Habitat Calcrete area on alluvial plain
Soil Light brown clay loam
Rock Type Calcrete pebble stones
Vegetation Low open mallee woodland over *Triodia* open hummock grassland
Veg Condition Good
Notes Low Disturbance - Rabbit burrows
Litter 5%
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Acacia kempeana	+	1.0	
Acacia sp.	+	2	CN41
Acacia tetragonophylla	+	3	
Cenchrus ciliaris	+	0.3	
Enchylaena tomentosa	+	0.5	
Eragrostis eriopoda	1	0.3	
Eremophea spinosa	+	0.3	
Eucalyptus socialis	15	6	
Ptilotus obovatus	+	0.5	
Rhagodia eremaea	+	0.5	
Salsola tragus	+	0.1	
Senna artemisioides subsp. *artemisioides*	+	1.2	
Senna artemisioides subsp. *filifolia*	+	1.0	
Senna artemisioides subsp. *petiolaris*	1	1.2	CN38
Sida fibulifera	+	0.2	CN42
Sida sp. Limestone (D.E. Abrecht 5748)	+	0.2	
Triodia scariosa	5	0.3	CN40
Triodia secunda	5	0.4	CN39

Wingellina 2008 **Site:** WIN010

Described by BGN **Date:** 15/04/2008 **Type:** Quadrat (30x30m)
Season: Poor **Uniformity:**

Location Valley floor

MGA Zone and Coordinate: 52 498908E 7116922N
Soil Red clay loam
Veg Condition Good
Notes Disturbance low - rabbit warrens
Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Acacia kempeana	3	0.6	BGN065	
Acacia oswaldii	<1	1.1	BGN142	
Cenchrus ciliaris		0.7	BGN098	Outside quadrat
Cymbopogon obtectus		0.4	BGN055	Outside quadrat
Dodonaea viscosa subsp. *spatulata*	<1	0.1	BGN059	
Enteropogon ramosus	<2	0.5		
Eragrostis eriopoda	5	0.2		
Eragrostis sp.	1	0.1	BGN050	
Eragrostis sp.		0.15	BGN084	Outside quadrat
Eremophea spinosa	<1	0.15	BGN090	
Eucalyptus socialis subsp. *eucentrica*	10	5	BGN143	
Ptilotus obovatus var. *obovatus*		0.5		Outside quadrat
Ptilotus sp.		0.9	BGN144	Outside quadrat
Rhagodia eremaea		0.8	BGN083	Outside quadrat
Senna artemisioides subsp. *artemisioides*		0.6	BGN080	Outside quadrat
Senna artemisioides subsp. *artemisioides*		2	BGN145	Outside quadrat
Sida calyxhymenia		0.1	BGN070	Outside quadrat
Sida sp.		0.5	BGN052	Outside quadrat
Triodia helmsii	4-5	0.4	BGN074	

Wingellina 2010 **Site:** WIN011

Described by RF **Date:** 7/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 497285E 7117067N
Habitat Stony plains; SW aspect
Soil Light brown clay loam with pebble stones
Vegetation Open low mallee woodland over *Triodia* hummock grassland
Veg Condition Excellent
Notes Low Distubance - area disturbance by mining - cleared
Litter - 15%
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Acacia kempeana	+	1.5	CN36
Acacia nyssophylla	+	1.6	
Acacia tetragonophylla	+	1.2	
Cenchrus ciliaris	1	0.3	CN35
Enchylaena tomentosa	+	0.3	
Eremophea spinosa	+	0.3	CN34
Eucalyptus gamophylla	1	2	
Eucalyptus socialis	10	7	
Ptilotus obovatus	1	0.5	
Rhagodia eremaea	+	0.75	
Salsola tragus	+	0.2	
Senna artemisioides subsp. *artemisioides*	+	1.0	
Senna artemisioides subsp. *filifolia*	+	1.5	CN32
Sida fibulifera	+	0.3	CN33
Sida sp. Limestone (D.E. Abrecht 5748)	+	0.2	CN31
Triodia brizoides	10	0.4	CN37

Wingellina 2008 **Site:** WIN011

Described by BGN **Date:** 15/04/2008 **Type:** Quadrat (30x30m)
Season: Poor **Uniformity:**

Location Valley floor

MGA Zone and Coordinate: 52 497289E 7117073N
Soil Red clay loam
Rock Type Gabro
Veg Condition Good
Fire Age 2-3
Notes Disturbance low; some camel grazing
Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Acacia kempeana		2.5	BGN065	Outside quadrat
Acacia validinervia		2	BGN148	Outside quadrat
Cenchrus ciliaris	<1	0.4	BGN098	
Enteropogon ramosus	2	0.4		
Eragrostis eriopoda	2	0.1		
Eucalyptus gamophylla		2	BGN072	Outside quadrat
Eucalyptus socialis	20	6	BGN079	
Eucalyptus sp.	5	2	BGN071	
Eucalyptus trivalvis		5	BGN149	Outside quadrat
Euphorbia boophthona		0.3	BGN150	Outside quadrat
Ptilotus obovatus var. *obovatus*	<1	0.4		
Salsola tragus	<1	0.1	BGN095	
Senna artemisioides subsp. *oligophylla*		1	BGN085	Outside quadrat
Sida calyxhymenia	<1	0.2	BGN070	
Triodia helmsii	20	0.4	BGN074	
Unknown	<1	1	BGN082	
Unknown		1.1	BGN147	Outside quadrat

Wingellina 2010 **Site:** WIN012

Described by RF **Date:** 8/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 497076E 7122988N
Habitat Sandplain
Soil Orange, light brown sand
Vegetation Open low mallee woodland over hummock grassland
Veg Condition Pristine
Notes Low Disturbance
Litter - 10%
Species List:

Taxa	Cover %	Hgt (m)	Specimen		
Acacia ampliceps	+	2	CN77		
Acacia aneura (55x2mm)	+	4	CN68	Blue	green
Acacia aneura (35x1mm)	+	2	CN72	Blue	green
Acacia melleodora	+	1.5	CN79		
Acacia prainii	+	1.5	CN78		
Acacia tetragonophylla	+	2			
Aristida contorta	+	0.2			
Aristida holathera	+	0.3	CN75		
Cenchrus ciliaris	+	0.4			
Cymbopogon obtectus	+	0.3	CN87		
Dodonaea viscosa subsp. *angustissima*	+	2	CN76		
Enchylaena tomentosa	+	0.4			
Eragrostis eriopoda	+	0.3			
Eremophila cuneifolia	+	1	CN69		
Eremophila glabra	+	1.5			
Eucalyptus gamophylla	10	5			
Eucalyptus socialis	15	6			
Grevillea sp.	+	1	CN71		
Lysiana murrayi	+	1	CN73		
Maireana planifolia	+	0.2			
Rhagodia eremaea	+	1	CN74		
Rulingia sp.	+	1	CN81		
Sclerolaena parviflora	+	0.1			
Senna pleurocarpa var. *pleurocarpa*	+	1	CN80		
Stenopetalum velutinum	+	0.1			
Templetonia egena	+	1.5			
Triodia pungens	30	0.4	CN70		


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Wingellina 2008 **Site:** WIN012

Described by BGN **Date:** 15/04/2008 **Type:** Quadrat (30x30m)
Season: Poor **Uniformity:**

Location Plain

MGA Zone and Coordinate: 52 497075E 7122987N
Habitat Spifex grassland
Veg Condition Excellent
Notes Disturbance low
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Acacia aneura var. *intermedia*	2	5	BGN154
Acacia minyura		0.7	BGN158
Acacia oswaldii	2	1.1	BGN142
Acacia prainii	5	0.8	BGN152
Acacia prainii	2	4	BGN160
Acacia victoriae		2.5	BGN166 Near Irunjytu townsite
Alyogyne pinoniana		0.8	BGN157
Eremophila duttonii		3	BGN165
Eucalyptus gamophylla	8	6	BGN153
Eucalyptus socialis subsp. *eucentrica*	5	5	BGN155
Eucalyptus socialis subsp. *eucentrica*	3	7	BGN159
Ptilotus clementii		0.3	BGN162
Senna pleurocarpa	3	0.3	BGN156
Senna pleurocarpa		1	BGN163
Solanum lasiophyllum		1	BGN164
Triodia pungens	45	0.4	BGN151
Unknown		0.7	BGN161

Wingellina 2010 **Site:** WIN013

Described by RF **Date:** 7/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 494009E 7114357N
Habitat Floodplain; NE aspect
Soil Red sandy loam
Vegetation Open shrubland
Veg Condition Pristine
Notes Low Disturbance
Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Abutilon malvifolium	+	0.3	W64	
Acacia aneura	3	6		All dead from fire
Acacia victoriae	+	0.5	W91	
Acacia victoriae	+	1.8	W78	
Aristida latifolia	2	0.4	W79	
Astrebla pectinata	20	0.4	W77	
Cenchrus ciliaris	+	0.3		
Daucus glochidiatus	+	0.3	W93	
Dichanthium sericeum	+	0.3	W92	
Dichanthium sericeum subsp. *humilius*	+	0.3	W82	
Enneapogon polyphyllus	+	0.3		
Eragrostis setifolia	+	0.3		
Eragrostis setifolia	3	0.3		
Eragrostis xerophila	3	0.4		
Erodium cygnorum	+	0.3		
Euphorbia boophthona	+	0.3		
Euphorbia centralis	+	0.4	W85	
Hibiscus sturtii var. *grandiflorus*	+	0.1	W87	
Panicum decompositum	+	0.4	W86	
Plantago drummondii	+	0.1	W80	
Ptilotus aervoides	+		W92	
Ptilotus obovatus	+	0.5		
Rhodanthe floribunda			W90	
Rhynchosia minima	+	0.3		
Salsola kali	+	0.3		
Sauropus trachyspermus	+		W89	
Sclerolaena patenticuspis		0.2	W14	Sclerolaena sp.
Senecio magnificus	+		W88	
Sida fibulifera	+	0.3		
Sida trichopoda	+	0.2	W81	#9546
Solanum lasiophyllum				

Wingellina 2008 **Site:** WIN013

Described by BGN **Date:** 15/04/2008 **Type:** Quadrat (30x30m)
Season: Poor **Uniformity:**

Location Valley floor

MGA Zone and Coordinate: 52 494008E 7114364N
Soil Red clay loam
Vegetation Grassland under dead mulga
Veg Condition Degraded
Fire Age 2-3 yrs
Notes Disturbance high
Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Abutilon leucopetalum	<2	0.15	BGN119	
Acacia aneura var. *aneura*	2	2		
Acacia aneura var. *intermedia*		0.5	BGN133	Outside quadrat
Acacia aneura var. tenuis		0.8	BGN170	Outside quadrat
Acacia tetragonophylla		2.5		Outside quadrat
Acacia victoriae	<2	1.2	BGN166	
Aristida contorta	35	0.1	BGN091	
Aristida contorta	<1	0.4	BGN146	
Aristida latifolia	8	0.4	BGN167	
Enteropogon ramosus	<2	0.3		
Eragrostis eriopoda	<2	0.3		
Euphorbia australis		0.05	BGN118	Outside quadrat
Panicum decompositum		0.6	BGN171	Outside quadrat
Ptilotus obovatus var. *obovatus*		0.5		Outside quadrat
Salsola tragus	<2	0.3	BGN095	
Sclerolaena patenticuspis	<2	0.15	BGN135	
Sclerolaena sp.	4	0.1	BGN087	
Senecio magnificus		0.3	BGN168	Outside quadrat
Senna artemisioides subsp. *artemisioides*	2	1.2	BGN145	
Sida calyxhymenia	<1	0.1	BGN070	
Unknown		0.5	BGN169	Outside quadrat

Wingellina 2010 **Site:** WIN014

Described by RF **Date:** 8/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 493859E 7120042N
Habitat Rocky Plain; N aspect
Soil Rocky red earths
Vegetation Open Eucalypt Woodland
Veg Condition Excellent
Notes Low Disturbance
Eucalyptus red occus on lower margins whilst E. socialis occur on upper slopes
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Acacia nyssophylla	+	1.5	
Eucalyptus gypsophila	10	6	RF1
Eucalyptus socialis	20	5	
Ptilotus obovatus	2	0.4	
Sclerolaena parviflora	+	0.2	
Triodia scariosa	40		RF2
Zygophyllum apiculatum	+	1.5	9523

Wingellina 2008 **Site:** WIN014

Described by BGN **Date:** 17/04/2008 **Type:** Quadrat (30x30m)
Season: Poor **Uniformity:**

Location Low undulating hills

MGA Zone and Coordinate: 52 494856E 7120045N
Habitat

Soil Red clay loam
Rock Type

Vegetation *Eucalyptus* and mallee over *Eremophila* over spinifex
Veg Condition Very good
Fire Age

Notes Disturbance low
Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Acacia nyssophylla	<2	0.5	BGN175	
Acacia oswaldii		0.8	BGN142	Outside quadrat
Cenchrus ciliaris		0.4	BGN098	Outside quadrat; ±20
Cymbopogon obtectus		0.4	BGN055	Outside quadrat
Eremophila glabra subsp. *glabra*		2	BGN173	Outside quadrat
Eucalyptus gypsophila	15	7	BGN109	
Eucalyptus socialis subsp. *eucentrica*		3	BGN176	Outside quadrat
Euphorbia australis		0.07	BGN118	Outside quadrat
Maireana sp.	<2	0.07	BGN172	
Ptilotus obovatus var. *obovatus*	5	0.4		
Rhagodia eremaea	<2	0.6	BGN083	
Salsola tragus	<2	0.15	BGN095	
Senna sp.		1.4	BGN174	Outside quadrat
Sida calyxhymenia	<2	0.2	BGN070	
Sida sp.		0.6	BGN052	Outside quadrat
Triodia helmsii	20	0.4	BGN074	
Triodia sp.	40	0.5	BGN049	

Wingellina 2010 **Site:** WIN015

Described by RF **Date:** 9/10/2010 **Type:** Q 50 x 50

Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 495386E 7119500N

Habitat Stony Plain; SE aspect

Soil Red/white gravel

Vegetation *Eucalyptus socialis* Woodland, *Acacia aneura*, *Senna artemisioides* and hummock grassland

Veg Condition Pristine

Notes Low Disturbance
Litter - 10%

Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Abutilon fraseri	+	0.2	AM21	#9601
Acacia aneura	10	6	AM19	
Acacia aneura	10	6	AM20	
Acacia pruinocarpa	+	1.5		
Acacia tetragonophylla	+	1		
Cenchrus ciliaris	1	0.3		
Enchylaena tomentosa	+	0.2		
Eragrostis eriopoda	+	0.3		
Eremophila alternifolia	+	2	AM22	#9602
Eucalyptus socialis	5	6		
Ptilotus obovatus	10	0.4		
Rhagodia eremaea	+	1.5		
Salsola kali	20	0.3		
Sclerolaena diacantha	5	0.3		
Senna artemisioides subsp. *filifolia*	2	0.4		
Sida sp. Limestone (D.E. Abrecht 5748)	+	0.3	9603	
Triodia scariosa	10	0.4	AM24	#9605
Zygophyllum apiculatum	+	0.2		

Wingellina 2008 **Site:** WIN015

Described by BGN **Date:** 17/04/2008 **Type:** Quadrat (30x30m)
Season: Poor **Uniformity:**

Location Low undulating hills

MGA Zone and Coordinate: 52 495393E 7119520N
Vegetation Eucalypt and acacia over spinifex
Veg Condition Good
Notes Disturbance low
Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Acacia aneura var. *intermedia*	10	3	BGN127	
Acacia aneura var. *intermedia*		2.3	BGN154	
Acacia kempeana		1	BGN065	Outside quadrat
Acacia tetragonophylla	<2	1.1		
Amyema maidenii subsp. *maidenii*	<2	4	BGN137	
Cenchrus ciliaris	2	0.5	BGN098	
Eragrostis eriopoda	<2	0.2		
Eragrostis sp.	10	0.3	BGN084	
Eremophila sp.	4	1.2	BGN126	
Eucalyptus sp.	10	6		
Euphorbia boophthona	<2	0.3	BGN150	
Hibiscus leptocladus	<2	1.2	BGN116	
Maireana sp.	<2	0.2	BGN179	
Olearia stuartii	<2	0.5	BGN178	
Pterocaulon serrulatum	<2	0.2	BGN104	
Ptilotus obovatus var. *obovatus*	10	0.4		
Rhagodia eremaea	<2	1	BGN083	
Salsola tragus	<1	0.2	BGN095	
Senna artemisioides subsp. *artemisioides*	<2	0.8	BGN080	
Sida calyxhymenia	<1	0.15	BGN070	
Solanum orbiculatum subsp. *orbiculatum*		0.8	BGN180	Outside quadrat
Triodia sp.	20	0.4		
Unknown	1	0.5	BGN056	
Unknown		3	BGN177	Outside quadrat

Wingellina 2010 **Site:** WIN016

Described by RF **Date:** 9/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 495322E 7117525N
Habitat Sandplain
Vegetation *Eucalyptus socialis*, E. gypsophila, *Senna* with open Hummock grassland
Veg Condition Excellent
Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Acacia aneura	+	2.2	AM26	Narrow form
Acacia aneura	+	3	AM25	Broad form
Amyema maidenii subsp. *maidenii*	+			
Cenchrus ciliaris	+	0.4		
Enchylaena tomentosa	+	0.3		
Eremophila paisleyi	+	1.8	AM28	
Eucalyptus gypsophila	5	4		
Eucalyptus socialis	5	4		
Ptilotus obovatus	5	0.3		
Rhagodia eremaea	+	0.4		
Sclerolaena diacantha	1	0.2		
Senna artemisioides subsp. *artemisioides*	+	0.8	AM30	
Senna artemisioides subsp. *filifolia*	+	0.5	AM29	
Sida sp. Limestone (D.E. Abrecht 5748)	+	0.2		
Solanum orbiculatum	+	0.5		
Tribulus occidentalis	+	0.05		
Triodia scariosa	10	0.3		
Zygophyllum eremaeum	+	0.1	AM27	
Zygophyllum ovatum	+	0.02		

Wingellina 2008 **Site:** WIN016

Described by BGN **Date:** 17/04/2008 **Type:** Quadrat (30x30m)
Season: Poor **Uniformity:**

Location Flat plain at foot of low ridge
MGA Zone and Coordinate: 52EN

Soil Red clay loam
Vegetation Eucalypt and acacia over ptilotus, spinifex and acacia
Veg Condition Very good
Notes Low disturbance
Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Acacia kempeana	5	0.8	BGN065	
Acacia oswaldii	<2	1.5	BGN183	
Acacia oswaldii	7	1.4	BGN142	
Chamaesyce australis	<2	0.08	BGN096	
Enteropogon ramosus	2	0.4		
Eragrostis eriopoda		0.4		Outside quadrat
Eremophila glabra subsp. *glabra*		2.5	BGN173	Outside quadrat
Eremophila latrobei subsp. *latrobei*		1.1	BGN184	Outside quadrat
Eucalyptus socialis subsp. *eucentrica*		8	BGN182	Outside quadrat
Eucalyptus socialis subsp. *eucentrica*	15	5	BGN159	
Maireana scleroptera		0.6	BGN099	Outside quadrat
Maireana sp.	<2	0.5	BGN179	
Maireana sp.	<2	0.07	BGN172	
Ptilotus exaltatus var. *exaltatus*		0.3		Outside quadrat
Ptilotus obovatus var. *obovatus*	6	0.6		
Rhagodia eremaea	2	0.8	BGN083	
Salsola tragus	<2	0.08	BGN095	
Senna artemisioides subsp. *artemisioides*		1.2	BGN080	Outside quadrat
Senna artemisioides subsp. *artemisioides*		0.7	BGN145	Outside quadrat
Sida calyxhymenia	<2	0.15	BGN070	
Triodia scariosa	25	0.4	BGN181	
Zygophyllum apiculatum		0.1	BGN120	Outside quadrat

Wingellina 2008 **Site:** WIN017

Described by BGN **Date:** 17/04/2008 **Type:** Quadrat (30x30m)
Season: Poor **Uniformity:**

Location Flat plain valley floor

MGA Zone and Coordinate: 52 490448E 7116028N
Soil Red clay loam
Rock Type

Vegetation Sparse Hakea over grassland
Veg Condition Good
Notes Disturbance low
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Acacia victoriae	<2	0.4	BGN186
Aristida contorta	<2	0.1	BGN091
Aristida latifolia	<2	0.5	BGN167
Cenchrus ciliaris	20	0.2	BGN098
Cymbopogon obtectus	<2	0.4	BGN055
Enteropogon ramosus	3	0.3	
Eragrostis eriopoda	<2	0.2	
Euphorbia boophthona	<2	0.6	BGN150
Hakea divaricata	10	6	BGN140
Maireana eriosphaera	<2	0.2	BGN130
Ptilotus obovatus var. *obovatus*	<2	0.5	
Senna artemisioides subsp. *artemisioides*	<2	0.5	BGN145
Sida sp.	2	0.6	BGN185
Triodia pungens	<2	0.2	BGN151
Triodia scariosa	<2	0.8	BGN181

Wingellina 2008 **Site:** WIN018

Described by BGN **Date:** 18/04/2008 **Type:** Quadrat (10x50

Season: Poor **Uniformity:**

Location SW corner of tenement
MGA Zone and Coordinate: 52EN

Habitat Creekline
Soil Red clay loam
Veg Condition Good
Fire Age 2-3 yrs
Notes Disturbance medium
Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Aristida contorta	8	0.4	BGN146	
Cenchrus ciliaris	6	0.6	BGN098	
Dodonaea viscosa subsp. *spatulata*	<2	1	BGN192	
Eucalyptus camaldulensis var. *obtusa*	20	15-20	BGN189	
Glycine canescens	<2	0.3	BGN191	
Olearia sp.	3	0.3		All dead; no ID
Psydrax attenuata var. *tenella*	<2	0.3	BGN188	
Pterocaulon serrulatum	<2	0.2	BGN104	
Themeda sp.	30	0.8	BGN190	
Themeda triandra	5	0.4	BGN187	

Wingellina 2010 **Site:** WIN019

Described by RF **Date:** 8/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 491647E 7113386N
Habitat Rocky Hill Crest
Soil Basalt rock gravel
Vegetation Spinifex hummock grassland
Veg Condition Pristine
Notes Low Disturbance
Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Abutilon indicum	+	0.3		
Acacia brachystachya	+	0.5		
Acacia pruinocarpa	+	2		
Acacia validinervia	+	0.8		
Aristida burbidgeae	+	0.3		
Aristida contorta	+	0.3		
Brachyscome ciliaris	+	0.2		
Chrysocephalum pterochaetum	+	0.3	AM13	
Cymbopogon obtectus	+	0.3	9565	
Daucus glochidiatus	+	0.2		
Enneapogon polyphyllus	+	0.3		
Eremophila latrobei	+	0.5		
Eriachne mucronata	+	0.3		
Erodium cygnorum	+	0.3		
Eucalyptus socialis	+	1.8		
Euphorbia boophthona	+	0.3		
Hakea lorea	+	1.8		
Halgania cyanea	2	0.25	9520	
Haloragis sp.	+	0.1		
Heliotropium asperrimum	+	0.4	AM14	#9595
Hibiscus coatesii	+	0.5		
Hibiscus sturtii var. *grandiflorus*	+	0.2	AM18	
Indigofera georgei	+	0.4	9504	
Lepidium oxytrichum	+	0.2		
Paraneurachne muelleri	+	0.3	AM12	#9596
Ptilotus exaltatus	+	0.3		
Ptilotus obovatus	+	0.4		
Scaevola amblyanthera var. centralis	+	0.2	AM17	
Schoenia ayersii	+	0.25	AM16	#9598
Senna artemisioides subsp. *helmsii*	+	0.4		
Stackhousia muricata subsp. *annual* (W.R. Barker 2172)	+	0.2	AM15	#9597
Themeda triandra	1	0.3		
Trichodesma zeylanicum	+	0.4		
Triodia scariosa	20	0.3		
Zygophyllum apiculatum	+	0.1		

Wingellina 2008 **Site:** WIN019

Described by BGN **Date:** 18/04/2008 **Type:** Quadrat (30x30m)
Season: Poor **Uniformity:**

Location Low ridge

MGA Zone and Coordinate: 52 491645E 7113388N
Habitat Spinifex low ridge
Soil Red clay loam
Notes Disturbance low
Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Acacia pruinocarpa	1	1	BGN131	
Acacia tetragonophylla	<2	1		
Acacia validinervia	2	1	BGN073	
Cymbopogon obtectus	3	0.5	BGN055	
Eragrostis sp.	<2	0.2	BGN084	
Eremophila alternifolia	2	0.7	BGN061	
Eriachne mucronata	2	0.3	BGN063	
Eucalyptus sp.	4	2	BGN193	
Hakea lorea subsp. *lorea*	2	1	BGN139	
Halgania cyanea	5	0.5	BGN068	
Ptilotus exaltatus var. *exaltatus*	<2	0.3		
Sida sp.	<2	0.3	BGN195	
Triodia helmsii	50	0.3	BGN074	
Unknown	<2	0.3	BGN194	All dead

Wingellina 2010 **Site:** WIN020

Described by RF **Date:** 7/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 495901E 7114015N
Habitat Rock Basalt Hill
Soil Red
Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Abutilon malvifolium	+	0.5	W64	
Acacia pruinocarpa	+	3		
Acacia sibirica	+	0.5	W61	
Acacia validinervia	+	1.2	W62	
Amphipogon caricinus var. *caricinus*	+	0.4	W65	
Cheilanthes lasiophylla	+	0.1	W54	
Cymbopogon obtectus	1	0.3	W53	
Enneapogon polyphyllus	+	0.2	W57	
Eremophila latrobei subsp. *glabra*	+	1.2	W59	
Eriachne mucronata	10	0.3		
Euphorbia boophthona	+	0.2		
Goodenia ramelii	+	0.5	W68	Out of range distribution
Hakea lorea	1	2.5		
Hibiscus sturtii var. *grandiflorus*	+	0.2	W55	
Indigofera sp. MacDonnel Ranges	+	twiner	W56	
Lepidium oxytrichum	+	0.3	W69	
Ptilotus exaltatus	+	0.3		
Ptilotus sessilifolius	+	0.4	W58	
Schoenia ayersii	+	0.2	W66	
Senna artemisioides subsp. *artemisioides*	+	0.6	W67	
Senna artemisioides subsp. *helmsii*			W70	
Solanum petrophilum	+	0.2	W63	
Stenopetalum velutinum	+	0.1	W60	
Themeda triandra	+	0.3	W71	
Trichodesma zeylanicum	+	1.8		
Triodia scariosa	10	0.3		
Zygophyllum ovatum	+	0.3	W25	

Wingellina 2008 **Site:** WIN020

Described by BGN **Date:** 18/04/2008 **Type:** Quadrat (30x30m)
Season: Poor **Uniformity:**

Location Ridge top

MGA Zone and Coordinate: 52 495908E 7114085N
Habitat Ridge top
Soil Red clay loam
Veg Condition Very good
Notes Disturbance low. Series of small ridges with young spinifex on down slopes and mature Spinifex on ridge tops
Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Acacia kempeana	2	0.4	BGN065	
Acacia pruinocarpa	<3	3	BGN131	
Acacia pruinocarpa	<2	0.4		
Acacia validinervia	<2	0.6	BGN073	
Acacia victoriae		1	BGN166	Outside quadrat
Cymbopogon obtectus	3	0.5	BGN055	
Enteropogon ramosus	<2	0.2		
Eremophila alternifolia	<2	0.4	BGN061	
Eriachne mucronata	<2	0.2	BGN063	
Goodenia glandulosa		0.2	BGN196	Outside quadrat
Hakea lorea subsp. *lorea*	2	2.5	BGN139	
Halgania cyanea		0.4	BGN068	Outside quadrat
Senna artemisioides subsp. *oligophylla* x *helmsii*	5	0.7	BGN054	
Sida sp.	<2	0.3	BGN052	
Solanum petrophilum	<2	0.3	BGN122	
Triodia helmsii	30	0.4	BGN074	
Unknown	<2	0.3	BGN194	
Unknown	<2	0.5	BGN053	

Wingellina 2010 **Site:** WIN021

Described by RF **Date:** 7/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform.

Location Wingellina

MGA Zone and Coordinate: 52 495193E 7113253N
Habitat Basalt Hill Top
Soil Red sandy clay loam
Vegetation Open woodland Euc dominated with *Triodia* hummock grassland
Veg Condition Pristine
Notes Low Disturbance
Litter 1%
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Acacia sibirica			W61A
Acacia tetragonophylla	+	1	
Acacia validinervia	+	1.5	
Amphipogon caricinus var. *caricinus*	+	0.3	
Corymbia eremaea	1.5	4	W75
Cymbopogon obtectus	+	0.3	
Dicrastylis gilesii	+	1	W56
Enneapogon polyphyllus	+	0.3	
Eremophila latrobei	+	0.5	
Eremophila longifolia	+	1	W76
Eriachne mucronata	2	0.3	
Eucalyptus gamophylla	2	3	
Euphorbia boophthona	+	0.3	
Halgania cyanea	2	0.3	9520
Haloragis sp.	+	0.3	W73
Heliotropium asperrimum	+	0.3	W54
Hibiscus sturtii var. *grandiflorus*	+	0.2	
Indigofera sp. MacDonnel Ranges	+	0.4	
Ptilotus clementii	+	0.3	
Ptilotus exaltatus	+	0.3	
Ptilotus obovatus	+	0.4	
Senna artemisioides subsp. *helmsii*	+	0.5	
Senna glutinosa subsp. *glutinosa*	+	0.5	W59
Sida filiformis	+	0.3	W55
Solanum petrophilum			
Stenopetalum sp.			
Themeda triandra	+	0.4	
Triodia scariosa	10	0.3	

Wingellina 2008 **Site:** WIN021

Described by BGN **Date:** 18/04/2008 **Type:** Quadrat (30x30m)
Season: Poor **Uniformity:**

Location Ridge top

MGA Zone and Coordinate: 52 495182E 7113253N
Habitat Ridge top
Soil Red clay loam
Veg Condition Excellent
Notes Disturbance low
Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Acacia kempeana	<2	1.3	BGN065	
Acacia validinervia	5	0.5	BGN073	
Codonocarpus cotinifolius	3	2.5	BGN197	
Cymbopogon obtectus	10	0.6	BGN055	
Eriachne mucronata	<2	0.2	BGN063	
Eucalyptus gamophylla	<2	0.5	BGN072	
Eucalyptus mannensis subsp. *mannensis*		15-20	BGN203	In creek
Hakea lorea subsp. *lorea*	<2	2	BGN139	
Pittosporum angustifolium		1	BGN202	Drainage line of ridge
Ptilotus exaltatus var. *exaltatus*	<2	0.8		
Ptilotus helipteroides	<2	0.2	BGN201	
Senna artemisioides subsp. *oligophylla* x *helmsii*		0.8	BGN054	Outside quadrat
Senna glutinosa	2	1.1	BGN058	
Sida sp.	<2	0.4	BGN052	
Triodia helmsii	70	0.4	BGN074	
Unknown	3	3	BGN199	
Unknown	<2	0.7	BGN198	
Unknown	6	0.7	BGN200	
Unknown		0.6	BGN053	Outside quadrat
Unknown	<2	0.2	BGN194	

Wingellina 2010 **Site:** WIN022

Described by RF **Date:** 8/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 493578E 7120057N
Habitat Low calcrete hillside; E aspect
Soil Brown fine clay loam
Rock Type Calcrete scree
Vegetation Low mallee woodland over hummock grassland
Veg Condition Excellent
Notes Low Disturbance
Litter - 30%
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Acacia kempeana	+	2.0	
Acacia nyssophylla	+	3.0	
Acacia sibirica	+	1.5	
Acacia sp.	+	2	CN90
Acacia tetragonophylla	+	3	
Cenchrus ciliaris	+	0.3	
Cenchrus pennisetiformis	+	0.3	
Dodonaea lanceolata	+	1.5	
Enchylaena tomentosa	+	0.3	
Eremophea spinosa	+	0.1	
Eucalyptus socialis	8	6	
Eucalyptus socialis subsp. *eucentrica*	4	6	CN92
Ptilotus obovatus	3	0.5	
Salsola tragus	+	0.3	
Sclerolaena patenticuspis	+	0.3	
Senna artemisioides subsp. *artemisioides*	+	1.5	
Senna artemisioides subsp. *helmsii*	+	1.5	
Senna artemisioides subsp. *petiolaris*	+	1.5	
Senna artemisioides subsp. x *sturtii*	+	0.75	CN91
Sida sp. Limestone (D.E. Abrecht 5748)	+	0.2	
Triodia scariosa	30	0.3	CN89
Zygophyllum eichleri	+	0.1	


08.10.2010

Wingellina 2008 **Site:** WIN022

Described by BGN **Date:** 19/04/2008 **Type:** Quadrat (30x30m)
Season: Poor

Location Low ridge

MGA Zone and Coordinate: 52 493577E 7120059N
Habitat Low ridge
Soil Red clay loam
Rock Type Gabro
Veg Condition Excellent
Fire Age

Species List:

Taxa	Cover %	Hgt (m)	Specimen	
Acacia clelandii	<2	2.5	BGN103	
Acacia nyssophylla	<2	1.4	BGN175	
Acacia sp.		1.6	BGN206	Outside quadrat
Cenchrus ciliaris	<2	0.5	BGN098	
Dodonaea lobulata		0.7	BGN204	Outside quadrat
Eremophila glabra subsp. *glabra*	<2	3	BGN173	
Eucalyptus gypsophila	5	7-15	BGN109	
Eucalyptus socialis subsp. *eucentrica*	3	15	BGN102	
Eucalyptus trivalvis	5	10	BGN149	
Maireana sp.	<2	0.6	BGN179	
Ptilotus obovatus var. *obovatus*	5	0.5		
Scaevola spinescens		0.7	BGN205	Outside quadrat
Senna glaucifolia	4	1.2	BGN067	
Sida calyxhymenia	<2	0.15	BGN070	
Triodia pungens	45	0.4	BGN151	
Unknown	<2	0.7	BGN082	

Wingellina 2010 **Site:** WIN0023

Described by RF **Date:** 9/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 495735E 7118461N
Habitat Hillside scree slope; W Aspect
Soil Medium brown clay loam with pebblestone scree
Vegetation Open low woodland over hummock grassland
Veg Condition Pristine
Notes Low disturbance
Litter - 2%
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Acacia aneura var. *major*	+	3	CN128
Acacia kempeana	+	2	
Acacia prainii	+	1.5	
Acacia pruinocarpa	+	1	
Amyema *maidenii*	+	0.1	CN136
Cenchrus ciliaris	+	0.4	
Codonocarpus cotinifolius	+	0.5	
Enchylaena tomentosa	+	0.75	
Eremophea spinosa	+	0.1	
Eriachne mucronata	+	0.2	
Eucalyptus gypsophila	5	4	
Eucalyptus socialis	5	4	
Goodenia centralis	+	0.2	CN129
Indigofera georgei	+	0.3	CN133
Jasminum didymum subsp. *lineare*	+	1.5	CN135
Leucochrysum stipitatum	+	0.1	CN134
Ptilotus obovatus	3	0.75	
Rhagodia sp.	+	0.75	
Salsola tragus	+	0.1	
Sclerolaena patenticuspis	+	0.1	CN131
Sclerolaena patenticuspis	+	0.2	CN132
Senna artemisioides subsp. *artemisioides*	+	1	
Senna artemisioides subsp. *artemisioides*	3	1.0	
Senna artemisioides subsp. *helmsii*	+	1	
Sida fibulifera	+	0.3	
Sida sp. Limestone (D.E. Abrecht 5748)	+	0.1	
Stenopetalum velutinum	+	0.2	
Triodia scariosa	20	0.3	
Zygophyllum ovatum	+	0.2	

Wingellina 2008 **Site:** WIN023

Described by BGN **Date:** 19/04/2008 **Type:** Quadrat (30x30m)
Season: Poor **Uniformity:**

Location Valley creek line

MGA Zone and Coordinate: 52 495737E 7118461N
Habitat Valley creek line
Soil Red clay loam
Veg Condition good
Fire Age 6 months
Notes Disturbance medium; camel grazing
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Acacia oswaldii	2	4	BGN051
Acacia pruinocarpa	2	2	BGN131
Aristida latifolia	4	0.5	BGN167
Cenchrus ciliaris	<2	0.5	BGN098
Cymbopogon obtectus	<2	0.5	BGN055
Eragrostis eriopoda	<2	0.3	
Eragrostis sp.	5	0.2	BGN050
Eremophila duttonii	<2	0.6	BGN066
Eremophila glabra subsp. *glabra*	<2	0.2	BGN172
Eucalyptus gypsophila	4	10	BGN109
Eucalyptus socialis subsp. *eucentrica*	6	2.5	BGN141
Eucalyptus socialis subsp. *eucentrica*	6	3	BGN102
Indigofera georgei	2	0.2	BGN207
Ptilotus obovatus var. *obovatus*	<2	0.3	
Rhagodia eremaea	<2	0.5	BGN083
Salsola tragus	<2	0.1	BGN095
Senna artemisioides subsp. *artemisioides*	4	1.3	BGN080
Senna artemisioides subsp. *artemisioides*	<2	0.8	BGN145
Senna artemisioides subsp. *oligophylla* x *helmsii*	<2	0.4	BGN054
Senna pleurocarpa	<2	0.6	BGN156
Senna sp.	10	0.7	BGN174
Sida sp.	<2	0.3	BGN052
Solanum petrophilum	<2	0.3	BGN122
Triodia helmsii	60	0.3	BGN074
Zygophyllum apiculatum	<2	0.1	BGN120

Wingellina 2010 **Site:** WIN024

Described by RF **Date:** 7/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 498511E 7116061N
Habitat Rocky granite hill top
Soil Orange brown clay loam
Vegetation Low open mallee woodland over *Triodia* hummock grassland
Veg Condition Pristine
Notes Low Disturbance
Litter - 5%
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Abutilon leucopetalum	+	0.5	CN16
Acacia ligulata	+	2	CN18
Acacia strongylophylla	+	0.5	
Acacia tetragonophylla	+	1.0	
Acacia validinervia	+	0.3	
Acetosa vesicaria	+	0.3	
Boerhavia coccinea	+	0.1	CN19
Brachychiton gregorii	+	4	CN24
Brachyscome ciliaris	+	0.1	CN28
Cheilanthes lasiophylla	+	0.2	CN10
Cucumis sp.	+	0.1	CN13
Dicrastylis gilesii	+	0.75	CN20
Digitaria brownii	+	0.2	CN21
Enchylaena tomentosa	+	0.3	
Enneapogon lindleyanus	+	0.3	CN22
Enneapogon polyphyllus	+	0.2	CN14
Eriachne mucronata	+	0.3	
Erodium carolinianum	+	0.1	CN27
Eucalyptus gamophylla	5	2	
Hakea lorea subsp. *lorea*	+	2	CN23
Halgania cyanea	+	0.3	
Heliotropium asperrimum	+	0.1	CN26
Indigofera sp. MacDonnel Ranges	+	0.3	
Lepidium oxytrichum	+	0.1	
Ptilotus obovatus	+	0.5	
Rhagodia eremaea	+	0.75	
Salsola tragus	+	0.2	
Senna artemisioides subsp. *artemisioides*	+	1	
Senna artemisioides subsp. *helmsii*	+	0.3	
Senna glutinosa	+	1	
Sida phaeotricha	+	0.75	CN17
Stenopetalum velutinum	+	0.2	CN29
Triodia sp.	20	0.3	CN25
Zygophyllum apiculatum	+	0.1	


07.10.2010

Wingellina 2008 **Site:** WIN024

Described by BGN **Date:** 20/04/2008 **Type:** Quadrat (30x30m)
Season: Poor **Uniformity:**

Location ridge top

MGA Zone and Coordinate: 52 498509E 7116060N
Habitat Ridge top
Soil Red clay loam
Rock Type Gabro
Vegetation Eucalypt over Triodia
Veg Condition Excellent
Notes Disturbance low
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Acacia strongylophylla	<2	0.3	BGN075
Acacia validinervia	<2	0.3	BGN073
Eucalyptus gamophylla	20	2	BGN062
Eucalyptus sp.	<2	1	BGN071
Hakea lorea subsp. *lorea*	<2	0.8	BGN139
Halgania cyanea	2	0.2	BGN068
Pterocaulon serrulatum	<2	0.4	BGN104
Senna artemisioides subsp. *artemisioides*	5	0.6	BGN080
Sida sp.	<2	0.8	BGN052
Triodia schinzii	50	0.4	BGN064
Unknown	<2	0.4	BGN200

Wingellina 2010 **Site:** WIN025

Described by RF **Date:** 8/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 497627E 7115670N
Habitat Sloping scree plain; NW aspect
Soil Light brown sandy loam clay with gibber plain mantle
Vegetation Low open mallee woodland over *Triodia* hummock grassland
Veg Condition Pristine
Notes Low disturbance
Litter - 20%
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Abutilon ? cryptopetalum	+	0.3	
Abutilon fraseri	+	0.4	
Acacia aneura var. *microcarpa*	+	2	CN104
Acacia kempeana	+	5	
Acacia nyssophylla	+	1.5	
Aristida latifolia		+	CN108
Cenchrus ciliaris	+	0.3	
Citrullus colocynthis			
Cymbopogon obtectus	+	0.4	
Digitaria brownii	+	0.3	
Digitaria brownii	+	0.3	CN102
Enchylaena tomentosa	+	0.4	
Enteropogon ramosus	+	0.5	
Eragrostis eriopoda	+	0.3	CN100
Eremophila longifolia	+	1.5	
Eremophila paisleyi	+	2	
Eremophila serrulata	1	2	
Eucalyptus gypsophila	5	4	CN101
Eucalyptus socialis	15	4	
Ptilotus obovatus	5	0.6	
Rhagodia eremaea	+	0.5	
Sclerolaena parviflora	+	0.2	
Senna artemisioides subsp. *artemisioides*	2	1.5	
Senna artemisioides subsp. *artemisioides*	2	1.5	
Senna artemisioides subsp. *filifolia*	1	1.5	
Senna artemisioides subsp. *petiolaris*	+	1.5	
Sida calyxhymenia	+	1.0	
Sida calyxhymenia	+	0.4	CN103
Sida sp. Limestone (D.E. Abrecht 5748)	+	0.2	
Solanum ferocissimum	+	0.3	CN98

Wingellina 2008 **Site:** WIN025

Described by BGN **Date:** 20/04/2008 **Type:** Quadrat (30x30m)
Season: Poor **Uniformity:**

Location Undulating valley floor

MGA Zone and Coordinate: 52 497628E 7115669N
Habitat Undulating valley floor at base of hill
Soil Red clay loam
Vegetation Eucalypt over Spinifex
Veg Condition Very good
Notes disturbance low; some camel grazing
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Acacia kempeana	<2	2.5	BGN065
Acacia oswaldii	2	2	BGN142
Cenchrus ciliaris	<2	0.6	BGN098
Enteropogon ramosus	<2	0.3	
Eragrostis sp.	<2	0.2	BGN084
Eragrostis sp.	<2	0.2	BGN050
Eucalyptus socialis subsp. *eucentrica*	10	10	BGN110
Eucalyptus socialis subsp. *eucentrica*	5	10	BGN102
Pittosporum angustifolium	<2	1.4	BGN202
Ptilotus obovatus var. *obovatus*			
Rhagodia eremaea	<2	1.2	BGN083
Sida calyxhymenia	<2	0.1	BGN070
Sida sp.	<2	0.2	BGN052
Solanum orbiculatum subsp. *orbiculatum*	<2	0.6	BGN219
Triodia helmsii	70	0.5	BGN074
Unknown	3	0.6	BGN082

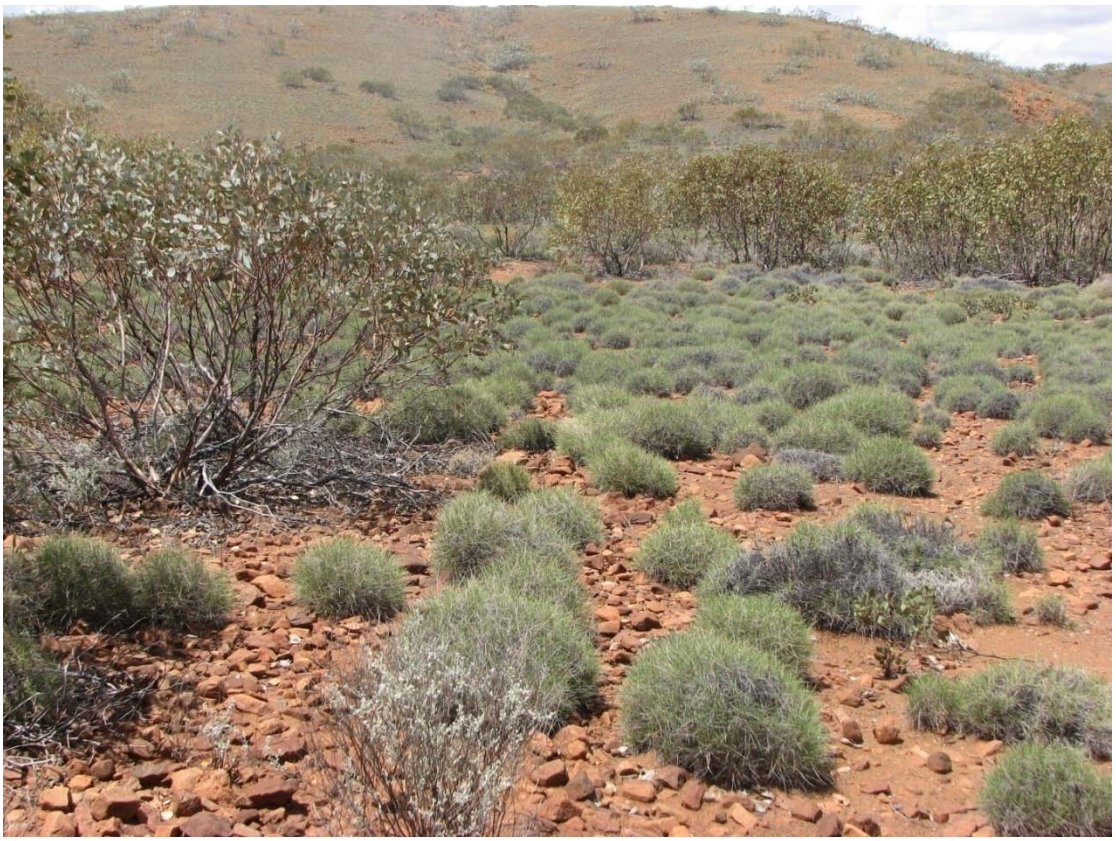
Wingellina 2010 **Site:** WIN026

Described by RF **Date:** 6/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 499880E 7114949N
Habitat Rocky slope; NE aspect
Soil Red rocky calcrete
Vegetation Low Open *Eucalyptus* mallee over *Triodia* hummock grassland
Veg Condition Pristine
Notes Low Disturbance
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Abutilon cryptopetalum	+	0.1	CN11
Acacia nyssophylla	1.5	2	W6
Acacia validinervia	2	3	W1
Amyema sanguinea	+		W22
Brachyscome tesquorum	+	0.2	W12
Corymbia eremaea	+	3	W16
Cucumis sp.	+	Climber	W10
Einadia nutans subsp. *eremaea*	+		W15
Eremophila latrobei subsp. *glabra*	+	1	W3
Eriachne mucronata	+	0.2	W14
Eucalyptus socialis subsp. *eucentrica*	15	3	W2
Euphorbia tannensis	+	0.5	W7
Halgania cyanea	+	0.3	W18
Haloragis uncatipila	+	0.3	W8
Indigofera sp. MacDonnel Ranges	+	1	W9
Jasminum didymum subsp. *lineare*	+	1	W21
Paraceterach muelleri	+	0.3	W17
Paspalidium constrictum			W23
Pittosporum angustifolium	+	1.2	CN12
Ptilotus obovatus	+	1	W11
Santalum lanceolatum	+	2	W5
Senna artemisioides subsp. *oligophylla*	+	1.5	W13
Senna artemisioides subsp. x *sturtii*	+	1	W4
Triodia scariosa	35	0.3	W20



Wingellina 2008 **Site:** WIN026

Described by BGN **Date:** 20/04/2008 **Type:** Quadrat (30x30m)
Season: Poor **Uniformity:**

Location Ccreekline between ridges

MGA Zone and Coordinate: 52 499885E 7114952N
Habitat Creekline between ridges
Soil Red clay loam
Veg Condition Excellent
Fire Age 2 yrs
Notes Disturbance low; some camel grazing
Species List:

Taxa	Cover %	Hgt (m)	Specimen
Acacia kempeana	3	1	BGN065
Acacia validinervia	6	1.7	BGN220
Amyema miquelii	<2	4	BGN222
Eragrostis eriopoda	<2	0.3	
Eucalyptus mannensis subsp. *mannensis*	2	7	BGN221
Eucalyptus socialis subsp. *eucentrica*	6	5	BGN182
Eucalyptus socialis subsp. *eucentrica*	6	3	BGN176
Ptilotus obovatus var. *obovatus*	<2	0.3	
Senna artemisioides subsp. *oligophylla* x *helmsii*	<2	1.5	BGN054
Sida calyxhymenia	<2	0.1	BGN070
Sida sp.	<2	0.5	BGN052
Triodia helmsii	70	0.4	BGN074
Unknown	<2	0.2	BGN082
Unknown	<2	0.5	BGN053

Wingellina 2010 **Site:** WIN027

Described by RF **Date:** 7/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 499028E 7117907N
Habitat Mulga plains
Soil Light brown clay loam with pebbles
Vegetation Vegetation structure not possible to determine
Veg Condition Very Good
Fire Age Recent
Notes Survey area burnt - massive mulga death
Species List:

Taxa	Cover %	Height	Specimen	
Acacia aneura (60x1mm)	3	6	CN53	Terete
Acacia kempeana	1	6	CN52	
Acacia kempeana	+	0.2		
Aristida contorta	+	0.2		
Atriplex elachophylla	+	0.1	CN52	
Cenchrus ciliaris	+	0.2		
Chrysocephalum pterochaetum	+	0.2	CN46	
Cucumis sp.	+	0.2		
Digitaria coenicola	+	0.2	CN45	
Enneapogon cylindricus	3	0.2		
Erodium carolinianum	+	0.1		
Euphorbia centralis sens. lat	+	0.05	CN55	
Hakea lorea subsp. *lorea*	+	6	CN56	
Lepidium phlebopetalum sens. lat	+	0.1	CN51	
Ptilotus obovatus	+	1		
Rhagodia eremaea	+	1		
Rhodanthe floribunda	+	0.1	CN47	
Salsola tragus	+	0.2		
Sauropus trachyspermus	+	0.1	CN50	
Sida fibulifera	+	0.1	CN48	
Solanum ? esuriale	+	0.1	CN57	
Tribulus sp.	+	0.05	CN49	
Wahlenbergia communis	+	0.3	CN43	

Wingellina 2008 **Site:** WIN027

Described by BGN **Date:** 20/04/2008 **Type:** Quadrat (30x30m)
Season: Poor **Uniformity:**

Location Valley floor

MGA Zone and Coordinate: 52 499028E 7117910N
Habitat Flat mulga downs, valley floor
Soil Red clay loam
Veg Condition Degraded
Fire Age <2 yrs
Notes Disturbance high; frequent fire and camels
Species List:

Taxa	Cover %	Height	Specimen
Acacia aneura var. *aneura*	4	3	BGN132
Acacia aneura var. *intermedia*	3	7	BGN133
Amyema maidenii subsp. *maidenii*	<2	5	BGN137
Aristida contorta	50	0.4	
Aristida contorta	2	0.1	BGN091
Chamaesyce australis	<2	0.1	BGN096
Cymbopogon obtectus	2	0.5	BGN055
Enteropogon ramosus	<2	0.3	
Eragrostis sp.	60	0.3	BGN084
Hakea lorea subsp. *lorea*	4	5	BGN139
Mukia maderaspatana	<2	0.1	BGN113
Panicum decompositum	<2	0.2	BGN171
Ptilotus obovatus var. *obovatus*	<2	0.5	BGN223
Rhagodia eremaea	<2	0.3	BGN083
Salsola tragus	<2	0.2	BGN095
Sida calyxhymenia	<2	0.3	BGN070

Wingellina 2010 **Site:** WIN028

Described by RF **Date:** 7/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 497956E 7117595N
Habitat Low stony rise with outcropping
Soil Light brown clay loam with rocky scree
Vegetation *Triodia* hummock grassland with scattered shrubs
Veg Condition Pristine
Notes Low Disturbance
Litter - 2%
Species List:

Taxa	Cover %	Height	Specimen
Acacia pruinocarpa	1	0.5	
Acacia sibirica	+	0.75	CN02
Cenchrus ciliaris	+	0.5	
Enneapogon cylindricus	+	0.2	
Eremophila glabra	+	1.2	CN58
Eucalyptus socialis	1	1.5	
Goodenia sp.	+	0.3	CN59
Halgania cyanea	+	0.3	
Hibiscus sp.	+	0.2	CN64
Indigofera georgei	+	0.4	CN61
Ptilotus clementii	+	0.3	CN66
Ptilotus obovatus	1	0.3	
Ptilotus sessilifolius	+	0.2	CN62
Salsola tragus	+	0.3	
Sclerolaena parviflora	+	0.2	CN63
Senna artemisioides subsp. *artemisioides*	2	0.75	
Sida sp. Limestone (D.E. Abrecht 5748)	+	0.2	
Stenopetalum velutinum	+	0.2	CN65
Triodia scariosa	20	0.3	CN60
Zygophyllum eichleri	+	0.05	CN67

Wingellina 2008 **Site:** WIN028

Described by BGN **Date:** 20/04/2008 **Type:** Quadrat (30x30m)
Season: Poor **Uniformity:**

Location Undulating valley floor

MGA Zone and Coordinate: 52 497954E 7117597N
Habitat Undulating valley floor
Soil Red clay loam
Vegetation Spinifex grassland
Veg Condition Degraded
Fire Age 2-3 yrs
Notes Disturbance medium; frequent fires
Species List:

Taxa	Cover %	Height	Specimen
Acacia kempeana	3	0.3	BGN065
Acacia pruinocarpa	4	0.6	BGN131
Aristida contorta	<2	0.2	BGN091
Cymbopogon obtectus	<2	0.5	BGN055
Eragrostis sp.	<2	0.1	BGN050
Eucalyptus socialis subsp. *eucentrica*	15	2	BGN159
Halgania cyanea	6	0.2	BGN068
Ptilotus obovatus var. *obovatus*	2	0.4	BGN223
Salsola tragus	<2	0.15	BGN095
Senna artemisioides subsp. *artemisioides*	6	0.7	BGN080
Senna artemisioides subsp. *petiolaris*	2	1	BGN224
Sida calyxhymenia	<2	0.1	BGN070
Sida sp.	<2	0.4	BGN115
Themeda sp.	<2	0.15	BGN190
Triodia helmsii	80	0.2	BGN074

Wingellina 2010 **Site:** WIN029

Described by RF **Date:** 8/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 496004E 7117217N
Habitat Flat scree plains with pebblestone pavement; NW aspect
Soil Light brown clay loam
Vegetation Open mallee woodland over low open shrubland
Veg Condition Good
Notes Medium Disturbance - previously cleared area
Litter - 5%
Species List:

Taxa	Cover %	Height	Specimen	
Abutilon fraseri	+	1	CN93	
Acacia aneura var. *conifera*	2	5	CN11	
Acacia kempeana	5	1.5		*Acacia* justacacia
Acacia nyssophylla	+	3		*Acacia* pungent tip
Acacia sp.	+	2.5		*Acacia* hyperdermic
Acacia tetragonophylla	+	2		
Cenchrus ciliaris	+	0.4		
Cymbopogon obtectus	+	0.4		*Cymbopogon*
Enchylaena tomentosa	+	0.3		
Enneapogon cylindricus	+	0.2		
Eremophea spinosa	+	0.1		*Sclerolaena* soft
Eremophila latrobei subsp. *glabra*	+	1		*Eremophila* narrow leaf
Eremophila paisleyi	1	2	CN96	Warty stems
Eucalyptus socialis	10	6		
Paspalidium constrictum	+	0.4		
Pterocaulon sphacelatum	+	0.4	CN95	Pterocaulon small
Ptilotus exaltatus	+	0.4	CN96	
Ptilotus obovatus	5	0.4		
Rhagodia eremaea	+	0.1		
Salsola tragus	+	0.2		
Sclerolaena patenticuspis	+	0.2		*Sclerolaena* calcrete
Senna artemisioides subsp. *artemisioides*	2	10		
Senna artemisioides subsp. *filifolia*	+	1.5		
Senna artemisioides subsp. *petiolaris*	+	1.5		
Sida calyxhymenia	+	1.3	CN94	
Sida fibulifera	+	0.4		*Sida* fib 2
Sida sp. Limestone (D.E. Abrecht 5748)				*Sida* blue
Triodia scariosa	5	0.3		*Triodia* calcrete

Wingellina 2008 **Site:** WIN029

Described by BGN **Date:** 20/04/2008 **Type:** Quadrat (30x30m)
Season: Poor **Uniformity:**

Location Undulating flat, valley floor

MGA Zone and Coordinate: 52 496005E 7117214N
Habitat Undulating flat
Soil Red clay loam
Vegetation Eucalypt over Spinifex
Veg Condition Good
Notes Disturbance low; camel grazing
Species List:

Taxa	Cover %	Height	Specimen
Acacia aneura var. *intermedia*	2	4	BGN133
Acacia kempeana	4	1.2	BGN065
Acacia nyssophylla	<2	2	BGN111
Acacia oswaldii	4	2	BGN142
Acacia oswaldii	<2	2	BGN225
Aristida contorta	<2	0.4	BGN146
Cenchrus ciliaris	<2	0.3	BGN098
Eragrostis sp.	<2	0.2	BGN050
Eremophila latrobei subsp. *latrobei*	2	2	BGN078
Eucalyptus socialis subsp. *eucentrica*	8	7	BGN110
Ptilotus obovatus var. *obovatus*	5	0.5	BGN223
Rhagodia eremaea	2	1.2	BGN083
Sclerolaena parviflora	<2	0.1	BGN069
Senna artemisioides subsp. *artemisioides*	5	2	BGN145
Senna artemisioides subsp. *artemisioides*	6	1	BGN080
Sida calyxhymenia	<2	0.1	BGN070
Triodia sp.	7	0.3	BGN049
Unknown	6	1.5	BGN082

Wingellina 2010 **Site:** WIN030

Described by RF **Date:** 6/10/2010 **Type:** Quadrat (50X50m)
Season: Excellent **Uniformity:** Uniform

Location Wingellina

MGA Zone and Coordinate: 52 499191E 7114581N
Habitat Stony scree slope; S aspect
Soil Red sandy loam with scree
Vegetation Open Eucalypt mallee
Veg Condition Pristine
Notes Low Disturbance
Litter - 5%
Species List:

Taxa	Cover %	Height	Specimen	
Abutilon cryptopetalum	+	0.3	W28	
Acacia nyssophylla	+	1.8	W24	
Enchylaena tomentosa	+	0.3		
Enneapogon polyphyllus	+	0.3	W27	
Eucalyptus socialis subsp. *eucentrica*	40	7	W2	
Pterocaulon sphacelatum	+	0.2		Pterocaulon sp.
Ptilotus obovatus	+	0.3		
Ptilotus sp.	+	0.3	SP42	*Ptilotus* sp. 1
Rhagodia eremaea	+	0.4		
Salsola kali	1	0.2	SP26	
Sclerolaena divaricata	+	0.2		
Sclerolaena parviflora	+	0.2	SP41	#9507
Sida fibulifera	+	0.3		
Sida sp. Limestone (D.E. Abrecht 5748)	+	0.1	W29	*Sida* sp. Limestone (D.E.
Triodia scariosa	30	0.4		
Zygophyllum eremaeum	+	0.2	W26	
Zygophyllum ovatum	+	0.1	W25	

Wingellina 2008 **Site:** WIN030

Described by BGN **Date:** 20/04/2008 **Type:** Quadrat (30x30m)
Season: Poor **Uniformity:**

Location Lower slope

MGA Zone and Coordinate: 52 499135E 7114640N
Habitat Footslope
Soil Red clay loam
Vegetation Eucalypt over Spinifex
Veg Condition Very Good
Notes Disturbance low
Species List:

Taxa	Cover %	Height	Specimen
Acacia aneura var. *aneura*	2	2	BGN128
Acacia nyssophylla	<2	1.7	BGN111
Aristida contorta	<2	0.4	BGN146
Eucalyptus gypsophila			
Eucalyptus gypsophila	4	7	BGN226
Eucalyptus gypsophila	20	10	BGN109
Halgania cyanea	2	0.3	BGN068
Ptilotus obovatus var. *obovatus*	7	0.6	BGN223
Rhagodia eremaea	<2	1	BGN083
Salsola tragus	<2	0.2	BGN095
Sida calyxhymenia	<2	0.1	BGN070
Triodia sp.	70	0.4	BGN049

Appendix F

Flora Species Recorded at Wingellina during 2008 & 2010 Flora and Vegetation Surveys, and their Conservation Status

NT = near threatened, V = vulnerable' R = rare; P = priority, LC = least concern,

NC = no conservation code assigned. NR = species not recorded from state/territory

Family	Species	WA	SA	NT
Acanthaceae				
	Rostellularia adscendens			
	Rulingia sp.			
Amaranthaceae				
	Amaranthus sp.			
	Ptilotus aervoides			
	Ptilotus chippendalei			
	Ptilotus clementii			
	Ptilotus exaltatus			
	Ptilotus helipteroides			
	Ptilotus obovatus			
	Ptilotus polystachyus			
	Ptilotus sessilifolius			
Apiaceae				
	Daucus glochidiatus			
Apocynaceae				
	Rhyncharrhena linearis			
	Sarcostemma sp.			
Araliaceae				
	Hydrocotyle trachycarpa			
Asparagaceae				
	Thysanotus sp.			
Asteraceae				
	Brachyscome ciliaris			
	Brachyscome tesquorum			
	Calotis hispidula			
	Calotis latiuscula	P3	NC	LC
	Chrysocephalum apiculatum			
	Chrysocephalum eremaeum			
	Chrysocephalum pterochaetum			
	Leiocarpa semicalva			
	Leiocarpa tomentose			
	Leucochrysum stipitatum			
	Minuria leptophylla			
	Olearia stuartii			
Family	Species	WA	SA	NT
Asteraceae				
	Pterocaulon serrulatum			
	Pterocaulon sphacelatum			
	Rhodanthe floribunda			

	Schoenia ayersii			
	Schoenia cassiniana			
	Senecio gregorii			
	Senecio magnificus			
	Sigesbeckia australiensis			
	* *Sonchus oleraceus*			
Boraginaceae				
	Halgania cyanea			
	Heliotropium asperrimum			
	Omphalolappula concave			
	Trichodesma zeylanicum			
Brassicaceae				
	Arabidella trisecta			
	* *Capsella bursa-pastoris*			
	Lepidium oxytrichum			
	Lepidium phlebopetalum			
	Menkea lutea	P1	R	NR
	Menkea villosula			
	* *Sisymbrium orientale*			
	Stenopetalum lineare			
	Stenopetalum velutinum			
Campanulaceae				
	Wahlenbergia communis			
	Wahlenbergia tumidifructa			
Celastraceae				
	Stackhousia muricata subsp. annual (W.R. Barker 2172)			
Chenopodiaceae				
	Atriplex elachophylla			
	Atriplex semibaccata			
	Dysphania cristata			
	Dysphania rhadinostachya			
	Einadia nutans subsp. *eremaea*			
	Enchylaena tomentose			
	Eremophea spinosa			
	Maireana erioclada			
	Maireana eriosphaera			
	Maireana integra			
Family	Species	WA	SA	NT
Chenopodiaceae				
	Maireana planifolia			
	Maireana scleroptera			
	Maireana villosa sens. lat.			

	Rhagodia eremaea			
	Salsola tragus			
	Sclerolaena convexula			
	Sclerolaena cornishiana			
	Sclerolaena costata			
	Sclerolaena deserticola			
	Sclerolaena diacantha			
	Sclerolaena divaricata			
	Sclerolaena lanicuspis			
	Sclerolaena parviflora			
	Sclerolaena patenticuspis			
Chloanthaceae				
	Dicrastylis gilesii			
Colchicaceae				
	Wurmbea deserticola			
Convolvulaceae				
	Bonamia erecta			
	Convolvulus clementii			
	Convolvulus erubescens			
	Evolvulus alsinoides var. *villosicalyx*			
Cucurbitaceae				
	* *Citrullus colocynthis*			
	* *Citrullus lanatus*			
	Cucumis sp.			
	Mukia maderaspatana			
Cyperaceae				
	Eleocharis pallens			
Dilleniaceae				
	Hibbertia triandra			
Euphorbiaceae				
	Euphorbia australis			
	Euphorbia boophthona			
	Euphorbia centralis sens. lat			
	Euphorbia inappendiculata	P3	NR	NR
	Euphorbia tannensis			
Fabaceae				
	Acacia ampliceps			
	Acacia aneura var. *aneura*			
Family	Species	WA	SA	NT
Fabaceae				
	Acacia aneura var. *conifera*			
	Acacia aneura var. *intermedia*			

	Acacia aneura var. *major*			
	Acacia aneura var. *microcarpa*			
	Acacia aneura var. *tenuis*			
	Acacia brachystachya			
	Acacia clelandii			
	Acacia dictyophleba			
	Acacia kempeana			
	Acacia ligulata			
	Acacia melleodora			
	Acacia minyura			
	Acacia nyssophylla			
	Acacia oswaldii			
	Acacia pachyacra			
	Acacia prainii			
	Acacia pruinocarpa			
	Acacia sibirica			
	Acacia strongylophylla			
	Acacia synchronicia			
	Acacia tetragonophylla			
	Acacia validinervia			
	Acacia victoriae			
	Crotalaria eremaea			
	Glycine canescens			
	Indigofera georgei			
	Indigofera linifolia			
	Indigofera sp. MacDonnel Ranges			
	Petalostylis cassioides			
	Rhynchosia minima			
	Senna artemisioides subsp. *artemisioides*			
	Senna artemisioides subsp. *filifolia*			
	Senna artemisioides subsp. *helmsii*			
	Senna artemisioides subsp. *oligophylla*			
	Senna artemisioides subsp. *oligophylla x helmsii*			
	Senna artemisioides subsp. *petiolaris*			
	Senna artemisioides subsp. *x sturtii*			
	Senna glaucifolia			
	Senna glutinosa			
	Senna pleurocarpa			
	Swainsona acuticarinata			
Family	Species	WA	SA	NT
Fabaceae				
	Swainsona campylantha			

	Swainsona tenuis			
	Templetonia egena			
Geraniaceae				
	Erodium carolinianum			
	Erodium cygnorum			
Goodeniaceae				
	Goodenia centralis			
	Goodenia glandulosa			nt
	Goodenia heterochila			
	Goodenia lunata	P1	NR	NR
	Goodenia ramelii			
	Scaevola amblyanthera var. *centralis*			
	Scaevola spinescens			
Gyrostemonaceae				
	Codonocarpus cotinifolius			
Haloragaceae				
	Haloragis gossei			
	Haloragis uncatipila			
Hemerocallidaceae				
	Caesia chlorantha			
Lamiaceae				
	Harmsiodoxa sp. Eremaean (A.S. George 3894)			
	Prostanthera wilkieana			nt
	Spartothamnella teucriiflora			
Loranthaceae				
	Amyema maidenii			
	Amyema miquelii			
	Amyema sanguinea			
	Lysiana murrayi			
Malvaceae				
	Abutilon cryptopetalum			
	Abutilon fraseri			
	Abutilon indicum			
	Abutilon lepidum			
	Abutilon leucopetalum			
	Abutilon macrum			
	Abutilon malvifolium			
	Alyogyne pinoniana			
	Brachychiton gregorii			
	Gossypium sturtianum			
Family	Species	WA	SA	NT
Malvaceae				

	Hibiscus brachysiphonius			
	Hibiscus coatesii			
	Hibiscus leptocladus			
	Hibiscus solanifolius			
	Hibiscus sturtii var. *grandiflorus*			
	* *Malvastrum americanum*			
	Rulingia loxophylla			
	Sida calyxhymenia			nt
	Sida fibulifera			
	Sida filiformis			
	Sida phaeotricha			
	Sida sp. Excedentifolia (J.L. Egan 1925)			
	Sida sp. Limestone (D.E. Abrecht 5748)			
	Sida trichopoda			
Moraceae				
	Ficus brachypoda			
Myrtaceae				
	Aluta maisonneuvei subsp. *maisonneuvei*			
	Corymbia eremaea			
	Corymbia hamersleyana			
	Eucalyptus camaldulensis var. *obtusa*			
	Eucalyptus gamophylla			
	Eucalyptus gongylocarpa			
	Eucalyptus gypsophila			
	Eucalyptus mannensis subsp. *mannensis*			
	Eucalyptus oxymitra			
	Eucalyptus socialis			
	Eucalyptus socialis subsp. *eucentrica*			
	Eucalyptus striaticalyx			
	Eucalyptus trivalvis			
	Micromyrtus fimbrisepala			
Nyctaginaceae				
	Boerhavia coccinea			
	Boerhavia schomburgkiana			
Oleaceae				
	Jasminum didymum subsp. *lineare*			
Phyllanthaceae				
	Sauropus trachyspermus			
Pittosporaceae				
	Pittosporum angustifolium			

Family	Species	WA	SA	NT
Plantaginacaea				
	Plantago drummondii			
Poaceae				
	Amphipogon caricinus var. caricinus			
	Aristida burbidgeae			
	Aristida contorta			
	Aristida holathera			
	Aristida latifolia			
	Aristida nitidula			
	Astrebla elymoides			
	Astrebla pectinata			
	Austrostipa nitida			
	Bothriochloa ewartiana			
	Brachyachne ciliaris			
	* *Cenchrus ciliaris*			
	* *Cenchrus pennisetiformis*			
	Cymbopogon obtectus			
	Dichanthium affine			
	Dichanthium sericeum subsp. humilius			
	Dichanthium sericeum subsp. sericeum			
	Digitaria ammophila			
	Digitaria brownii			
	Digitaria coenicola			
	Digitaria ctenantha			
	Enneapogon caerulescens			
	Enneapogon cylindricus			
	Enneapogon lindleyanus			
	Enneapogon polyphyllus			
	Enteropogon ramosus			
	Eragrostis desertorum			
	Eragrostis eriopoda			
	Eragrostis setifolia			
	Eragrostis xerophila			
	Eriachne helmsii			
	Eriachne mucronata			
	Monachather paradoxus			
	Panicum decompositum			
	Panicum effusum			
	Paraneurachne muelleri			
	Paractaenum refractum			
	Paspalidium constrictum			

	Themeda triandra			
Family	Species	WA	SA	NT
Poaceae				
	Thyridolepis mitchelliana			
	Triodia brizoides			
	Triodia helmsii			
	Triodia irritans			
	Triodia lanigera			
	Triodia pungens			
	Triodia scariosa			
	Triodia schinzii			
	Triodia secunda			
Polygalaceae				
	Chamaesyce australis			
Polygonaceae				
	* *Acetosa vesicaria*			
Portulacaceae				
	Calandrinia eremaea			
	*[1] *Portulaca oleracea*			
	Portulaca oleracea var. Yuendumu (T.S.Henshall 2868)			
Proteaceae				
	Grevillea berryana			
	Hakea divaricata			
	Hakea lorea			
Pteridaceae				
	Cheilanthes lasiophylla			
	Cheilanthes sieberi			
	Paraceterach muelleri			
Rubiaceae				
	Psydrax attenuata var. *tenella*			
	Psydrax suaveolens			
Santalaceae				
	Santalum lanceolatum			
	Santalum spicatum			
Sapindaceae				
	Dodonaea lanceolata			
	Dodonaea lobulata			
	Dodonaea viscosa subsp. *angustissima*			
	Dodonaea viscosa subsp. *mucronata*			
	Dodonaea viscosa subsp. *spatulata*			

Scrophulariaceae				
	Eremophila alternifolia			nt
	Eremophila cuneifolia			
	Eremophila duttonii			
	Eremophila elderi			
	Eremophila forrestii subsp. *forrestii*			
	Eremophila georgei			
	Eremophila gilesii subsp. *gilesii*			
	Eremophila glabra			
	Eremophila latrobei subsp. *glabra*			
	Eremophila latrobei subsp. *latrobei*			
	Eremophila longifolia			
	Eremophila paisleyi			
	Eremophila platythamnos subsp. *exotrachys*			
	Eremophila serrulata			
Solanaceae				
	Duboisia hopwoodii			
	Nicotiana occidentalis subsp. *oblique*			
	Solanum centrale			
	Solanum cleistogamum			
	Solanum coactiliferum			
	Solanum ellipticum			
	Solanum esuriale			
	Solanum ferocissimum			
	Solanum lasiophyllum			
	Solanum orbiculatum			
	Solanum petrophilum			
Thymelaeaceae				
	Pimelea trichostachya			
Zygophyllaceae				
	Tribulus occidentalis			
	* *Tribulus terrestris*			
	Tribulus terretris forma long style (D.E. Symon 10352)			
	Zygophyllum apiculatum			
	Zygophyllum eichleri			
	Zygophyllum eremaeum			
	Zygophyllum ovatum			nt

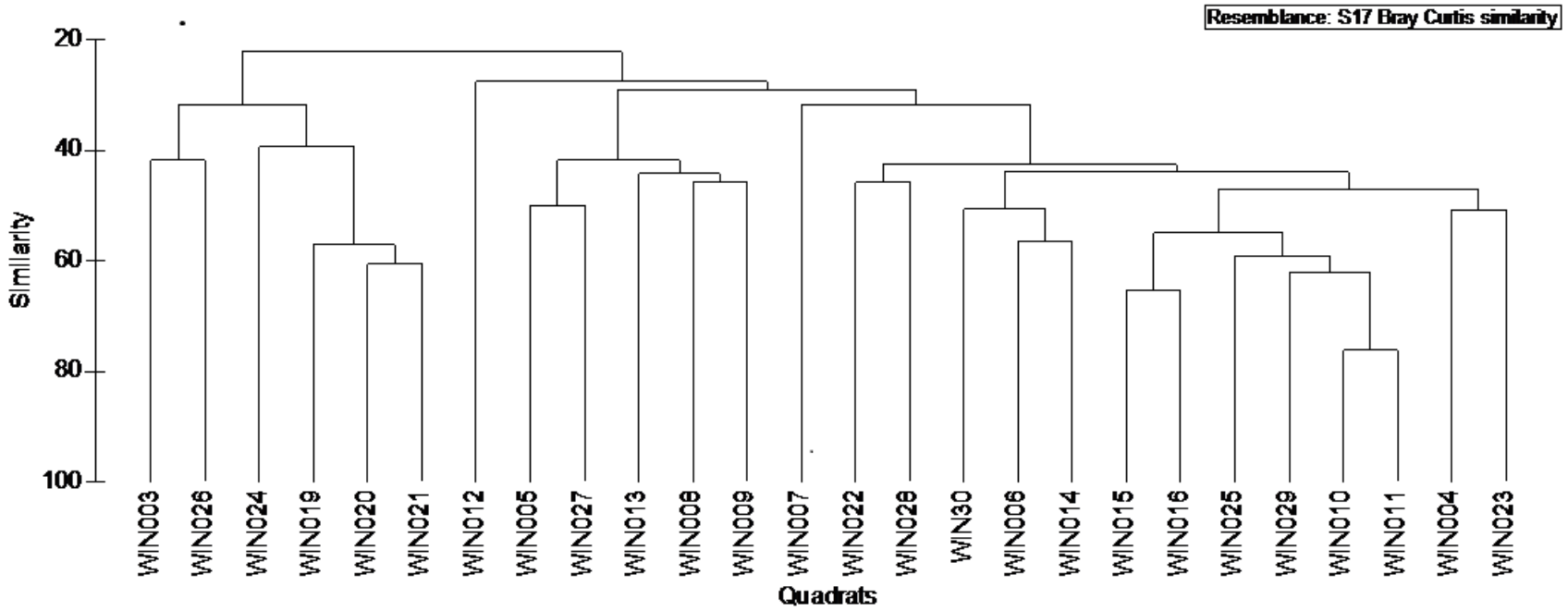
Appendix G

Number and Location of Collected Priority Flora

Species	Quadrat/ Relevé	Easting	Northing	# plants	% cover
Calotis latiuscula	PARC5	498986	7114051	1	<1%
Calotis latiuscula	PARC9	490739	7114379	1	<1%
Euphorbia inappendiculata		490133	7116532	1	
Goodenia lunata		494009	7114357	1	
Menkea lutea		490133	7116532	20	
Menkea lutea		491017	7115228	10	
Menkea lutea		491079	7115856	50	
Menkea lutea		490207	7116654	30	
Menkea lutea		490707	7115026	50	
Menkea lutea		498293	7113649	100	
Menkea lutea		494089	7113918	1	
Menkea lutea	PARC3	490342	7116669		<1%
Menkea lutea	PARC4	491383	7115898		<1%
Menkea lutea	PARC5	498986	7114051		<1%
Menkea lutea	PARC6	494089	7113918		<1%
Menkea lutea	PARC9	490739	7114379		<1%

Appendix H

Results of the Vegetation Statistical Analysis


Resemblance: S17 Bray Curtis similarity
Similarity
20
40
60
80
100
WIN003
WIN026
WIN024
WIN019
WIN020
WIN021
WIN012
WIN005
WIN027
WIN013
WIN008
WIN009
WIN007
WIN022
WIN028
WIN030
WIN006
WIN014
WIN015
WIN016
WIN025
WIN029
WIN010
WIN011
WIN004
WIN023
Quadrats