RECON ENVIRONMENTAL

HERBERT LUKIN RIDGE & SURROUNDS

VEGETATION SURVEY

FOR GOLDEN WEST RESOURCES LTD

GoldenWest RESOURCES LIMITED

MAY 2010

REPORT NUMBER: GWR01

Survey

Mapping

Flora

Rehabilitation

REPORT GWR01 COMPILED BY:
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Recon Environmental was commissioned in March 2009 by Golden West Resources Ltd to map native vegetation communities; and, identify any significant vegetation communities or Declared Rare Flora/Priority species in the Wiluna West Project area. The flora and vegetation assessment was conducted in accordance with Guidance Statement No. 51 *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (Environmental Protection Authority, 2004). The purpose of this study is to characterise the vegetation and flora occurring within the survey area.

The survey area lies within the Austin Botanical District of the Murchison Region in the Eremaean Province as defined by Beard (1990). The vegetation formations in this botanical district can be summarised as mulga (*Acacia aneura*) low woodlands or tall shrublands associated with red loams over siliceous hardpan and scattered mulga and mallee over spinifex hummock grasslands on gently undulating sandplain (Van Vreeswyk, 1998).

No Threatened Ecological Communities (TEC's) as defined by the Environmental Protection and Biodiversity Conservation (EPBC) Act (1999), or the Department of Environment and Conservation (2009) were observed in the survey area. However part of the Wiluna West Project area falls within the Priority Ecological Community: Wiluna West (P1).

A total of 278 native taxa from 120 genera and 41 families have been recorded in the survey area. Families of native species with greatest representation included Fabaceae (45 taxa), Poaceae (23 taxa), Chenopodiaceae (19 taxa), Scrophulariaceae (16 taxa), and Malvaceae (15 taxa).

The most common genera were *Acacia* (23), *Eremophila* (16), *Senna* (14), *Maireana* (11), and *Ptilotus* (10).

No Declared Plants pursuant to Section 37 of the *Agriculture and Related Resources Protection Act, 197*6, as listed by the Department of Agriculture & Food (2009) were observed within the survey area. Six introduced weed species were identified in the survey area.

Six introduced species have been recorded within the survey area. Introduced species were found to be generally isolated in occurrence, with the exception of *Bidens bipinnata** which was found to occur extensively through some of the drainage systems in the northern end of the survey area.

No plant taxa located in the survey area are gazetted as Declared Rare Flora pursuant to subsection 2 of section 23F of the Wildlife Conservation Act (1950). No plant taxa listed as Threatened pursuant to Schedule 1 of the EPBC Act (1999) were located in the survey area.

Fourteen priority flora were recorded in the Wiluna West Project area: *Beyeria lapidicola* (P1), *Eremophila congesta* (P1), *Ptilotus astrolasius* var. *luteous* (P1), *Ptilotus chrysocomus* (P1), *Eremophila ?anomala* (P1), *Calytrix uncinata* (P3), *Eremophila arachnoides* subsp. *arachnoides* (P3), *Homalocalyx echinulatus* (P3), *Maireana prosthecochaeta* (P3), *Olearia mucronata* (P3), *Prostanthera ferricola* (P3), *Tribulus adelacanthus* (P3), *Sauropus ramosissimus* (P3), and *Baeckea* sp. Melita Station (P4). All Priority Flora recorded within the survey area are found in other parts of Western Australia and are not restricted to the Joyner's Find area.

Beyeria lapidicola (P1) and *Prostanthera ferricola* (P3) are Banded Ironstone Formation (BIF) endemic species – only known to occur on BIF. *Beyeria lapidicola* is particularly of significance due to it's limited distribution in WA (only known from three other BIF ranges as shown in Florabase (WAHERB, 2010)); and despite extensive searches in the Herbert Lukin Ridge & Surrounds survey area, it is only known from one location (in the Herbert Lukin Ridge & Surrounds survey area).

Sida sp. Wiluna (Markey & Dillon 4126) is an undescribed species of significance which was found to occur across a wider range of habitat types, within the survey area, than was previously known.

Schoenus variicellae was collected within the survey area, representing a significant range extension for this species.

Twenty-nine vegetation habitats were identified within the survey area (Figure 4). These communities reflect underlying geology, landforms and soils; and those that fall within the Wiluna West PEC can be grouped into the 6 Community Types as identified by Markey and Dillon (2007; 2009) for the Joyner's Find Hills.

As the current survey covers not only the BIF ridges but also extends across the adjacent hills and plains, additional habitats were encountered that were not associated with BIF and hence not a part of the Wiluna West PEC as indicated in Figure 2.

SIMS-M (stony ironstone mid-slope mulga shrublands) is the only habitat to be restricted in occurrence to the PEC and associated BIF ridges. All habitat types (except SIMS-M) that were mapped within the proposed PEC boundary were also found to extend outside of the proposed PEC boundary. While the SIMS-B (stony ironstone mulga shrublands on rocky slopes and crests, frequently on BIF) habitat was mapped in two small locations outside of the proposed PEC boundary, these occurrences of the SIMS-B habitat were extremely restricted and the majority of this habitat type was found to be within the PEC boundary, and associated with BIF.

2. INTRODUCTION

Recon Environmental was commissioned in March 2009 by Golden West Resources Ltd to map native vegetation communities; and, identify any significant vegetation communities or Declared Rare Flora/Priority species in the Wiluna West Project area.

The flora and vegetation assessment was conducted in accordance with Guidance Statement No. 51 *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (Environmental Protection Authority (EPA), 2004). The purpose of this study is to provide background botanical information for the proposed Wiluna West Project mining proposal, with the following objectives for the survey area:

- document plant species;
- document an describe plant species of conservation significance;
- describe and map vegetation associations;
- outline the conservation significance of vegetation associations.

Wiluna is the closest Weather Station to the Wiluna West Project area (Table 1; Bureau of Meteorology, 2009). The climate in the Wiluna area is described as arid, with Beard (1990) classifying the area as Desert – often with 12 months of dry weather with limited rain occurring in both summer and winter. The mean annual rainfall is 256mm, which is vastly exceeded by the high evaporation rate which averages around 3,200mm per year (Bureau of Meteorology, 2009a). Most rain tends to fall between January and May, however this is unreliable and irregular resulting from the remnants of tropical cyclones (Beard, 1976). The driest months of the year are usually during spring (August – November).

TABLE 1 MONTHLY CLIMATE STATISTICS: WILUNA

STATISTICS	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
TEMPERATURE (°C)													
Maximum Temperature													
Mean maximum temperature	37.9	36.5	34.1	29.2	23.8	19.9	19.4	21.8	26.3	30.2	34.0	36.8	29.2
Highest temperature	46.9	46.8	44.0	40.0	37.2	32.2	29.0	33.4	37.5	42.9	43.3	46.9	46.9
Date	1990	1991	1985	1957	1990	1969	2008	1995	1983	2004	1959	1990	25/12/1990
Lowest maximum temperature	18.5	18.7	15.8	16.7	11.1	12.0	10.3	10.1	12.3	13.0	16.2	20.2	10.1
Date	2006	1980	1965	1964	1968	1998	1985	1985	1977	1966	1978	1975	30/08/1977
Minimum Temperature													
Mean minimum temperature	22.8	22.1	19.6	15.0	10.0	6.7	5.4	6.7	9.9	13.8	17.8	21.0	14.2
Lowest temperature	8.3	12.1	9.4	3.9	-0.6	-2.0	-2.2	-2.3	1.2	4.2	4.4	8.3	-2.3
Date	1958	1967	1958	1960	1966	2000	2009	2000	1970	1973	1968	1961	4/08/2000
Lowest ground temperature	8.3	10.0	7.2	1.5	-3.1	-7.2	-7.2	-4.3	-1.5	1.7	4.4	5.4	-7.2
Date	1958	1960	1968	2000	1968	1997	1957	2000	2001	1958	1960	1966	22/07/1957
Highest minimum temperature	33.6	32.2	29.4	25.5	22.0	18.9	15.5	18.7	23.0	27.4	27.9	30.5	33.6
Date	1991	1998	1978	1991	2005	1965	2009	1994	1981	1995	1979	2005	20/01/1991
RAINFALL (mm)													
Mean rainfall	35.5	38.0	35.2	29.3	25.6	24.2	15.1	10.2	4.4	7.2	10.2	21.5	256.1
Mean daily evaporation	11.0	9.5	7.8	5.6	3.7	2.5	2.6	3.7	5.7	7.9	9.3	10.1	6.6
Mean number of days of rain ≥1mm	3.2	3.3	3.2	2.7	2.9	3.1	2.5	1.7	1.0	1.0	1.8	2.5	28.9
Highest rainfall	231.9	271.6	234.9	527.1	142.0	108.5	149.0	67.4	71.1	88.6	63.8	161.4	712.1
Date	1902	1995	1934	1900	1942	1986	1974	1965	1904	1975	1975	1930	1900
Lowest rainfall	0	0	0	0	0	0	0	0	0	0	0	0	48.8
Date	1993	1991	1993	1994	2000	2007	2003	2007	2005	2005	1997	1990	1910

Bureau of Meteorology (2009).

The survey area lies within the Austin Botanical District of the Murchison Region in the Eremaean Province as defined by Beard (1990). The vegetation formations in this botanical district can be summarised as mulga (*Acacia aneura*) low woodlands or tall shrublands associated with red loams over siliceous hardpan and scattered mulga and mallee over spinifex hummock grasslands on gently undulating sandplain (Van Vreeswyk, 1998). Changes in vegetation communities reflect soils and underlying geology, with close associations existing between tree species and soil type.

2.1 Survey Location

The Wiluna West Project area lies approximately 34km south west of Wiluna on the Lake Way pastoral lease (Figure 1). The area is approximately 450km north of Kalgoorlie and nearly 600km east northeast of Geraldton in the North Eastern Goldfields region.

The Herbert Lukin Ridge & Surrounds Vegetation Survey covers an area of 12,647 Ha.

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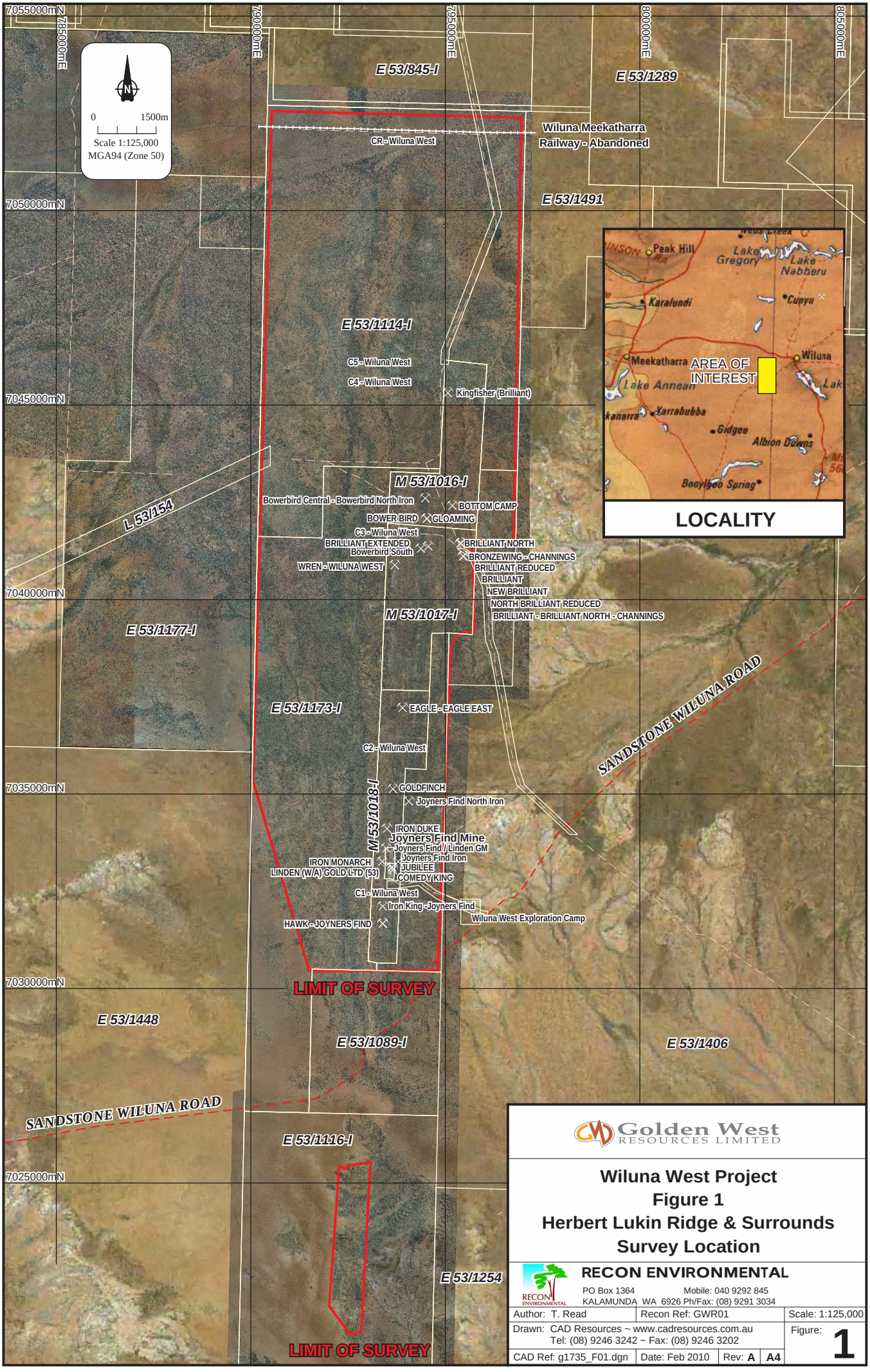

Golden West RESOURCES LIMITED

Wiluna West Project
Figure 1
Herbert Lukin Ridge & Surrounds
Survey Location

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Author: T. Read	Recon Ref: GWR01	Scale: 1:125,000
Drawn: CAD Resources ~ www.cadresources.com.au Tel: (08) 9246 3242 ~ Fax: (08) 9246 3202		Figure: 1
CAD Ref: g1735_F01.dgn	Date: Feb 2010	Rev: A A4

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3. METHODS

A database search of the Declared Rare and Priority Flora species records held by DEC was undertaken to identify those species which have the potential to occur within the survey area (Appendix V).

Available reports relating to the survey area (Markey & Dillon, 2007; Jim's Seeds, Weeds & Trees, 2005 and 2006; Botanica Consulting, 2007a-e and 2008a-c; Payne *et. al,* 1998; Pringle *et. al,* 1994), and the Rare Flora Lists (DEC, 2008) were examined. Close examination of Declared Rare Flora and Priority Flora that had the potential to occur within the project area were undertaken in Florabase (WAHERB, 2009) and at the Western Australian Herbarium.

A search of the Threatened Ecological Communities (TEC's) database was also undertaken of the same area nominated for the Rare Flora search.

The survey was conducted over 64 days from March to June 2009. Weather conditions were generally fine and warm for the most part, with some isolated thunderstorms.

Provisional vegetation community boundaries were mapped onto aerial photos, and sample sites selected. Sample sites were selected to ensure each community was adequately sampled; to help interpret aerial photo patterns; and enable a comprehensive vegetation description (list of sample sites and their coordinates in Appendix IV). All exploration tracks plus numerous additional cross country traverse lines were covered by quadbike (CanAm Outlander Max-XT) to confirm community boundaries. Where differences in communities and community boundaries were encountered, additional sites were selected in the field. Where boundaries were inaccessible to vehicle access, they were checked on foot.

Each sample site was examined on foot, and covered a minimum area of 20m x 20m; GPS coordinates were recorded at the centre point of the site, and each site was photographed. The dominant species in each stratum (identified as per Pringle, 1998; Table 2) and relative dominance of each stratum was recorded together with a complete list of plant species. Dominant species being those which were recorded as dominant in a stratum at a third or more of sampling sites; while common species are those subordinate species recorded at a third or more sampling sites or where traverse notes indicated that they were common in a particular habitat (as per Pringle, 1998). The projected perennial shrub foliar cover (PFC) for each stratum was determined using a Bitterlich gauge (Cooper, 1957); position in the landscape, soil type and colour, rock type, litter cover, evidence of fire, vegetation condition, and any erosion features were also noted. Vegetation condition scale was used as per Keighery (1994). Data from the 119 plots previously installed across the Herbert Lukin Ridge & Surrounds (Markey & Dillon, 2007; Jim's Seeds, Weeds & Trees, 2006) were also included in the total site evaluation.

TABLE 2 VEGETATION STRATA

STRATA	DESCRIPTION
Tree:	Plants with a single stem at a height of 1.3m above ground level.
Mallee:	Multi-stemmed Eucalypts.
Tall Shrub:	Shrubs over 2m tall.
Mid Shrub:	Shrubs 1m to 2m tall.
Low Shrub:	Shrubs less than 1m tall.
Perennial Grass:	Tussock and hummock grasses (grass species persisting for at least two years).

Plant species suspected to be DRF or Priority species, and those species not immediately recognised were recorded and collected for identification. Where identifications could not be confirmed upon close examination, specimens were forwarded to an independent expert botanist for confirmation identification and comparison with plant specimens at the Western Australian Herbarium. Specimens of significant and Priority flora will be submitted to DEC (and the WA Herbarium) with Rare Flora Report Forms upon conclusion of the project.

All plant name nomenclature follows the new linear systematic sequence for vascular plants and arrangements of collections at the WA Herbarium; which is based on the work of the Angiosperm Phylogeny Group (2009).

3.1 Level of Survey

The EPA Guidance Statement No. 51 (EPA, 2004) outlines the expectations of the EPA and details the extent, design and intensity of field surveys for environmental assessments. Two formal levels of flora survey are defined by the EPA Guidance Statement No. 51:

- *Level One:* a 'desktop' study to collate historical knowledge conducted in conjunction with a reconnaissance survey (site inspection);
- *Level Two:* an intensive survey that incorporates a detailed and comprehensive survey to characterise the flora present, combined with a Level One survey.

Throughout most areas of the State where the scale and nature of the proposed impact is moderate to high, a Level Two survey will be required. This is typically the case for most resource development projects.

TABLE 3 REQUIREMENTS OF SURVEY (Adapted from EPA Position Statement 51)

Level 1 Survey	Background Research/Desktop Study:	Markey & Dillon, 2007, and 2009; Jim's Seeds, Weeds & Trees, 2005 and 2006; Botanica Consulting, 2007a-e and 2008a-c; Payne *et. al,* 1998; Pringle *et. al,* 1994.
	RECONNAISSANCE SURVEY:	i) Undertaken to verify accuracy of the background study; ii) To further delineate and characterise the flora and range of vegetation units present in the survey area; and iii) Identify potential impacts.
Level 2 Survey	Incorporates Level 1 Survey	Requirements completed.
	DETAILED SURVEY: i) One or more visits in the main flowering season, and visit/s in other seasons.	Both 2006 surveys (Markey & Dillon, 2007; Jim's Seeds, Weeds & Trees, 2006) were undertaken in Spring after a fair season with good recordings of ephemeral species. 2009 survey undertaken during Autumn and Winter with numerous visits over this period. As most rain tends to fall between January and May, this should provide an opportune period for survey (driest months of the year on average tend to be during spring August – November).
	ii) Replication of plots in vegetation units, and greater coverage and displacement of plots over the survey area.	Original placement of 92 quadrats was undertaken on behalf of GWR in July 2006 by Jim's Seeds, Weeds & Trees, (2006); DEC re-assessed 23 of these quadrats and installed an additional 27 quadrats in August 2006 (Markey & Dillon, 2007).
	COMPREHENSIVE SURVEY: Survey at the intensity applied in Detailed Survey, of both the locality and parts of the local area. Survey to be structured with longer-term study and multiple visits.	Not all components of this level of survey undertaken to date. A total area of 12,647Ha was included within the 2009 survey area. In addition to the 119 previously established quadrats; 147 sample sites were intensively evaluated; with additional traverse notes and opportunistic sampling also undertaken across this extended area.

3.2 Limitations

According to the EPA Guidance Statement 51 (2004), flora and vegetation surveys may be limited by factors including a lack of pre-existing information, inappropriate survey timing or intensity, or access or resource constraints. An assessment of potential survey constraints is summarised in Table 4.

TABLE 4 FLORA & VEGETATION SURVEY LIMITATIONS AND CONSTRAINTS

Aspect	Constraint	Comment
Sources of information and availability of contextual information (i.e. pre-existing background versus new material)	Adequate	Regional mapping was undertaken in nearby areas by the Rangeland Survey team from Department of Agriculture (Payne *et. al,* 1998; and Pringle *et. al.,* 1994); plus Beard's (1976) regional mapping of the Murchison. Work undertaken by DEC (Markey & Dillon, 2007 & 2009) in the local area provided a solid foundation to work from; and was supplemented by additional background from Jims Seeds, Weeds, & Trees (2005, 2006), and Botanica Consulting (2007a-e and 2008a-c).
The scope (i.e. what life forms were sampled)	Adequate	Only vascular taxa were assessed.
Proportion of flora collected and identified (based on sampling, timing and intensity)	Adequate	A combined total of 278 taxa were recorded within the survey boundary; higher than previously recorded for the area due in part to the wider survey boundary. Four collections from the 2009 survey could not be identified beyond genus level due to a lack of reproductive material, while an additional 26 taxa were identified to species or subspecies level with some degree of uncertainty.
Completeness and further work which might be needed (e.g. was the relevant area fully surveyed)	Some constraints	A total area of 12,647Ha was included within the 2009 survey area. In addition to the 119 previously established quadrats; 147 sample sites were intensively evaluated; with additional traverse notes and opportunistic sampling also undertaken across the extended area. While the majority of Priority Flora populations encountered were recorded on traverse and on sample sites, little work was undertaken with population definition or population counts due to time constraints as the focus of the study was on mapping of the ridges and surrounding area.
Mapping reliability	Adequate	Mapping was undertaken at a scale of 1:10,000. Extensive ground truthing was undertaken across the survey area
Timing / weather / season / cycle	Some constraints	2009 survey was undertaken during Autumn and Winter with numerous visits over this period. As most rain tends to fall between January and May, this should have provided an opportune period for survey (driest months of the year on average tend to be during spring August – November). Rainfall during the March – June period in 2009 for the Wiluna area was however below average; resulting in limited flowering on perennials; and only limited presence of any ephemerals noted during the survey. Fortunately the 2006 surveys were undertaken in Spring after a fair season where rainfall had provided some good ephemeral collections.
Disturbances (e.g. fire, flood, accidental human intervention)	Some influence	Parts of the western survey boundary had been subject to fire (3-10 years previous). The influence of this fire was minimal and restricted mostly to the

		sandplain communities which were only on fringes of the survey boundary. The survey area is located on an active pastoral lease and hence subject to grazing pressures over an extended period of time. Parts of the northern survey area also exhibited signs of historic timber removal. There were some small areas subject to historic mining and prospecting operations in addition to the current exploration activity.
Intensity (in retrospect, was the intensity adequate)	Adequate	The intensity of the survey is considered to be adequate.
Resources	Adequate	Resources were adequate for the botanical survey and vegetation mapping. A total of 64 person days were expended in the field during the 2009 survey.
Access problems	Adequate	There are good main artery tracks enabling access to most areas within the limit of survey. The main ridges were traversed on a 200-400m grid (east west), on foot where there was no quad bike access due to the steep terrain. The remainder of the survey area was traversed by quad bike on a similar grid pattern; with all areas easily accessed via quad bike. All vegetation types as shown on aerial photography were accessed and boundaries checked using a quad bike or on foot. All habitat units mapped were ground truthed.
Experience levels (e.g. degree of expertise in plant identification to taxon level)	Adequate	The Principal Consultant managing the field program and reporting process has 12 years experience in botanical surveys and natural resource management within remote areas of Western Australia. When required external botanical experts were consulted to assist with taxonomic identifications.

4. PRIORITY ECOLOGICAL COMMUNITIES

The search of the DEC Threatened Ecological Communities (TEC's) database (7th April, 2009; search conducted on same coordinates as Rare Flora search detailed in Appendix V) identified three PEC's (Priority Ecological Communities; TEC and PEC definitions in Appendix I) potentially within the survey area including:

- "Millbillillie: Bubble calcrete groundwater assemblage type on Carey palaeodrainage on Millbillillie Station" PEC (P1)
- "Bubble Well calcrete groundwater calcrete assemblage type on Carey palaeodrainage on Millbillillie Station" PEC (P1)
- "Wiluna West" PEC (P1)

Examination of the DEC (2007) report into the Banded Ironstone Formation Ranges of the Midwest and Goldfields confirmed the Wiluna West PEC lies along the Herbert Lukin Ridge.

The buffer zone for the Wiluna West PEC was found to cover part of the Wiluna West Project area; and further background was requested from DEC to determine the tentative boundaries of the PEC in relation to the project area. The tentative Wiluna West PEC boundary as defined by DEC covers an estimated area of 23,156.25 Ha.

Section 4.1 details the description of the plant assemblage of the Wiluna West PEC as defined by Markey and Dillon (2007; 2009); while Section 4.2 describes the work undertaken on behalf of GWR in expanding the background botanical data for the Wiluna West Project area.

4.1 Plant Communities of the Wiluna West PEC[1]

Markey and Dillon (2007, 2009) undertook a study of the flora and vegetation communities of the Herbert Lukin Ridge (in August, 2006) defining six community types that were correlated with topographic position, slope and substrate type. They established 50 20m x 20m quadrats (referred to as the DEC quadrats in this document) and recorded a total of 191 flora taxa of which only two were introduced weed species.

Reasonable rains were experienced in 2006 which is refected in the good number of ephemerals and geophytes on the flora list (Appendix II). The best represented families were the Asteraceae (14 native taxa and 1 introduced taxon), Chenopodiaceae (23 taxa and 1 hybrid), Poaceae (23 taxa), Mimosaceae (15 taxa and 1 hybrid) now reclassified as Fabaceae (including Mimosaceae, Papilionaceae and Caesalpiniaceae: 26 taxa and 7 hybrids), Myoporaceae (now Scrophulariaceae: 12 taxa), Amaranthaceae (11 taxa), Malvaceae (11 taxa), Myrtaceae (8 taxa), and Goodeniaceae (6 taxa). The most common genera were *Acacia* (15 and 1 hybrid), *Eremophila* (12), Ptilotus (10 taxa), *Maireana* (9 taxa and 1 hybrid), *Senna* (7 taxa and 6 hybrids), *Sida* (6 taxa), and *Sclerolaena* (6 taxa).

4.1.1 Community Type 1

Community Type 1 is found on crests and steeper upper slopes.

It is described as a sparse open tall shrubland of *Acacia aneura* var. cf. *microcarpa, Grevillea berryana* and (less commonly, *Acacia aneura* cf. var. *argentea, Acacia quadrimarginea*) over mid storey shrub stratum of *Eremophila latrobei* subsp. *latrobei, Prostanthera campbellii,* (occasionally *Dodonaea petiolaris* and *Baeckea* sp. Melita Station (P4), *Eremophila punctata,* and *E. flabellata*), over common sub-shrubs *Ptilotus obovatus, Sida* sp. Golden calyces glabrous*, S.* sp. Excedentifolia*,* the perennial herb *Ptilotus schwartzii,* the geophyte *Cheilanthes brownii,* and the perennial grasses *Eriachne helmsii, E. mucronata,* and *Monachather paradoxus.*

4.1.2 Community Type 2

Community Type 2: is allied floristically to Community type 1. This community is located on flat summit surfaces on ridge tops, and on the undulating pediments and valley floors off the main ridges. Structurally, this habitat encompasses mosaics of *Acacia* over *Triodia* grasslands or low

[1] Summarised from Markey & Dillon (2007 & 2009).

myrtaceous-*Eremophila* shrublands, with isolated mallees of *Eucalyptus kingsmillii* subsp. *kingsmillii.*

This community is described as sparse open shrublands of emergent tall shrubs of *Acacia aneura* var. cf. *microcarpa, A. aneura* var. cf. *aneura, Grevillea berryana* and *Acacia rhodophloia* (less frequently *A. quadrimarginea*), over mid shrub stratum of *Eremophila punctata, E. latrobei* subsp. *latrobei, E. jucunda* subsp. *jucunda* (less commonly *Eremophila forrestii*), sub-shrubs *Ptilotus obovatus, Sida* sp. Golden calyces glabrous, (less commonly *Ptilotus schwartzii*) and *Monachather paradoxus.* Hummocks – open grasslands of *Triodia melvillei* are a distinctive layer in this habitat. Where *Triodia melvillei* is absent or of low abundance, low shrubs such as *Homalocalyx echinulatus* (P3), *Eremophila forrestii,* and *E. jucunda* are far more conspicuous, as are other perennial grasses such as *Thyridolepis multiculmis.*

4.1.3 Community Type 3

Community Type 3 is usually found on pediments, lower slopes and slightly low outcrops of weathered BIF (Banded Ironstone Formation) and other metasediments, quartz and ultramafic lithologies, usually obscured by colluvium.

This community consists of *Acacia aneura* (notably *A. aneura* var. cf. *tenuis*), and less frequently, *Acacia balsamea* and *A. cuthbertsonii* subsp. *cuthbertsonii* tall open shrublands over shrubs such as *Scaevola spinescens, Senna artemisioides* subsp. *helmsii, Eremophila flabellata,* over sparse low shrubs such as *Maireana convexa, M. georgei, Ptilotus obovatus,* and less frequently *Eremophila jucunda* subsp. *jucunda* and *Sida ectogama*.

4.1.4 Community Type 4

Community Type 4 consists of a tall open shrubland of *Acacia aneura* and *A. tetragonophylla,* occasionally with isolated emergent trees of *Acacia pruinocarpa,* over a mosaic of shrubland and chenopods. The shrubland is dominated by *Sida ectogama*, *Rhagodia eremaea, Eremophila flabellata, E. galeata,* and *Ptilotus obovatus,* which then grades into more open low chenopod shrubland and succulent geophytes, which is dominated by *Tecticornia, Maireana,* and *Sclerolaena.*

4.1.5 Community Type 5

Community Type 5 is found on lower slopes, pediments and valley flats.

The community is described as a tall shrubland or open tall shrubland of *Acacia aneura* (often *A.* var. cf. *microcarpa* and occasionally *A.* var. cf. *tenuis*), often with a canopy of *A. pruinocarpa* over a typical mid-shrub stratum of *Eremophila forrestii, E. latrobei* subsp. *latrobei, Senna* spp., *Eremophila flabellata, Rhagodia eremaea, Sida ectogama*, and *Ptilotus obovatus,* usually over *P. schwartzii, Sida* sp. Excedentifolia and the perennial grass *Monachather paradoxa.*

4.1.6 Community Type 6

Community Type 6 is generally located midslope, associated with massive haematite-enriched outcrops, often with an underlying influence of mafic and ultramafic lithologies and dipping into a mesic shallow valley.

It can be summarized as consisting of *Acacia aneura* cf. var. *microcarpa* and occasionally *A. pruinocarpa* over *Eremophila latrobei* subsp. *latrobei, Dodonaea petiolaris, Eremophila flabellata, Sida* sp. Wiluna (Markey and Dillon 4126), and less frequently *Ptilotus rotundifolius, Eremophila jucunda* subsp. *jucunda, Harnieria kempeana* subsp. *muelleri.*

4.1.7 Summary

Markey and Dillon (2007, 2009) report that the hills around Joyner's Find are only 15-30m higher than the surrounding lower slopes and outwash plains; despite this low altitudinal separation, the floristic communities on rocky upland sites were shown to be significantly dissimilar to the lower slope and outwash communities. They continue to say that Community Type 6 was the exception, where these upland sites have characteristic upland taxa, and affinities to the lower slope communities; suggesting these three sites may have spanned the transition between upland communities (Types 1 and 2) and community Type 5.

In summarising other related reports, Markey and Dillon (2007, 2009) state that: "surveys in the wider Midwest region are finding that ranges which can be less than 100km apart will harbour

fundamentally different floristic communities. This turnover of communities among ranges is associated, in part, with range-specific geology, a climatic gradient and the Quaternary history of each individual range."

Direct comparisons with the nearest greenstone belts to the Herbert Lukin Ridge are somewhat limited due to a lack of survey on some of these other ranges. The base findings of Dillon and Markey (2007) included:

- Booylgoo Range - has been adequately surveyed (125km south) and does not appear to share any floristic communities with the Herbert Lukin Ridge (however it is worth noting the BIF communities may share similar elements, although there are notable differences in common or significant indicator species).
- Montague Range – located 75km southeast of the Joyner's Find Hills, is associated with the northern half of the Gum Creek greenstone belt; while it has not been surveyed for floristic communities, it is believed that due to the differences in geology between the areas and their separation, they are unlikely to share similar communities, particularly in the upland communities.

4.2 Quadrat Based Data-sets

In June and July 2006, Jim's Seeds, Weeds & Trees (as contracted by GWR) undertook a detailed floristic survey of the three ranges across the Herbert Lukin Ridge and within the Wiluna West Project area. Following consultation with DEC, the survey was based on a series of permanently located quadrats following the "Recommended Survey Protocol for Flora Surveys of Banded Ironstone Ridges of the Yilgarn Craton" (as outlined in DEC, 2007).

A total of 92 20m x 20m quadrats (referred to as the GWR quadrats in this document) were installed on the three ridges (A, B and C) within the Wiluna West Project area[2]. The placement of quadrats was limited by restricting the quadrats to the hill/ridge formations with 31 quadrats located in the top third of the landform, 28 in the middle third and 22 located in the bottom third (and hence missing the drainage systems and plains between the ridges). Four vegetation groups were recorded as a result of the sampling:

- Community 1: Mulga low woodlands.

  Dominant species being *Acacia aneura.* The upper storey comprised *Acacia pruinocarpa* and *A. aneura;* mid-storey including *Acacia aneura, A. quadrimarginea, A. craspedocarpa, A. tetragonophylla, Eremophila latrobei* subsp. *latrobei, E. punctata, Psydrax attenuata, Senna glutinosa* subsp. *chatelainiana* and *Prostanthera althoferi*; and understorey comprised of *Eremophila flabellata, Eriachne pulchella, Aristida contorta, Maireana georgei,* and *Ptilotus schwartzii.*

  A wide spread community covering all three ranges and tending to be at all locations of the landform element but favouring the lower third. 68 quadrats.

- Community 2: Hummock grassland (Mulga and *Eucalyptus kingsmillii* over hard spinifex).

  Dominant species being *Eucalyptus kingsmillii, Triodia melvillei* and *Acacia rhodophloia.* The upper storey comprised *Eucalyptus kingsmillii, Acacia pruinocarpa, A. aneura* and *A. rhodophloia;* mid-storey including *Eremophila latrobei* subsp. *latrobei, E. punctata, E. forrestii, Senna glutinosa* subsp. *chatelainiana* and *Stenanthemum petraeum*; and understorey comprised of *Ptilotus schwartzii, Goodenia macroplectra, Eremophila flabellata, Eriachne pulchella,* and *Eragrostis eriopoda.* 15 quadrats.

  Wide spread, occurs across all three ranges favouring the top third of the landform.

- Community 3: *Aluta maisonneuvei* subsp. *auriculata* shrubland.

  Dominant species being *Aluta maisonneuvei* subsp. *auriculata.* The upper storey comprised *Acacia aneura;* mid-storey including *Aluta maisonneuvei* subsp. *auriculata, Eremophila punctata, E. latrobei* subsp. *latrobei;* and understorey comprised of *Eriachne pulchella* and *Triodia melvillei.*

  Wide spread, appears to be restricted to C Ridge and tends to favour the top third of the landform element. 6 quadrats.

[2] as summarised from Jim's Seeds, Weeds and Trees (2006).

- Community 4: Mulga with *Acacia burkittii* shrubland.

  Dominant species being *Acacia burkittii* and *A. ?cuthbertsonii* subsp. *cuthbertsonii.* The upper storey comprised *Acacia aneura, Acacia burkittii* and *A. ?cuthbertsonii* subsp. *cuthbertsonii;* mid-storey including *Scaevola spinescens, Eremophila scoparia,* and *Ptilotus obovatus*; and understorey comprised of *Eriachne pulchella, Maireana georgei* and *Sclerolaena eriacantha.*

  As only three quadrats were placed in this community, no assumptions were undertaken as to the preference of location within the survey area.

Where Community 1 appears to include Markey and Dillon's Community Types 1, 5 and 6; Community 2 and 3 correlates with Markey and Dillon's Community Type 2; and Community 4 with Markey and Dillon's Community Type 3. Markey and Dillon's Community Type 4 was not identified in this survey, but was sampled with the results placing it in Community 1.

4.2.1 Summary

A species list summarising all botanical work undertaken to date for GWR (by consultants Botanica, and Jim's Seeds, Weeds & Trees) and DEC within the Wiluna West Project area is listed in Appendix II.

Both quadrat based surveys were undertaken in 2006:

- GWR quadrats were installed in July;
- DEC quadrats in August.

Botanica Consulting installed 92 quadrats across the Herbert Lukin Ridge area and within the Wiluna West Project area; 23 of these GWR quadrats were used in the DEC survey (Appendix III); resulting in a total of 119 quadrats installed across the Herbert Lukin Ridge area (Figure 2).

Following the completion of the current regional vegetation mapping, a newly proposed PEC boundary has been outlined as per the vegetation communities defined by Markey & Dillon (2007) and Section 6 of this document, and the mapped surface geology of the area, as shown in Figure 2.

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N

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MGA94 (Zone 50)

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7060000mN 7055000mN 7050000mN 7045000mN 7040000mN 7035000mN 7030000mN 7025000mN 7020000mN 7015000mN

DEC PEC Buffer

GOLDFIELDS HIGHWAY

Tentative Boundary for the Wiluna West PEC (P1).

Tentative PEC Boundary
(not yet ground truthed)

Proposed PEC Boundary

Tentative PEC Boundary
(not yet ground truthed)

SANDSTONE WILUNA ROAD

Iron Duke

Joyners Find

Wiluna West Camp

Tentative PEC Boundary
(not yet ground truthed)

SANDSTONE WILUNA ROAD

LIMIT OF SURVEY

LIMIT OF SURVEY

D5 - D7
G84 - G86
D4
G81 - G83
G78 - G80
D1 - D3
G30
G29
D8
D9
D49
G26 - G28
G75 - G77
D11
D10
D26
D25
G72 - G74
G23 - G25
G21 - G33
G20 - G22
D17
G69 - G71
D16
D19
D18
D20
D15
D13
D14
D12
G66 - G68
G35
G17 - G19
G34
G63 - G65
G14 - G16
G36 - G38
D24
D23
G39 - G41
D21
G11 - G13
D22
G60 - G62
D27 - D29
G57 - G59
D48
G42 - G44
G8 - G10
D31
G87 - G89
D30
D35
D36
G5 - G7
D41
G90 - G92
G54 - G56
D50
D46
D33
D32
D34
G2 - G4
G51 - G53
D37 - D39
D45
D40
G1
D47
G48 - 50
D42
G46
G45
G47
D43
D44

Herbert Lukin Ridge: Wiluna West Priority Ecological Community (P1)

Floristic Groups (Markey & Dylon, 2007)

Type 1 Found on crests and steeper upper slopes; described as a sparse open tall shrubland of *Acacia aneura*,with *Grevillea berryana* over mid storey shrub stratum of *Eremophila latrobei* subsp. *latrobei*, *Prostanthera campbellii*, (occasionally *Dodonaea petiolaris* and *Baeckea* sp. Melita Station, *Eremophila punctata*, and *E. flabellata*), over *Ptilotus obovatus*, *Sida chrysocalyx* (= *Sida* sp. Golden calyces glabrous), *S. excedentifolia* (= *Sida* sp. Excedentifolia), *Ptilotus schwartzii*, *Cheilanthes brownii*, and perennial grasses *Eriachne helmsii*, *E. mucronata*, and *Monachather paradoxus*.

Type 2 This community is located on flat summit surfaces on ridge tops, and on the undulating pediments and valley floors off the main ridges; encompassing mosaics of *Acacia* over *Triodia* grasslands or low myrtaceous-*Eremophila* shrublands, with isolated mallees of *Eucalyptus kingsmillii* subsp. *kingsmillii*.

Type 3 Is usually found on pediments, lower slopes and slightly low outcrops of weathered BIF and other metasediments, quartz and ultramafic lithologies, usually obscured by colluvium. This community consists of *Acacia aneura*, and less frequently, *Acacia balsamea* (P4) and *A. cuthbertsonii* subsp. *cuthbertsonii* tall open shrublands over *Scaevola spinescens*, *Senna artemisioides* subsp. *helmsii*, *Eremophila flabellata*, above sparse low shrubs *Maireana convexa*, *M. georgei*, *Ptilotus obovatus*, and less frequently *Eremophila jucunda* subsp. *jucunda* and *Sida* sp. unisexual.

Type 4 Consists of a tall open shrubland of *Acacia aneura* and *A. tetragonophylla*, occasionally with isolated emergent trees of *Acacia pruinocarpa*, over a mosaic of shrubland and chenopods. The shrubland is dominated by *Sida* sp. unisexual (= *Sida ectogama*), *Rhagodia eremaea*, *Eremophila flabellata*, *E. galeata*, and *Ptilotus obovatus*, which then grades into more open low chenopod shrubland and succulent geophytes dominated by *Halosarcia*, *Maireana*, and *Sclerolaena*.

Type 5 Is found on lower slopes, pediments and valley flats. The community is described as a tall shrubland or open tall shrubland of *Acacia aneura*, often with a canopy of *A. pruinocarpa* over a typical mid-shrub stratum of *Eremophila forrestii*, *E. latrobei*, *Senna* spp., *Eremophila flabellata*, *Rhagodia eremaea*, *Sida* sp. unisexual (= *Sida ectogama*), and *Ptilotus obovatus*, usually over *P. schwartzii*, *Sida excedentifolia* (= *Sida* sp. *Excedentifolia*) and perennial grass *Monachather paradoxa*.

Type 6 Is generally located midslope, associated with massive haematite-enriched outcrops. It can be summarized as consisting of *Acacia aneura* cf. var. *microcarpa* and occasionally *A. pruinocarpa* over *Eremophila latrobei* subsp. *latrobei*, *Dodonaea petiolaris*, *Eremophila flabellata*, *Sida* sp. Wiluna (Markey and Dillon 4126), and less frequently *Ptilotus rotundifolius*, *Eremophila jucunda* subsp. *jucunda*, *Harnieria kempeana* subsp. *muelleri*.

Unplaced

Markey, A.S. and Dillon S.J. (2007). Draft: *Flora and vegetation of the Banded Iron Formation of the Yilgarn Craton: Joyners Find Hills*. Science Division, DEC, Wanneroo.

D1 - D50 DEC Quadrat Locations

G01 - G92 GWR Quadrat Locations

Golden West RESOURCES LIMITED

Wiluna West Project
Figure 2
PRIORITY ECOLOGICAL COMMUNITY: THE WILUNA WEST SYSTEM (P1)

RECON ENVIRONMENTAL
PO Box 1364 Mobile: 040 9292 845
KALAMUNDA WA 6926 Ph/Fax: (08) 9291 3034

Author: T. Read	Recon Ref: GWR01	Scale: 1:70,000
Drawn: CAD Resources ~ www.cadresources.com.au Tel: (08) 9246 3242 ~ Fax: (08) 9246 3202		Figure: 2
CAD Ref: g1735_F02.dgn	Date: Feb 2010	Rev: B A1

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5. FLORA

A total of 279 native taxa from 120 genera and 41 families have been recorded in the survey area. Families of native species with greatest representation included Fabaceae (45 taxa), Poaceae (23 taxa), Chenopodiaceae (19 taxa), Scrophulariaceae (17 taxa), and Malvaceae (15 taxa).

The most common genera were *Acacia* (23), *Eremophila* (17), *Senna* (14), *Maireana* (11), and *Ptilotus* (10).

No plant taxa located in the survey area are gazetted as Declared Rare Flora pursuant to subsection 2 of section 23F of the Wildlife Conservation Act (1950). No plant taxa listed as Threatened pursuant to Schedule 1 of the EPBC Act (1999) were located in the survey area.

5.1 Introduced Taxa (Weeds)

Six introduced weed species were identified in the survey area:

- Portulacaceae: *Portulaca oleracea** (pigweed, purslane) a prostrate succulent annual, occurring over much of Western Australia, often occurring in disturbed sites (Hussey *et al.,* 1997; WAHERB, 2010). Located in the DRAS habitat during the current survey.
- Zygophyllaceae: *Tribulus terrestris** (caltrop) a prostrate annual with yellow flowers less than 1cm across, and very spiny fruits; widespread across Western Australia (Hussey *et al.,* 1997; WAHERB, 2010). One record of this species in the SAES habitat.
- Primulaceae: *Anagallis arvensis* var. *caerulea** (blue pimpernel) a hairless spreading annual with blue flowers; naturalised across much of Western Australia (Hussey *et al.,* 1997; WAHERB, 2010). Recorded in the SAES habitat.
- Convolvulaceae: *Cuscuta epithymum** (lesser dodder) a parasitic twinning annual herb or climber; not uncommon in the southern areas of Western Australia (Hussey *et al.,* 1997; WAHERB, 2010). Recorded by Botanica in earlier surveys of the Joyner's Find area.
- Cucurbitaceae: *Citrullus lanatus** (afghan melon, pie melon) a summer growing annual with long leafy trailing stems, bright yellow flowers producing a spherical fruit up to 15cm across usually with mottled green stripes, becoming yellow with age; naturalised across much of Western Australia (Hussey *et al.,* 1997; WAHERB, 2010). One record of this species on the current survey adjacent a main access track near an abandoned water point.
- Asteraceae: *Bidens bipinnata** (beggar's tick) an erect annual herb commonly found in areas associated drainage; naturalised across much of northern Western Australia (Hussey *et al.,* 1997; WAHERB, 2010). Located in drainage lines and floodplains in the current survey area; extensively occurring in parts of the HPMD habitat and often found in the DRAS habitat.

No Declared Plants pursuant to Section 37 of the *Agriculture and Related Resources Protection Act, 197*6, as listed by the Department of Agriculture and Food (2009) were observed within the survey area.

5.2 Priority Flora

Eighteen Priority Flora were identified from the DEC database search for the Herbert Lukin Ridge & Surrounds region as potentially occurring within the survey area (Appendix V). Fourteen Priority Flora have been located in the current Herbert Lukin Ridge & Surrounds survey area as detailed in Table 5 and shown on Figure 3. All location details of any priority flora encountered on this survey or in the area to date by GWR are detailed in Appendix VI.

All priority species identified on this survey have been previously recorded in areas outside of the project area (WAHERB, 2010).

TABLE 5 PRIORITY FLORA KNOWN IN THE HERBERT LUKIN RIDGE & SURROUNDS SURVEY AREA

Priority Flora	DEC Conservation Code	IBRA Regions
Beyeria lapidicola	P1	Eremaean province: Murchison Botanical District
Eremophila congesta	P1	Eremaean province: Murchison Botanical District
Eremophila ?anomala	P1	Eremaean province: Murchison Botanical District
Ptilotus chrysocomus	P1	Eremaean province: Gascoyne & Murchison Botanical Districts
Calytrix uncinata	P3	Eremaean province: Murchison & Yalgoo Botanical Districts
Eremophila arachnoides subsp. *arachnoides*	P3	Eremaean province: Little Sandy Desert & Murchison Botanical District
Homalocalyx echinulatus	P3	Eremaean province: Gascoyne & Murchison Botanical Districts
Maireana prosthecochaeta	P3	Eremaean province: Gascoyne & Murchison Botanical Districts; Northern province: Central Kimberley
Olearia mucronata	P3	Eremaean province: Murchison & Pilbara Botanical Districts
Prostanthera ferricola	P3	Eremaean province: Gascoyne & Murchison Botanical Districts
Ptilotus luteous	P3	Eremaean province: Gascoyne & Murchison Botanical Districts
Tribulus adelacanthus	P3	Eremaean province: Gascoyne & Murchison Botanical Districts
Sauropus ramosissimus	P3	Eremaean province: Gascoyne, Gibson Desert, Great Victoria Desert, and Murchison Botanical Districts
Baeckea sp. Melita Station (H. Pringle 2738)	P4	Eremaean province: Gascoyne & Murchison Botanical Districts

5.2.1 *Beyeria lapidicola* (P1).

Only five collections from three locations are known of *Beyeria lapidicola*: Weld Range (220km west of Joyner's Find); Bulga Downs Station (220km southeast of Joyner's Find); and the Joyner's Find population located by Markey and Dillon (2007). All three populations occur on crests, hill slopes and steep escarpments of outcropping banded iron formation as stated by Markey and Dillon (2007).

Beyeria lapidicola is only known from one location in the Herbert Lukin Ridge on the eastern side of C Ridge in the SIMS-B and SIME habitats (Plate 3).

Plate 1 *Beyeria lapidicola* (P1): shrub and leaf.

5.2.2 Eremophila congesta (P1)

Eremophila congesta is only known from the Wiluna region where it occurs on lateritic outcrops and hilly areas in Acacia shrubland (Chinnock, 2007).

It is a densely branched upright shrub to 1.3m tall; blue flowers from August to September; occurring on lateritic outcrops in greenstone hills, and on stony quartzite slopes (WAHERB, 2009).

In the Herbert Lukin Ridge & Surroundsarea it was found in dense colonies on the hills to the north east of the main ridges where it is the dominant species in the lower and mid stratas (habitats SAEC and SMEC; Plate 1). While this species has also been recorded in the SIMS-B, SIMS-C and SUAE habitats, it does not occur in large numbers in these communities.

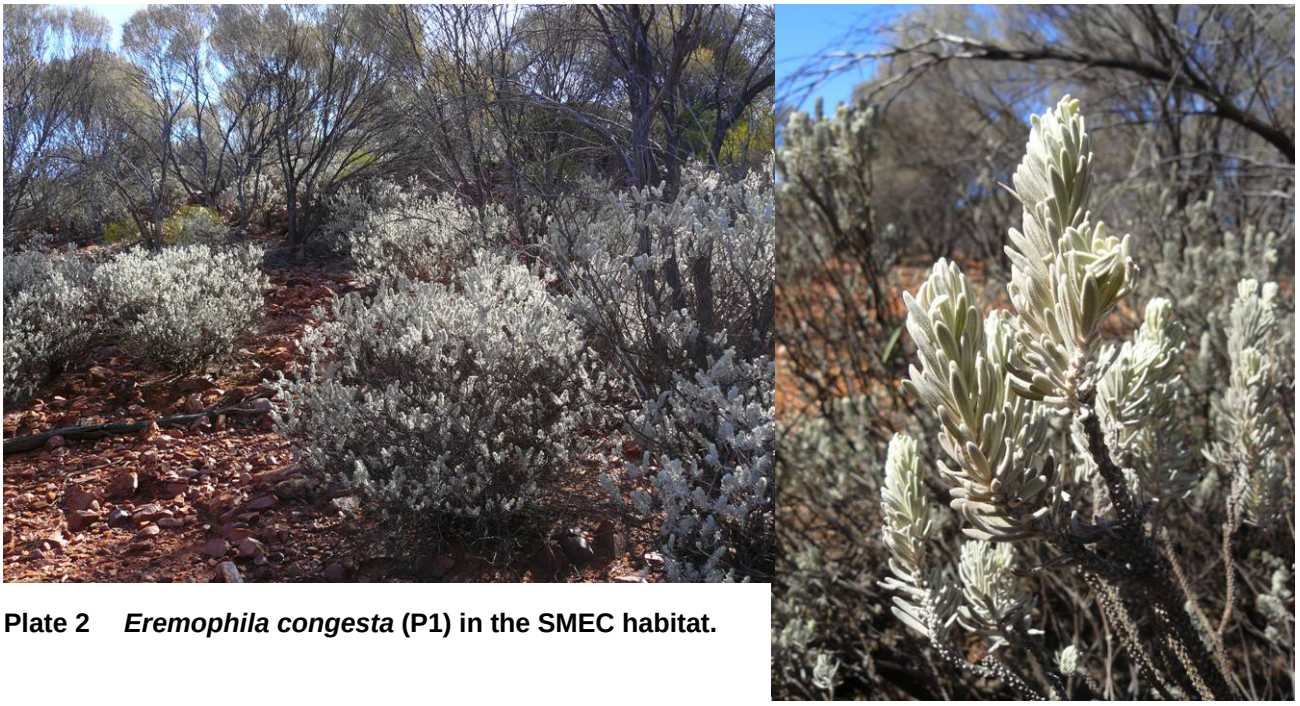

Plate 2 *Eremophila congesta* (P1) in the SMEC habitat.

5.2.3 Eremophila anomala (P1)

Eremophila anomala is only previously known from a small area north east of Paroo homestead, where it is abundant on stony red-brown clay loams in open mulga woodland (Chinnock, 2007).

It is a low spreading shrub to 0.2-0.4m tall; with cream/white flowers from August to September; occurring on basalt outcrop (WAHERB, 2010; Chinnock, 2007).

The collections from the current survey have only been tentatively identified, and require flowering specimens for this identification to be confirmed.

5.2.4 Ptilotus chrysocomus (P1)

Ptilotus chrysocomus is only recorded in two locations on Florabase: the first from Blue Hill Station south of the Carnarvon Range where it was observed on the plain below the bases of breakaways, growing in open Acacia shrubland (Davis, 2004); the second collection was by Jim's Seeds, Weeds & Trees (2005) in the Wiluna West Project area where it was also collected at the base of a rocky breakaway.

Ptilotus chrysocomus is a perennial compact woody shrub to 1m high (Plate 2); flower spikes are sometimes solitary, yellow to straw coloured, pink tinged in early bud. It is known to occur on brown sandy clays at the bases of breakaways and on rocky scree slopes.

In the Joyner's Find area this species was not uncommon in the habitats related to the footslopes associated with rocky breakaways.

Plate 3 *Ptilotus chrysocomus* (P1) in the ASXI habitat.

5.2.5 *Calytrix uncinata* (P3)

Calytrix uncinata (P3) was collected within the OALS habitat, and while it tended to occur in low numbers, it was not considered to be uncommon with this vegetation type.

Calytrix uncinata is a shrub from 0.3m to 1m high with white flowers from August to November (Plates 4-5). It is known to occur on a varying range of substrates from white or red sand, sandy clay, and has been recorded on granite or sandstone breakaways, and rocky rises (WAHERB, 2009).

In the Herbert Lukin Ridge & Surroundsit was commonly located in the OALS habitat; and was also recorded in the OALS-S, BCLS, and BRXS habitats.

Plate 4 *Calytrix uncinata* (P3) leaf form and flower.

Plate 5 *Calytrix uncinata* (P3) in the OALS habitat.

5.2.6 *Eremophila arachnoides* subsp. *arachnoides* (P3)

Eremophila arachnoides subsp. *arachnoides* is an erect broom-like shrub 2 - 3.5m tall (Plate 6); it has white, blue and/or purple flowers (Chinnock, 2007).

It is restricted to the Austin Botanical District and is known from near Yarrabubba and on Yeelirrie Station. Chinnock (2007) states in the Yarrabubba area it dominates open areas on powdery grey loams (calcrete) in very open mulga woodland.

This species was identified in the Wiluna West Project area by Keith Lindbeck & Associates and requires further survey to determine how widespread it may be within the Project area.

Plate 6 *Eremophila arachnoides* subsp. *arachnoides* (P3) with *Acacia burkittii*.

5.2.7 Homalocalyx echinulatus (P3)

Homalocalyx echinulatus is a low shrub from 0.45-1m high with pink flowers from June to September (Plate 7). It is known to occur on laterite, breakaways, and sandstone hills.

This species tended to be found within the LOMS habitat and usually formed the dominant species in the small areas in which it occurred. Population numbers ranged from less than 10 in any particular location to 500+.

Plate 7 *Homalocalyx echinulatus* (P3) leaf and flower; the dominant species in this LOMS habitat.

5.2.8 Maireana prosthecochaeta (P3)

Maireana prosthecochaeta is a low open densely-leaved shrub 0.3-0.6m high (Plate 8). It is known to occur on laterite, on hills, and on saline soils. It was only found on footslopes associated with breakaways in the BCLS habitat.

Plate 8 *Maireana prosthecochaeta* (P3) in the BCLS habitat.

5.2.9 Olearia mucronata (P3)

Olearia mucronata (Plate 9) is a densely branched, aromatic shrub growing 0.6-1m high; with white or yellow flowers from August to January. It is known to occur along shallow drainage channels.

In the Joyner's Find area it was only observed in low numbers in three locations (DRAS, SIMS-M and BRXS habitats).

Plate 9 *Olearia mucronata* (P3) in the BRXS habitat.

5.2.10 Prostanthera ferricola (P3)

Prostanthera ferricola is an erect, open branched shrub, with purple flowers from July to September (Plates 10-11); it tends to be scattered infrequently in sparse *Acacia aneura* shrubland on gently inclined mid and upper slopes and crests of banded ironstone and basalt, in shallow red-brown skeletal sandy loam soils, occasionally found in gullies or on quartz (Conn & Shepherd, 2007).

Conn and Shepherd (2007) state this species may be vulnerable to impact from future mining activities as there are only six known populations which are restricted to ironstone outcrops and lateritic hills.

In the Herbert Lukin Ridge & Surrounds*Prostanthera ferricola* was only recorded on C Ridge (in the ASET, LOMS, SIMS-C and OALS habitats).

Plate 10 *Prostanthera ferricola* (P3) in the ASET habitat.

Plate 11 *Prostanthera ferricola* (P3) –older plant.

5.2.11 Ptilotus luteous (P3)

Ptilotus luteolus is a low compact perennial shrub 0.3-0.4m high, leaves are obovate, grey; flower spikes are yellow, with flowering occurring from March to October. It is known to occur in red sandy soils on stony hills and screes (WAHERB, 2010).

This species was only collected during the 2006 DEC survey (Markey & Dillon, 2007; 2009), despite extensive searching it was not relocated during the current survey.

5.2.12 Tribulus adelacanthus (P3)

Tribulus adelacanthus is a prostrate herb growing to between 10-14mm in height; it has 3-6 leaflet pairs and 5 winged fruits lacking any spines (WAHERB, 2010).

This species was only collected during the 2006 DEC survey (Markey & Dillon, 2007; 2009); and was just added to the Priority Flora lists in October, 2009.

5.2.13 Sauropus ramosissimus (P3)

Sauropus ramosissimus is a slender, much branched shrub, growing to 30cm.

Only one collection was made of this species during the current survey. It is associated with small breakaways within the survey area in the BRXS habitat.

5.2.14 Baeckea sp. Melita Station (P4)

Baeckea sp. Melita Station is an upright shrub that grows to 2.5m tall (Plate 12). It has a distinctive hooked leaf, and occurs on dark red rocky soil over ironstone.

While the larger populations of this species occurred on the main ridges usually associated with banded ironstone formation (SIMS-B); it was also located on numerous other hills and associated with breakaways within the survey area (SIMS-C, OALS, OALS-S, SIMS-C, and BRXS).

Plate 12 *Baeckea* sp. Melita Station (P4) in the SIMS-B habitat.

5.2.15 Other species of significance

- *Sida* sp. Wiluna (Markey & Dillon 4126)

Markey and Dillon (2007) collected a morphologically distinct *Sida* sp. (A. Markey & S. Dillon 4126) during their survey of Herbert Lukin Ridge. In their report they state a search of collections at the Western Australian Herbarium (WAHERB) found a match with two other collections which similarly could not be identified to species level (*Sida* sp. (D.J. Edinger 5375) from Doolgunna Station, 143km NNE Meekatharra; and *Sida* sp. (A.A. Mitchell 4149) from Nemesis Gold Mine near Cue).

Addition collections of this potentially new species from the survey area have been confirmed by Steven Dillon from the WAHERB as the Sida species of interest (June, 2009). Unfortunately there is insufficient material available to enable confirmation of this species identification. Further collections of the *Sida* sp. are required with mature fruit to confirm its potential status as a new species and possibly a Priority Taxon.

The *Sida* sp. Wiluna (Markey & Dillon 4126) was originally collected in the Wiluna West Project area on crests, hill slopes and steep escarpments of outcropping banded iron formation (habitats SIMS-B and SIMS-M; Plates 13-14); further collections during the current survey have seen the distribution in the area expanded off the main ridges and also now identified as occurring in the OALS, AXSI, BRXS, and infrequently in the SIMS-C and LOMS habitats.

Plate 13 *Sida* sp. Wiluna (Markey & Dillon 4126) – low shrub and leaf form.

Plate 14 *Sida* sp. Wiluna (Markey & Dillon 4126) – flower bud and flower.

- *Hibiscus* sp. JFH179-TJR

This *Hibiscus* specimen (collected in a burnt area of sandplain in the SAMA habitat) is possibly of interest as it is unlike other described *Hibiscus* species in the WA Herbarium collection. It is not possible to give any further information as to the significance of this specimen at this time due to taxonomic work currently underway on the revision of this genus, however it does resemble other collections currently included in the ongoing revision.

- *Schoenus variicellae*

Schoenus variicellae is an annual grass-like sedge, growing to 16cm. It is usually found in winter-set depressions or other damp locations (WAHERB, 2010). This collection from the DRAS habitat represents a significant range extension, approximately 200km to the east of its previously known distribution.

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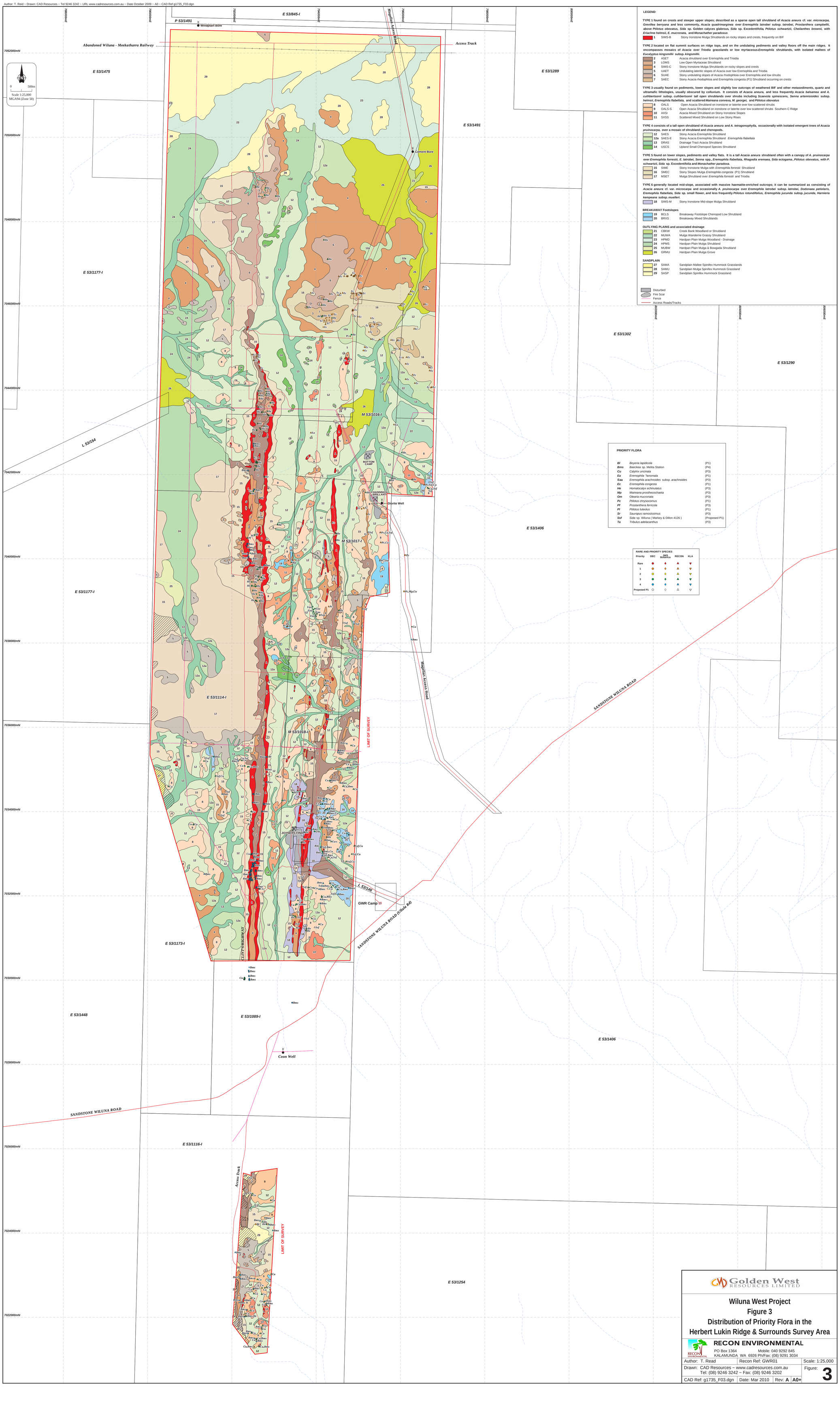
Author: T. Reid ~ Drawn: CAD Resources ~ Tel 9246 3242 ~ URL www.cadresources.com.au ~ Date October 2009 ~ A0 ~ CAD Ref g1735_F03.dgn



LEGEND:

TYPE 1 found on crests and steeper upper slopes; described as a sparse open tall shrubland of *Acacia aneura* cf. var. *microcarpa, Grevillea berryana* and less commonly, *Acacia quadrimarginea* over *Eremophila latrobei* subsp. *latrobei, Prostanthera campbellii,* above *Ptilotus obovatus, Sida* sp. Golden calyces glabrous, *Sida* sp. Excedentifolia, *Ptilotus schwartzii, Cheilanthes brownii,* with *Eriachne helmsii, E. mucronata,* and *Monachather paradoxus*

1	SIMS-B	Stony Ironstone Mulga Shrublands on rocky slopes and crests, frequently on BIF

TYPE 2 located on flat summit surfaces on ridge tops, and on the undulating pediments and valley floors off the main ridges. It encompasses mosaics of *Acacia* over *Triodia* grasslands or low myrtaceous-*Eremophila* shrublands, with isolated mallees of *Eucalyptus kingsmillii* subsp. *kingsmillii*.

2	ASET	Acacia shrubland over Eremophila and Triodia
3	LOMS	Low Open Myrtaceae Shrubland
4	SIMS-C	Stony Ironstone Mulga Shrublands on rocky slopes and crests
5	UAET	Undulating lateritic slopes of Acacia over low Eremophila and Triodia
6	SUAE	Stony undulating slopes of Acacia rhodophloia over Eremophila and low shrubs
7	SAEC	Stony Acacia rhodophloia and Eremophila congesta (P1) Shrubland occurring on crests

TYPE 3 usually found on pediments, lower slopes and slightly low outcrops of weathered BIF and other metasediments, quartz and ultramafic lithologies, usually obscured by colluvium. It consists of *Acacia aneura,* and less frequently *Acacia balsamea* and *A. cuthbertsonii* subsp. *cuthbertsonii* tall open shrublands over shrubs including *Scaevola spinescens, Senna artemisioides* subsp. *helmsii, Eremophila flabellata,* and scattered *Maireana convexa, M. georgei,* and *Ptilotus obovatus*

8	OALS	Open Acacia Shrubland on ironstone or laterite over low scattered shrubs
9	OALS-S	Open Acacia Shrubland on ironstone or laterite over low scattered shrubs Southern C Ridge
10	AXSI	Acacia Mixed Shrubland on Stony Ironstone Slopes
11	SXSS	Scattered Mixed Shrubland on Low Stony Rises

TYPE 4 consists of a tall open shrubland of *Acacia aneura* and *A. tetragonophylla,* occasionally with isolated emergent trees of *Acacia pruinocarpa,* over a mosaic of shrubland and chenopods.

12	SAES	Stony Acacia Eremophila Shrubland
12a	SAES-E	Stony Acacia Eremophila Shrubland *Eremophila flabellata*
13	DRAS	Drainage Tract Acacia Shrubland
14	USCS	Upland Small Chenopod Species Shrubland

TYPE 5 found on lower slopes, pediments and valley flats. It is a tall *Acacia aneura* shrubland often with a canopy of *A. pruinocarpa* over *Eremophila forrestii, E. latrobei, Senna* spp., *Eremophila flabellata, Rhagodia eremaea, Sida ectogama*, *Ptilotus obovatus,* with *P. schwartzii, Sida* sp. Excedentifolia and *Monachather paradoxa.*

15	SIME	Stony Ironstone Mulga with *Eremophila forrestii* Shrubland
16	SMEC	Stony Slopes Mulga *Eremophila congesta* (P1) Shrubland
17	MSET	Mulga Shrubland over *Eremophila forrestii* and Triodia

TYPE 6 generally located mid-slope, associated with massive haematite-enriched outcrops; it can be summarized as consisting of *Acacia aneura* cf. var. *microcarpa* and occasionally *A. pruinocarpa* over *Eremophila latrobei* subsp. *latrobei, Dodonaea petiolaris, Eremophila flabellata, Sida* sp. small flower, and less frequently *Ptilotus rotundifolius, Eremophila jucunda* subsp. *jucunda, Harnieria kempeana* subsp. *muelleri.*

18	SIMS-M	Stony Ironstone Mid-slope Mulga Shrubland

BREAKAWAY Footslopes

19	BCLS	Breakaway Footslope Chenopod Low Shrubland
20	BRXS	Breakaway Mixed Shrublands

OUTLYING PLAINS and associated drainage

21	CBKW	Creek Bank Woodland or Shrubland
22	MUWA	Mulga Wanderrie Grassy Shrubland
23	HPMD	Hardpan Plain Mulga Woodland - Drainage
24	HPMS	Hardpan Plain Mulga Shrubland
25	MUBW	Hardpan Plain Mulga & Bowgada Shrubland
26	GRMU	Hardpan Plain Mulga Grove

SANDPLAIN

27	SAMA	Sandplain Mallee Spinifex Hummock Grasslands
28	SAMU	Sandplain Mulga Spinifex Hummock Grassland
29	SASP	Sandplain Spinifex Hummock Grassland

Disturbed
Fire Scar
Fence
Access Roads/Tracks

PRIORITY FLORA

Bl	*Beyeria lapidicola*	(P1)
Bms	*Baeckea* sp. Melita Station	(P4)
Cu	*Calytrix uncinata*	(P3)
Ea	*Eremophila ?anomala*	(P1)
Eaa	*Eremophila arachnoides subsp. arachnoides*	(P3)
Ec	*Eremophila congesta*	(P1)
He	*Homalocalyx echinulatus*	(P3)
Mp	*Maireana prosthecochaeta*	(P3)
Om	*Olearia mucronata*	(P3)
Pc	*Ptilotus chrysocomus*	(P1)
Pf	*Prostanthera ferricola*	(P3)
Pl	*Ptilotus luteolus*	(P1)
Sr	*Sauropus ramosissimus*	(P3)
Ssf	*Sida* sp. Wiluna (Markey & Dillon 4126)	(Proposed P1)
Ta	*Tribulus adelacanthus*	(P3)

RARE AND PRIORITY SPECIES

Priority	DEC	JWS Botanica	RECON	KLA
Rare	●	♦	▲	▼
1	●	♦	▲	▼
2	●	♦	▲	▼
3	●	♦	▲	▼
4	●	♦	▲	▼
Proposed P1	○	◇	△	▽

Golden West RESOURCES LIMITED

Wiluna West Project
Figure 3
Distribution of Priority Flora in the Herbert Lukin Ridge & Surrounds Survey Area

RECON ENVIRONMENTAL
PO Box 1364 Mobile: 040 9292 845
KALAMUNDA WA 6926 Ph/Fax: (08) 9291 3034

Author: T. Read	Recon Ref: GWR01	Scale: 1:25,000
Drawn: CAD Resources ~ www.cadresources.com.au Tel: (08) 9246 3242 ~ Fax: (08) 9246 3202		Figure: 3
CAD Ref: g1735_F03.dgn	Date: Mar 2010	Rev: A A0+

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6. VEGETATION COMMUNITIES - DESCRIPTIONS

Twenty-nine vegetation communities were identified within the survey area (Figure 4). These communities reflect underlying geology, landforms and soils.

Where the vegetation communities correlate with the Wiluna West PEC they can generally be grouped into six main types following Markey and Dillon's (2007) descriptions of the communities of the Joyner's Find Hills. The remaining vegetation communities or habitats tend to be found downslope from the hills and ridges on the surrounding plains.

The vegetation communities associated with main vegetation types as per Markey and Dillon (2007) can be grouped as follows:

- TYPE 1 found on crests and steeper upper slopes; described as a sparse open tall shrubland of *Acacia aneura* cf. var. *microcarpa, Grevillea berryana* and less commonly, *Acacia quadrimarginea* over *Eremophila latrobei* subsp. *latrobei, Prostanthera campbellii,* above *Ptilotus obovatus, Sida* sp. Golden calyces glabrous*, Sida* sp. Excedentifolia*, Ptilotus schwartzii, Cheilanthes brownii,* with *Eriachne helmsii, E. mucronata,* and *Monachather paradoxus*. SIMS-B
- TYPE 2 located on flat summit surfaces on ridge tops, and on the undulating pediments and valley floors off the main ridges. It encompasses mosaics of *Acacia* over *Triodia* grasslands or low myrtaceous-*Eremophila* shrublands, with isolated mallees of *Eucalyptus kingsmillii* subsp. *kingsmillii.* ASET, LOMS, SIMS-C, UAET, SUAE, SAEC
- TYPE 3 usually found on pediments, lower slopes and slightly low outcrops of weathered BIF and other metasediments, quartz and ultramafic lithologies, usually obscured by colluvium. It consists of *Acacia aneura,* and less frequently *Acacia balsamea* and *A. cuthbertsonii* subsp. *cuthbertsonii* tall open shrublands over shrubs including *Scaevola spinescens, Senna artemisioides* subsp. *helmsii, Eremophila flabellata,* and scattered *Maireana convexa, M. georgei,* and *Ptilotus obovatus*. OALS, OALS-S, AXSI, SXSS
- TYPE 4 consists of a tall open shrubland of *Acacia aneura* and *A. tetragonophylla,* occasionally with isolated emergent trees of *Acacia pruinocarpa,* over a mosaic of shrubland and chenopods. SAES, DRAS, USCS
- TYPE 5 found on lower slopes, pediments and valley flats. It is a tall *Acacia aneura* shrubland often with a canopy of *A. pruinocarpa* over *Eremophila forrestii, E. latrobei, Senna* spp., *Eremophila flabellata, Rhagodia eremaea, Sida ectogama*, *Ptilotus obovatus,* with *P. schwartzii, Sida* sp. Excedentifolia and *Monachather paradoxa*. SIME, SMEC, MSET
- TYPE 6 generally located mid-slope, associated with massive haematite-enriched outcrops; it can be summarized as consisting of *Acacia aneura* cf. var. *microcarpa* and occasionally *A. pruinocarpa* over *Eremophila latrobei* subsp. *latrobei, Dodonaea petiolaris, Eremophila flabellata, Sida* sp. Wiluna, and less frequently *Ptilotus rotundifolius, Eremophila jucunda* subsp. *jucunda, Harnieria kempeana* subsp. *muelleri*. SIMS-M

Species lists for each of the vegetation communities are located in Appendix VII.

No Threatened Ecological Communities (TEC's) as defined by the EPBC Act (1999) or the Department of Environment and Conservation (2009a; 2009b) were observed in the survey area.

6.1 *Stony Ironstone Mulga Shrublands on rocky slopes and crests, frequently on BIF* (SIMS-B)

6.1.1 Description

SIMS-B can be described as an *Acacia aneura* var. *microcarpa* shrubland with *Grevillea berryana* occurring on rocky outcrops usually on banded iron formation (BIF) above *Prostanthera campbellii, Eremophila latrobei* subsp. *latrobei, E. punctata,* over scattered *Ptilotus schwartzii* and *Cheilanthes brownii* (Plate 15).

Plate 15 SIMS-B Stony ironstone mulga shrubland, frequently on BIF.

6.1.2 Structure

TREES (0-3% PFC)	Others:	*Acacia pruinocarpa*
MALLEES (0-1% PFC)	Others:	*Eucalyptus kingsmillii* subsp. *kingsmillii*
TALL SHRUBS (6-24% PFC)	Dominants:	*Acacia aneura* var. *microcarpa*
	Others:	*Grevillea berryana, Acacia quadrimarginea*
MID SHRUBS (1-16% PFC)	Dominants:	*Prostanthera campbellii, Eremophila latrobei* subsp. *latrobei, E. punctata*
	Others:	*Stenanthemum petraeum, Dodonaea petiolaris*
LOW SHRUBS (0-11% PFC)	Dominants:	*Ptilotus schwartzii, P. obovatus*
	Others:	*Eremophila flabellata, Cheilanthes brownii*
GRASSES (<1% PFC)	Others:	*Eriachne helmsii, E. mucronata, Monachather paradoxus*

6.1.3 Gradational Associations

SIMS-B was in Pristine to Excellent condition at all sites reviewed. It tended to occur only on crests of the ridges in narrow areas frequently following the BIF; however it was also recorded on low hills where there has been secondary iron enrichment (and no BIF). It merged into the Type 2 communities: SIMS-C (stony ironstone mulga shrublands on crests and rises, LOMS (low open Myrtaceae shrublands), and ASET (Acacia shrubland over Eremophila and Triodia); and the Type 6 community SIMS-M (stony ironstone mid-slope mulga shrubland).

6.1.4 Significant Flora

Baeckea sp. Melita Station (P4) was found to occur in numerous areas in this habitat (both on and off the BIF). *Beyeria lapidicola* (P1) is also known from one location on C Ridge occurring only in the SIMS-B habitat.

Other Priority taxa occasionally recorded within this habitat include *Eremophila congesta* (P1), *Homalocalyx echinulatus* (P3) and the potentially undescribed *Sida* sp. Wiluna (Markey & Dillon 4126). *Tribulus adelacanthus* was also recorded at one location on the very northern end of B Ridge by DEC.

6.2 Acacia shrubland over Eremophila and Triodia (ASET)

6.2.1 Description

ASET is a mixed Acacia shrubland generally comprised of *Acacia aneura* over mid to low shrubs including *Eremophila punctata, E. latrobei, E. forrestii,* over *Triodia melvillei* (Plate 16).

Plate 16 ASET Acacia Shrubland over Eremophila and Triodia.

6.2.2 Structure

TREES (0-2% PFC)	Others:	*Grevillea berryana, A. pruinocarpa*
MALLEES (0-1% PFC)	Others:	*Eucalyptus kingsmillii* subsp. *kingsmillii*
TALL SHRUBS (11-21% PFC)	Dominants: Others:	*Acacia aneura* var. ?*microcarpa* *Acacia rhodophloia, A. quadrimarginea*
MID SHRUBS (6-16% PFC)	Dominants: Others:	*Eremophila punctata, E. latrobei* subsp. *latrobei* *Eremophila forrestii, Stenanthemum petraeum, Acacia aneura*
LOW SHRUBS (0-4% PFC)	Others:	*Eremophila jucunda* subsp. *jucunda, E. flabellata, Ptilotus schwartzii, Stenanthemum petraeum*
GRASSES (0-20% PFC)	Dominants: Others:	*Triodia melvillei* *Monachather paradoxus*

6.2.3 Gradational Associations

The ASET habitat appears to be in Pristine to Excellent condition; except to the south where it has been impacted by recent fires, and in some areas sand encroachment from the surrounding sandplain is broadening the interzonal boundary.

This habitat frequently merges with other Type 1 and 2 communities.

6.2.4 Significant Flora

Priority taxa occasionally recorded within this habitat include *Eremophila congesta* (P1) and *Prostanthera ferricola* (P3).

6.3 Low Open Myrtaceae Shrubland (LOMS)

6.3.1 Description

LOMS is a low open shrubland, usually dominated by *Aluta maisonneuvei* subsp. *auriculata,* and tending to have very sharp boundaries with the surrounding Acacia shrublands (Plate 17). In some areas the dominant shrub is the Priority Flora *Homalocalyx echinulatus* (P3) (Plate 7; Section 5.1.7).

Plate 17 LOMS- Low open Myrtaceae shrubland.

6.3.2 Structure

TREES (0-2% PFC)	Others:	*Grevillea berryana*
TALL SHRUBS (1-8% PFC)	Dominants: Others:	*Acacia aneura* var. *microcarpa* *Acacia quadrimarginea, A. rhodophloia*
MID SHRUBS (0-5% PFC)	Dominants: Others:	*Aluta maisonneuvei* subsp. *auriculata* *Eremophila punctata, E. latrobei* subsp. *latrobei, Prostanthera campbellii*
LOW SHRUBS (7-21% PFC)	Dominants: Others:	*Aluta maisonneuvei* subsp. *auriculata* *Homalocalyx echinulatus* (P3)*, Ptilotus schwartzii, Eremophila jucunda* subsp. *jucunda, Sida* sp. Golden calyces glabrous
GRASSES (0-3% PFC)	Others:	*Triodia melvillei, Eragrostis eriopoda*

6.3.3 Gradational Associations

LOMS only occurs on the ironstone dominated uplands and frequently merges with other Type 2 communities, particularly ASET (Acacia shrubland over Eremophila and Triodia); and also with the Type 1 community SIMS-B (Stony Ironstone Mulga Shrublands on rocky slopes and crests, frequently on BIF). This habitat tended to be in Excellent condition.

6.3.4 Significant Flora

In some locations the LOMS habitat is dominated by *Homalocalyx echinulatus* (P3); *Prostanthera ferricola* (P3) has also been recorded within this habitat.

6.4 Stony Ironstone Mulga Shrublands on rocky slopes and crests (SIMS-C)

6.4.1 Description

SIMS-C is a commonly occurring upland habitat associated with ironstone or laterite; dominated by *Acacia aneura* var. *microcarpa*, with *Grevillea berryana,* above *Eremophila latrobei* subsp. *latrobei* often with *Stenanthemum petraeum, Eremophila punctata, E. jucunda* subsp. *jucunda,* and *Sida* sp. Golden calyces glabrous (Plate 18).

Plate 18 SIMS-C Stony ironstone mulga shrublands on rocky slopes and crests.

6.4.2 Structure

TREES (0-7% PFC)	Dominants:	*Grevillea berryana, Acacia aneura* var. *microcarpa*
	Others:	*Acacia pruinocarpa*
MALLEES (0-1% PFC)	Others:	*Eucalyptus kingsmillii* subsp. *kingsmillii*
TALL SHRUBS (5-23% PFC)	Dominants:	*Acacia aneura* var. *microcarpa, A. aneura* var. *aneura*
	Others:	*Grevillea berryana, Acacia quadrimarginea*
MID SHRUBS (0-15% PFC)	Dominants:	*Stenanthemum petraeum, Eremophila latrobei* subsp. *latrobei*
	Others:	*Dodonaea petiolaris, Prostanthera campbellii, Eremophila punctata, Senna artemisioides* subsp. *helmsii*
LOW SHRUBS (0-8% PFC)	Dominants:	*Eremophila latrobei,* subsp. *latrobei*
	Others:	*Eremophila jucunda* subsp. *jucunda, E. flabellata, Ptilotus schwartzii, Sida* sp. Golden calyces glabrous
GRASSES (<1% PFC)	Others:	*Eriachne mucronata, E. helmsii, Eragrostis setifolia*

6.4.3 Gradational Associations

The SIMS-C habitat frequently merges with other Type 2 communities; the Type 1 community SIMS-B; and is also closed allied with the Type 6 community SIMS-M (Stony ironstone mulga shrubland on mid-slopes).

There is some evidence of very old fire scars: on A Ridge and to the western side of the survey area; however this habitat is mostly in Very Good to Excellent condition.

6.4.4 Significant Flora

Prostanthera ferricola (P3) and *Baeckea* sp. Melita Station (P4) were identified within this habitat. *Eremophila congesta* (P1), *E. ?anomala* (P1), and *Sida* sp. Wiluna (Markey & Dillon 1426) have also been associated with this habitat, although they do not commonly occur.

6.5 Undulating lateritic slopes of Acacia over low Eremophila and Triodia (UAET)

6.5.1 Description

UAET tends to occur on the undulating lateritic low hills mostly to the west of the three main ridges in the survey areae. It is a low shrubland dominated by *Eremophila jucunda* subsp. *jucunda* and *Triodia melvillei* with scattered tall shrubs of *Acacia aneura* (Plate 19).

Plate 19 UAET Undulating lateritic slopes of Acacia over low Eremophila and Triodia.

6.5.2 Structure

TREES (0-2% PFC)	Others:	*Grevillea berryana, Acacia pruinocarpa*
MALLEES (0-2% PFC)	Others:	*Eucalyptus kingsmillii* subsp. *kingsmillii*
TALL SHRUBS (7-12% PFC)	Dominants: Others:	*Acacia aneura* var. *microcarpa* *Grevillea berryana, Acacia sibirica*
MID SHRUBS (0-9% PFC)	Dominants: Others:	*Eremophila latrobei* subsp. *latrobei, E. punctata* *Eremophila forrestii, Acacia aneura* var. *microcarpa, Stenanthemum petraeum*
LOW SHRUBS (9-17% PFC)	Dominants:	*Eremophila jucunda* subsp. *jucunda*
GRASSES (3-15% PFC)	Dominants:	*Triodia melvillei*

6.5.3 Gradational Associations

UAET tends to be in Excellent Condition. It frequently merges upslope with SIMS-C (stony ironstone mulga shrubland on crests and slopes); and downslope with the Type 5 communities: SIME (stony ironstone mulga with *Eremophila forrestii* shrubland) or MSET (mulga shrubland over *Eremophila forrestii* and Triodia).

6.5.4 Significant Flora

The undescribed *Sida* sp. Wiluna (Markey & Dillon 1426) has been associated with this habitat.

6.6 Stony undulating slopes of *Acacia rhodophloia* over Eremophila and low shrubs (SUAE)

6.6.1 Description

SUAE appears to be limited to the northern end of the main ridge (C Ridge) in the survey area (and extending north beyond the survey boundary). It is a shrubland dominated by *Acacia rhodophloia* frequently over *Eremophila jucunda* subsp. *jucunda* with *E. latrobei* subsp. *latrobei* and *E. punctata,* and also *Aluta maisonneuvei* subsp. *auriculata* (Plate 20).

Plate 20 SUAE Stony undulating slopes of *Acacia rhodophloia* over Eremophila and low shrubs.

6.6.2 Structure

TALL SHRUBS (12-16% PFC)	Dominants:	*Acacia rhodophloia*
	Others:	*Acacia sibirica, A. aneura* var. *microcarpa*
MID SHRUBS (2-12% PFC)	Dominants:	*Eremophila latrobei* subsp. *latrobei*
	Others:	*Aluta maisonneuvei* subsp. *auriculata, Eremophila forrestii, E. punctata, Acacia rhodophloia*
LOW SHRUBS (0-7% PFC)	Dominants:	*Eremophila jucunda* subsp. *jucunda*
	Others:	*Sida* sp. *Golden calyces glabrous*
GRASSES (<1% PFC)	Others:	*Eriachne helmsii, E. mucronata*

6.6.3 Gradational Associations

SUAE tends to be in mostly in Pristine to Excellent Condition; the northern most occurrence of this habitat (it extends beyond the survey boundary) has been impacted by fire in the last 5-10 years (where it is in Very Good condition. In its most northern occurrence it boundaries with SASP (sandplain spinifex hummock grassland); otherwise it tends to merge with other Type 2 communities notably SIMS-C (stony ironstone mulga shrubland on slopes and crests) and LOMS (low open Myrtaceae shrubland).

This habitat appears to be limited to the northern end of C Ridge and is frequently associated with outcropping jaspilite.

6.6.4 Significant Flora

No significant flora recorded in this habitat.

6.7 Stony *Acacia rhodophloia* and *Eremophila congesta* (P1) Shrubland occurring on crests (SAEC)

6.7.1 Description

SAEC was only identified in the north east of the survey area, away from the three main north south oriented ridges. It is a shrubland dominated by *Acacia rhodophloia* over *Eremophila congesta* (P1) with *E. latrobei* subsp. *latrobei* and *E. punctata,* and on occasion *Triodia melvillei* only occurring on the crests of hills (Plate 21).

Plate 21 SAEC Stony *Acacia rhodophloia* and *Eremophila congesta* (P1) Shrubland occurring on crests.

6.7.2 Structure

TREES (0-2% PFC)	Others:	*Grevillea berryana*
TALL SHRUBS (11-18% PFC)	Dominants: Others:	*Acacia rhodophloia* *Acacia sibirica, A. pruinocarpa*
MID SHRUBS (1-11% PFC)	Dominants: Others:	*Eremophila congesta* (P1) *Eremophila latrobei* subsp. *latrobei, E. punctata, Acacia rhodophloia*
LOW SHRUBS (2-11% PFC)	Dominants: Others:	*Eremophila congesta* (P1), *E. jucunda* subsp. *jucunda* *Acacia rhodophloia, Sida* sp. Golden calyces glabrous
GRASSES (0-5% PFC)	Others:	*Triodia melvillei*

6.7.3 Gradational Associations

SAEC is in Pristine Condition. It tends to merge with other Type 2 communities in particular SIMS-C (stony ironstone mulga shrubland on slopes and crests); and the downslope Type 5 community SMEC (stony slopes mulga *Eremophila congesta* (P1) shrubland).

This habitat appears to be limited to the north east area within the current survey, and may be associated with underlaying limestone.

Structurally SAEC is very similar to SUAE (Stony undulating slopes of *Acacia rhodophloia* over Eremophila and low shrubs). Both habitats occur on crests frequently with a stony laterite soil profile; the main difference of these two habitats being the addition of *E. congesta* which is not present in the SUAE habitat. This strong similarity contributes to the grouping of the SAEC habitat in the Markey & Dillon Type 2 vegetation community, however the underlying geology is significantly different. Due to the absence of BIF in the areas where this habitat occurs, SAEC is not considered to fall within the Wiluna West PEC.

6.7.4 Significant Flora

The Priority Flora *Eremophila congesta* (P1) is a dominant species in the SAEC habitat.

6.8 Open Acacia Shrubland on ironstone or laterite over low scattered shrubs (OALS)

6.8.1 Description

OALS is a varying habitat generally dominated by *Acacia quadrimarginea* and/or *A. balsamea* (P4) with *Acacia aneura* and often *Acacia cuthbertsonii* subsp. *cuthbertsonii* over *Scaevola spinescens, Eremophila latrobei* subsp. *latrobei, Ptilotus obovatus* and *E. flabellata* (Plate 22).

OALS frequently occurs on lateritic low rises; low outcrops of weathered BIF; rough quartz slopes; and upper breakaway surfaces.

Plate 22 OALS Open Acacia Shrubland on ironstone or laterite over low scattered shrubs.

6.8.2 Structure

TREES (0-4% PFC)	Others:	*Acacia pruinocarpa*
TALL SHRUBS (1-26% PFC)	Dominants:	*Acacia balsamea*, *A. aneura* var. ?*aneura, A. quadrimarginea*
	Others:	*Acacia cuthbertsonii* subsp. *cuthbertsonii, Santalum spicatum*
MID SHRUBS (1-13% PFC)	Dominants:	*Scaevola spinescens, Eremophila latrobei* subsp. *latrobei, Ptilotus obovatus*
	Others:	*Senna artemisioides* subsp. *helmsii, Acacia balsamea*, *Sida ectogama*
LOW SHRUBS (0-15% PFC)	Dominants:	*Eremophila flabellata, Acacia aneura*
	Others:	*Calytrix uncinata* (P3), *Ptilotus obovatus, Maireana convexa, M. georgei, Dodonaea microzyga* subsp. *acrolobata, Eremophila jucunda* subsp. *jucunda*

6.8.3 Gradational Associations

OALS frequently merges with the Type 5 community SIME (stony ironstone mulga with *Eremophila forrestii* shrubland); and downslope with the Type 4 community SAES (stony Acacia Eremophila shrubland).

OALS tends to be in Excellent to Very Good Condition

6.8.4 Significant Flora

Calytrix uncinata (P3) is not uncommon within this habitat; *Ptilotus chrysocomus* (P1), *Eremophila arachnoides* subsp. *arachnoides* (P3), *Ptilotus luteolus* (P3), *Prostanthera ferricola* (P3), and *Baeckea* sp. Melita Station (P4) were recorded within the OALS habitat.

The undescribed flora *Sida* sp. Wiluna (Markey & Dillon 4126) was also recorded within this habitat.

6.9 Open Acacia Shrubland on ironstone or laterite over low scattered shrubs – southern C Ridge (OALS-S)

6.9.1 Description

OALS-S is closely related to the OALS habitat, although only located on the southern end of C Ridge (south of the Sandstone Wiluna Road); it is generally dominated by *Acacia quadrimarginea* with *Acacia aneura* over *Scaevola spinescens, Eremophila latrobei* subsp. *latrobei, Ptilotus obovatus* and *E. flabellata* (Plate 23).

Plate 23 OALS -S Open Acacia Shrubland on ironstone or laterite over low scattered shrubs.

6.9.2 Structure

TREES (0-4% PFC)	Others:	*Acacia aneura* var. *tenuis, A. pruinocarpa*
TALL SHRUBS (1-26% PFC)	Dominants:	*Acacia aneura* var. *?aneura, A. quadrimarginea*
	Others:	*Acacia tetragonophylla, Grevillea berryana*
MID SHRUBS (1-13% PFC)	Dominants:	*Eremophila latrobei* subsp. *latrobei, Scaevola spinescens*
	Others:	*Eremophila punctata, Baeckea* sp. Melita Station (P4), *Santalum lanceolatum*
LOW SHRUBS (0-15% PFC)	Dominants:	*Eremophila flabellata, Acacia aneura*
	Others:	*Calytrix uncinata* (P3), *Eremophila jucunda* subsp. *jucunda, E. latrobei* subsp. *latrobei*

6.9.3 Gradational Associations

OALS-S frequently merges downslope with the Type 4 community SAES (stony Acacia Eremophila shrubland).

OALS-S appears to be in Excellent condition.

The notable difference between the OALS and OALS-S habitat is the presence of *Acacia balsamea:* in the OALS habitat *A. balsamea* is a dominant species occurring in both the tall and mid shrub strata; it is absent from the OALS-S habitat.

6.9.4 Significant Flora

Calytrix uncinata (P3) and *Baeckea* sp. Melita Station (P4) were both recorded within the OALS-S habitat.

6.10 Acacia Mixed Shrubland on Stony Ironstone Slopes (AXSI)

6.10.1 Description

AXSI is a varying habitat generally dominated by *A. balsamea* (P4) with *Acacia cuthbertsonii* subsp. *cuthbertsonii* and *A. aneura* above *Scaevola spinescens, Eremophila latrobei* subsp. *latrobei, Ptilotus obovatus* and *Senna artemisioides* subsp. *helmsii* (Plate 24).

AXSI frequently occurs on stony ironstone; low outcrops of weathered BIF; and low rough quartz slopes.

Plate 24 AXSI Acacia Mixed Shrubland on Stony Ironstone Slopes.

6.10.2 Structure

TREES (0-1% PFC)	Others:	*Acacia aneura* var. *tenuis*
TALL SHRUBS (1-12% PFC)	Dominants:	*Acacia balsamea*, *Acacia cuthbertsonii* subsp. *cuthbertsonii, A. aneura var. ?aneura*
	Others:	*A. tetragonophylla, A. burkittii, Santalum spicatum*
MID SHRUBS (3-18% PFC)	Dominants:	*Scaevola spinescens, Senna artemisioides* subsp. *helmsii, Eremophila latrobei* subsp. *latrobei, Acacia cuthbertsonii* subsp. *cuthbertsonii, Ptilotus obovatus*
	Others:	*Acacia balsamea*, *Eremophila oppositifolia, Sida ectogama*
LOW SHRUBS (0-9% PFC)	Dominants:	*Senna artemisioides* subsp. *helmsii*, *Scaevola spinescens, Ptilotus obovatus, Maireana georgei*
	Others:	*Eremophila flabellata, Acacia aneura, Maireana convexa, Cheilanthes brownii*

6.10.3 Gradational Associations

AXSI is closely related to OALS and frequently merges with this habitat, occurring on similar substrates.

AXSI appears to be in Excellent condition.

6.10.4 Significant Flora

The described flora *Sida* sp. Wiluna (Markey & Dillon 4126) was recorded within this habitat.

6.11 Scattered Mixed Shrubland on Low Stony Rises (SXSS)

6.11.1 Description

SXSS is an open, scattered shrubland occurring on stony ironstone and quartz. It is dominated by *Acacia* species, mainly *Acacia aneura* var. *tenuis, A. tetragonophylla, A. burkittii* with *A. cuthbertsonii* subsp. *cuthbertsonii;* above scattered *Scaevola spinescens, Ptilotus obovatus, Senna artemisioides* subsp. *helmsii,* and *Maireana georgei* (Plate 25).

Plate 25 SXSS Scattered Mixed Shrubland on Low Stony Rises.

6.11.2 Structure

TREES (1-5% PFC)	Dominants:	*Acacia aneura* var. *tenuis*
	Others:	*Casuarina pauper, Acacia pruinocarpa*
TALL SHRUBS (3-8% PFC)	Dominants:	*Acacia burkittii, A. aneura* var. *tenuis*
	Others:	*Hakea recurva* subsp. *recurva, Acacia cuthbertsonii* subsp. *cuthbertsonii, A. tetragonophylla*
MID SHRUBS (2-8% PFC)	Dominants:	*Scaevola spinescens, Acacia burkittii*
	Others:	*Acacia tetragonophylla, Ptilotus obovatus, Senna artemisioides* subsp. *helmsii*
LOW SHRUBS (0-5% PFC)	Dominants:	*Ptilotus obovatus, Eremophila flabellata*
	Others:	*Maireana georgei*

6.11.3 Gradational Associations

SXSS is related to AXSI (Acacia mixed shrubland on stony ironstone slopes) and frequently merges upslope with this habitat; downslope SXSS merges with SAES (stony Acacia Eremophila shrubland).

SXSS appears to be in Very Good condition: grazing is evident, and there is a high probability the chenopods in this community have been impacted as a result of long term grazing activity.

6.11.4 Significant Flora

Ptilotus luteolus (P3) has been previously recorded in this habitat.

6.12 Stony Acacia Eremophila Shrubland (SAES)

6.12.1 Description

The habitat type SAES was originally described by Pringle (1994; 1998) who states that it occurs as nearly level stony plains below areas of greater relief in both greenstone and granite dominated landscapes. Soils are generally shallow (<60 cm) red stony earths. SAES can be summarised as an open *Acacia aneura* shrubland on stony red earth over scattered *Eremophila* species, *Sida ectogama, Ptilotus obovatus,* and *P. schwartzii* (Plate 26).

Plate 26 SAES Stony Acacia Eremophila shrubland.

6.12.2 SAES Structure

TREES (0-4% PFC)	Others:	*Acacia pruinocarpa, A. aneura* var. *tenuis*
MALLEES (0-1% PFC)	Others:	*Eucalyptus kingsmillii* subsp. *kingsmillii*
TALL SHRUBS (3-17% PFC)	Dominants: Others:	*Acacia aneura* var. ?*aneura* *Acacia tetragonophylla, Psydrax suaveolens*
MID SHRUBS (0-16% PFC)	Dominants: Others:	*Sida ectogama, Ptilotus obovatus, Eremophila latrobei* subsp. *latrobei, Eremophila galeata* *Rhagodia eremaea, Eremophila forrestii, Senna* sp. Meekatharra, *S. artemisioides* subsp. *helmsii, Scaevola spinescens, Maireana convexa*
LOW SHRUBS (1-10% PFC)	Dominants: Others:	*Eremophila flabellata, Ptilotus schwartzii, P. obovatus* *Sida* sp. Excedentifolia, *Solanum lasiophyllum, Sclerolaena cuneata, Maireana georgei*

6.12.3 SAES Habitat Variation: SAES-E

SAES-E is closely related to SAES and generally merges into SAES. The main difference between the two habitats is density and diversity. SAES tends to have a higher overall diversity with a higher chenopod component; while SAES-E doesn't tend to have the open space between the mulga and is often located along the footslopes of the hills and ridges in the survey area.

SAES-E can be described as an *Acacia aneura* shrubland on stony red earths over *Eremophila flabellata*, *E. latrobei* subsp. *latrobei, Ptilotus obovatus,* and *P. schwartzii* (Plate 27). SAES-E appears to be in Very Good to Excellent condition.

Plate 27 SAES-E Stony Acacia Eremophila shrubland – *Eremophila flabellata*.

6.12.4 SAES-E Structure

TREES (0-8% PFC)	Dominants: Others:	*Acacia pruinocarpa* *Acacia aneura* var. *tenuis*
MALLEES (0-1% PFC)	Others:	*Eucalyptus kingsmillii* subsp. *kingsmillii*
TALL SHRUBS (3-18% PFC)	Dominants: Others:	*Acacia aneura* var. ?*aneura* *Acacia tetragonophylla*
MID SHRUBS (0-8% PFC)	Dominants: Others:	*Eremophila latrobei* subsp. *latrobei, Acacia aneura* *Eremophila forrestii, Ptilotus obovatus, Sida ectogama, Scaevola spinescens*
LOW SHRUBS (1-17% PFC)	Dominants: Others:	*Eremophila flabellata, Eremophila jucunda* subsp. *jucunda* *Ptilotus schwartzii, P. obovatus, Sida* sp. Excedentifolia

6.12.5 Gradational Associations

SAES frequently grades upslope into SIME (stony ironstone mulga with *Eremophila forrestii* shrubland) and downslope into DRAS (drainage tract Acacia shrubland); GRMU (hardpan plain mulga grove), where SAES is evident in the inter grove areas; or HPMS (hardpan plain mulga shrublands).

SAES condition varies between Very Good and Good due to the impact of long term grazing on the more palatable chenopod species.

6.12.6 Significant Flora

Eremophila arachnoides subsp. *arachnoides* (P3) has been recorded in this habitat by Keith Lindbeck & Associates.

Ptilotus chrysocomus (P1) was recorded in this habitat, although it is not frequently associated with SAES.

6.13 Drainage Tract Acacia Shrubland (DRAS)

6.13.1 Description

DRAS has been previously described by Pringle (1998) and occurs in areas where there is more concentrate run-on. It ranges from a scattered to close tall shrubland, sometimes woodland with understorey development inversely related to upper storey cover (Pringle, 1998; Plate 28). Species common to DRAS are also common to other sclerophyll shrubland habitats.

Plate 28 DRAS Drainage Tract Acacia Shrubland.

6.13.2 Structure

TREES (0-13% PFC)	Dominants:	*Acacia aneura* var. *tenuis*
	Others:	*Acacia pruinocarpa*
TALL SHRUBS (7-23% PFC)	Dominants:	*Acacia aneura* var. ?*microcarpa*, *A. aneura* var. ?*aneura, A. sibirica*
	Others:	*Acacia tetragonophylla, A. quadrimarginea, Psydrax suaveolens, P. latifolia, P. rigidula*
MID SHRUBS (0-17% PFC)	Dominants:	*Sida ectogama, Acacia aneura*
	Others:	*Ptilotus obovatus, Rhagodia eremaea, Eremophila latrobei* subsp. *latrobei, Eremophila galeata Eremophila forrestii*, *S. artemisioides* subsp. *helmsii, Scaevola spinescens, Maireana convexa, Acacia ramulosa* var. *linophylla*
LOW SHRUBS (0-8% PFC)	Dominants:	*Acacia aneura, Eremophila flabellata, Ptilotus schwartzii, P. obovatus*
	Others:	*Sida* sp. Excedentifolia, *Solanum lasiophyllum, Enchylaena tomentosa , Maireana convexa, M. georgei, Abutilon cryptopetalum, A. oxycarpum* subsp. *prostratum* ms*, Cheilanthes sieberi* subsp. *sieberi, Spartothamnella teucriiflora*

6.13.3 Gradational Associations

DRAS is very similar to GRMU (hardpan plain mulga grove); and merges downslope into HPMD (hardpan plain mulga shrubland – drainage) or CBKW (creek bank woodland or shrubland).

DRAS condition is generally Very Good.

6.13.4 Significant Flora

Olearia mucronata (P3) was recorded once in this habitat.

Schoenus variicellae was collected within the DRAS habitat representing a significant range extension for this species.

6.14 Upland Small Chenopod Species Shrubland (USCS)

6.14.1 Description

USCS supports a blend of chenopod and sclerophyll vegetation on soils with dense stony mantles. It can be described as an open *Acacia aneura* shrubland on stony red earth over scattered *Ptilotus obovatus, Maireana* spp., *Sclerolaena* spp., and *Tecticornia* spp. (Plate 29).

Plate 29 USCS Upland Small Chenopod Species Shrubland.

6.14.2 Structure

TREES (0-4% PFC)	Others:	*Acacia aneura* var. *tenuis, A. pruinocarpa*
TALL SHRUBS (4-11% PFC)	Dominants:	*Acacia aneura* var. ?*aneura, Acacia aneura* var. ?*microcarpa*
	Others:	*Acacia tetragonophylla, Psydrax suaveolens*
MID SHRUBS (0-12% PFC)	Dominants:	*Maireana convexa, M. villosa, Acacia aneura, Ptilotus obovatus*
	Others:	*Sida ectogama, Rhagodia eremaea, Eremophila forrestii, E. galeata, Senna artemisioides* subsp. *helmsii, Scaevola spinescens*
LOW SHRUBS (0-3% PFC)	Dominants:	*Maireana georgei, M. triptera, Eremophila flabellata, Ptilotus obovatus, Sclerolaena cuneata, Tecticornia disarticulata*
	Others:	*Sida* sp. Excedentifolia, *Solanum lasiophyllum, Sclerolaena cuneata, Maireana tomentosa*

6.14.3 Gradational Associations

USCS frequently grades SAES (stony Acacia Eremophila shrubland), and it can be difficult to determine actual boundaries between the two habitats. Where occurrences of the USCS habitat were too small to map they have been included in the SAES habitat.

USCS condition varies between Very Good and Good due to the impact of long term grazing on the more palatable chenopod species.

6.14.4 Significant Flora

No significant flora recorded in this habitat.

6.15 Stony Ironstone Mulga with *Eremophila forrestii* Shrubland (SIME)

6.15.1 Description

SIME is a commonly occurring mulga shrubland associated with the lower slopes of the hills and ridges in the survey area. It is dominated by *Acacia aneura* var. *microcarpa*, above *Eremophila forrestii* often with *E. punctata, E. flabellata* and *E. jucunda* subsp. *jucunda* (Plate 30).

Plate 30 SIME Stony Ironstone Mulga with *Eremophila forrestii* Shrubland.

6.15.2 Structure

TREES (0-1% PFC)	Others:	*Acacia pruinocarpa*
TALL SHRUBS (9-25% PFC)	Dominants: Others:	*Acacia aneura* var. *microcarpa* *Acacia aneura* var. ?*aneura*
MID SHRUBS (2-15% PFC)	Dominants: Others:	*Eremophila forrestii* *Eremophila punctata, E. latrobei* subsp. *latrobei, Senna artemisioides* subsp. *helmsii*
LOW SHRUBS (0-13% PFC)	Dominants: Others:	*Eremophila flabellata, E. forrestii* *Rhagodia eremaea, Eremophila jucunda* subsp. *jucunda, Ptilotus schwartzii, Sida* sp. Golden calyces glabrous*, S.* sp. Excedentifolia
GRASSES (<1% PFC)	Others:	*Monachather paradoxa*

6.15.3 Gradational Associations

SIME generally lies on the mid level and footslopes of the main ridges in the survey area. It merges upslope with the SIMS-B habitat (stony ironstone mulga shrubland on crests and slopes, frequently on BIF); and downslope with SAES (stony Acacia Eremophila shrubland).

There is some evidence of very old fire scars: on A Ridge and to the western side of the survey area; however this habitat is mostly in Very Good to Excellent condition.

6.15.4 Significant Species

Eremophila congesta (P1) occasionally occurs within the SIME habitat; and *Beyeria lapidicola* (P1) was recorded once.

Malleefowl (*Leipoa ocellata*) were observed in this habitat.

6.16 Stony Slopes Mulga *Eremophila congesta* (P1) Shrubland (SMEC)

6.16.1 Description

SMEC occurs along the lower slopes of hills in the north and east of the survey area. It is can be summarised as *Acacia aneura* var. *microcarpa* above *Eremophila congesta* (P1), often with emergent *Acacia pruinocarpa* (Plate 31).

Plate 31 SMEC Stony Slopes Mulga *Eremophila congesta* (P1) Shrubland.

6.16.2 Structure

TREES (2-6% PFC)	Others:	*Acacia pruinocarpa*
MALLEES (0-1% PFC)	Others:	*Eucalyptus kingsmillii* subsp. *kingsmillii*
TALL SHRUBS (7-15% PFC)	Dominants:	*Acacia aneura* var. *microcarpa*
MID SHRUBS (6-19% PFC)	Dominants: Others:	*Eremophila congesta* (P1) *Ptilotus obovatus, Eremophila forrestii, Acacia aneura* var. ?*microcarpa, Senna artemisioides* subsp. x *sturtii*
LOW SHRUBS (0-2% PFC)	Dominants: Others:	*Eremophila congesta* (P1) *Ptilotus schwartzii, Eremophila flabellata, Eremophila jucunda* subsp. *jucunda, Acacia aneura, Ptilotus obovatus*

6.16.3 Gradational Associations

Downslope SMEC merges into SAES (stony Acacia Eremophila shrubland); upslope it merges into SAEC (stony slopes *Acacia rhodophloia Eremophila congesta* (P1) shrubland on crests). Where the *Eremophila congesta* dominance starts to disappear, this habitat often merges into SIMS-C (stony ironstone mulga shrubland on slopes and crests).

Like the SAEC habitat, SMEC appears to be limited to the north east area within the current survey, and may be associated with underlying limestone.

Structurally SMEC is very similar to SIME (Stony ironstone mulga with *Eremophila forrestii* shrubland), with *E. congesta* taking the place of *E. forrestii.* SMEC occupies a similar position in the landscape as SIME, however it appears to be restricted to the low hills to the north east of the main ridges. This strong similarity contributes to the grouping of the SMEC habitat in the Markey & Dillon Type 5 vegetation community, however the underlying geology is significantly different. Due to the absence of BIF in the areas where this habitat occurs, SMEC is not considered to fall within the Wiluna West PEC.

SMEC appears to be in Pristine to Excellent condition.

6.16.4 Priority Flora

The Priority Flora *Eremophila congesta* (P1) is a dominant species in the SMEC habitat.

6.17 Mulga Shrubland over *Eremophila forrestii* and Triodia (MSET)

6.17.1 Description

MSET occurs on lateritic soils, it is dominated by *Acacia aneura* var. *microcarpa*, above *Eremophila forrestii* often with *E. jucunda* subsp. *jucunda* over *Triodia melvillei* (Plate 32).

Plate 32 MSET Mulga Shrubland over *Eremophila forrestii* and Triodia.

6.17.2 Structure

MALLEE (0-1% PFC)	Others:	*Acacia pruinocarpa*
TALL SHRUBS (13-20% PFC)	Dominants: Others:	*Acacia aneura* var. *microcarpa* *Acacia aneura* var. *aneura, A. aneura* var. *tenuis, A. sibirica, A. rhodophloia, A pruinocarpa*
MID SHRUBS (1-17% PFC)	Dominants: Others:	*Eremophila forrestii* *Eremophila latrobei* subsp. *latrobei, Acacia ramulosa* var. *linophylla, A. aneura* var. *microcarpa*
LOW SHRUBS (0-12% PFC)	Dominants: Others:	*Eremophila forrestii, E. jucunda* subsp. *jucunda* *Eremophila flabellata, Sida* sp. Excedentifolia, *Spartothamnella teucriiflora*
GRASSES (0-25% PFC)	Dominants: Others:	*Triodia melvillei* *Eragrostis setifolia, Monachather paradoxus, Eriachne mucronata, Thyridolepis multiculmis*

6.17.3 Gradational Associations

MSET often merges with the other common laterite habitat to the west of C Ridge - UAET (undulating lateritic slopes of Acacia over low Eremophila and Triodia); and is closely related to the SIME (stony ironstone mulga with *Eremophila forrestii* shrubland) habitat. MSET tends to have an obvious *Triodia melvillei* stratum that SIME lacks; and it occurs on deeper soils with small lateritic gravel evident across the soil surface.

While there is some evidence of very old fire scars in places, this habitat is in Very Good to Excellent condition.

6.17.4 Significant Flora

No significant flora recorded in this habitat.

6.18 Stony Ironstone Mid-slope Mulga Shrubland (SIMS-M)

6.18.1 Description

SIMS-M is a mid-slope habitat associated with iron rich outcrops. It consists of *Acacia aneura* var. *microcarpa*, with scattered *A. pruinocarpa* above *Eremophila latrobei* subsp. *latrobei*, *Dodonaea petiolaris, Harnieria kempeana* subsp. *muelleri, Eremophila flabellata,* with *E. jucunda* subsp. *jucunda,* and *Ptilotus rotundifolius* (Plate 33).

Plate 33 SIMS-M Stony ironstone mulga shrublands on rocky slopes and crests.

6.18.2 Structure

TREES (0-3% PFC)	Others:	*Acacia pruinocarpa*
TALL SHRUBS (11-18% PFC)	Dominants:	*Acacia aneura* var. *microcarpa*`
	Others:	*Acacia quadrimarginea, A. tetragonophylla*
MID SHRUBS (3-11% PFC)	Dominants:	*Dodonaea petiolaris, Eremophila latrobei* subsp. *latrobei, Sida* sp. Excedentifolia
	Others:	*Prostanthera campbellii, Eremophila punctata, Sida* sp. Wiluna`
LOW SHRUBS (1-14% PFC)	Dominants:	*Eremophila flabellata, Harnieria kempeana* subsp. *muelleri*
	Others:	*Ptilotus obovatus, P. rotundifolius, Eremophila jucunda* subsp. *jucunda, Ptilotus schwartzii*

6.18.3 Gradational Associations

As stated by Markey and Dillon (2007) SIMS-M shows affinity with both the upland communities: particularly SIMS-B (stony ironstone mulga shrubland on slopes and crests, frequently on BIF) and SIMS-C (stony ironstone mulga shrubland on slopes and crests); and the lower slope community SAES (stony Acacia Eremophila shrubland).

It is likely this habitat is an interzonal community between the steeper upper ridges and the footslopes. This community only occurs in small narrow inter-zones on B Ridge as can be seen in the final vegetation map of the survey area.

This habitat is mostly in Very Good to Excellent condition.

6.18.4 Significant Flora

Sida sp. Wiluna (Markey & Dillon 4126) has been recorded within this habitat.

Olearia mucronata (P3) was recorded once in this habitat.

6.19 Breakaway Footslope Chenopod Low Shrubland (BCLS)

6.19.1 Description

BCLS (as previously described by Pringle, 1998) occurs on the very gently inclined footslopes and alluvial plains deposited from the erosion of intensely weathered, generally granitic rocks underlying ferruginous duricrusts and exposed in breakaway scarps. It is generally comprised of a low scattered shrubland generally dominated by chenopod species (Plate 34).

Plate 34 BCLS Breakaway footslope chenopod low shrubland.

6.19.2 Structure

TREES (0-3% PFC)	Others:	*Acacia aneura var. tenuis*
MALLEES (0-7% PFC)	Others:	*Eucalyptus carnei*
TALL SHRUBS (0-3% PFC)	Others:	*Acacia aneura, A. tetragonophylla, A. quadrimarginea, Eremophila oppositifolia, Hakea recurva* subsp. *recurva*
MID SHRUBS (0-9% PFC)	Dominants: Others:	*Eremophila oppositifolia, Scaevola spinescens* *Rhagodia eremaea, Acacia pruinocarpa, Eremophila ?pantonii*
LOW SHRUBS (0-14% PFC)	Dominants: Others:	*Tecticornia disarticulata, Ptilotus albidus, P. obovatus* *Frankenia sp., Maireana glomerifolia, M. triptera, Sclerolaena cuneata, S. eriacantha, Eremophila oppositifolia, Ptilotus chrysocomus* (P1)

6.19.3 Gradational Associations

BCLS may merge upslope with OALS (open Acacia shrubland on ironstone or laterite over low scattered shrubs); and downslope with SAES (stony Acacia Eremophila shrubland). It shares similar aspects to BRXS (breakaway mixed shrublands). BCLS is generally in Excellent condition.

6.19.4 Significant Flora

Ptilotus chrysocomus (P1), *Calytrix uncinata* (P3), *Maireana prosthecochaeta* (P3), *Olearia mucronata* (P3), and *Sauropus ramosissimus* (P3) have been recorded within the BCLS habitat.

One collection of the tentatively identified *Eremophila ?anomala* (P1) was recorded within this habitat.

6.20 Breakaway Mixed Shrublands (BRXS)

6.20.1 Description

BRXS is a varied habitat closely allied with BCLS (breakaway footslope chenopod low shrubland) in that it shares the same physical environmental characteristics. It is generally a scattered *Acacia* species shrubland above *Eremophila* species, *Ptilotus obovatus,* with *Scaevola spinescens,* and often with emergent *Eucalyptus carnei* near the footslope edges of the breakaway scarp; it has also been recorded as a moderately close tall to mid shrubland (Plate 35).

Plate 35 BRXS Breakaway Mixed Shrublands.

6.20.2 Structure

TREES (0-4% PFC)	Others:	*Acacia aneura, Callitris columellaris*
MALLEES (0-12% PFC)	Others:	*Eucalyptus carnei*
TALL SHRUBS (2-17% PFC)	Others:	*Acacia aneura* var. ?*microcarpa*, *A. aneura* var. ?*aneura, A. quadrimarginea, A. balsamea*
MID SHRUBS (2-13% PFC)	Dominants:	*Eremophila oppositifolia, Scaevola spinescens, Ptilotus obovatus*
	Others:	*Eremophila ?pantonii, Dodonaea petiolaris, Prostanthera campbellii, Eremophila exilifolia, Mirbelia rhagodioides*
LOW SHRUBS (0-5% PFC)	Dominants:	*Eremophila flabellata, Ptilotus obovatus*
	Others:	*Ptilotus albidus, Frankenia sp., Ptilotus chrysocomus* (P1)

6.20.3 Gradational Associations

BRXS merges upslope with OALS (open Acacia shrubland on ironstone or laterite over low scattered shrubs); and downslope with SAES (stony Acacia Eremophila shrubland). It shares similar aspects to BCLS (breakaway footslope chenopod low shrubland).

The BRXS habitat is in Excellent to Pristine condition in the survey area.

6.20.4 Significant Flora

Ptilotus chrysocomus (P1), *Calytrix uncinata* (P3), *Olearia mucronata* (P3), *Sauropus ramosissimus* (P3), *Baeckea* sp. Melita Station have been recorded in this habitat.

6.21 Creek Bank Woodland or Shrubland (CBKW)

6.21.1 Description

According to Pringle (1998) CBKW is known in the Murchison River catchment, North Eastern Goldfields and in the Sandstone Yalgoo area. Creek beds are characteristically between 20 and 50m wide and up to 4m deep, incised into hardpan. They tend to disperse once they have reached the nearly flat hardpan plains as was noted in the current survey. The vegetation fringing the creeklines often consists of a moderately close mulga woodland or tall shrubland (Plate 36).

Plate 36 CBKW Creek bank Woodland or Shrubland.

6.21.2 Creekline Structure

TREES (4-5% PFC)	Others:	*Eucalyptus camaldulensis, Acacia pruinocarpa, A. craspedocarpa*
MALLEES (0-1% PFC)	Others:	*Eucalyptus kingsmillii* subsp. *kingsmillii*
TALL SHRUBS (4-6% PFC)	Dominants: Others:	*Acacia aneura var. tenuis* *Acacia quadrimarginea, A. aneura*
MID SHRUBS (0-1% PFC)	Others:	*Acacia quadrimarginea, A. aneura var. tenuis, A. craspedocarpa, Eremophila forrestii, E. latrobei* subsp. *latrobei*
LOW SHRUBS (0-1% PFC)	Others:	*Ptilotus obovatus, Sida ectogama*
GRASSES (<1% PFC)	Others:	*Cyperus squarrosus*

6.21.3 Gradational Associations

CBKW merges downstream with HPMD (hardpan plain mulga shrubland – drainage). While closely related to DRAS (drainage tract Acacia shrubland), it can be distinguished by the large open central channel and the presence of *Eucalyptus camaldulensis.*

6.21.4 Significant Flora

No significant flora recorded in this habitat.

6.22 Mulga Wanderrie Grassy Shrubland (MUWA)

6.22.1 Description

MUWA (as described by Pringle, 1994; 1998) is distributed extensively throughout the North Eastern Goldfields on deep earthy red sands; it is most commonly associated with granite. MUWA is generally a scattered mulga shrubland over wanderrie grasses (Plate 37).

Plate 37 MUWA Mulga Wanderrie Grassy Shrubland.

6.22.2 Structure

TREES (0-9% PFC)	Dominants:	*Acacia aneura var. tenuis*
TALL SHRUBS (2-11% PFC)	Dominants: Others:	*Acacia aneura var. tenuis, A. aneura var. aneura* *Acacia craspedocarpa*
MID SHRUBS (1-5% PFC)	Dominants: Others:	*Acacia aneura var. tenuis, A. aneura var. aneura* *Acacia ramulosa* var. *linophylla, Eremophila forrestii, Maireana convexa, Rhagodia eremaea*
LOW SHRUBS (4-9% PFC)	Dominants: Others:	*Eremophila flabellata, Ptilotus obovatus* *Eremophila forrestii, Acacia aneura, Acacia craspedocarpa, Solanum lasiophyllum*
GRASSES (0-20% PFC)	Dominants:	*Eragrostis eriopoda*

6.22.3 Gradational Associations

MUWA is similar to the HPMS (hardpan plain mulga shrubland) habitat, but has deeper soils and less occurrences of *Eremophila* species, also the grass stratum in MUWA is more evident than within the HPMS habitat.

The MUWA habitat in the current survey area is in Very Good to Excellent condition.

6.22.4 Significant Flora

No significant flora recorded in this habitat.

6.23 Hardpan Plain Mulga Woodland - Drainage (HPMD)

6.23.1 Description

HPMD is a mulga woodland with a poorly developed low and mid shrub strata (Plate 38). It occupies the lowest part of the landscape in the current survey area, and disperses concentrated run-on from all major drainage units (DRAS – drainage tract Acacia shrubland; and CBKW – creek bank woodland or shrubland)

Plate 38 HPMD Hardpan Plain Mulga Woodland - drainage.

6.23.2 Structure

TREES (0-20% PFC)	Dominants:	*Acacia aneura* var. *tenuis, A. craspedocarpa*
TALL SHRUBS (1-19% PFC)	Dominants: Others:	*Acacia aneura* var. *tenuis, A. aneura var. aneura* *Acacia craspedocarpa, A. ramulosa* var. *linophylla, Psydrax rigidula*
MID SHRUBS (1-4% PFC)	Others:	*Grevillea deflexa, Senna artemisioides* subsp. *artemisioides, Eremophila spectabilis* subsp. *brevis, Psydrax rigidula*
LOW SHRUBS (0-4% PFC)	Dominants: Others:	*Acacia aneura* var. *tenuis, A. craspedocarpa* *Cheilanthes sieberi* subsp. *sieberi, Hibiscus burtonii, Spartothamnella teucriiflora*
GRASSES (0-10% PFC)	Others:	*Monachather paradoxus, Eragrostis eriopoda, E. setifolia, Triodia concinna*

6.23.3 Gradational Associations

HPMD is closely allied with HPMS (hardpan plain mulga shrubland), forming that part of the landscape where the concentrated run-on from the upstream habitats (HPMS, DRAS and CBKW) becomes dispersed across these nearly flat plains.

HPMD is generally in Very Good condition. There are numerous mulga stumps and some very old tracks winding throughout this habitat, indicating that there have been large amounts of timber removed from this habitat in the past.

6.23.4 Significant Flora

No significant flora recorded in this habitat.

6.24 Hardpan Plain Mulga Shrubland (HPMS)

6.24.1 Description

Pringle (1998) reports that HPMS is one of the most widely distributed habitats in the arid zone of Western Australia, usually occupying transitional plains between erosional uplands and lake systems; the soil is usually a shallow (<60cm) clay loam over a ferrugino-siliceous hardpan. After major rainfall events these plains (which rarely attain a slope of 1%) are subject to low energy sheet flows (Pringle, 1998).

HPMS is usually a scattered to moderately close tall mulga shrubland with a well developed low and mid shrub strata (Plate 39).

Plate 39 HPMS Hardpan Plain Mulga Shrubland.

6.24.2 Structure

TREES (0-9% PFC)	Dominants: Others:	*Acacia aneura* var. *tenuis* *Acacia craspedocarpa, A. pruinocarpa*
MALLEES (0-1% PFC)	Others:	*Eucalyptus kingsmillii* subsp. *kingsmillii*
TALL SHRUBS (4-23% PFC)	Dominants: Others:	*Acacia aneura* var. *tenuis, Acacia aneura* var. *aneura* *Acacia craspedocarpa, A. tetragonophylla, Psydrax suaveolens*
MID SHRUBS (0-11% PFC)	Dominants: Others:	*Eremophila spectabilis* subsp. *brevis, Ptilotus obovatus, Acacia aneura* *Eremophila forrestii, E. latrobei* subsp. *latrobei, Rhagodia eremaea, Acacia ramulosa* var. *linophylla, Psydrax rigidula, Sida ectogama, S.* sp. dark green fruits, *Hibiscus burtonii, Solanum lasiophyllum,*
LOW SHRUBS (0-6% PFC)	Dominants: Others:	*Acacia aneura* var. *tenuis, A. craspedocarpa* *Cheilanthes sieberi* subsp. *sieberi, Eremophila flabellata, Hibiscus , Spart., Enchylaena tomentosa, Maireana convexa, M. georgei*
GRASSES (0-8% PFC)	Others:	*Monachather paradoxus, Eragrostis eriopoda, E. setifolia, Triodia concinna*

6.24.3 Gradational Associations

HPMS merges downslope into the closely related HPMD habitat (hardpan plain mulga woodland - drainage). It merges into MUBW (hardpan plain mulga and bowgada shrubland) on deeper soils; and the SAMU (sandplain mulga spinifex hummock grasslands) habitat as the soils become sandy.

HPMS is generally in Very Good condition.

6.24.4 Significant Flora

No significant flora recorded in this habitat.

6.25 Hardpan Plain Mulga & Bowgada Shrubland (MUBW)

6.25.1 Description

MUBW is usually a scattered to moderately close tall Acacia shrubland but it is occasionally dominated by mid shrubs (*Acacia ramulosa* var. *linophylla,* with *Eremophila forrestii*) or by the tree strata (Pringle, 1998). Low shrub strata are also present (*Ptilotus obovatus*), while perennial grasses are usually only a minor component of the vegetation (Plate 40).

Plate 40 MUBW Hardpan Plain Mulga & Bowgada Shrubland.

6.25.2 Structure

TREES (1-2% PFC)	Others:	*Acacia sibirica, A. craspedocarpa, Hakea lorea*
TALL SHRUBS (17-19% PFC)	Dominants: Others:	*Acacia ramulosa* var. *linophylla* *Acacia aneura* var. *aneura, A. aneura* var. *tenuis, A. sibirica, Psydrax suaveolens*
MID SHRUBS (0-5% PFC)	Dominants: Others:	*Acacia ramulosa* var. *linophylla, Eremophila forrestii* *Rhagodia eremaea*
LOW SHRUBS (5-8% PFC)	Dominants: Others:	*Ptilotus obovatus, Eremophila flabellata* *Enchylaena tomentosa, Maireana convexa, M. georgei, M. trichoptera, Spartothamnella teucriiflora*
GRASSES (<1% PFC)	Others:	*Eriachne helmsii, Triodia concinna*

6.25.3 Gradational Associations

Pringle (1998) describes MUBW as occurring on slightly deeper and sometimes lighter loams than HPMS (hardpan plain mulga shrubland), and receiving more concentrated run-on. As a result, clumping of vegetation is generally less pronounced than in similar habitats.

The small occurrence of MUBW encountered in the currently survey appears to be in Very Good to Excellent condition.

6.25.4 Significant Flora

No significant flora recorded in this habitat.

6.26 Hardpan Plain Mulga Grove (GRMU)

6.26.1 Description

Pringle (1998) reports that GRMU is characteristic of gently inclined sheet flood plains from the Pilbara to the North Eastern Goldfields. Pringle (1998) states "Groves are generally contour-aligned arcuate bands of denser vegetation separated by comparably impoverished run-off areas. The groves have much deeper soil to hardpan and an abundance of tall shrubs with a morphology well suited to funnelling intercepted rain into the ground. This enhances soil moisture content in these fertile patches. The soils are usually red earths, occasionally light clays."

Mulga groves are often moderately close to closed tall shrublands, or less frequently low woodlands (Plate 41).

Plate 41 GRMU Hardpan Plain Mulga Grove.

6.26.2 Structure

TREES (5-25% PFC)	Dominants:	*Acacia sibirica,*
	Others:	*A. pruinocarpa, Acacia aneura* var. *tenuis*
MALLEES (0-4% PFC)	Others:	*Eucalyptus kingsmillii* subsp. *kingsmillii*
TALL SHRUBS (3-22% PFC)	Dominants:	*Acacia aneura* var. *tenuis, A. sibirica*
	Others:	*Acacia aneura* var. *aneura, A. ramulosa* var. *linophylla, A. tetragonophylla*
MID SHRUBS (0-8% PFC)	Dominants:	*Ptilotus obovatus, Acacia aneura* var. *tenuis, Psydrax latifolia*
	Others:	*Eremophila forrestii, E. spectabilis* subsp. *brevis, E. latrobei* subsp. *latrobei, E. clarkei, Rhagodia eremaea, Sida* sp. Excedentifolia*, Senna artemisioides* subsp. *artemisioides*
LOW SHRUBS (0-9% PFC)	Dominants:	*Acacia aneura* var. *tenuis, A. sibirica, Ptilotus obovatus*
	Others:	*Cheilanthes sieberi* subsp. *sieberi, Solanum lasiophyllum, Spartothamnella teucriiflora*

6.26.3 Gradational Associations

GRMU is very similar to the Acacia dominated drainage systems. In particular the groves are most similar to the DRAS (drainage tract Acacia shrubland) habitat.

GRMU is in Excellent to Pristine condition on the western side of the survey area (Plate 41). Where GRMU is found in the north western end of the current survey area it ranges in condition from Very

Good to Degraded condition (Plate 42). This is likely the result of a combination of factors including: historic timber removal; impact of fires (old fire scars evident); and impact of long term grazing on an area of rangeland in poor condition.

Plate 42 GRMU Very Good condition to Degraded condition.

6.26.4 Significant Flora

No significant flora recorded in this habitat.

6.27 Sandplain Mallee Spinifex Hummock Grasslands (SAMA)

6.27.1 Description

SAMA occurs on deep red sandy soils and consists of Triodia grasslands interspersed with mallee (Plate 43).

Plate 43 SAMA Sandplain Mallee Spinifex Hummock Grasslands.

6.27.2 Structure

MALLEES (8-10% PFC)	Dominants:	*Eucalyptus lucasii*
MID SHRUBS (0-2% PFC)	Dominants: Others:	*Acacia ?thoma* *Eremophila forrestii, Senna artemisioides* subsp. *x artemisioides*
LOW SHRUBS (1-2% PFC)	Dominants: Others:	*Eremophila forrestii, Acacia sibirica* *Acacia rhodophloia, Solanum lasiophyllum,*

GRASSES (9-11% PFC)	Dominants:	*Triodia concinna*
	Others:	*Eragrostis eriopoda*

6.27.3 Gradational Associations

The SAMA habitat was only encountered on the very western edge of the survey area. This area of had been extensively burnt in the past (7+ years); vegetation condition is Good.

6.27.4 Significant Flora

No significant flora recorded in this habitat.

6.28 Sandplain Mulga Spinifex Hummock Grassland (SAMU)

6.28.1 Description

Pringle (1998) summarises SAMU as often occurring adjacent to rock outcrops in sandplains, in areas subject to diffuse run-on, and often as a broad transitional zone between SASP (sandplain spinifex hummock grassland) and *Acacia aneura* sheet flood systems on hardpan plains including HPMS and HPMD (hardpan plain mulga shrublands or woodlands).

SAMU occurs as a scattered tall mulga shrubland over a hummock grass (Triodia) stratum (Plate 44).

Plate 44 SAMU Sandplain Mulga Spinifex Hummock Grassland.

6.28.2 Structure

TREES (1-9% PFC)	Dominants:	*Acacia sibirica*
	Others:	*Acacia aneura* var. *tenuis, A. aneura* var.?*aneura*
TALL SHRUBS (3-17% PFC)	Dominants:	*Acacia aneura* var. ?*microcarpa*
	Others:	*Acacia aneura* var. ?*aneura*
MID SHRUBS (0-9% PFC)	Dominants:	*Acacia aneura* var. ?*microcarpa*
	Others:	*Acacia ramulosa* var. *linophylla, Eremophila spectabilis, E. forrestii*
LOW SHRUBS (0-3% PFC)	Others:	*Acacia aneura* var. ?*microcarpa*, *Rhagodia eremaea, Solanum lasiophyllum, Abutilon oxycarpum* subsp. *prostratum* ms
GRASSES (5-60% PFC)	Dominants:	*Triodia concinna*
	Others:	*Monachather paradoxus, Eriachne helmsii, Eragrostis eriopoda*

6.28.3 Gradational Associations

SAMU grades into SASP (sandplain spinifex hummock grassland) as spinifex cover increases and the presence of *Acacia aneura* declines as the influence of surface water run-on diminishes and sand depth increases (Pringle, 1998).

The northern boundary of this habitat has been impacted by fire (Plate 44), with limited regeneration of the mid and upper stratum to date (which has made determining the boundary between SAMU and SASP quite difficult). Vegetation condition in the SAMU habitat varies from Excellent to Good.

6.28.4 Significant Flora

No significant flora recorded in this habitat.

6.29 Sandplain Spinifex Hummock Grassland (SASP)

6.29.1 Description

SASP consists of a Triodia grassland, where the hummock grass layer generally dominates in terms of projected foliar cover and biomass (Plate 45). Soils in this habitat tend to be deep earth red sands.

Plate 45 SASP Sandplain Spinifex Hummock Grassland.

6.29.2 Structure

MALLEES (0-3% PFC)	Others:	*Eucalyptus kingsmillii* subsp. *kingsmillii*
TALL SHRUBS (0-10% PFC)	Dominants: Others:	*Acacia aneura* var. ?*aneura*, A. ?*effusifolia* *Acacia jamesiana*
MID SHRUBS (0-15% PFC)	Dominants: Others:	*Acacia aneura* var. ?*aneura, A. ?effusifolia* *Acacia murrayana, Keraudrenia velutina* subsp. *elliptica, A. jamesiana*
LOW SHRUBS (1-8% PFC)	Others: Others:	*Keraudrenia velutina* subsp. *elliptica, Acacia aneura* var. ?*aneura* *Eremophila forrestii, E. flabellata, Solanum lasiophyllum, Leptosema chambersii*
GRASSES (4-60% PFC)	Dominants: Others:	*Triodia concinna* *Monachather paradoxus, Eriachne mucronata, Eragrostis eriopoda*

6.29.3 Gradational Associations

See Section 6.28.3.

Vegetation condition in the SASP habitat varies from Excellent to Good.

6.29.4 Significant Flora

No significant flora recorded in this habitat.

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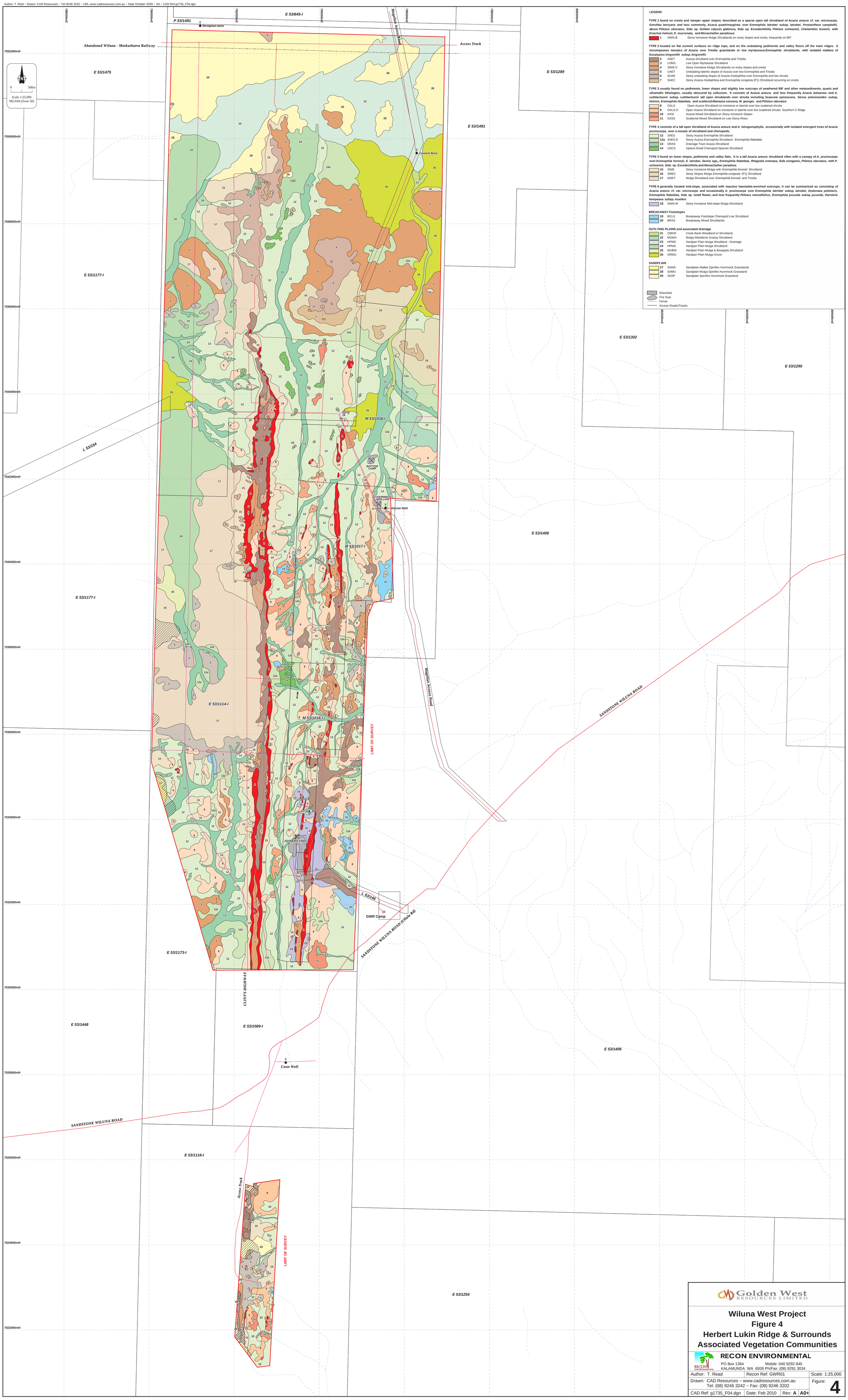

LEGEND:

TYPE 1 found on crests and steeper upper slopes; described as a sparse open tall shrubland of *Acacia aneura* cf. var. *microcarpa, Grevillea berryana* and less commonly, *Acacia quadrimarginea* over *Eremophila latrobei* subsp. *latrobei, Prostanthera campbellii,* above *Ptilotus obovatus, Sida* sp. Golden calyces glabrous, *Sida* sp. Excedentifolia, *Ptilotus schwartzii, Cheilanthes brownii,* with *Eriachne helmsii, E. mucronata,* and *Monachather paradoxus*

1	SIMS-B	Stony Ironstone Mulga Shrublands on rocky slopes and crests, frequently on BIF

TYPE 2 located on flat summit surfaces on ridge tops, and on the undulating pediments and valley floors off the main ridges. It encompasses mosaics of *Acacia* over *Triodia* grasslands or low myrtaceous-*Eremophila* shrublands, with isolated mallees of *Eucalyptus kingsmillii* subsp. *kingsmillii*.

2	ASET	Acacia shrubland over Eremophila and Triodia
3	LOMS	Low Open Myrtaceae Shrubland
4	SIMS-C	Stony Ironstone Mulga Shrublands on rocky slopes and crests
5	UAET	Undulating lateritic slopes of Acacia over low Eremophila and Triodia
6	SUAE	Stony undulating slopes of Acacia rhodophloia over Eremophila and low shrubs
7	SAEC	Stony Acacia rhodophloia and Eremophila congesta (P1) Shrubland occurring on crests

TYPE 3 usually found on pediments, lower slopes and slightly low outcrops of weathered BIF and other metasediments, quartz and ultramafic lithologies, usually obscured by colluvium. It consists of *Acacia aneura,* and less frequently *Acacia balsamea* and *A. cuthbertsonii* subsp. *cuthbertsonii* tall open shrublands over shrubs including *Scaevola spinescens, Senna artemisioides* subsp. *helmsii, Eremophila flabellata,* and scattered *Maireana convexa, M. georgei,* and *Ptilotus obovatus*

8	OALS	Open Acacia Shrubland on ironstone or laterite over low scattered shrubs
9	OALS-S	Open Acacia Shrubland on ironstone or laterite over low scattered shrubs Southern C Ridge
10	AXSI	Acacia Mixed Shrubland on Stony Ironstone Slopes
11	SXSS	Scattered Mixed Shrubland on Low Stony Rises

TYPE 4 consists of a tall open shrubland of *Acacia aneura* and *A. tetragonophylla,* occasionally with isolated emergent trees of *Acacia pruinocarpa,* over a mosaic of shrubland and chenopods.

12	SAES	Stony Acacia Eremophila Shrubland
12a	SAES-E	Stony Acacia Eremophila Shrubland *Eremophila flabellata*
13	DRAS	Drainage Tract Acacia Shrubland
14	USCS	Upland Small Chenopod Species Shrubland

TYPE 5 found on lower slopes, pediments and valley flats. It is a tall *Acacia aneura* shrubland often with a canopy of *A. pruinocarpa* over *Eremophila forrestii, E. latrobei, Senna* spp., *Eremophila flabellata, Rhagodia eremaea, Sida ectogama*, *Ptilotus obovatus,* with *P. schwartzii, Sida* sp. Excedentifolia and *Monachather paradoxa.*

15	SIME	Stony Ironstone Mulga with *Eremophila forrestii* Shrubland
16	SMEC	Stony Slopes Mulga *Eremophila congesta* (P1) Shrubland
17	MSET	Mulga Shrubland over *Eremophila forrestii* and Triodia

TYPE 6 generally located mid-slope, associated with massive haematite-enriched outcrops; it can be summarized as consisting of *Acacia aneura* cf. var. *microcarpa* and occasionally *A. pruinocarpa* over *Eremophila latrobei* subsp. *latrobei, Dodonaea petiolaris, Eremophila flabellata, Sida* sp. small flower, and less frequently *Ptilotus rotundifolius, Eremophila jucunda* subsp. *jucunda, Harnieria kempeana* subsp. *muelleri*.

18	SIMS-M	Stony Ironstone Mid-slope Mulga Shrubland

BREAKAWAY Footslopes

19	BCLS	Breakaway Footslope Chenopod Low Shrubland
20	BRXS	Breakaway Mixed Shrublands

OUTLYING PLAINS and associated drainage

21	CBKW	Creek Bank Woodland or Shrubland
22	MUWA	Mulga Wanderrie Grassy Shrubland
23	HPMD	Hardpan Plain Mulga Woodland - Drainage
24	HPMS	Hardpan Plain Mulga Shrubland
25	MUBW	Hardpan Plain Mulga & Bowgada Shrubland
26	GRMU	Hardpan Plain Mulga Grove

SANDPLAIN

27	SAMA	Sandplain Mallee Spinifex Hummock Grasslands
28	SAMU	Sandplain Mulga Spinifex Hummock Grassland
29	SASP	Sandplain Spinifex Hummock Grassland

Disturbed
Fire Scar
Fence
Access Roads/Tracks

Wiluna West Project
Figure 4
Herbert Lukin Ridge & Surrounds
Associated Vegetation Communities

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7. VEGETATION COMMUNITIES – DISCUSSION

7.1 Data-set comparison

7.1.1 Local: Herbert Lukin Ridge

Detailed vegetation mapping undertaken during the current survey indicates more habitat variability than the quadrat based assessment undertaken by Markey & Dillon (2007; 2009) and Jim's Seeds Weeds & Trees (2006). This is can be contributed to a number of factors including: the wider scope of the survey area (12,647 Ha); placement of the quadrats in the landscape; and data analysis.

The GWR quadrats were limited in their placement by being restricted to the three main ridges in the project area; some of the quadrats were also limited in their ability to provide useful data as they were placed across community boundaries or in boundary inter-zones and hence picking up species that may have provided more complete data sets in their true habitat types. The base assumption for the GWR dataset (Jim's Seeds Weeds & Trees, 2006) appears to have been to illustrate the differences in habitat types between the crest, mid-slope and footslope communities, which in turn has limited the number of communities the quadrats were able to represent for the Herbert Lukin Ridge and Wiluna West survey area.

The DEC quadrats were similarly more concentrated on the Ridges and uplands in the area (14 quadrats on Community Type 1; 14 quadrats on Community Type 2), than the plains between the ridges (Community Type 4 with two quadrats).

Like the GWR quadrats there were also a few DEC quadrats that were placed across community boundaries which consequently has the potential to limit the data analysis. An example of this is within Community Type 2. The GWR data analysis (Jim's Seeds Weeds & Trees, 2006) identified an *Aluta maisonneuvei* subsp. *auriculata* shrubland community (mapped in the current survey as LOMS); in the DEC analysis (Markey & Dillon, 2007) this community is included within Community Type 2. Part of the reason for this is that the DEC quadrats which covered the Aluta shrubland also straddled across the habitat boundary into the adjoining Acacia Triodia grasslands. It is essential to note here that Community Type 2 is recorded as being a mosaic of these habitats – this example is only provided to highlight differences in data collection and analysis.

The quadrats placed along the Herbert Lukin Ridge area have been concentrated on the ridges in the area due to the presence of BIF. As stated by Gibson (2009) "work undertaken by DEC and others in the early 1990's indicated that some of the Banded Ironstone Formation ranges of the Yilgarn were a repository for localised endemic plant species and restricted vegetation communities". Gibson (2009) also went on to summarise the finding of the work undertaken to date by DEC: "in terms of vegetation composition the mid and upper slope communities are those communities which are mostly different between ranges". These findings explain the underlying assumption of both quadrat based studies in the area where the quadrats were concentrated on the mid and upslope communities in the landscape in an effort to identify significant flora and restricted vegetation communities associated with the BIF in the Joyner's Find Hills.

Following the completion of the current regional vegetation mapping, a newly proposed PEC boundary has been outlined as per the vegetation communities defined by Markey & Dillon (2007; Section 4.1) and Section 6 of this document, and the mapped surface geology of the area, as shown in Figure 2.

As the current survey covers not only the BIF ridges but also extends across the adjacent hills and plains, additional habitats were encountered that were not associated with BIF and hence not a part of the Wiluna West PEC as indicated in Figure 2.

SIMS-M, a habitat type generally found in the mid slope area, is the only habitat restricted in occurrence to the BIF ridges. As stated by Markey and Dillon (2007) SIMS-M shows affinity with both the upland communities (particularly SIMS-B and SIMS-C), and the lower slope community (SAES). It is likely this habitat is an interzonal community between the steeper upper ridges and the footslopes.

All habitat types (except SIMS-M) that were mapped within the proposed PEC boundary were also found to extend outside of the proposed PEC boundary (Table 6). While the SIMS-B habitat was mapped in two small locations outside of the proposed PEC boundary (two isolated BIF outcrops on the south end of C Ridge, south of the Sandstone Wiluna Rd; the second a very small outcrop of ironstone (not BIF) near the western survey boundary), these occurrences of the SIMS-B habitat

were extremely restricted and the majority of this habitat type was found to be within the PEC boundary, and associated with BIF.

TABLE 6 VEGETATION HABITATS WITHIN THE PROPOSED PEC BOUNDARY.

Vegetation Type	Habitat	Proportion of Survey Area (Total Area 12,647 Ha)	Mapped Within Proposed PEC Boundary	Restricted to PEC Boundary – within Limit of Survey
1	SIMS-B	2.0%	Yes	No
2	ASET	2.9%	Yes	No
2	LOMS	0.8%	Yes	No
2	SIMS-C	6.9%	Yes	No
2	UAET	2.1%	Yes	No
2	SUAE	2.2%	Yes	No
2	SAEC	0.4%	No	
3	OALS	5.8%	Yes	No
3	OALS-S	0.6%	No	
3	AXSI	0.4%	Yes	No
3	SXSS	0.7%	Yes	No
4	SAES	20.7%	Yes	No
4	SAES-E	2.9%	Yes	No
4	DRAS	6.5%	Yes	No
4	USCS	0.4%	Yes	No
5	SIME	5.9%	Yes	No
5	SMEC	2.5%	No	
5	MSET	8.5%	Yes	No
6	SIMS-M	0.8%	Yes	Yes
Breakaway	BCLS	0.3%	No	
Breakaway	BRXS	0.4%	No	
Drainage	CBKW	0.3%	No	
Mulga Plains	MUWA	0.6%	No	
Mulga Plains	HPMD	6.1%	No	
Mulga Plains	HPMS	7.0%	No	
Mulga Plains	MUBW	0.3%	No	
Mulga Plains	GRMU	3.6%	No	
Sandplain	SAMA	0.1%	No	
Sandplain	SAMU	2.5%	No	
Sandplain	SASP	5.0%	No	
Disturbed areas (including main access tracks & historic mining areas)		0.7%		

The current study has also provided a good indication of Priority Flora distribution in the survey area (Figure 3). Examination of Figure 3 and species distribution plans on Florabase (WAHERB, 2010) indicate that most of the significant species that have been identified in the Wiluna West Project area are not limited or restricted to the BIF; and that all species of Priority flora identified in the survey area are found in other areas outside of the limit of survey.

Those Priority species that are restricted to the BIF associated habitats within the survey area include *Beyeria lapidicola* (P1) and *Prostanthera ferricola* (P3). *Beyeria lapidicola* is particularly of significance due to it's limited distribution in WA (only known from three other BIF ranges as shown in Florabase (WAHERB, 2010)); and despite extensive searches in the Herbert Lukin Ridge & Surrounds survey area, it is only known from one location (in the Herbert Lukin Ridge & Surrounds survey area), on the eastern side of C-Ridge occurring in the SIMS-B and SIME habitats.

The undescribed species *Sida* sp. Wiluna (Markey & Dillon, 4126) was found to occur across a wider range of habitats, than was previously known. While it occurs in higher densities on the BIF (SIMS-B and SIMS-M habitats) than was generally true for other sites, it was collected from a widespread area across the survey area (Figure3).

7.1.2 Regional: Yilgarn Craton

A study undertaken by Gibson *et al.* (2007) looked into the conservation status of flora in the Yilgarn BIF ranges. It examined patterns in distribution of threatened, rare and poorly known taxa and patterns in endemism on a subset of the 25 of these BIF ranges most prospective for mining (Plate 46).

The data collated was used to identify taxa with distributions restricted or largely restricted to the BIF ranges. The analysis of the 25 BIF ranges identified:

- 24 taxa endemic to BIF and restricted to a single range: no known locally endemic taxa are restricted to the Joyner's Find Hills;
- 6 taxa endemic to BIF with distributions covering several ranges: including *Beyeria lapidicola* (P1) of which there is one known population in the Joyner's Find Hills;
- 14 taxa with distributions centred on BIF ranges (includes taxa which have only occasionally been collected or seen off BIF, and taxa that are restricted to BIF ranges but also grow on laterized BIF): including *Prostanthera ferricola* (P3) which has been recorded in low numbers in the Joyner's Find Hills;
- that a flora of at least 300 taxa per range may be expected: the Markey and Dillon (2007) survey reported a total of 192 taxa and 10 hybrids from their study of the Joyner's Find Hills, which is significantly lower than the 300 taxa suggested; this may be due to these hills being in a more arid climatic zone than many of the other ranges they are compared to (refer Plate 46).

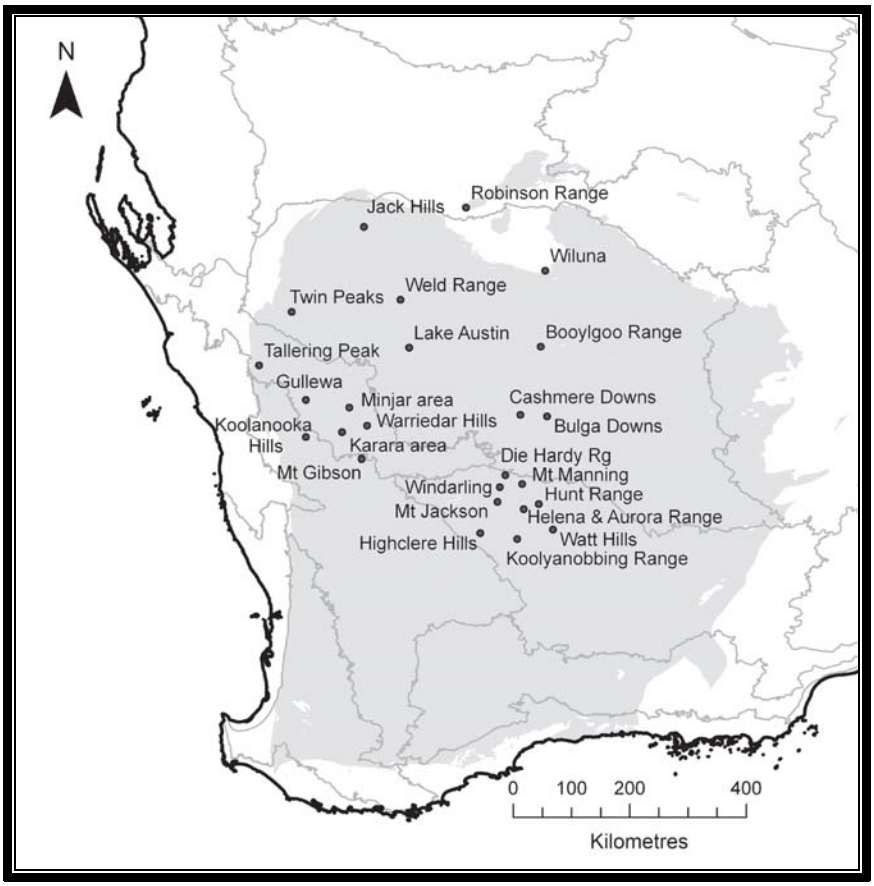

Plate 46 Showing the IBRA bioregions in WA, the extent of the Yilgarn Craton (shaded), and the locations of the 25 BIF ranges included in the Gibson *et al.* (2007) study[3]

The DEC (2007) report examining biodiversity values and conservation requirements of these BIF ranges summarises the more arid ranges surveyed by DEC in 2006 (including Robinson Range, Booylgoo Range, Wiluna West (Joyner's Find Hills), Cashmere Downs, Bulga Downs and Wolla Wolla / Gullewa) stating that preliminary results suggest while each of the systems surveyed appear floristically distinct from one other (in line with the 2005 survey results and confirming Beard's large scale mapping work), "the ranges appear less diverse with fewer geographically restricted vegetation units than those surveyed in 2005" (including Jack Hills, Weld Range, Koolanooka Hills, Mt Karara / Mungada Ridge/Blue Hills, Minjar / Gnows Nest, Warriedar Hill / Pinyalling, Mt Gibson).

This is supported by Gibson *et al.* (2007) who state "The degree of endemism and number of DRF and Priority Flora vary considerably between the BIF ranges. On current data some ranges (such as Helena and Aurora Range, Koolanooka Hills, Mt Jackson, Mt Gibson and Karara) have much higher conservation significance than others."

7.2 Significance of Vegetation Communities

When examining the distribution and composition of each of the vegetation units identified in the current survey, and taking into consideration the presence of rare flora, it is possible to give an assessment of how significant a habitat is in a local and regional context.

The current survey lies across the tentative boundary of the Wiluna West Priority Ecological Community (P1) (Section 4, Figure 2); as such the plant assemblage of the Herbert Lukin Ridge & Surrounds fall within this PEC; hence those vegetation communities which are restricted to the Herbert Lukin Ridge are of significance (Table 6). This is particularly relevant to those habitats with a number of Priority Flora (Tables 7 and 8).

[3] As shown on page 4 Gibson *et al.* (2007).

TABLE 7 SIGNIFICANT VEGETATION COMMUNITIES.

Community Type	Habitat	Level of Significance	Assessment
1	SIMS-B	Regional	Mostly this habitat is restricted in distribution to the Wiluna West PEC. Presence of Significant & Priority Flora, including BIF endemic flora.
2	ASET	Regional	Occurs within the PEC Presence of Priority Flora, including BIF endemic flora.
2	LOMS	Regional	Occurs within the PEC. Presence of Significant & Priority Flora, including BIF endemic flora.
2	SIMS-C	Regional	Occurs within the PEC. Presence of Significant & Priority Flora, including BIF endemic flora.
2	UAET	Local	Occurs within the PEC. Presence of Significant Flora.
2	SUAE	Local	Occurs within the PEC.
2	SAEC	Local	Presence of Priority Flora.
3	OALS	Local	Occurs within the PEC. Presence of Significant & Priority Flora.
3	OALS-S	Local	Presence of Significant & Priority Flora.
3	AXSI	Local	Occurs within the PEC. Presence of Significant Flora.
3	SXSS	Local	Occurs within the PEC. Presence of Priority Flora.
4	SAES	Local	Occurs within the PEC. Presence of Priority Flora.
4	DRAS	Local	Occurs within the PEC. Presence of Priority Flora.
4	USCS	Local	Occurs within the PEC.
5	SIME	Regional	Occurs within the PEC. Presence of Malleefowl and Priority Flora, including BIF endemic flora.
5	SMEC	Local	Presence of Priority Flora.
5	MSET	Local	Occurs within the PEC.
6	SIMS-M	Regional	Restricted to within the PEC. Presence of Significant & Priority Flora.
Breakaways	BCLS	Local	Presence of Priority Flora.
Breakaways	BRXS	Local	Presence of Significant & Priority Flora.

The upland communities, in particular the communities associated with BIF and BIF endemic flora (*Beyeria lapidicola* (P1) and *Prostanthera ferricola* (P3)), are of regional significance due to the restricted distribution of the BIF endemic species; and resulting from the limited distribution of the plant assemblages of these habitats (SIMS-B and SIMS-M).

The SIME habitat is also of regional significance due to the presence of BIF endemic flora (*Beyeria lapidicola* (P1)) and the known presence of Malleefowl mounds in the survey area. The Malleefowl (*Leipoa ocellata*) are protected under Commonwealth and State legislation. They are listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation*

(EPBC) Act 1999 and are a Schedule 1 species under the Western Australian *Wildlife Conservation (Specially Protected Fauna) Notice 2008*.

The breakaway communities (BCLS, BRXS, OALS) and their associated uplands are of significance due to their fragile nature, and the restricted distribution of some of their Priority Flora (*Ptilotus chrysocomus* (P1), and *Maireana prosthecochaeta* (P3)).

TABLE 8 SIGNIFICANT FLORA IDENTIFIED WITHIN EACH HABITAT.

Community Type	Habitat	Significant Flora
1	SIMS-B	*Beyeria lapidicola* (P1), *Eremophila congesta* (P1), *Homalocalyx echinulatus* (P3), *Tribulus adelacanthus* (P3), *Baeckea* sp. Melita Station (P4), *Sida* sp. Wiluna (Markey & Dillon 4126)
2	ASET	*Eremophila congesta* (P1), *Prostanthera ferricola* (P3)
2	LOMS	*Homalocalyx echinulatus* (P3), *Prostanthera ferricola* (P3)
2	SIMS-C	*Eremophila congesta* (P1), *Eremophila ?anomala* (P1), *Prostanthera ferricola* (P3), *Baeckea* sp. Melita Station (P4), *Sida* sp. Wiluna (Markey & Dillon 4126)
2	UAET	*Sida* sp. Wiluna (Markey & Dillon 4126)
2	SAEC	*Eremophila congesta* (P1)
3	OALS	*Ptilotus chrysocomus* (P1), *Calytrix uncinata* (P3), *Eremophila arachnoides* subsp. *arachnoides* (P3), *Ptilotus luteolus* (P3), *Prostanthera ferricola* (P3), *Baeckea* sp. Melita Station (P4), *Sida* sp. Wiluna (Markey & Dillon 4126)
3	OALS-S	*Calytrix uncinata* (P3), *Baeckea* sp. Melita Station (P4)
3	AXSI	*Sida* sp. Wiluna (Markey & Dillon 4126)
3	SXSS	*Ptilotus luteolus* (P3)
4	SAES	*Ptilotus chrysocomus* (P1), *Eremophila ?anomala* (P1), *Eremophila arachnoides* subsp. *arachnoides* (P3)
4	DRAS	*Olearia mucronata* (P3)
5	SIME	*Beyeria lapidicola* (P1), *Eremophila congesta* (P1)
5	SMEC	*Eremophila congesta* (P1)
6	SIMS-M	*Olearia mucronata* (P3), *Baeckea* sp. Melita Station (P4), *Sida* sp. Wiluna (Markey & Dillon 4126)
Breakaways	BCLS	*Ptilotus chrysocomus* (P1), *Eremophila ?anomala* (P1), *Calytrix uncinata* (P3), *Maireana prosthecochaeta* (P3), *Olearia mucronata* (P3)
Breakaways	BRXS	*Ptilotus chrysocomus* (P1), *Calytrix uncinata* (P3), *Olearia mucronata* (P3), *Sauropus ramosissimus* (P3), *Baeckea* sp. Melita Station (P4), *Sida* sp. Wiluna (Markey & Dillon 4126)

7.3 Recommendations

It is recommended the following strategies are taken under consideration to assist in the management of potential impacts to the vegetation and flora around the Wiluna West Project area.

7.3.1 Significant Flora

This survey has provided a broad overview of Priority and significant flora species found in the Herbert Lukin Ridge & Surrounds area. Further work is required to comprehensively map the distribution and abundance of each priority species found within the Joyner's Find Hills.

It is recommended:

- that where Priority Flora populations are small (such as *Olearia mucronata, Prostanthera ferricola*), they are counted and mapped; where larger, extensive populations occur (including *Homalocalyx echinatus, Baeckea* sp. Melita Station, *Calytrix uncinata*), they have boundaries mapped and an estimation of abundance made within populations.
- that where possible the final footprint area for the proposed Wiluna West Project be modified to avoid all known populations of Priority Flora. Where this is not possible, it will be necessary to determine the proportion of the population of each species of Priority Flora that will be impacted by the proposed Wiluna West Project.
- that any Priority Flora impacted on within the Herbert Lukin Ridge & Surrounds be recorded in cumulative impact tables in order to record impacts on populations.
- that the *Sida* sp. Wiluna (Markey & Dillon 4126) be continually monitored in order to collect mature fruits for submission to the WAHERB; and that further flowering specimens be submitted to the WAHERB.

7.3.2 Surface Disturbance

Where clearing is to occur it is recommended that the following strategies be implemented:

- Areas to be cleared must be clearly defined to prevent unnecessary clearing.
- All care to be taken to minimise impacts to any known population of rare flora.
- Any priority flora adjacent to an area to be cleared, to be marked with flagging tape.
- Machinery operators be advised prior to starting, that any vegetation marked in such a way is to be protected and left undisturbed.
- Off-road driving should be limited to the immediate project area as required during the course of normal safe operations.
- Clearing and handling of topsoil or subsoil only to be undertaken when the soil is dry – this will assist in maintaining the viability of soil microbes and the seed store in the topsoil.
- As part of the clearing process it is necessary to push up, track-roll and stockpile all vegetative material; followed by the topsoil layer, then the subsoil so there are three stockpiles of material to push back over re-profiled slopes or newly rehabilitated areas.
- Where the topsoil is not able to be utilised directly into newly re-profiled rehabilitation areas, then topsoil stockpiles are to be no higher than 1.5m, and preferentially in windrows.
- Vegetative matter, logs, topsoil and rocks should be returned to areas that have been disturbed and in need of rehabilitation. These materials assist with rehabilitation processes by providing seed stores, moisture traps and fauna micro-habitats.

7.3.3 Rehabilitation

- Undertaking progressive rehabilitation using topsoil recently pushed where possible will assist a higher rate of natural colonisation and endemic species recruitment.
- Seeding of the completed earthworks to be undertaken using endemic species in the seed mix, ideally to have been collected in current survey area. It is recommended a different seed mix be used for each type of rehabilitated landform (eg hill slope, flat, drainage line)

and that the species list for each mix be derived from similar landforms found in the surrounding landscape to the Wiluna West Project area.

- It is recommended that rehabilitation is undertaken in accordance with EPA Guidance Statement 6: *Rehabilitation of Terrestrial Ecosystems.*

7.3.4 Drill Site Rehabilitation

- That a drill site rehabilitation (DSR) program be implemented at the completion of any drilling program where all drill holes are located and capped according to DMP (Department of Mines and Petroleum) requirements; and
- All unused exploration tracks be deep ripped.

7.3.5 Weed Management

- Strict vehicle hygiene is to be adhered to, so as to minimise the spread of invasive weeds.
- All earth moving and mobile equipment to be cleaned prior to moving to or from the project area.
- Education of all site personnel, including contractors with respect to the appearance, significance, and impacts of weed species. It is important to note how these species can be inadvertently dispersed through bushland areas by clothing, footwear or machinery.
- Monitoring of rehabilitation and impact areas should pay particular attention to the presence of weed species to ensure there has been no introduction of weed species to new areas during exploration activities; should weed populations be noted it may be necessary to undertake species specific control measures.

7.3.6 Monitoring

It is recommended that a monitoring program be developed and implemented for the priority flora populations around operational areas to assist in managing potential impacts. Such a program would need to be monitored six monthly while active mining operations are ongoing, and should record population numbers and condition.

It is recommended a suitable monitoring program be developed and implemented for rehabilitation areas. Initially the program should entail a visual monitoring component recording species germination; site stability; and if any additional seeding or earthworks are required; it should also be looking to identify if any priority flora are present. This visual component should be undertaken at least six monthly for the first two years. Ecosystem Function Analysis (EFA) or a similar monitoring technique should be undertaken in the second or third year (following seeding) and reassessed every three years (not more than every second year).

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Appendix I Priority Ecological Community Definitions.

DEFINITIONS AND CRITERIA FOR PRIORITY ECOLOGICAL COMMUNITIES[4]

Ecological Community
A naturally occurring biological assemblage that occurs in a particular type of habitat.
Note: The scale at which ecological communities are defined will often depend on the level of detail in the information source, therefore no particular scale is specified.

A **threatened ecological community** (TEC) is one which is found to fit into one of the following categories; "presumed totally destroyed", "critically endangered", "endangered" or "vulnerable". Possible threatened ecological communities that do not meet survey criteria are added to DEC's

PRIORITY ECOLOGICAL COMMUNITY LIST

Possible threatened ecological communities that do not meet survey criteria or that are not adequately defined are added to the Priority Ecological Community Lists 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 with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) and for which current threats exist. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.

Priority Two: Poorly-known ecological communities

Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, State forest, unallocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.

Priority Three: 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 within 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 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: Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.

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.

[4] As defined by DEC 2009:
http://www.dec.wa.gov.au/management-and-protection/threatened-species/wa-s-threatened-ecological-communities.html

Appendix II Herbert Lukin Ridge & Surrounds: Background Species Lists

Family	Species	Vegetation surveys undertaken in the Wiluna West Project Area &Along Herbert Lukin Ridge. [5]										
		DEC	Botanica Reports									
			A	B	C	D	E	F	G	H	I	J
Pteridaceae	*Cheilanthes brownii*	+										
	Cheilanthes sieberi subsp. *sieberi*	+		+	+		+		+	+	+	+
Hemerocallidaceae	*Dianella revoluta*						+					
Asparagaceae	*Thysanotus manglesianus*	+										
Cyperaceae	*Bulbostylis barbata*	+										
	Callitris columellaris						+					
	Cyperus squarrosus	+										
Poaceae	*Aristida contorta*	+		+	+	+	+			+		
	Aristida holathera var. *holathera*	+										
	Aristida obscura	+										
	Austrostipa elegantissima	+										
	Austrostipa nitida				+							
	Brachyachne prostrata	+										
	Cymbopogon ambiguus						+					
	Digitaria brownii	+										

[5] DEC Markey, A.S. and Dillon S.J. (2007). Draft: Flora and vegetation of the Banded Iron Formation of the Yilgarn Craton: Joyner's Find Hills. Science Division, DEC, Wanneroo

A Jim's Seeds, Weeds & Trees (2005). Vegetation Survey of Tenements M53/1016 and L53/148 (Proposed Haul Road). Unpublished report prepared for Golden West Resources, September 2005.

B Jim's Seeds, Weeds & Trees (2006). Flora and Vegetation of the Wiluna West Banded Ironstone Formations. Unpublished report prepared for Golden West Resources, September 2006.

C Botanica Consulting (2007a). Draft: Flora Survey of the Bowerbird Project and Related Haul Road (within M53/1016, M53 1017, M53/1018, M53/1078, M53/1089). Unpublished report prepared for Golden West Resources - Wiluna West Project, April 2007.

D Botanica Consulting (2007b). Draft: Flora and Vegetation Survey of Four Proposed Gravel Pits. Unpublished Report prepared for Golden West Resources, May 2007.

E Botanica Consulting (2007c). Flora Survey for GWR Proposed POW (within E53/1116). Unpublished report prepared for Golden West Resources, July 2007.

F Botanica Consulting (2007d). Flora Survey for GWR Proposed POW. Unpublished report prepared for Golden West Resources, December 2007.

G Botanica Consulting (2007e). Flora Survey for GWR Proposed POW's (within E53/1114, E53/1116, E53/1173, M53/1016, M53/1017, M53/1018, M53/1078, L53/146). Unpublished report prepared for Golden West Resources, December 2007.

H Botanica Consulting (2008a). Draft: Banded Ironstone Formation and Associated Vegetation Mapping (within M53/1016, M531017, M53/1018, M53/1078, M53/1089). Unpublished report prepared for Golden West Resources - Wiluna West Project, March 2008.

I Botanica Consulting (2008b). Flora Survey for GWR Proposed POW's (within M53/1016, M53/1017, M53/1018, M53/1078, E53/1089). Unpublished report prepared for Golden West Resources, April 2008.

J Botanica Consulting (2008c). Flora Survey for GWR Proposed POW's 20, 21, & 22 (within M53/1016, M53/1017, M53/1018, M53/1078, E53/1114, E53/1173). Unpublished report prepared for Golden West Resources, October 2008.

Family	Species	Vegetation surveys undertaken in the Wiluna West Project Area &Along Herbert Lukin Ridge. [5]										
		DEC	Botanica Reports									
			A	B	C	D	E	F	G	H	I	J
	Enneapogon caerulescens	+										
	Enneapogon polyphyllus			+						+		
	Eragrostis dielsii	+										
	Eragrostis eriopoda	+	+	+		+					+	+
	Eragrostis lacunaria	+										
	Eragrostis pergracilis	+										
	Eragrostis setifolia						+					
	Eriachne helmsii	+										
	Eriachne ?helmsii			+						+		
	Eriachne mucronata	+										
	Eriachne pulchella			+	+	+				+	+	+
	Eriachne pulchella subsp. *dominii*	+										
	Eriachne pulchella subsp. *pulchella*	+										
	Monachather paradoxus	+		+						+		
	Paspalidium ?clementii			+						+	+	+
	Paspalidium basicladum	+										
	Thyridolepis mitchelliana	+										
	Thyridolepis multiculmis	+										
	Triodia concinna	+										
	Triodia melvillei	+	+	+	+	+	+	+		+	+	+
	Tripogon loliiformis	+										
Proteaceae	*Grevillea berryana*	+	+	+	+	+	+	+		+	+	+
	Grevillea juncifolia subsp. *juncifolia*						+					
	Grevillea striata		+									
	Hakea francisiana						+					
	Hakea kippistiana		+	+			+			+		
	Hakea leucoptera subsp. *sericipes*	+										
	Hakea lorea subsp. *lorea*		+									
	Hakea preissii				+							
	Hakea recurva subsp. *recurva*	+										

Family	Species	Vegetation surveys undertaken in the Wiluna West Project Area &Along Herbert Lukin Ridge. [5]									
		DEC	Botanica Reports								
			A	B	C	D	E	F	G	H	I	J
Dilleniaceae	*Hibbertia ?arcuata*		+									
Haloragaceae	*Haloragis odontocarpa*									+		
	Haloragis odontocarpa forma *pterocarpa*	+										
	Haloragis trigonocarpa	+								+		
Zygophyllaceae	*Tribulus adelacanthus* (P3)	+										
	Tribulus astrocarpus	+										
	Tribulus hirsutus			+						+		
	Tribulus platypterus			+						+		
	Tribulus suberosus	+	+									
	Zygophyllum eichleri	+										
	Zygophyllum iodocarpum		+	+						+		
Fabaceae	*Acacia acuminata*		+									
	Acacia aneura		+	+	+	+	+	+		+	+	+
	Acacia aneura fine leaf						+					
	Acacia aneura var. *aneura*				+							
	Acacia aneura var. *conifera*				+							
	Acacia aneura var. cf. *microcarpa*	+										
	Acacia aneura var. cf. *aneura*	+										
	Acacia aneura var. cf. *tenuis*	+										
	Acacia aneura var. cf. *argentea*	+										
	Acacia aneura x craspedocarpa	+										
	Acacia balsamea	+									+	
	Acacia burkittii	+		+	+	+		+		+	+	+
	Acacia coolgardiensis subsp. *effusa*						+					
	Acacia craspedocarpa		+	+	+	+	+	+		+	+	+
	Acacia cuthbertsonii subsp. *cuthbertsonii*	+	+		+	+	+	+			+	+
	Acacia ?cuthbertsonii subsp. *cuthbertsonii*			+						+		
	Acacia hemiteles		+									
	Acacia ligulata						+					
	Acacia linophylla		+									

Family	Species	Vegetation surveys undertaken in the Wiluna West Project Area &Along Herbert Lukin Ridge. [5]										
		DEC	Botanica Reports									
			A	B	C	D	E	F	G	H	I	J
	Acacia pachyacra						+					
	Acacia pruinocarpa	+	+	+	+	+	+	+		+	+	+
	Acacia quadrimarginea	+	+	+	+	+	+	+			+	+
	Acacia ramulosa						+					
	Acacia ?ramulosa var. *linophylla*		+									
	Acacia ramulosa var. *linophylla*	+			+						+	+
	Acacia rhodophloia	+	+	+	+	+	+			+	+	+
	Acacia sibirica	+										
	Acacia tetragonophylla	+	+	+	+	+	+	+		+		
	Acacia thoma	+										
	Acacia ?xanthocarpa		+									
	Leptosema chambersii						+					
	Mirbelia rhagodioides	+	+									
	Mirbelia ?rhagodioides				+							
	Rhynchosia cf. *minima*	+										
	Senna artemisioides subsp. *artemisioides*			+	+	+	+			+		
	Senna artemisioides subsp. *x artemisioides x* subsp. *x sturtii*	+										
	Senna artemisioides subsp *x helmsii x glaucifolia* (Markey & Dillon 4717)	+										
	Senna artemisioides subsp. *x helmsii x glaucifolia x oligophylla* (Markey & Dillon 4312)	+										
	Senna artemisioides subsp. aff. *helmsii* (R. Meissner & B. Bayliss 1432)	+										
	Senna artemisioides subsp. *filifolia*	+	+	+			+			+		
	Senna artemisioides subsp. *helmsii*	+	+	+	+		+	+		+		
	Senna artemisioides subsp. *sturtii*		+		+							
	Senna cardiosperma										+	+
	Senna glaucifolia	+			+							
	Senna glaucifolia x sp. Meekatharra (E. Bailey 1-26) (Markey & Dillon 3149)	+										
	Senna glutinosa subsp. *chatelainiana*		+	+	+	+		+		+	+	+

Family	Species	Vegetation surveys undertaken in the Wiluna West Project Area &Along Herbert Lukin Ridge. [5]										
		DEC	Botanica Reports									
			A	B	C	D	E	F	G	H	I	J
	Senna glutinosa subsp. *chatelainiana x charlesiana* (Markey & Dillon 3413)	+										
	Senna glutinosa subsp. *luerssenii*	+										
	Senna sp. Austin (A. Strid 20210)	+										
	Senna sp. Meekatharra (E. Bailey 1-26)	+										
	Swainsona canescens	+										
	Swainsona kingii	+										
Polygalaceae	*Emex australis**			+						+		
	Polygala isingii	+		+						+		
Rhamnaceae	*Stenanthemum petraeum*	+	+	+	+	+		+		+	+	+
Casuarinaceae	*Casuarina pauper*	+										
Celastraceae	*Stackhousia muricata*						+					
Oxalidaceae	*Oxalis perennans*	+										
Euphorbiaceae	*Beyeria lapidicola* (P1)	+										
	Euphorbia boophthona	+										
	Euphorbia drummondii subsp. *drummondii*	+		+						+	+	+
	Euphorbia tannensis subsp. *eremophila*	+										
Phyllanthaceae	*Phyllanthus erwinii*	+										
Geraniaceae	*Erodium cygnorum*	+	+									
	Erodium crinitum			+						+		
Myrtaceae	*Aluta maisonneuvei*				+		+					
	Aluta maisonneuvei subsp. *auriculata*	+	+	+			+	+	+	+	+	
	Aluta maisonneuvei subsp. *maisonneuvei*					+						
	Baeckea sp. Melita Station (H. Pringle 2738) (P4)	+	+	+		+		+		+	+	
	Calothamnus aridus						+					
	Calytrix carinata		+									
	Calytrix desolata	+						+	+		+	
	Calytrix uncinata (P3)	+	+			+	+	+			+	
	Calytrix sp.				+							
	Corymbia deserticola						+					

Family	Species	Vegetation surveys undertaken in the Wiluna West Project Area &Along Herbert Lukin Ridge. [5]									
		DEC	Botanica Reports								
			A	B	C	D	E	F	G	H	I	J
	Eucalyptus camaldulensis		+									
	Eucalyptus carnei	+	+									
	Eucalyptus kingsmillii		+	+	+		+	+		+	+	+
	Eucalyptus kingsmillii subsp. *kingsmillii*	+										
	Eucalyptus leptopoda						+					
	Eucalyptus lucasii						+					
	Eucalyptus oldfieldii						+					
	Micromyrtus flaviflora						+					
	Homalocalyx echinulatus (P3)	+			+						+	+
	Thryptomene decussata	+	+	+	+					+		
Sapindaceae	*Dodonaea microzyga* var. *acrolobata*	+		+	+			+		+		
	Dodonaea ?microzyga var. *acrolobata*		+									
	Dodonaea petiolaris	+										
	Dodonaea rigida	+	+	+						+		
	Dodonaea viscosa				+							
	Dodonaea viscosa subsp. *mucronata*		+									
	Dodonaea viscosa subsp. *spatulata*		+	+			+			+		
Malvaceae	*Abutilon cryptopetalum*	+										
	Abutilon otocarpum										+	+
	Abutilon oxycarpum subsp. *prostratum*	+										
	Hibiscus burtonii	+	+	+						+		
	Hibiscus gardneri	+										
	Hibiscus solanifolius	+										
	Hibiscus sturtii						+					
	Hibiscus ?sturtii			+						+		
	Keraudrenia velutina subsp. *elliptica*						+					
	Sida calyxhymenia		+	+		+	+	+		+	+	+
	Sida ectogama	+	+									
	Sida fibulifera			+						+		
	Sida sp. dark fruits (S. van Leeuwen 2260)	+		+	+		+			+		

Family	Species	Vegetation surveys undertaken in the Wiluna West Project Area &Along Herbert Lukin Ridge. [5]									
		DEC	Botanica Reports								
			A	B	C	D	E	F	G	H	I	J
	Sida sp. Excedentifolia (J.L. Egan 1925)	+		+						+	+	+
	Sida aff. sp. Golden calyces glabrous					+						
	Sida. sp. Golden calyces glabrous (H.N. Foote 32)	+		+	+					+	+	+
	Sida sp. Wiluna (Markey & Dillon 4126)	+										
	Sida sp. (sterile)				+			+			+	+
	Sida sp. verrucose glands (F.H. Mollemans 2423)	+										
Santalaceae	*Anthobolus leptomerioides*	+										
	Exocarpos aphyllus		+		+							
	Exocarpos sparteus						+					
	Santalum acuminatum		+	+	+					+		
	Santalum lanceolatum	+	+									
	Santalum spicatum	+		+	+	+		+		+		
Loranthaceae	*Amyema fitzgeraldii*				+							
	Amyema gibberula var. *tatei*	+										
	Amyema hilliana	+										
	Amyema ?nestor			+						+		
	Lysiana murrayi	+										
Frankeniaceae	*Frankenia pauciflora*		+									
Amaranthaceae	*Amaranthus mitchellii*	+										
	Ptilotus aervoides	+		+						+		
	Ptilotus albidus		+					+				
	Ptilotus luteolus (P3)	+										
	Ptilotus chrysocomus (P1)		+									
	Ptilotus exaltatus	+		+						+		
	Ptilotus exaltatus var. *villosus*			+						+		
	Ptilotus gaudichaudii var. *gaudichaudii*	+										
	Ptilotus helipteroides	+		+						+		
	Ptilotus helipteroides subsp. *helipteroides*				+							
	Ptilotus obovatus	+	+	+	+	+	+	+		+	+	+
	Ptilotus polystachyus			+						+		

Family	Species	Vegetation surveys undertaken in the Wiluna West Project Area &Along Herbert Lukin Ridge. [5]										
		DEC	Botanica Reports									
			A	B	C	D	E	F	G	H	I	J
	Ptilotus polystachyus var. *polystachyus*	+			+							
	Ptilotus roei	+										
	Ptilotus rotundifolius	+	+									
	Ptilotus schwartzii	+	+	+	+	+		+		+	+	+
	Ptilotus sp.			+						+		
Chenopodiaceae	*Atriplex codonocarpa*	+										
	Atriplex quinii		+									
	Dysphania melanocarpa forma *melanocarpa*	+										
	Dysphania saxatilis	+										
	Dysphania glomulifera subsp. *eremaea*	+										
	Dysphania kalpari	+		+						+		
	Enchylaena tomentosa						+					
	Enchylaena tomentosa var. *tomentosa*	+										
	Maireana carnosa	+	+				+					
	Maireana convexa	+	+				+					
	Maireana georgei	+	+	+	+		+			+		
	Maireana glomerifolia		+									
	Maireana melanocoma	+										
	Maireana planifolia	+										
	Maireana planifolia x villosa (Markey & Dillon 3479)	+										
	Maireana prosthecochaeta (P3)		+									
	Maireana thesioides	+										
	Maireana tomentosa		+									
	Maireana tomentosa subsp. *tomentosa*	+										
	Maireana triptera	+										
	Maireana villosa	+										
	Rhagodia eremaea	+		+						+		
	Sclerolaena cuneata	+										
	Sclerolaena densiflora	+										
	Sclerolaena diacantha		+									

Family	Species	Vegetation surveys undertaken in the Wiluna West Project Area &Along Herbert Lukin Ridge. [5]										
		DEC	Botanica Reports									
			A	B	C	D	E	F	G	H	I	J
	Sclerolaena eriacantha	+	+	+						+		
	Sclerolaena fusiformis	+										
	Sclerolaena microcarpa	+										
	Tecticornia aff. *calyptrata*	+										
	Tecticornia disarticulata	+	+									
Portulacaceae	*Calandrinia creethae*	+										
	Calandrinia monosperma	+										
	Calandrinia ptychosperma	+										
	Calandrinia schistorhiza	+										
	*Portulaca oleracea**	+										
Primulaceae	*Anagallis arvensis* var. *caerulea**		+									
Rubiaceae	*Psydrax attenuata*		+					+				
	Psydrax latifolia	+	+	+	+	+	+	+		+	+	+
	Psydrax rigidula	+	+	+	+	+				+	+	+
	Psydrax suaveolens	+	+	+			+			+	+	+
	Synaptantha tillaeacea var. *tillaeacea*	+										
Apocynaceae	*Marsdenia australis*	+		+	+	+				+		
	Rhyncharrhena linearis	+		+						+		
	Sarcostemma viminale						+	+				
	Sarcostemma viminale subsp. *australe*	+	+	+						+		
Convolvulaceae	*Cuscuta epithymum**		+									
	Duperreya commixta	+										
	Duperreya sericea		+									
Solanaceae	*Lycium australe*		+									
	Nicotiana rosulata		+	+						+		
	Nicotiana rosulata subsp. *rosulata*	+										
	Solanum ellipticum	+										
	Solanum lachnophyllum			+						+		
	Solanum lasiophyllum	+	+	+	+	+	+	+		+	+	+
	Solanum nummularium	+										

Family	Species	Vegetation surveys undertaken in the Wiluna West Project Area &Along Herbert Lukin Ridge. [5]									
		DEC	Botanica Reports								
			A	B	C	D	E	F	G	H	I	J
	Solanum orbiculatum			+			+	+		+		
Scrophulariaceae	*Eremophila clarkei*	+	+								+	+
	Eremophila compacta			+	+	+	+	+		+	+	+
	Eremophila compacta subsp. *compacta*		+									
	Eremophila congesta (P1)	+	+	+						+	+	+
	Eremophila drummondii		+									
	Eremophila flabellata	+	+	+	+	+	+	+		+	+	+
	Eremophila forrestii			+	+	+	+	+		+	+	+
	Eremophila forrestii subsp. *forrestii*	+	+									
	Eremophila fraseri				+			+			+	+
	Eremophila galeata	+	+	+						+		
	Eremophila glutinosa							+				
	Eremophila hygrophana	+										
	Eremophila jucunda				+							
	Eremophila jucunda subsp. *jucunda*	+					+	+			+	+
	Eremophila latrobei				+	+	+					
	Eremophila latrobei subsp. *filiformis*		+									
	Eremophila latrobei subsp. *glabra*							+				
	Eremophila latrobei subsp. *latrobei*	+		+						+	+	+
	Eremophila longifolia						+					
	Eremophila margarethae						+					
	Eremophila oldfieldii subsp. *angustifolia*			+						+		
	Eremophila oppositifolia subsp. *angustifolia*	+	+									
	Eremophila pantonii	+										
	Eremophila punctata	+		+	+	+		+		+	+	+
	Eremophila scoparia									+		
	Eremophila ?shonae		+									
	Eremophila shonae subsp. shonae						+					
	Eremophila spectabilis			+			+		+	+	+	
	Eremophila spectabilis subsp. *brevis*	+										

Family	Species	Vegetation surveys undertaken in the Wiluna West Project Area &Along Herbert Lukin Ridge. [5]									
		DEC	Botanica Reports								
			A	B	C	D	E	F	G	H	I	J
	Eremophila sp.									+		
	Eremophila sp. ?glabra									+	+	+
Lamiaceae	*Dicrastylis flexuosa*						+					
	Dicrastylis sessilifolia						+					
	Prostanthera althoferi			+			+	+		+	+	+
	Prostanthera althoferi subsp. *althoferi*		+	+	+					+		
	Prostanthera althoferi subsp. *althoferi x campbellii*	+										
	Prostanthera althoferi subsp. *althoferi x wilkieana* (Markey & Dillon 4299)	+										
	Prostanthera campbellii	+	+	+	+					+	+	+
	Prostanthera magnifica			+						+	+	+
	Prostanthera ferricola (P3)	+										
	Prostanthera wilkieana	+		+						+		
	Spartothamnella teucriiflora	+	+	+						+		
Acanthaceae	*Harnieria kempeana* subsp. *muelleri*	+		+	+					+		
Campanulaceae	*Isotoma petraea*	+	+									
	Wahlenbergia tumidifructa	+										
Goodeniaceae	*Brunonia australis*	+		+						+		
	Goodenia havilandii	+										
	Goodenia macroplectra	+	+	+						+	+	+
	Goodenia occidentalis		+									
	Goodenia peacockiana	+										
	Goodenia ?quasilibera		+									
	Goodenia tenuiloba			+						+		
	Goodenia triodiophila	+										
	Scaevola spinescens	+	+		+		+	+		+		
Asteraceae	*Actinobole uliginosum*	+										
	*Bidens bipinnata**	+										
	Brachyscome ciliocarpa	+	+	+						+		
	Calocephalus multiflorus	+	+									

Family	Species	Vegetation surveys undertaken in the Wiluna West Project Area &Along Herbert Lukin Ridge. [5]										
		DEC	Botanica Reports									
			A	B	C	D	E	F	G	H	I	J
	Calotis hispidula	+										
	Chrysocephalum puteale	+	+									
	Chthonocephalus viscosus	+										
	Erymophyllum ramosum		+									
	Erymophyllum ramosum subsp. *ramosum*	+										
	Gnephosis tenuissima		+									
	Helipterum craspedioides						+					
	Olearia mucronata (P3)	+										
	Olearia pimelioides						+					
	Leiocarpa semicalva subsp. *semicalva*		+									
	Podolepis canescens	+	+									
	Podolepis capillaris						+					
	Podolepis ?capillaris		+									
	Rhodanthe charsleyae	+	+									
	Rhodanthe maryonii	+										
	Streptoglossa liatroides	+										
	Waitzia acuminata var. *acuminata*	+										
Apiaceae	*Trachymene ornata*	+										
Parmeliaceae	*Xanthoparmelia antleriformis*						+					

Appendix III GWR Herbert Lukin Ridge & Surrounds Vegetation Quadrat Summary

GWR Quadrat	JSWT[6] Vegetation Community	Ridge	Location of landform element	Habitat Type	DEC Quadrat	DEC Community Type
Q01	1	B	Top Third	SIMS-M		6
Q02	1	B	Middle Third	SIMS-M	WILU38	6
Q03	1	B	Top Third	SIMS-B	WILU39	1
Q04	1	B	Bottom Third	SIMS-M		1
Q05	1	B	Top Third	SIMS-B		1
Q06	1	B	Middle Third	SIMS-B		1
Q07	1	B	Bottom Third	SIMS-M	WILU36	6
Q08	2	B	Top Third	ASET		2
Q09	2	B	Middle Third	ASET		2
Q10	2	B	Bottom Third	SIME		5
Q11	1	B	Top Third	SIMS-B	WILU21	1
Q12	1	B	Middle Third	SIMS-B		1
Q13	1	B	Bottom Third	SAES	WILU22	3
Q14	2	B	Top Third	ASET		2
Q15	2	B	Middle Third	ASET		2
Q16	1	B	Bottom Third	SIME		5
Q17	2	B	Top Third	UAET		2
Q18	1	B	Middle Third	OALS		3
Q19	1	B	Bottom Third	SIMS-B		1
Q20	1	B	Top Third	SIIMS-B	WILU16	1
Q21	1	B	Middle Third	SAES		4
Q22	1	B	Bottom Third	SAES	WILU17	5
Q23	1	B	Top Third	SIMS-B		1
Q24	1	B	Middle Third	SIME		5
Q25	1	B	Bottom Third	SAES		4
Q26	1	B	Top Third	OALS		3
Q27	1	B	Middle Third	SAES		4
Q28	1	B	Bottom Third	SAES		4
Q29	1	B	Top Third	SIMS-B		1
Q30	1	B	Bottom Third	SIMS-B		1
Q31	1	A	Top Third	SIME		5
Q32	1	A	Middle Third	SIME		5
Q33	1	A	Bottom Third	SIME		5
Q34	1	A	Top Third	SIMS-C		2
Q35	2	A	Bottom Third	SIME		5
Q36	1	A	Top Third	SIMS-C		2
Q37	1	A	Middle Third	OALS		3
Q38	1	A	Bottom Third	OALS		3
Q39	2	A	Top Third	SUAE		2
Q40	1	A	Middle Third	SIMS-C	WILU23	2
Q41	1	A	Bottom Third	SIMS-C		2
Q42	1	A	Top Third	ASET		2
Q43	2	A	Middle Third	SIMS-C		2
Q44	1	A	Bottom Third	OALS		3
Q45	1	C	Top Third	Outside limit of survey	WILU42	1
Q46	1	C	Middle Third	Outside limit of survey		

[6] Jim's Seeds Weeds & Trees (2006).

GWR Quadrat	JSWT[6] Vegetation Community	Ridge	Location of landform element	Habitat Type	DEC Quadrat	DEC Community Type
Q47	1	C	Bottom Third	Outside limit of survey	WILU43	2
Q48	1	C	Top Third	Outside limit of survey	WILU47	1
Q49	1	C	Middle Third	Outside limit of survey		
Q50	1	C	Bottom Third	Outside limit of survey		
Q51	3	C	Top Third	LOMS		2
Q52	1	C	Middle Third	SIMS-B	WILU32	1
Q53	1	C	Bottom Third	SIME	WILU33	5
Q54	1	C	Bottom Third	SIMS-B		1
Q55	1	C	Middle Third	SIMS-B		1
Q56	2	C	Top Third	SIMS-B		1
Q57	2	C	Top Third	ASSET	WILU27	2
Q58	1	C	Middle Third	SIMS-B	WILU28	1
Q59	1	C	Bottom Third	SIMS-B		1
Q60	3	C	Top Third	LOMS		2
Q61	1	C	Middle Third	MSET		5
Q62	1	C	Bottom Third	MSET		5
Q63	2	C	Top Third	ASET		2
Q64	1	C	Middle Third	SIMS-B		1
Q65	1	C	Bottom Third	SAES-E		4
Q66	2	C	Top Third	ASET	WILU14	2
Q67	2	C	Middle Third	ASET		2
Q68	2	C	Bottom Third	ASET	WILU12	2
Q69	3	C	Top Third	SIMS-B		1
Q70	3	C	Middle Third	SIMS-B		1
Q71	3	C	Bottom Third	SIMS-B		1
Q72	1	C	Top Third	ASET		2
Q73	1	C	Middle Third	SIMS-B		1
Q74	1	C	Bottom Third	SIME		5
Q75	1	C	Top Third	ASET		2
Q76	1	C	Middle Third	SIMS-B	WILU8	1
Q77	1	C	Bottom Third	SIME		5
Q78	1	C	Top Third	SIMS-B		1
Q79	1	C	Middle Third	ASET		2
Q80	1	C	Bottom Third	SAES		4
Q81	1	C	Middle Third	SUAE		2
Q82	1	C	Top Third	SUAE		2
Q83	1	C	Bottom Third	SUAE		2
Q84	1	C	Top Third	SUAE	WILU6	2
Q85	3	C	Middle Third	LOMS		2
Q86	1	C	Bottom Third	SUAE	WILU7	2
Q87	4	Opportunistic	Top Third	OALS		3
Q88	4	Opportunistic	Middle Third	OALS	WILU31	3
Q89	4	Opportunistic	Bottom Third	SXSS	WILU30	Unplaced
Q90	1	C	Top Third	SIMS-B		1
Q91	1	C	Middle Third	SIMS-B / SIME	WILU35	6
Q92	1	C	Bottom Third	SIMS-B		6

Appendix IV Herbert Lukin Ridge & Surrounds Vegetation Survey Sample Site Locations

Site	Date	WGS84 Zone 50	
		Easting	Northing
JFH01	07/03/09	794177	7032668
JFH02	07/03/09	794163	7032483
JFH03	08/03/09	794165	7032233
JFH04	08/03/09	793940	7032186
JFH05	08/03/09	793640	7032216
JFH06	08/03/09	794510	7032152
JFH07	09/03/09	793725	7031463
JFH08	09/03/09	794588	7031618
JFH09	09/03/09	794617	7030792
JFH10	09/03/09	794371	7031056
JFH11	09/03/09	793496	7031334
JFH12	09/03/09	793621	7031237
JFH13	09/03/09	793712	7031238
JFH14	09/03/09	793761	7031181
JFH15	09/03/09	794081	7031295
JFH16	10/03/09	793991	7030859
JFH17	10/03/09	794001	7030690
JFH18	10/03/09	793066	7030791
JFH19	10/03/09	792779	7030791
JFH20	10/03/09	792565	7030827
JFH21	10/03/09	792365	7030888
JFH21b	10/03/09	792439	7030985
JFH22	10/03/09	791640	7030946
JFH23	10/03/09	791874	7031158
JFH24	10/03/09	791499	7031418
JFH25	10/03/09	792242	7031332
JFH26	11/03/09	793449	7031532
JFH27	11/03/09	793420	7031464
JFH28	11/03/09	793260	7031575
JFH29	11/03/09	792885	7031528
JFH30	11/03/09	792688	7031560
JFH31	11/03/09	792624	7031579
JFH32	11/03/09	792560	7031555
JFH33	11/03/09	793590	7031768
JFH34	11/03/09	792034	7032059
JFH35a	11/03/09	791583	7032064
JFH35b	11/03/09	791540	7032090
JFH36	12/03/09	791845	7032419
JFH37	12/03/09	791345	7032497
JFH38	12/03/09	791105	7032439
JFH39	12/03/09	791352	7033505
JFH40	12/03/09	791119	7033938
JFH41	12/03/09	790983	7034271
JFH42	12/03/09	791191	7035655
JFH43	13/03/09	792560	7032031
JFH44	13/03/09	792426	7032339
JFH45	13/03/09	792582	7032475
JFH46	17/03/09	790492	7034596
JFH47	17/03/09	790335	7034588
JFH48	17/03/09	791808	7035327

Site	Date	WGS84 Zone 50	
		Easting	Northing
JFH49	17/03/09	791566	7035301
JFH50	18/03/09	791884	7034418
JFH51	18/03/09	791884	7034920
JFH52	18/03/09	791975	7036066
JFH53	18/03/09	792103	7037640
JFH54	18/03/09	791096	7039555
JFH55	18/03/09	790491	7039581
JFH56	19/03/09	791270	7037180
JFH57	19/03/09	791651	7037608
JFH58	19/03/09	790921	7037668
JFH59	19/03/09	790916	7038288
JFH60	19/03/09	791180	7040583
JFH61	19/03/09	790892	7040345
JFH62	20/03/09	790981	7039851
JFH63	20/03/09	790822	7043314
JFH64	20/03/09	790321	7043637
JFH65	20/03/09	791529	7043947
JFH66	21/03/09	791498	7043616
JFH67	21/03/09	790680	7044717
JFH68	22/03/09	791027	7046257
JFH69	22/03/09	790492	7046806
JFH70	22/03/09	791015	7047853
JFH71	22/03/09	791485	7048024
JFH72	23/03/09	791144	7049422
JFH73	23/03/09	792185	7049408
JFH74	23/03/09	792025	7050348
JFH75	23/03/09	791162	7050898
JFH76	23/03/09	791177	7051697
JFH77	23/03/09	790491	7052146
JFH78	24/03/09	793322	7049343
JFH79	24/03/09	793160	7049341
JFH80	24/03/09	793066	7049328
JFH81	24/03/09	793063	7049677
JFH82	24/03/09	792987	7050888
JFH83	24/03/09	794516	7052061
JFH83a	24/03/09	794521	7052007
JFH84	04/04/09	794825	7044462
JFH85	04/04/09	794656	7044400
JFH86	04/03/09	794958	7043796
JFH87	16/04/09	792643	7034615
JFH88	17/04/09	792603	7039075
JFH89	17/04/09	792776	7038814
JFH90	17/04/09	792890	7038792
JFH91	17/04/09	792909	7037505
JFH92	17/04/09	793379	7037253
JFH93	18/04/09	792477	7041671
JFH94	21/04/09	792771	7047429
JFH95	21/04/09	792855	7048024
JFH96	21/04/09	793657	7049920
JFH97	22/04/09	794652	7050497
JFH98	22/04/09	794465	7050354

Site	Date	WGS84 Zone 50	
		Easting	Northing
JFH99	22/04/09	794887	7050047
JFH100	22/04/09	794975	7049649
JFH101	23/04/09	796311	7049624
JFH102	23/04/09	796213	7048688
JFH103	24/04/09	793282	7044584
JFH104	01/05/09	794712	7032817
JFH105	01/05/09	794730	7033481
JFH106	02/05/09	794221	7045562
JFH107	02/05/09	793738	7045912
JFH108	02/05/09	794486	7049204
JFH109	02/05/09	794656	7048703
JFH110	03/05/09	795381	7045560
JFH111	03/05/09	794807	7045282
JFH112	03/05/09	796144	7044782
JFH113	03/05/09	796123	9044260
JFH114	03/05/09	796115	7043952
JFH115	04/05/09	795846	7043183
JFH116	04/05/09	796079	7043424
JFH117	04/05/09	796160	7042976
JFH118	04/05/09	796405	7042624
JFH119	04/05/09	796180	7041918
JFH120	04/05/09	796682	7041819
JFH121	04/05/09	796662	7041667
JFH122	04/05/09	796565	7041755
JFH123	05/05/09	793913	7043790
JFH124	05/05/09	794956	7043589
JFH124a	05/05/09	794882	7043547
JFH125	15/05/09	793998	7033152
JFH126	15/05/09	794110	7033156
JFH127	16/05/09	794256	7033856
JFH128	16/05/09	794225	7034046
JFH129	17/05/09	794573	7033134
JFH130	17/05/09	794765	7033821
JFH131	19/05/09	793694	7041680
JFH132	20/05/09	793012	7032974
JFH133	17/06/09	793327	7038401
JFH134	17/06/09	794091	7038785
JFH135	19/06/09	793713	7033703
JFH136	22/06/09	793931	7033522
JFH137	25/06/09	792381	7025311
JFH138	25/06/09	792981	7025146
JFH139	25/06/09	792346	7024928
JFH140	25/06/09	792642	7024874
JFH141	25/06/09	792774	7024441
JFH142	26/06/09	792298	7024514
JFH143	27/06/09	792582	7021491

Appendix V Rare and Priority Vascular Species potentially occurring in the Wiluna West Project area

Rare and Priority Species potentially occurring in the Wiluna West Project area as detailed from the DEC Database Search, 9th April, 2009.

Family	Species	DEC Conservation Code
Poaceae	*Neurachne lanigera*	P1
Celastraceae	*Stackhousia clementii*	P3
Euphorbiaceae	*Beyeria lapidicola*	P2
Zygophyllaceae	*Tribulus adelacanthus*	P3
Myrtaceae	*Baeckea* sp. Melita Station (H. Pringle 2738) *Baeckea* sp. Sandstone (C.A. Gardner s.n. 26 Oct 1963) *Calytrix uncinata* *Euryomyrtus inflata* *Homalocalyx echinulatus*	P4 P3 P3 P3 P3
Amaranthaceae	*Ptilotus chrysocomus* *Ptilotus luteous*	P1 P3
Chenopodiaceae	*Maireana prosthecochaeta*	P3
Scrophulariaceae	*Eremophila congesta* *Eremophila fasciata* *Eremophila flaccida* subsp. *attenuata* *Eremophila micrantha* *Eremophila pungens*	P1 P3 P3 P3 P4
Asteraceae	*Olearia mucronata*	P3

Database search included Threatened Flora Database, the WA Herbarium database, and the Declared Rare and Priority Flora Species Lists for a polygon location search based on the coordinates:

- NW Cnr: -26 degrees 36' 57.16864" latitude 119 degrees 54' 52.69000" longitude
- SE Cnr: -26 degrees 36' 33.36406" latitude 119 degrees 58' 11.01709" longitude
- Zone 50

Information Reference Number 12-0409 9th April, 2009

Additional species based information was requested from the WA Herbarium database in March, 2010: Information Reference Number 35-0310 24th March, 2010.

Department of Environment and Conservation (DEC) CONSERVATION CODES

R: Declared Rare Flora - Extant Taxa

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

X: Declared Rare Flora - Presumed Extinct Taxa

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

1: Priority One - Poorly known Taxa

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

2: Priority Two - Poorly Known Taxa

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

3: Priority Three - Poorly Known Taxa

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

4: Priority Four - Rare Taxa

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

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

Appendix VI Priority Flora Population Locations in the Herbert Lukin Ridge & Surrounds Survey Area

TABLE 9 PRIORITY FLORA POPULATIONS ENCOUNTERED IN THE HERBERT LUKIN RIDGE & SURROUNDS SURVEY AREA.

Species	DEC Conservation Code	Site	WGS84 mE	WGS84 mN	Zone	Number of Individuals	Estimated Population	Habitat/Comment	Date
Baeckea sp. Melita Station	P4		792527	7021298	50		pnd[7]	scattered	27/06/09
Baeckea sp. Melita Station	P4		792648	7021304	50	10	+	pnd: population extends	27/06/09
Baeckea sp. Melita Station	P4		792587	7021432	50	10	+	pnd: population extends	27/06/09
Baeckea sp. Melita Station	P4		792582	7021491	50		pnd	JFH143	27/06/09
Baeckea sp. Melita Station	P4		792540	7021499	50	10	+	pnd: population extends	27/06/09
Baeckea sp. Melita Station	P4		792385	7021618	50	1			27/06/09
Baeckea sp. Melita Station	P4		792469	7021642	50	2	pnd	pnd, continues south	27/06/09
Baeckea sp. Melita Station	P4		792708	7021766	50	6	+	pnd	27/06/09
Baeckea sp. Melita Station	P4		792297	7022015	50	6	pnd		27/06/09
Baeckea sp. Melita Station	P4		792339	7022024	50	3	pnd		27/06/09
Baeckea sp. Melita Station	P4		792348	7022175	50		pnd		27/06/09
Baeckea sp. Melita Station	P4		792825	7022332	50	10	+	pnd: scattered	26/06/09
Baeckea sp. Melita Station	P4		702308	7022353	50	8	+	pnd	26/06/09
Baeckea sp. Melita Station	P4		792788	7022381	50	20	+	pnd: scattered	26/06/09
Baeckea sp. Melita Station	P4		792311	7022406	50	4	+	pnd	26/06/09
Baeckea sp. Melita Station	P4		792509	7022687	50	4			26/06/09
Baeckea sp. Melita Station	P4		792081	7023541	50	4	pnd	edge of fire scar	26/06/09
Baeckea sp. Melita Station	P4		792971	7024062	50	20	+		26/06/09
Baeckea sp. Melita Station	P4		792885	7024197	50	6	+	scattered	26/06/09
Baeckea sp. Melita Station	P4		792669	7024289	50	1			26/06/09
Baeckea sp. Melita Station	P4		792786	7024359	50		pnd		25/06/09
Baeckea sp. Melita Station	P4	CJ	792420	7029997	50	4			7/04/09
Baeckea sp. Melita Station	P4	CJ	792412	7030008	50	2			7/04/09
Baeckea sp. Melita Station	P4	CJ	792410	7030016	50	1			7/04/09
Baeckea sp. Melita Station	P4	CJ	792415	7030027	50	3			7/04/09
Baeckea sp. Melita Station	P4	CJ	792412	7030037	50	13		extending north	7/04/09
Baeckea sp. Melita Station	P4	C1	792406	7030091	50	6		extending south	7/04/09
Baeckea sp. Melita Station	P4	C1	792405	7030106	50	1		extends north	7/04/09

[7] pnd: Population not defined.

Species	DEC Conservation Code	Site	WGS84 mE	WGS84 mN	Zone	Number of Individuals	Estimated Population	Habitat/Comment	Date
Baeckea sp. Melita Station	P4		794104	7031823	50		pnd	scattered	23/06/09
Baeckea sp. Melita Station	P4		794105	7031916	50		pnd	scattered	23/06/09
Baeckea sp. Melita Station	P4		794133	7031965	50		pnd	scattered	23/06/09
Baeckea sp. Melita Station	P4		794129	7031993	50		pnd	scattered	23/06/09
Baeckea sp. Melita Station	P4		794524	7032042	50		pnd	JFH6a	8/03/09
Baeckea sp. Melita Station	P4		794510	7032152	50		pnd	JFH06	8/03/09
Baeckea sp. Melita Station	P4		794069	7032160	50		pnd	scattered	23/06/09
Baeckea sp. Melita Station	P4	C1	792595	7032185	50	5		extends south	6/04/09
Baeckea sp. Melita Station	P4	C1	792586	7032198	50	2			6/04/09
Baeckea sp. Melita Station	P4	C1	792594	7032204	50	2		possibly extends north	6/04/09
Baeckea sp. Melita Station	P4	C1	792574	7032207	50	4			6/04/09
Baeckea sp. Melita Station	P4		794165	7032233	50		pnd	JFH03	8/03/09
Baeckea sp. Melita Station	P4		794168	7032300	50		pnd	scattered	23/06/09
Baeckea sp. Melita Station	P4	C2	792486	7032363	50	5		extends west	6/04/09
Baeckea sp. Melita Station	P4		792448	7032368	50		pnd		13/03/09
Baeckea sp. Melita Station	P4	C2	792409	7032379	50	1			6/04/09
Baeckea sp. Melita Station	P4	C2	792480	7032379	50	3			6/04/09
Baeckea sp. Melita Station	P4	C2	792432	7032381	50	7		extending south along crest	6/04/09
Baeckea sp. Melita Station	P4	C2	792487	7032385	50	5			6/04/09
Baeckea sp. Melita Station	P4	C2	792449	7032391	50	2		extending south along crest	6/04/09
Baeckea sp. Melita Station	P4	C2	792419	7032393	50	1			6/04/09
Baeckea sp. Melita Station	P4	C2	792410	7032398	50	3			6/04/09
Baeckea sp. Melita Station	P4	C2	792557	7032398	50	3		extends south along east face	6/04/09
Baeckea sp. Melita Station	P4	C2	792555	7032404	50	2			6/04/09
Baeckea sp. Melita Station	P4	C2	792460	7032410	50	7			6/04/09
Baeckea sp. Melita Station	P4	C2	792559	7032415	50	1		extends north along east face	6/04/09
Baeckea sp. Melita Station	P4	C2	792446	7032421	50	6			6/04/09
Baeckea sp. Melita Station	P4	C2	792420	7032425	50	9		extends north along west face and crest	6/04/09
Baeckea sp. Melita Station	P4	C2	792453	7032430	50	3			6/04/09
Baeckea sp. Melita Station	P4	C2	792455	7032440	50	2		extending north west	6/04/09

Species	DEC Conservation Code	Site	WGS84 mE	WGS84 mN	Zone	Number of Individuals	Estimated Population	Habitat/Comment	Date
Baeckea sp. Melita Station	P4	C2	792539	7032440	50	3		extends north	6/04/09
Baeckea sp. Melita Station	P4		792566	7032468	50		pnd		13/03/09
Baeckea sp. Melita Station	P4		792422	7032469	50		pnd		13/03/09
Baeckea sp. Melita Station	P4		792582	7032475	50		pnd	JFH45	13/03/09
Baeckea sp. Melita Station	P4	C2	792432	7032485	50	3			6/04/09
Baeckea sp. Melita Station	P4	C2	792447	7032496	50	3		extends over west face and south	6/04/09
Baeckea sp. Melita Station	P4	C2	792435	7032498	50	3			6/04/09
Baeckea sp. Melita Station	P4	C2	792437	7032502	50	1			6/04/09
Baeckea sp. Melita Station	P4	C2	792424	7032508	50	1			6/04/09
Baeckea sp. Melita Station	P4	C2	792432	7032508	50	3			6/04/09
Baeckea sp. Melita Station	P4	C2	792445	7032509	50	2			6/04/09
Baeckea sp. Melita Station	P4		791344	7032519	50		pnd		12/03/09
Baeckea sp. Melita Station	P4	C2	792447	7032523	50	6		extends north	6/04/09
Baeckea sp. Melita Station	P4	C2	792423	7032527	50	4		extends along west face	6/04/09
Baeckea sp. Melita Station	P4	C2	792431	7032562	50	3		west face	7/04/09
Baeckea sp. Melita Station	P4	C2	792440	7032570	50	4			7/04/09
Baeckea sp. Melita Station	P4	C2	792557	7032576	50	6		extending south, east face	6/04/09
Baeckea sp. Melita Station	P4	C2	792439	7032581	50	3			7/04/09
Baeckea sp. Melita Station	P4	C2	792447	7032584	50	4			7/04/09
Baeckea sp. Melita Station	P4	C2	792461	7032585	50	7		extends south	6/04/09
Baeckea sp. Melita Station	P4	C2	792457	7032593	50	23		extends over west face and south	6/04/09
Baeckea sp. Melita Station	P4	C2	792581	7032593	50	3		east face	6/04/09
Baeckea sp. Melita Station	P4	C2	792448	7032593	50	8			7/04/09
Baeckea sp. Melita Station	P4	C2	792575	7032595	50	7		east face	6/04/09
Baeckea sp. Melita Station	P4	C2	792563	7032597	50	5		east face	6/04/09
Baeckea sp. Melita Station	P4	C2	792574	7032601	50	5		also extending across east face, and north (joins earlier marked population, 200m north)	6/04/09
Baeckea sp. Melita Station	P4	C2	792459	7032603	50	12		extends over west face and north	6/04/09
Baeckea sp. Melita Station	P4	C2	792446	7032603	50	5			7/04/09
Baeckea sp. Melita Station	P4	C2	792449	7032614	50	8		west face extending north	7/04/09
Baeckea sp. Melita Station	P4	C2	792558	7032617	50	2		east face	6/04/09

Species	DEC Conservation Code	Site	WGS84 mE	WGS84 mN	Zone	Number of Individuals	Estimated Population	Habitat/Comment	Date
Baeckea sp. Melita Station	P4	C2	792468	7032619	50	3		extends over west face and north	6/04/09
Baeckea sp. Melita Station	P4	C2	792478	7032690	50	6		extending south along west face	6/04/09
Baeckea sp. Melita Station	P4	C2	792526	7032691	50	2		extending east	6/04/09
Baeckea sp. Melita Station	P4	C2	792481	7032703	50	7		extending along west face	6/04/09
Baeckea sp. Melita Station	P4	C2	792526	7032706	50	1		extending east	6/04/09
Baeckea sp. Melita Station	P4	C2	792487	7032707	50	6		extending along west face	6/04/09
Baeckea sp. Melita Station	P4	C2	792511	7032715	50	1		extending east	6/04/09
Baeckea sp. Melita Station	P4	C2	792491	7032720	50	9		extending along west face	6/04/09
Baeckea sp. Melita Station	P4	C2	792508	7032726	50	3		extending east	6/04/09
Baeckea sp. Melita Station	P4	C2	792497	7032727	50	6		extending along west face	6/04/09
Baeckea sp. Melita Station	P4	C2	792496	7032745	50	3		extending along west face	6/04/09
Baeckea sp. Melita Station	P4	C2	792507	7032747	50	9		extending east	6/04/09
Baeckea sp. Melita Station	P4	C2	792497	7032753	50	5		extending along west face	6/04/09
Baeckea sp. Melita Station	P4	C2	792510	7032756	50	2		extending east	6/04/09
Baeckea sp. Melita Station	P4	C2	792493	7032763	50	3		extending along west face	6/04/09
Baeckea sp. Melita Station	P4	C2	792566	7032766	50	4		extending south and across east face	6/04/09
Baeckea sp. Melita Station	P4	C2	792524	7032767	50	3		extending south	6/04/09
Baeckea sp. Melita Station	P4	C2	792549	7032773	50	7		extending south	6/04/09
Baeckea sp. Melita Station	P4	C2	792488	7032775	50	4		extending south, west face	6/04/09
Baeckea sp. Melita Station	P4	C2	792498	7032775	50	1		extending along west face	6/04/09
Baeckea sp. Melita Station	P4	C2	792549	7032784	50	3			6/04/09
Baeckea sp. Melita Station	P4	C2	792549	7032790	50	12			6/04/09
Baeckea sp. Melita Station	P4	C2	792542	7032796	50	3			6/04/09
Baeckea sp. Melita Station	P4	C2	792583	7032837	50	1		already flagged, continues east along face	6/04/09
Baeckea sp. Melita Station	P4	C2	792528	7032924	50	30			6/04/09
Baeckea sp. Melita Station	P4		794146	7032957	50	10	+		16/05/09
Baeckea sp. Melita Station	P4	C2	792467	7032979	50	3		extending south	6/04/09
Baeckea sp. Melita Station	P4	C2	792487	7033002	50	3		west face	6/04/09
Baeckea sp. Melita Station	P4		794154	7033020	50	10	+		16/05/09
Baeckea sp. Melita Station	P4		794154	7033055	50	10	+		16/05/09

Species	DEC Conservation Code	Site	WGS84 mE	WGS84 mN	Zone	Number of Individuals	Estimated Population	Habitat/Comment	Date
Baeckea sp. Melita Station	P4		794110	7033156	50		pnd	JFH126	15/05/09
Baeckea sp. Melita Station	P4		794115	7033171	50		pnd		15/05/09
Baeckea sp. Melita Station	P4		794356	7033289	50		pnd	occasional	17/05/09
Baeckea sp. Melita Station	P4		794213	7033326	50	3			17/05/09
Baeckea sp. Melita Station	P4		793891	7033568	50	5	+	pnd	6/05/09
Baeckea sp. Melita Station	P4		794263	7033617	50	5	+	extends north	17/05/09
Baeckea sp. Melita Station	P4		794198	7033714	50	6			16/05/09
Baeckea sp. Melita Station	P4		794195	7033817	50	10	+		16/05/09
Baeckea sp. Melita Station	P4		794214	7033826	50		pnd		16/05/09
Baeckea sp. Melita Station	P4		794274	7033841	50	5	+	JFH127	16/05/09
Baeckea sp. Melita Station	P4		794280	7033959	50	3	+		16/05/09
Baeckea sp. Melita Station	P4		794306	7033989	50	10	+		16/05/09
Baeckea sp. Melita Station	P4	C2	792712	7034004	50			clearing in this area will impact on priority flora	5/04/09
Baeckea sp. Melita Station	P4	C2	792721	7034005	50			clearing in this area will impact on priority flora	5/04/09
Baeckea sp. Melita Station	P4		794320	7034073	50		pnd		16/05/09
Baeckea sp. Melita Station	P4	C2	792763	7034163	50	3		extending south along the east face	5/04/09
Baeckea sp. Melita Station	P4	C2	792769	7034168	50	3		east face	5/04/09
Baeckea sp. Melita Station	P4		794141	7034177	50	2			22/06/09
Baeckea sp. Melita Station	P4	C2	792752	7034186	50	6		east face	5/04/09
Baeckea sp. Melita Station	P4	C2	792759	7034190	50	1		east face	5/04/09
Baeckea sp. Melita Station	P4	C2	792762	7034195	50	1		extending north along the east face	5/04/09
Baeckea sp. Melita Station	P4	C2	792500	7034217	50	1		west face	5/04/09
Baeckea sp. Melita Station	P4		794184	7034304	50	3			22/06/09
Baeckea sp. Melita Station	P4		793654	7034315	50		pnd		19/06/09
Baeckea sp. Melita Station	P4	C2	792522	7034412	50	6		along crest and face of western scarp; extends north and south	5/04/09
Baeckea sp. Melita Station	P4		791770	7034414	50		pnd		18/03/09
Baeckea sp. Melita Station	P4	C2	792511	7034415	50	12		along crest and face of western scarp; extends north and south	5/04/09
Baeckea sp. Melita Station	P4	C2	792499	7034419	50	2		along crest and face of western scarp; extends north and south	5/04/09

Species	DEC Conservation Code	Site	WGS84 mE	WGS84 mN	Zone	Number of Individuals	Estimated Population	Habitat/Comment	Date
Baeckea sp. Melita Station	P4		794638	7034600	50		pnd	occasional	17/05/09
Baeckea sp. Melita Station	P4		794588	7034679	50	5	+		17/05/09
Baeckea sp. Melita Station	P4	C2	792821	7034700	50	1		along eastern face of scarp	5/04/09
Baeckea sp. Melita Station	P4		794330	7034741	50	8			17/05/09
Baeckea sp. Melita Station	P4	C2	792807	7034999	50	5		along eastern face of scarp	5/04/09
Baeckea sp. Melita Station	P4		794752	7035044	50	1			17/05/09
Baeckea sp. Melita Station	P4		794876	7035124	50	2			17/05/09
Baeckea sp. Melita Station	P4		792145	7035201	50		pnd		15/04/09
Baeckea sp. Melita Station	P4		794533	7035451	50		pnd		21/06/09
Baeckea sp. Melita Station	P4		794727	7035612	50		pnd	scattered	21/06/09
Baeckea sp. Melita Station	P4		792444	7039897	50		pnd	population continues north	16/04/09
Baeckea sp. Melita Station	P4		792455	7039996	50		pnd	population extends north and south	16/04/09
Baeckea sp. Melita Station	P4		792397	7039999	50		pnd	population extends north and south	16/04/09
Baeckea sp. Melita Station	P4		792385	7040094	50		pnd	population extends north and south	16/04/09
Baeckea sp. Melita Station	P4	C3	792436	7040130	50		pnd	population continues south	15/04/09
Baeckea sp. Melita Station	P4	C3	792417	7040209	50		pnd	population continues north	15/04/09
Baeckea sp. Melita Station	P4		792348	7040313	50		pnd		25/03/09
Baeckea sp. Melita Station	P4		792382	7042094	50	2			18/04/09
Baeckea sp. Melita Station	P4		792517	7042678	50	3			18/04/09
Baeckea sp. Melita Station	P4		792519	7042730	50	2			18/04/09
Baeckea sp. Melita Station	P4	C3	792395	7140194	50		pnd	population extends north and south	15/04/09
Baeckea sp. Melita Station	P4		791579	7035304	50				17/03/09
Baeckea sp. Melita Station	P4		794256	7033856	50		pnd	JFH127	16/05/09
Beyeria lapidicola	P2		792852	7035304	50		pnd	scattered along BIF footslope	27/06/09
Calytrix uncinata	P3		792527	7021298	50		pnd	scattered	27/06/09
Calytrix uncinata	P3		792648	7021304	50	20	+	pnd: population extends	27/06/09
Calytrix uncinata	P3		792580	7021470	50	50	+	pnd: population extends	27/06/09
Calytrix uncinata	P3		792582	7021491	50		pnd	JFH143	27/06/09
Calytrix uncinata	P3		792674	7021618	50	5	+	pnd	27/06/09
Calytrix uncinata	P3		792464	7021627	50	1	pnd	pnd, continues south	27/06/09
Calytrix uncinata	P3		792703	7021726	50	20	+	pnd, continues south	27/06/09

Species	DEC Conservation Code	Site	WGS84 mE	WGS84 mN	Zone	Number of Individuals	Estimated Population	Habitat/Comment	Date
Calytrix uncinata	P3		792728	7021802	50	50	+	pnd	27/06/09
Calytrix uncinata	P3		792816	7022292	50	20	+	pnd	26/06/09
Calytrix uncinata	P3		792762	7022370	50	100	+	pnd: population extends	26/06/09
Calytrix uncinata	P3		792705	7022549	50	20	+		26/06/09
Calytrix uncinata	P3		792521	7022561	50	10	+		26/06/09
Calytrix uncinata	P3		792509	7022662	50	2			26/06/09
Calytrix uncinata	P3		792714	7022696	50	10	+		26/06/09
Calytrix uncinata	P3		792784	7022700	50	50	+		26/06/09
Calytrix uncinata	P3		792823	7022714	50	50	+		26/06/09
Calytrix uncinata	P3		792605	7022898	50	1			26/06/09
Calytrix uncinata	P3		792932	7023025	50	5			26/06/09
Calytrix uncinata	P3		792924	7024776	50	20	+	pnd	25/06/09
Calytrix uncinata	P3		792471	7024899	50		pnd		25/06/09
Calytrix uncinata	P3		792494	7024933	50	7			25/06/09
Calytrix uncinata	P3	CJ	792294	7030012	50	4			7/04/09
Calytrix uncinata	P3	CJ	792294	7030020	50	5		extends west	7/04/09
Calytrix uncinata	P3	CJ	792303	7030020	50	9			7/04/09
Calytrix uncinata	P3	CJ	792288	7030028	50	10		extends west	7/04/09
Calytrix uncinata	P3	CJ	792293	7030040	50	5			7/04/09
Calytrix uncinata	P3	CJ	792302	7030041	50	3		extends east	7/04/09
Calytrix uncinata	P3	C1	792308	7030052	50	13		extends east	7/04/09
Calytrix uncinata	P3	C1	792296	7030060	50	1			7/04/09
Calytrix uncinata	P3		794068	7031328	50		pnd	scattered	23/06/09
Calytrix uncinata	P3		791085	7033689	50		pnd		17/03/09
Calytrix uncinata	P3		793892	7031461	50		pnd	scattered	23/06/09
Calytrix uncinata	P3		793566	7031892	50		pnd		22/06/09
Calytrix uncinata	P3		794133	7031965	50		pnd	scattered	23/06/09
Calytrix uncinata	P3		794129	7031993	50		pnd	scattered	23/06/09
Calytrix uncinata	P3		794510	7032152	50		pnd	JFH06	8/03/09
Calytrix uncinata	P3	C1	792660	7032160	50		100+		6/04/09
Calytrix uncinata	P3	C1	792650	7032171	50	4			6/04/09

Species	DEC Conservation Code	Site	WGS84 mE	WGS84 mN	Zone	Number of Individuals	Estimated Population	Habitat/Comment	Date
Calytrix uncinata	P3		793940	7032186	50		pnd	JFH04	8/03/09
Calytrix uncinata	P3		793823	7032199	50		pnd	scattered	23/06/09
Calytrix uncinata	P3	A ridge (south Joyner's)	794358	7032207	50		pnd		8/03/09
Calytrix uncinata	P3	A ridge (south Joyner's)	794462	7032212	50		pnd		8/03/09
Calytrix uncinata	P3	A ridge (south Joyner's)	794323	7032299	50		pnd		8/03/09
Calytrix uncinata	P3		794712	7032817	50		pnd	JFH104	1/05/09
Calytrix uncinata	P3		794286	7032918	50		pnd		16/05/09
Calytrix uncinata	P3	C2	792449	7032986	50	1			6/04/09
Calytrix uncinata	P3		794848	7032992	50		pnd		1/05/09
Calytrix uncinata	P3	C2	792455	7032996	50	2			6/04/09
Calytrix uncinata	P3		794154	7033055	50	5	+		16/05/09
Calytrix uncinata	P3		794503	7033109	50	20	+		17/05/09
Calytrix uncinata	P3		794905	7033186	50		pnd		1/05/09
Calytrix uncinata	P3		794356	7033289	50	20	+	scattered	17/05/09
Calytrix uncinata	P3		794678	7033377	50		pnd		1/05/09
Calytrix uncinata	P3		794499	7033447	50		pnd		1/05/09
Calytrix uncinata	P3		794774	7033450	50		pnd		1/05/09
Calytrix uncinata	P3		794730	7033481	50		pnd	JFH105	1/05/09
Calytrix uncinata	P3		794397	7033560	50		pnd	frequently occurring	17/05/09
Calytrix uncinata	P3		793761	7033561	50	20	+	pnd	19/06/09
Calytrix uncinata	P3		791086	7033698	50		pnd		17/03/09
Calytrix uncinata	P3	C2	792367	7033794	50	3		extending south	5/04/09
Calytrix uncinata	P3		794413	7033816	50		pnd	occurring on breakaway crest	17/05/09
Calytrix uncinata	P3		794214	7033826	50	3			16/05/09
Calytrix uncinata	P3		794122	7033831	50		pnd	scattered	16/05/09
Calytrix uncinata	P3		794256	7033856	50		pnd	JFH127	16/05/09
Calytrix uncinata	P3		794280	7033959	50	20	+		16/05/09

Species	DEC Conservation Code	Site	WGS84 mE	WGS84 mN	Zone	Number of Individuals	Estimated Population	Habitat/Comment	Date
Calytrix uncinata	P3		793779	7033976	50	50	+	pnd	19/06/09
Calytrix uncinata	P3	C2	792460	7033997	50	13	+	extending south	5/04/09
Calytrix uncinata	P3	C2	792461	7034006	50	1			5/04/09
Calytrix uncinata	P3		794103	7034177	50	10			22/06/09
Calytrix uncinata	P3		794157	7034181	50	20	+		22/06/09
Calytrix uncinata	P3		794166	7034260	50	20	+		22/06/09
Calytrix uncinata	P3		794243	7034296	50		pnd		22/06/09
Calytrix uncinata	P3		794884	7034533	50	20	+		17/05/09
Calytrix uncinata	P3		790492	7034596	50		pnd	JFH46	17/03/09
Calytrix uncinata	P3		794638	7034600	50		pnd	scattered	17/05/09
Calytrix uncinata	P3		794321	7034732	50	5	+	scattered	17/05/09
Calytrix uncinata	P3		793074	7034832	50	50	+	pnd	19/06/09
Calytrix uncinata	P3		791609	7034845	50		pnd		17/03/09
Calytrix uncinata	P3		794820	7035105	50	30	+		17/05/09
Calytrix uncinata	P3		791338	7035199	50		pnd		17/03/09
Calytrix uncinata	P3		792234	7035213	50		pnd		15/04/09
Calytrix uncinata	P3		792192	7035231	50		pnd		15/04/09
Calytrix uncinata	P3		791566	7035301	50		pnd	JFH49	17/03/09
Calytrix uncinata	P3		794828	7035570	50		pnd	scattered	21/06/09
Calytrix uncinata	P3		795534	7040386	50		pnd		13/06/09
Calytrix uncinata	P3		795521	7040624	50		pnd		13/06/09
Calytrix uncinata	P3		796662	7041667	50		pnd	JFH121	4/05/09
Calytrix uncinata	P3		796644	7041686	50		pnd		4/05/09
Calytrix uncinata	P3		794397	7033560	50		pnd		17/05/09
Eremophila ?anomala	P1		793874	7042989	50		pnd		18/05/09
Eremophila ?anomala	P1		795846	7043183	50		pnd	Site JFH115	4/08/09
Eremophila congesta	P1		794506	7042799	50	17			18/05/09
Eremophila congesta	P1		796722	7044062	50		pnd	isolated	3/05/09
Eremophila congesta	P1		796746	7044072	50		pnd	Population extends	3/05/09
Eremophila congesta	P1		796340	7044167	50		pnd	Population extends	3/05/09
Eremophila congesta	P1		796123	7044260	50	1		JFH113	3/05/09

Species	DEC Conservation Code	Site	WGS84 mE	WGS84 mN	Zone	Number of Individuals	Estimated Population	Habitat/Comment	Date
Eremophila congesta	P1		796287	7044363	50		pnd	Population extends east from here	3/05/09
Eremophila congesta	P1		796692	7044464	50		pnd	Extensive population along hill slope	3/05/09
Eremophila congesta	P1		792657	7044529	50	1			19/04/09
Eremophila congesta	P1		796681	7044535	50		pnd	Extensive population, following hills	3/05/09
Eremophila congesta	P1		796123	7044625	50		pnd	Population extends north from here	3/05/09
Eremophila congesta	P1		792515	7044707	50		pnd		17/03/09
Eremophila congesta	P1		796059	7044772	50		pnd	Population extends east from here	3/05/09
Eremophila congesta	P1		796144	7044782	50		pnd	JFH112	3/05/09
Eremophila congesta	P1		792600	7044842	50	2			19/04/09
Eremophila congesta	P1		795973	7044977	50		pnd	Population is extensive	3/05/09
Eremophila congesta	P1		795853	7044985	50		pnd	Population follows hill	3/05/09
Eremophila congesta	P1		795917	7045182	50		pnd	Extensive population along hill crest	3/05/09
Eremophila congesta	P1		795780	7045190	50		pnd	Extensive population along hill side	3/05/09
Eremophila congesta	P1		795500	7045201	50		pnd	Population continues along hill and north and south of track (within habitat)	3/05/09
Eremophila congesta	P1		795301	7045210	50		pnd	Population continues along hill and north and south of track	3/05/09
Eremophila congesta	P1		796325	7045456	50		pnd		23/04/09
Eremophila congesta	P1		795284	7045512	50		pnd	Population extends in all directions, dominant mid-shrub	3/05/09
Eremophila congesta	P1		795381	7045560	50		pnd	JFH110	3/05/09
Eremophila congesta	P1		795446	7045561	50		pnd	Continues; dominant mid-shrub	3/05/09
Eremophila congesta	P1		794221	7045562	50		pnd	JFH106 dominant mid shrub	2/05/09
Eremophila congesta	P1		794858	7045884	50	1		already flagged; population extends south	24/08/09
Eremophila congesta	P1		794874	7045889	50	2		flagged, extends south	24/08/09
Eremophila congesta	P1		794886	7045890	50	10	+	population extends along east side of road and across hillslope to the east	24/08/09
Eremophila congesta	P1		794872	7045902	50	4	+	flagged, extends north and west	24/08/09
Eremophila congesta	P1		794863	7045911	50	10	+	flagged, extends north and west	24/08/09
Eremophila congesta	P1		795999	7046010	50		pnd	likely extends northwest	23/04/09
Eremophila congesta	P1		796561	7046040	50		pnd		23/04/09

Species	DEC Conservation Code	Site	WGS84 mE	WGS84 mN	Zone	Number of Individuals	Estimated Population	Habitat/Comment	Date
Eremophila congesta	P1		796031	7046047	50		pnd	continues	23/04/09
Eremophila congesta	P1		794518	7046256	50		pnd	Population continues north, south, and east	2/05/09
Eremophila congesta	P1		796193	7046277	50	100	++	Large population on east facing slope	23/04/09
Eremophila congesta	P1		794323	7046283	50	4	+		24/08/09
Eremophila congesta	P1		794962	7046292	50	3		already flagged	24/08/09
Eremophila congesta	P1		795068	7046294	50	1		already flagged	24/08/09
Eremophila congesta	P1		794574	7046295	50		pnd	population extends	24/08/09
Eremophila congesta	P1		795088	7046298	50	4	+	pnd	24/08/09
Eremophila congesta	P1		795055	7046300	50	1		already flagged	24/08/09
Eremophila congesta	P1		794837	7046301	50		pnd	extensive population	24/08/09
Eremophila congesta	P1		794876	7046303	50		pnd	extensive population, to north and west	24/08/09
Eremophila congesta	P1		794629	7046306	50		pnd	extensive population	24/08/09
Eremophila congesta	P1		793871	7046308	50	100	++		2/05/09
Eremophila congesta	P1		795036	7046310	50	2		already flagged	24/08/09
Eremophila congesta	P1		796245	7046345	50	100	++		23/04/09
Eremophila congesta	P1		796546	7046449	50	25	+	possibly extends eastwards	23/04/09
Eremophila congesta	P1		795001	7046553	50		pnd	Population continues	2/05/09
Eremophila congesta	P1		794741	7046696	50	2			24/08/09
Eremophila congesta	P1		794888	7046698	50	1			24/08/09
Eremophila congesta	P1		794905	7046699	50	4	+	pnd	24/08/09
Eremophila congesta	P1		794536	7046700	50	1			24/08/09
Eremophila congesta	P1		794723	7046704	50	2			24/08/09
Eremophila congesta	P1		794664	7046705	50	6	+	pnd	24/08/09
Eremophila congesta	P1		794912	7046707	50	1			24/08/09
Eremophila congesta	P1		794885	7046709	50	1			24/08/09
Eremophila congesta	P1		794751	7046711	50	1			24/08/09
Eremophila congesta	P1		795012	7046712	50	1			24/08/09
Eremophila congesta	P1		794909	7046722	50	2	+	pnd	24/08/09
Eremophila congesta	P1		794830	7046728	50	1			24/08/09
Eremophila congesta	P1		794927	7046734	50	1			24/08/09

Species	DEC Conservation Code	Site	WGS84 mE	WGS84 mN	Zone	Number of Individuals	Estimated Population	Habitat/Comment	Date
Eremophila congesta	P1		794839	7046737	50	1			24/08/09
Homalocalyx echinulatus	P3	C3	792594	7038992	50		pnd	extending south of existing track	4/04/09
Homalocalyx echinulatus	P3	C3	792562	7039007	50		pnd	extending north of existing track	4/04/09
Homalocalyx echinulatus	P3	C3	792573	7039009	50		pnd	extending north of existing track	4/04/09
Homalocalyx echinulatus	P3	C3	792615	7043209	50	1			4/04/09
Homalocalyx echinulatus	P3	C3	792877	7043407	50		pnd		4/04/09
Homalocalyx echinulatus	P3	C3	792844	7043427	50		pnd		4/04/09
Homalocalyx echinulatus	P3		792338	7022033	50	100	+	pnd	27/06/09
Homalocalyx echinulatus	P3		792819	7024213	50	100	+		26/06/09
Homalocalyx echinulatus	P3		792733	7024264	50	100	+		26/06/09
Homalocalyx echinulatus	P3		793761	7031181	50		pnd	JFH14	9/03/09
Homalocalyx echinulatus	P3		793775	7031219	50		pnd	scattered	23/06/09
Homalocalyx echinulatus	P3		793621	7031237	50		pnd	JFH12	9/03/09
Homalocalyx echinulatus	P3		793449	7031532	50		pnd	JFH26	11/03/09
Homalocalyx echinulatus	P3		793652	7033267	50	50	+		15/05/09
Homalocalyx echinulatus	P3		794254	7033397	50	20			17/05/09
Homalocalyx echinulatus	P3		793720	7033511	50	100	+		15/05/09
Homalocalyx echinulatus	P3		793441	7034453	50	50	+	pnd	19/06/09
Homalocalyx echinulatus	P3		794198	7036994	50	30	+	pnd	20/06/09
Homalocalyx echinulatus	P3		794218	7037104	50	100	+	pnd	20/06/09
Homalocalyx echinulatus	P3		794542	7038776	50	20			18/06/09
Homalocalyx echinulatus	P3		792603	7039075	50		pnd	JFH88	17/04/09
Homalocalyx echinulatus	P3		792701	7039550	50		pnd		16/04/09
Homalocalyx echinulatus	P3		794462	7040442	50	20	+		13/06/09
Homalocalyx echinulatus	P3		793083	7040807	50	20	+		14/06/09
Homalocalyx echinulatus	P3		792643	7040984	50		pnd		19/04/09
Homalocalyx echinulatus	P3		795178	7041573	50	50	+		19/05/09
Homalocalyx echinulatus	P3		795750	7041865	50	30	+		4/05/09
Homalocalyx echinulatus	P3		796279	7041883	50	100	+		4/05/09
Homalocalyx echinulatus	P3		795797	7041906	50	50	+		4/05/09
Homalocalyx echinulatus	P3		792578	7042305	50	75	+	extends north and south	18/04/09

Species	DEC Conservation Code	Site	WGS84 mE	WGS84 mN	Zone	Number of Individuals	Estimated Population	Habitat/Comment	Date
Homalocalyx echinulatus	P3		796033	7042520	50	50			4/05/09
Homalocalyx echinulatus	P3		792702	7043477	50				18/04/09
Homalocalyx echinulatus	P3		792742	7043481	50	75	+		18/04/09
Homalocalyx echinulatus	P3		792645	7043875	50		pnd		19/04/09
Homalocalyx echinulatus	P3		792806	7043885	50		100		18/04/09
Homalocalyx echinulatus	P3		792820	7043923	50	50	+	extending north	18/04/09
Homalocalyx echinulatus	P3		792812	7043968	50		pnd	population continues	19/04/09
Homalocalyx echinulatus	P3		792807	7044034	50		pnd	population continues	19/04/09
Homalocalyx echinulatus	P3		794156	7045765	50		pnd		4/05/09
Homalocalyx echinulatus	P3		794132	7045744	50	100	+		2/05/09
Homalocalyx echinulatus	P3		793787	7045971	50	100	+		2/05/09
Homalocalyx echinulatus	P3		794135	7046020	50	300	+		2/05/09
Homalocalyx echinulatus	P3		794293	7046112	50	50	+		2/05/09
Homalocalyx echinulatus	P3		794183	7046153	50	100	+		2/05/09
Homalocalyx echinulatus	P3		794271	7047109	50	100	+		2/05/09
Homalocalyx echinulatus	P3		794183	7047567	50	5	+		2/05/09
Maireana prosthecochaeta	P3		793327	7038401	50		pnd	JFH133	17/06/09
Maireana prosthecochaeta	P3		793407	7039912	50		pnd		14/06/09
Maireana prosthecochaeta	P3		793304	7038393	50		pnd		17/06/09
Olearia mucronata	P3		794135	7033621	50		pnd		2/05/09
Olearia mucronata	P3		794202	7034019	50		pnd		16/05/09
Olearia mucronata	P3		794225	7034046	50		pnd	JFH128; breakaways	16/05/09
Olearia mucronata	P3		795513	7039956	50		pnd		13/06/09
Olearia mucronata	P3		794264	7034074	50		pnd		16/05/09
Prostanthera ferricola	P3		792616	7039487	50		pnd	location to be confirmed	16/04/09
Prostanthera ferricola	P3		792654	7039508	50		pnd	location to be confirmed	16/04/09
Prostanthera ferricola	P3		792695	7039566	50		pnd	location to be confirmed	16/04/09
Prostanthera ferricola	P3		792628	7039581	50		pnd	location to be confirmed	16/04/09
Prostanthera ferricola	P3		792633	7039786	50		pnd	location to be confirmed	16/04/09
Prostanthera ferricola	P3		792668	7039795	50	10	+	location confirmed	16/04/09
Prostanthera ferricola	P3	C3	792366	7040493	50		pnd	location confirmed	15/04/09

Species	DEC Conservation Code	Site	WGS84 mE	WGS84 mN	Zone	Number of Individuals	Estimated Population	Habitat/Comment	Date
Ptilotus chrysocomus	P1		792893	7038031	50		pnd		
Ptilotus chrysocomus	P1		796115	7040086	50		pnd		13/06/09
Ptilotus chrysocomus	P1		793303	7038385	50		pnd		17/06/09
Ptilotus chrysocomus	P1		793327	7038401	50		pnd	JFH133	17/06/09
Ptilotus chrysocomus	P1		794298	7038865	50		pnd		18/06/09
Ptilotus chrysocomus	P1		795513	7039956	50		pnd		13/06/09
Ptilotus chrysocomus	P1		793340	7039956	50		pnd		14/06/09
Ptilotus chrysocomus	P1		795534	7040386	50		pnd		13/06/09
Ptilotus chrysocomus	P1		795521	7040624	50		pnd		13/06/09
Ptilotus chrysocomus	P1		794807	7045282	50		pnd	JFH111	3/05/09
Ptilotus chrysocomus	P1		796565	7041755	50		pnd	JFH122	4/05/09
Sauropus ramosissimus	P3		794402	7032246	50		pnd	laterite breakaways	
Sida sp. Wiluna			793712	7031238	50		pnd	JFH13	9/03/09
Sida sp. Wiluna			793965	7031253	50		pnd		9/03/09
Sida sp. Wiluna			793496	7031334	50		pnd	JFH11	9/03/09
Sida sp. Wiluna		A ridge (south Joyner's)	793725	7031463	50		pnd	JFH07	9/03/09
Sida sp. Wiluna			793538	7031490	50		pnd		11/03/09
Sida sp. Wiluna		A ridge (south Joyner's)	794452	7032042	50		pnd		8/03/09
Sida sp. Wiluna			793794	7032200	50		pnd		8/03/09
Sida sp. Wiluna			794165	7032233	50		pnd	JFH03	8/03/09
Sida sp. Wiluna			794712	7032817	50		pnd	JFH104	1/05/09
Sida sp. Wiluna			794286	7032918	50		pnd		16/05/09
Sida sp. Wiluna			794146	7032957	50		pnd		16/05/09
Sida sp. Wiluna			794848	7032992	50		pnd		1/05/09
Sida sp. Wiluna			794905	7033186	50		pnd		1/05/09
Sida sp. Wiluna			793761	7033661	50		pnd		19/06/09

Species	DEC Conservation Code	Site	WGS84 mE	WGS84 mN	Zone	Number of Individuals	Estimated Population	Habitat/Comment	Date
Sida sp. Wiluna			791845	7034476	50		pnd		18/03/09
Sida sp. Wiluna			791609	7034845	50		pnd		17/03/09
Sida sp. Wiluna			792145	7035201	50		pnd		15/04/09
Sida sp. Wiluna			792234	7035213	50		pnd		15/04/09
Sida sp. Wiluna			792157	7035214	50		pnd		15/04/09
Sida sp. Wiluna			792192	7035231	50		pnd		15/04/09
Sida sp. Wiluna			791367	7035269	50		pnd		17/03/09
Sida sp. Wiluna			794913	7038455	50		pnd		18/06/09
Sida sp. Wiluna			794643	7038478	50		pnd		18/06/09
Sida sp. Wiluna			795101	7038808	50		pnd		13/06/09
Sida sp. Wiluna			795240	7040626	50		pnd		13/06/09
Sida sp. Wiluna			796662	7041667	50		pnd	JFH121	4/05/09
Sida sp. Wiluna			796682	7041819	50		pnd	JFH120	4/05/09
Sida sp. Wiluna			791718	7033915	50		pnd		18/03/09
Sida sp. Wiluna			795521	7040624	50		pnd		13/06/09
Sida sp. Wiluna			793913	7043790	50		pnd	JFH123	5/05/09
Sida sp. Wiluna			794256	7033856	50		pnd	JFH127	16/05/09
Sida sp. Wiluna			794110	7033156	50		pnd	JFH126	15/05/09
Sida sp. Wiluna			796565	7041755	50		pnd	JFH122	4/05/09
Sida sp. Wiluna			792381	7025311	50		pnd	JFH137: check location	25/06/09

TABLE 10 PRIORITY FLORA POPULATIONS RECORDED BY KEITH LINDBECK & ASSOCIATES[8] IN THE WILUNA WEST PROJECT AREA.

Species	DEC Conservation Code	GDA94 mE	GDA94 mN	Zone	Number of Individuals	Keith Lindbeck & Associates Comment	Date
Baeckea sp Melita Station	P4	792404	7030197	50	4	recorded by KLA	
Baeckea sp Melita Station	P4	792403	7030208	50	5	recorded by KLA	18/05/09
Baeckea sp Melita Station	P4	792398	7030229	50	1	recorded by KLA	18/05/09
Baeckea sp Melita Station	P4	792522	7042730	50	1	POI 031	Sep/Oct 2009; Feb 2010
Baeckea sp Melita Station	P4	792526	7041649	50	50+	POI 059 recorded by KLA	Sep/Oct 2009; Feb 2010
Baeckea sp Melita Station	P4	792360	7040352	50	20+	POI 090 recorded by KLA (POI 090-095 population boundary)	Sep/Oct 2009; Feb 2010
Baeckea sp Melita Station	P4	792376	7040348	50		POI 091 recorded by KLA (POI 090-095 population boundary)	Sep/Oct 2009; Feb 2010
Baeckea sp Melita Station	P4	792373	7040348	50		POI 092 recorded by KLA (POI 090-095 population boundary)	Sep/Oct 2009; Feb 2010
Baeckea sp Melita Station	P4	792372	7040349	50		POI 093 recorded by KLA (POI 090-095 population boundary)	Sep/Oct 2009; Feb 2010
Baeckea sp Melita Station	P4	792376	7040354	50		POI 094 recorded by KLA (POI 090-095 population boundary)	Sep/Oct 2009; Feb 2010
Baeckea sp Melita Station	P4	792369	7040364	50		POI 095 recorded by KLA (POI 090-095 population boundary)	Sep/Oct 2009; Feb 2010
Baeckea sp Melita Station	P4	792343	7040310	50	20+	POI 097 recorded by KLA	Sep/Oct 2009; Feb 2010
Baeckea sp Melita Station	P4	792360	7040274	50	15	POI 100 recorded by KLA	Sep/Oct 2009; Feb 2010
Baeckea sp Melita Station	P4	792377	7040143	50	100+	POI 103 recorded by KLA	Sep/Oct 2009; Feb 2010
Baeckea sp Melita Station	P4	792398	7040050	50	15+	POI 106 recorded by KLA (POI 106-107 population boundary)	Sep/Oct 2009; Feb 2010
Baeckea sp Melita Station	P4	792379	7040043	50		POI 107 recorded by KLA (POI 106-107 population boundary)	Sep/Oct 2009; Feb 2010
Baeckea sp Melita Station	P4	792514	7041620	50	21	recorded by KLA	18/05/09
Baeckea sp Melita Station	P4	792539	7041646	50	38-40	recorded by KLA	18/05/09
Prostanthera ferricola	P3	792669	7039798	50	5	recorded by KLA	18/05/09
Homalocalyx echinulatus	P3	792683	7043074	50	20	recorded by KLA	18/05/09

[8] Data provided by Keith Lindbeck & Associates

Species	DEC Conservation Code	GDA94 mE	GDA94 mN	Zone	Number of Individuals	Keith Lindbeck & Associates Comment	Date
Homalocalyx echinulatus	P3	792664	7043102	50	50	recorded by KLA	18/05/09
Homalocalyx echinulatus	P3	792839	7043501	50	additional population	recorded by KLA	18/05/09
Homalocalyx echinulatus	P3	792629	7043600	50	additional population	recorded by KLA	18/05/09
Homalocalyx echinulatus	P3	792635	7043984	50	21	recorded by KLA	18/05/09
Homalocalyx echinulatus	P3	792601	7042271	50	50+	POI 043 recorded by KLA (POI 043-046 population boundary)	Sep/Oct 2009; Feb 2010
Homalocalyx echinulatus	P3	792606	7042291	50		POI 044 recorded by KLA (POI 043-046 population boundary)	Sep/Oct 2009; Feb 2010
Homalocalyx echinulatus	P3	792588	7042294	50		POI 045 recorded by KLA (POI 043-046 population boundary)	Sep/Oct 2009; Feb 2010
Homalocalyx echinulatus	P3	792570	7042279	50		POI 046 recorded by KLA (POI 043-046 population boundary)	Sep/Oct 2009; Feb 2010
Homalocalyx echinulatus	P3	792547	7042132	50	1	POI 052 recorded by KLA	Sep/Oct 2009; Feb 2010
Homalocalyx echinulatus	P3	792443	7041551	50	6	POI 063 recorded by KLA	Sep/Oct 2009; Feb 2010
Homalocalyx echinulatus*	P3	792796	7048800	50	178	recorded by KLA - **population boundaries provided in table below**	18/05/09
Eremophila congesta	P1	792522	7044705	50	5		18/05/09
Eremophila congesta	P1	792599	7044791	50	1	recorded by KLA	18/05/09
Eremophila congesta	P1	792591	7044799	50	4	recorded by KLA	18/05/09
Eremophila congesta	P1	792483	7044847	50	2		18/05/09
Eremophila congesta	P1	792363	7045450	50	1	POI 026 recorded by KLA	Sep/Oct 2009; Feb 2010
Eremophila congesta	P1	792507	7042398	50	1	POI 040 recorded by KLA	Sep/Oct 2009; Feb 2010
Eremophila arachnoides subsp. *arachnoides*	P3	794018	7038689	50	20	POI 128 recorded by Martin Henson KLA	1/10/09
Eremophila arachnoides subsp. *arachnoides*	P3	793916	7038861	50	200+	Recorded by KLA : Population boundary 1.1	October, 2009
Eremophila arachnoides subsp. *arachnoides*	P3	793937	7038794	50		Recorded by KLA : Population boundary 1.2	October, 2009
Eremophila arachnoides subsp. *arachnoides*	P3	793937	7038745	50		Recorded by KLA : Population boundary 1.3	October, 2009
Eremophila arachnoides subsp. *arachnoides*	P3	793968	7038707	50		Recorded by KLA : Population boundary 1.4	October, 2009

Species	DEC Conservation Code	GDA94 mE	GDA94 mN	Zone	Number of Individuals	Keith Lindbeck & Associates Comment	Date
Eremophila arachnoides subsp. *arachnoides*	P3	793983	7038667	50		Recorded by KLA : Population boundary 1.5	October, 2009
Eremophila arachnoides subsp. *arachnoides*	P3	794000	7038636	50		Recorded by KLA : Population boundary 1.6	October, 2009
Eremophila arachnoides subsp. *arachnoides*	P3	794084	7038663	50		Recorded by KLA : Population boundary 1.7	October, 2009
Eremophila arachnoides subsp. *arachnoides*	P3	794019	7038692	50		Recorded by KLA : Population boundary 1.8	October, 2009
Eremophila arachnoides subsp. *arachnoides*	P3	793970	7038816	50		Recorded by KLA : Population boundary 1.9	October, 2009
Sida sp. Wiluna		793684	7032384	50	2	POI 003 recorded by KLA	Sep/Oct 2009; Feb 2010
Sida sp. Wiluna		793694	7032385	50	5	POI 004 recorded by KLA	Sep/Oct 2009; Feb 2010
Sida sp. Wiluna		793690	7032366	50	1	POI 005 recorded by KLA	Sep/Oct 2009; Feb 2010
Sida sp. Wiluna		793682	7032371	50	2	POI 006 recorded by KLA	Sep/Oct 2009; Feb 2010
Sida sp. Wiluna		793662	7032404	50	1	POI 007 recorded by KLA	Sep/Oct 2009; Feb 2010
Sida sp. Wiluna		793603	7032411	50	20	POI 008 southern boundary recorded by KLA	Sep/Oct 2009; Feb 2010
Sida sp. Wiluna		793590	7032442	50		POI 010 northern boundary recorded by KLA	Sep/Oct 2009; Feb 2010
Homalocalyx echinulatus* **POPULATION BOUNDARY**							
Homalocalyx echinulatus	P3	792796	7048800	50			18/05/09
Homalocalyx echinulatus	P3	792783	7048786	50			18/05/09
Homalocalyx echinulatus	P3	792777	7048764	50			18/05/09
Homalocalyx echinulatus	P3	792780	7048752	50			18/05/09
Homalocalyx echinulatus	P3	792786	7048741	50			18/05/09
Homalocalyx echinulatus	P3	792792	7048736	50		TOTAL PLANTS - 178	18/05/09
Homalocalyx echinulatus	P3	792798	7048735	50			18/05/09
Homalocalyx echinulatus	P3	792796	7048749	50			18/05/09

Species	DEC Conservation Code	GDA94 mE	GDA94 mN	Zone	Number of Individuals	Keith Lindbeck & Associates Comment	Date
Homalocalyx echinulatus	P3	792794	7048761	50			18/05/09
Homalocalyx echinulatus	P3	792793	7048766	50			18/05/09
Homalocalyx echinulatus	P3	792788	7048770	50			18/05/09
Homalocalyx echinulatus	P3	792796	7048790	50			18/05/09
Homalocalyx echinulatus	P3	792798	7048802	50			18/05/09

TABLE 11 PRIORITY FLORA POPULATIONS RECORDED BY BOTANICA CONSULTING[9] IN THE WILUNA WEST PROJECT AREA.

Species	DEC Conservation Code	GDA94 mE	GDA94 mN	Zone	Botanica Consulting Comments
Baeckea sp. Melita Station	P4	792172	7022346	50	1
Baeckea sp. Melita Station	P4	792174	7022401	50	1
Baeckea sp. Melita Station	P4	792209	7022912	50	8
Baeckea sp. Melita Station	P4	792540	7022921	50	1
Baeckea sp. Melita Station	P4	792174	7022932	50	4
Baeckea sp. Melita Station	P4	792166	7022969	50	3
Baeckea sp. Melita Station	P4	792205	7023000	50	1
Baeckea sp. Melita Station	P4	792189	7023008	50	1
Baeckea sp. Melita Station	P4	792186	7023010	50	1
Baeckea sp. Melita Station	P4	792193	7023010	50	1
Baeckea sp. Melita Station	P4	793431	7029465	50	
Baeckea sp. Melita Station	P4	793431	7029465	50	20
Baeckea sp. Melita Station	P4	792410	7030305	50	45
Baeckea sp. Melita Station	P4	792459	7032419	50	100
Baeckea sp. Melita Station	P4	792620	7032834	50	1
Baeckea sp. Melita Station	P4	793789	7033343	50	10

[9] Data provided by Keith Lindbeck & Associates

Species	DEC Conservation Code	GDA94 mE	GDA94 mN	Zone	Botanica Consulting Comments
Baeckea sp. Melita Station	P4	792720	7034004	50	30
Baeckea sp. Melita Station	P4	792809	7035303	50	
Baeckea sp. Melita Station	P4	794515	7035401	50	5
Baeckea sp. Melita Station	P4	794264	7036200	50	
Baeckea sp. Melita Station	P4	796259	7038084	50	
Calytrix uncinata	P3	791795	7015000	50	12
Calytrix uncinata	P3	793513	7031781	50	
Calytrix uncinata	P3	794272	7034566	50	
Calytrix uncinata	P3	794272	7034566	50	10
Calytrix uncinata	P3	796271	7038387	50	
Calytrix uncinata	P3	796085	7039225	50	
Calytrix uncinata	P3	792317	7022091	50	30
Calytrix uncinata	P3	792434	7022161	50	25
Calytrix uncinata	P3	792454	7022455	50	50+
Calytrix uncinata	P3	792373	7035057	50	Population
Calytrix uncinata	P3	792309	7035079	50	Population
Calytrix uncinata	P3	792299	7035087	50	Population
Calytrix uncinata	P3	792510	7041594	50	x2 plants on edge of already cleared track
Calytrix uncinata	P3	792500	7041600	50	Already cleared
Eremophila congesta	P1	795234	7040584	50	1
Eremophila congesta	P1	794357	7040856	50	12
Eremophila congesta	P1	795137	7041192	50	
Eremophila congesta	P1	795122	7041210	50	1
Eremophila congesta	P1	792513	7044708	50	5
Eremophila congesta	P1	794684	7044753	50	
Eremophila congesta	P1	792479	7044844	50	
Eremophila congesta	P1	795248	7045381	50	
Eremophila congesta	P1	794168	7045497	50	Large population
Eremophila congesta	P1	795268	7045526	50	1000
Eremophila congesta	P1	795287	7045555		1000
Eremophila congesta	P1	794228	7045601		Large population

Species	DEC Conservation Code	GDA94 mE	GDA94 mN	Zone	Botanica Consulting Comments
Eremophila congesta	P1	794184	7045619		Large population
Eremophila congesta	P1	794360	7045640		Large population
Eremophila congesta	P1	794188	7045655		Large population
Eremophila congesta	P1	794310	7045661		Large population
Eremophila congesta	P1	794248	7045662		Large population
Eremophila congesta	P1	794372	7045686		Large population
Eremophila congesta	P1	794225	7045709		Large population
Eremophila congesta	P1	795294	7045709		500
Eremophila congesta	P1	794253	7045724		Large population
Eremophila congesta	P1	794314	7045725		Large population
Eremophila congesta	P1	794995	7045744		1000
Eremophila congesta	P1	794874	7045761		
Eremophila congesta	P1	794370	7045789		Large population
Eremophila congesta	P1	794362	7045800		Large population
Eremophila congesta	P1	794399	7045808		Large population
Eremophila congesta	P1	794959	7046257		
Homalocalyx echinulatus	P3	793085	7040813		40
Homalocalyx echinulatus	P3	792656	7039137		100
Homalocalyx echinulatus	P3	792582	7039163		2000
Homalocalyx echinulatus	P3	794471	7040601		50; 20m x 20m patch
Homalocalyx echinulatus	P3	792771	7041946		1
Homalocalyx echinulatus	P3	792553	7042202		100
Homalocalyx echinulatus	P3	792764	7043145		50
Homalocalyx echinulatus	P3	792654	7043802		10000
Homalocalyx echinulatus	P3	794376	7045717		200-300
Homalocalyx echinulatus	P3	792718	7048589		1000
Homalocalyx echinulatus	P3	792560	7048822		40
Homalocalyx echinulatus	P3	792660	7038998		x1000's plants
Homalocalyx echinulatus	P3	792649	7039199		x2000 plants from WP113-114 approx 800m
Homalocalyx echinulatus	P3	792498	7039243		x2000 plants from WP113-114 approx 800m
Homalocalyx echinulatus	P3	792500	7039250		Population

Species	DEC Conservation Code	GDA94 mE	GDA94 mN	Zone	Botanica Consulting Comments
Homalocalyx echinulatus	P3	792561	7039339		x300 plants from WP111-112
Homalocalyx echinulatus	P3	792460	7039350		Population
Homalocalyx echinulatus	P3	792500	7039350		Population
Homalocalyx echinulatus	P3	792540	7039350		Population
Homalocalyx echinulatus	P3	792580	7039350		Population
Homalocalyx echinulatus	P3	792475	7039368		Large population finish - already been cleared
Homalocalyx echinulatus	P3	792552	7039388		x300 plants from WP111-112
Homalocalyx echinulatus	P3	792463	7039449		Large population start
Homalocalyx echinulatus	P3	792460	7039450		Population
Homalocalyx echinulatus	P3	792500	7039450		Population
Homalocalyx echinulatus	P3	792536	7042100		x80 plants
Homalocalyx echinulatus	P3	792540	7042100		Population
Homalocalyx echinulatus	P3	792584	7042195		x253 plants
Homalocalyx echinulatus	P3	792580	7042200		Population
Homalocalyx echinulatus	P3	792580	7043050		Population
Homalocalyx echinulatus	P3	792592	7043053		x50 plants
Maireana prosthecochaeta	P3	796085	7039225		
Prostanthera ferricola	P3	792536	7040572		6
Prostanthera ferricola	P3	792665	7041441		30
Prostanthera ferricola	P3	792540	7040550		was searched for extensively and not located at the DEC known location
Ptilotus chrysocomus	P1	796099	7040086		
Ptilotus chrysocomus	P1	792536	7040572		
Ptilotus chrysocomus	P1	792665	7041441		30

Appendix VII Vegetation Communities - Species List

TABLE 12 HERBERT LUKIN RIDGE & SURROUNDS VEGETATION SURVEY – SPECIES LIST

Family	Species	DEC [10]	RECON ENV.	Habitat Types																														
				SIMS-B	ASET	LOMS	SIMS-C	UAET	SUAE	SAEC	OALS	OALS-S	AXSI	SXSS	SAES	SAES-E	DRAS	USCS	SIME	SMEC	MSET	SIMS-M	BCLS	BRXS	CBKW	MUWA	HPMD	HPMS	MUBW	GRMU	SAMA	SAMU	SASP
Pteridaceae	*Cheilanthes brownii*	+	+	+							+		+																					
	Cheilanthes sieberi subsp. *sieberi*	+	+				+								+	+	+												+		+		+	
Asparagaceae	*Thysanotus manglesianus*	+																																
Cyperaceae	*Bulbostylis barbata*	+	+														+																	
	Callitris columellaris		+	+																				+										
	Cyperus iria		+														+																	
	Cyperus squarrosus	+	+														+								+									
	Fimbristylis dichotoma (desert form)		+														+																	
	Schoenus variicellae		+														+																	
Poaceae	*Aristida contorta*	+	+	+							+				+		+																	
	Aristida holathera var. *holathera*	+	+				+								+																			
	Aristida ?holathera var. holathera		+												+																			
	Aristida obscura	+																																
	Austrostipa elegantissima	+																																
	Brachyachne prostrata	+																																
	Cymbopogon ambiguus		+														+																	
	Digitaria brownii	+	+				+										+																	
	Enneapogon caerulescens	+	+								+																							
	Eragrostis dielsii	+																																
	Eragrostis eriopoda	+	+	+		+	+				+						+		+		+						+	+			+			
	Eragrostis lacunaria	+	+								+													+										
	Eragrostis pergracilis	+																																
	Eragrostis setifolia		+				+		+								+				+				+	+	+	+				+	+
	Eragrostis tenellula		+																						+		+							

[10] DEC: Markey & Dillon (2007 & 2009).
RECON ENV: Full list of species identified during the current survey.

Family	Species	DEC [10]	RECON ENV.	Habitat Types																														
				SIMS-B	ASET	LOMS	SIMS-C	UAET	SUAE	SAEC	OALS	OALS-S	AXSI	SXSS	SAES	SAES-E	DRAS	USCS	SIME	SMEC	MSET	SIMS-M	BCLS	BRXS	CBKW	MUWA	HPMD	HPMS	MUBW	GRMU	SAMA	SAMU	SASP
	Eriachne helmsii	+	+	+			+		+		+				+		+										+	+	+	+		+	
	Eriachne mucronata	+	+	+			+	+	+		+	+			+						+			+				+					+
	Eriachne mucronata (xerophytic form)		+	+							+				+									+									
	Eriachne pulchella subsp. *dominii*	+	+														+							+									
	Eriachne pulchella subsp. *pulchella*	+																																
	Eriachne sp. (sterile)		+														+													+			+
	Iseilema eremaeum		+														+																
	Monachather paradoxus	+	+				+								+	+	+				+				+		+	+		+		+	+
	Paspalidium basicladum	+	+												+		+							+									
	Perotis rara		+														+																
	Poaceae sp. (sterile)		+			+																												+
	Themeda triandra		+																						+								
	Thyridolepis mitchelliana	+	+								+						+																
	Thyridolepis multiculmis	+	+	+			+				+				+		+				+			+									
	Triodia basedowii		+																															+
	Triodia concinna	+	+				+														+					+	+	+			+	+	+
	Triodia melvillei	+	+		+	+	+	+		+					+	+	+				+							+	+				
	Triodia ?scariosa		+																															+
	Tripogon loliiformis	+																																
Proteaceae	*Grevillea berryana*	+	+	+	+	+	+	+		+	+	+		+	+	+	+		+	+		+		+										
	Grevillea striata		+				+																											
	Grevillea juncifolia subsp. *juncifolia*		+																															+
	Grevillea deflexa		+														+										+	+					
	Hakea leucoptera subsp. *sericipes*	+	+				+				+		+										+											
	Hakea lorea subsp. *lorea*		+																										+			+	+	
	Hakea recurva subsp. *recurva*	+	+								+		+	+	+			+						+									
Dilleniaceae	*Hibbertia ?arcuata*		+								+													+									
Haloragaceae	*Haloragis odontocarpa* forma *pterocarpa*	+	+												+		+																	

Family	Species	DEC [10]	RECON ENV.	Habitat Types																													
				SIMS-B	ASET	LOMS	SIMS-C	UAET	SUAE	SAEC	OALS	OALS-S	AXSI	SXSS	SAES	SAES-E	DRAS	USCS	SIME	SMEC	MSET	SIMS-M	BCLS	BRXS	CBKW	MUWA	HPMD	HPMS	MUBW	GRMU	SAMA	SAMU	SASP
	Haloragis trigonocarpa	+	+														+																
Zygophyllaceae	*Tribulus adelacanthus* (P3)	+		+																													
	Tribulus astrocarpus	+																															
	Tribulus suberosus	+	+												+					+													
	*Tribulus terrestris**		+												+																		
	Zygophyllum eichleri	+																															
Fabaceae	*Acacia* aff. *ayersiana*		+												+		+																
	Acacia aneura var. cf. *aneura*	+																															
	Acacia aneura var. ?*aneura*		+		+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+		+	+	+	+	+		+		+	+
	Acacia aneura var. cf. *argentea*	+																															
	Acacia aneura var. ?*argentea*		+		+		+			+	+	+				+										+	+	+	+			+	+
	Acacia aneura var. *?fuliginea*		+													+									+								
	Acacia aneura var. ?*intermedia*		+		+	+					+		+			+	+			+			+				+	+					
	Acacia aneura var. cf. *microcarpa*	+																																
	Acacia aneura var. ?*microcarpa*		+	+	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+		+	+	+				+	
	Acacia aneura var. cf. *tenuis*	+											+																					
	Acacia aneura var. ?*tenuis*		+		+		+				+	+	+	+	+	+	+	+			+	+		+	+	+	+	+	+	+		+	
	Acacia aneura x craspedocarpa	+																																
	Acacia balsamea	+	+	+			+				+		+		+	+	+							+	+			+					
	Acacia burkittii	+	+								+		+	+	+		+																
	Acacia craspedocarpa		+	+	+	+	+			+	+		+		+	+	+		+					+	+	+	+	+		+		+	+
	Acacia cuthbertsonii subsp. *cuthbertsonii*	+	+		+						+			+		+						+	+										
	Acacia ?cuthbertsonii subsp. *cuthbertsonii*		+								+		+																					
	Acacia ?effusifolia		+														+																	+
	Acacia jamesiana		+																															+
	Acacia minyura		+								+				+	+											+	+					+
	Acacia murrayana		+																														+	+
	Acacia pachyacra		+														+																	+

Family	Species	DEC [10]	RECON ENV.	Habitat Types																													
				SIMS-B	ASET	LOMS	SIMS-C	UAET	SUAE	SAEC	OALS	OALS-S	AXSI	SXSS	SAES	SAES-E	DRAS	USCS	SIME	SMEC	MSET	SIMS-M	BCLS	BRXS	CBKW	MUWA	HPMD	HPMS	MUBW	GRMU	SAMA	SAMU	SASP
	Acacia pruinocarpa	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			+		+		+	+
	Acacia quadrimarginea	+	+	+	+	+	+				+	+	+		+	+	+					+	+	+	+			+					
	Acacia ramulosa var. linophylla	+	+		+		+	+						+		+	+				+			+		+	+	+	+	+		+	
	Acacia rhodophloia	+	+		+	+	+	+	+	+	+		+		+		+			+	+			+								+	
	Acacia sibirica	+	+	+	+	+	+	+	+		+		+		+	+	+				+				+	+	+	+	+		+	+	+
	Acacia tetragonophylla	+	+	+							+	+	+	+	+	+	+	+				+	+	+		+	+	+		+		+	
	Acacia thoma	+																																
	Acacia ?thoma		+		+	+										+			+		+										+		
	Glycine canescens		+														+													+				
	Indigofera ?georgei		+														+																	
	Kennedia prorepens		+														+																	
	Leptosema chambersii		+																													+	+
	Mirbelia rhagodioides	+	+								+				+	+	+							+			+						
	Rhynchosia cf. *minima*	+																																
	Senna artemisioides subsp. aff. *helmsii* (R. Meissner & B. Bayliss 1432)	+																																
	Senna artemisioides subsp. *filifolia*	+	+													+																		
	Senna artemisioides subsp. *helmsii*	+	+				+				+		+	+	+	+	+		+			+	+											
	Senna artemisioides subsp. *petiolaris*		+																									+						
	Senna artemisioides subsp. *x artemisioides*		+								+				+		+						+		+		+			+	+		
	Senna artemisioides subsp. *x artemisioides ?x charlesiana*		+												+																			
	Senna artemisioides subsp. *x artemisioides x* subsp. *x sturtii*	+																																
	Senna artemisioides subsp. *x artemisioides ?x* subsp. *x sturtii*		+		+						+	+		+	+		+					+											
	Senna artemisioides subsp *x helmsii x glaucifolia* (Markey & Dillon 4717)	+																																
	Senna artemisioides subsp. *x helmsii ?x glaucifolia*		+												+																			
	Senna artemisioides subsp. *x helmsii x glaucifolia x oligophylla* (Markey &	+																																

Family	Species	DEC [10]	RECON ENV.	Habitat Types																														
				SIMS-B	ASET	LOMS	SIMS-C	UAET	SUAE	SAEC	OALS	OALS-S	AXSI	SXSS	SAES	SAES-E	DRAS	USCS	SIME	SMEC	MSET	SIMS-M	BCLS	BRXS	CBKW	MUWA	HPMD	HPMS	MUBW	GRMU	SAMA	SAMU	SASP
	Dillon 4312)																																	
	Senna artemisioides subsp. *x helmsii x oligophylla*		+								+	+			+					+														
	Senna artemisioides subsp. *x sturtii*		+		+						+				+					+			+	+				+						
	Senna charlesiana		+												+																				
	Senna glaucifolia	+	+			+					+				+		+			+			+		+									
	Senna glaucifolia x sp. Meekatharra (E. Bailey 1-26) (Markey & Dillon 3149)	+																																	
	Senna glaucifolia ?x sp. Meekatharra (E. Bailey 1-26)		+	+	+	+		+			+	+			+	+	+		+	+			+											
	Senna glutinosa subsp. *chatelainiana x charlesiana* (Markey & Dillon 3413)	+																																	
	Senna glutinosa subsp. *luerssenii*	+	+													+																			
	Senna sp. Austin (A. Strid 20210)	+																																	
	Senna sp. Meekatharra (E. Bailey 1-26)	+	+				+				+	+	+	+	+	+	+					+		+	+										
	Swainsona canescens	+	+																								+								
	Swainsona kingii	+	+														+																		
	Tephrosia sp. (immature)		+																											+					
Polygalaceae	*Polygala isingii*	+	+														+																		
Rhamnaceae	*Stenanthemum petraeum*	+	+	+	+		+	+			+			+		+			+			+		+										
Casuarinaceae	*Casuarina pauper*	+	+											+																					
Cucurbitaceae	*Citrullus lanatus**		+																								+								
Celastraceae	*Stackhousia muricata*		+																																
Oxalidaceae	*Oxalis perennans*	+																																	
Euphorbiaceae	*Beyeria lapidicola* (P1)	+	+	+															+																
	Euphorbia boophthona	+																																	
	Euphorbia drummondii subsp. *drummondii*	+	+														+																		
	Euphorbia tannensis subsp. *eremophila*	+																																	
Phyllanthaceae	*Phyllanthus erwinii*	+																																	
	Sauropus ramosissimus (P3)		+																					+										

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Geraniaceae	*Erodium cygnorum*	+																																
Myrtaceae	*Aluta maisonneuvei* subsp. *auriculata*	+	+	+	+	+			+		+													+									
	Baeckea sp. Melita Station (H. Pringle 2738) (P4)	+	+	+			+				+	+												+									
	Calothamnus aridus		+																															+
	Calytrix desolata	+	+											+	+																			
	Calytrix uncinata (P3)	+	+								+	+												+	+									
	Eucalyptus camaldulensis		+																						+									
	Eucalyptus carnei	+	+										+											+	+									
	Eucalyptus kingsmillii subsp. *kingsmillii*	+	+		+		+	+						+		+					+	+				+			+	+	+			+
	Eucalyptus leptopoda		+																															+
	Eucalyptus lucasii		+												+																	+		
	Eucalyptus ?lucasii		+												+																	+		
	Homalocalyx echinulatus (P3)	+	+	+		+																												
	Micromyrtus sulphurea		+																					+										
	Thryptomene decussata	+	+				+				+													+										
Sapindaceae	*Dodonaea microzyga* var. *acrolobata*	+	+								+				+	+	+							+									+
	Dodonaea petiolaris	+	+	+			+				+			+	+	+						+	+	+						+				
	Dodonaea rigida	+	+				+				+		+	+	+		+																	
	Dodonaea viscosa subsp. *mucronata*		+												+		+						+	+										
Malvaceae	*Abutilon cryptopetalum*	+	+								+				+		+										+							
	Abutilon otocarpum		+														+								+					+				
	Abutilon oxycarpum subsp. *prostratum* ms	+	+														+															+		
	Hibiscus burtonii	+	+	+			+				+				+		+				+		+			+	+	+		+				+
	Hibiscus gardneri ms	+	+	+							+				+		+										+		+	+				
	Hibiscus stuartii		+			+																												
	Hibiscus solanifolius	+																																
	Hibiscus sp. JFH179-TJR		+																												+			
	Keraudrenia velutina subsp. *elliptica*		+			+																												+

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	Sida ectogama	+	+		+		+				+	+	+	+	+	+	+	+			+	+	+	+	+	+		+		+			
	Sida sp. Dark green fruits (S. van Leeuwen 2260)	+	+		+		+		+	+	+				+	+						+						+		+			+
	Sida sp. Excedentifolia (J.L. Egan 1925)	+	+	+			+			+	+				+	+	+				+			+				+					+
	Sida sp. Golden calyces glabrous (H.N. Foote 32)	+	+	+	+	+	+		+	+	+			+	+	+	+		+		+	+											
	Sida aff. sp. Golden calyces glabrous		+							+	+	+																						
	Sida sp. Wiluna (Markey & Dillon 4126)	+	+	+		+	+				+		+									+		+										
	Sida sp. verrucose glands (F.H. Mollemans 2423)	+	+														+																	
	*Sida ?*sp. verrucose glands (F.H. Mollemans 2423)		+																															+
Gyrostemonaceae	*Codonocarpus cotinifolius*		+																		+													
	Gyrostemon ramulosus		+																															+
Cleomaceae	*Cleome viscosa*		+																															+
Santalaceae	*Anthobolus leptomerioides*	+	+	+							+				+		+					+				+								
	Exocarpos sparteus		+																															+
	Santalum lanceolatum	+	+	+						+	+	+	+	+	+	+																		+
	Santalum spicatum	+	+								+		+	+	+		+							+				+						
Loranthaceae	*Amyema hilliana*		+					+			+																				+			
	Amyema gibberula var. *tatei*	+																																
	Amyema hilliana	+																																
	Lysiana murrayi	+																																
Frankeniaceae	*Frankenia ?pauciflora*		+								+												+											
	Frankenia ?cinerea		+	+																			+	+										
Amaranthaceae	*Amaranthus mitchellii*	+																																
	Ptilotus aervoides	+	+								+	+			+			+					+											
	Ptilotus albidus		+										+	+	+	+							+	+										
	Ptilotus chrysocomus (P1)		+								+					+							+	+										
	Ptilotus exaltatus var. *exaltatus*	+	+										+		+	+							+											
	Ptilotus gaudichaudii var.	+																																

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	gaudichaudii																																
	Ptilotus helipteroides	+	+						+																								
	Ptilotus luteolus (P3)	+									+			+																			
	Ptilotus obovatus	+	+	+			+				+		+	+	+	+	+	+		+		+	+	+	+	+		+	+	+		+	
	Ptilotus sessilifolius		+														+										+	+				+	+
	Ptilotus polystachyus var. *polystachyus*	+	+														+																
	Ptilotus roei	+																															
	Ptilotus rotundifolius	+	+												+	+						+											
	Ptilotus schwartzii	+	+	+	+	+	+				+	+	+		+	+	+		+	+		+	+					+		+			
Chenopodiaceae	*Atriplex codonocarpa*	+																															
	Dysphania glomulifera subsp. *eremaea*	+																															
	Dysphania kalpari	+	+																														+
	Dysphania melanocarpa forma *melanocarpa*	+																															
	Dysphania rhadinostachya subsp. *rhadinostachya*		+														+																
	Dysphania saxatilis	+																															
	Enchylaena tomentosa var. *tomentosa*	+	+		+						+		+	+	+	+						+	+					+					
	Maireana carnosa	+																															
	Maireana convexa	+	+	+			+						+	+	+	+	+	+	+			+		+		+		+					
	Maireana eriosphaera		+													+																	
	Maireana georgei	+	+								+		+	+	+		+	+				+	+				+	+				+	
	Maireana ?georgei		+	+							+	+		+	+	+		+						+				+	+	+			
	Maireana glomerifolia		+								+												+										
	Maireana melanocoma	+																															
	Maireana planifolia	+	+													+	+											+					
	Maireana planifolia x villosa (Markey & Dillon 3479)	+																															
	Maireana prosthecochaeta (P3)		+																				+										
	Maireana sp. (sterile)		+										+		+											+			+			+	

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	Maireana thesioides	+	+				+				+	+	+			+																	
	Maireana tomentosa subsp. *tomentosa*	+	+				+				+													+		+				+			
	Maireana aff. *tomentosa*		+													+		+															
	Maireana triptera	+	+								+		+	+	+	+		+					+										
	Maireana villosa	+	+												+		+						+					+	+				
	Rhagodia eremaea	+	+												+	+	+	+					+	+		+		+	+	+		+	
	Sclerolaena cuneata	+	+												+	+		+					+										
	Sclerolaena densiflora	+																															
	Sclerolaena eriacantha	+	+				+				+		+			+		+					+			+							
	Sclerolaena fusiformis	+	+				+																										
	Sclerolaena microcarpa	+																															
	Tecticornia aff. *calyptrata*	+																															
	Tecticornia disarticulata	+	+												+	+		+					+										
Nyctaginaceae	*Boerhavia coccinea*		+														+																
Portulacaceae	*Calandrinia creethae*	+																															
	Calandrinia monosperma	+																															
	Calandrinia ptychosperma	+																															
	Calandrinia schistorhiza	+																															
	*Portulaca oleracea**	+	+														+																
Primulaceae	*Anagallis arvensis* var. *caerulea**		+												+																		
Rubiaceae	*Psydrax latifolia*	+	+	+	+		+				+			+	+	+	+	+		+		+		+		+		+	+	+		+		
	Psydrax rigidula	+	+		+		+			+	+	+			+	+	+	+	+	+	+			+		+		+	+	+	+	+		+
	Psydrax suaveolens	+	+				+	+		+	+				+	+	+			+							+	+					+	
	Synaptantha tillaeacea var. *tillaeacea*	+																																
Apocynaceae	*Marsdenia australis*	+	+				+								+	+		+										+		+			
	Rhyncharrhena linearis	+	+												+						+	+						+		+			
	Cynanchum floribundum		+												+		+																
	Sarcostemma viminale subsp. *australe*	+	+								+	+																					

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Convolvulaceae	*Bonamia erecta*		+																															+
	*Cuscuta epithymum**		+																								+							
	Duperreya sericea		+								+				+		+																	
	Duperreya commixta	+																																
Solanaceae	*Duboisia hopwoodii*		+																														+	+
	Nicotiana rosulata subsp. *rosulata*	+																																
	Solanum ellipticum	+																																
	Solanum lasiophyllum	+	+						+		+			+	+	+	+	+	+					+			+	+		+	+	+	+
	Solanum nummularium	+	+								+				+	+		+																
Scrophulariaceae	*Eremophila ?anomala* (P1)		+				+								+								+											
	Eremophila clarkei	+	+											+																				
	Eremophila ?clarkei		+										+			+																		
	Eremophila congesta (P1)	+	+							+				+		+				+														
	Eremophila exilifolia		+								+		+		+									+										
	Eremophila flabellata	+	+	+			+				+	+	+	+	+	+	+	+	+	+	+	+	+	+		+		+	+			+	+	
	Eremophila forrestii subsp. *forrestii*	+	+		+		+	+	+		+			+	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+
	Eremophila galeata	+	+								+			+	+	+	+	+											+		+			
	Eremophila hygrophana	+	+		+	+		+	+		+				+	+	+				+								+					
	Eremophila jucunda subsp. *jucunda*	+	+	+	+	+	+	+		+	+	+		+	+	+	+		+	+	+	+		+		+		+					+
	Eremophila latrobei subsp. *latrobei*	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+		+	+	+		+		+				
	Eremophila aff. *latrobei* subsp. *latrobei*		+												+		+																	
	Eremophila oppositifolia subsp. *angustifolia*	+	+								+		+	+	+							+	+	+										
	Eremophila pantonii	+	+								+		+	+			+						+	+										
	Eremophila ?platythamnos subsp. *platythamnos*		+																															+
	Eremophila punctata	+	+	+	+	+	+	+	+	+	+	+		+		+			+		+	+		+										
	Eremophila spectabilis subsp. *brevis*	+	+												+		+	+									+	+		+		+		
	Eremophila sp. (sterile)		+				+									+											+	+						+
Pedaliaceae	*Josephinia eugeniae*		+														+																	

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Lamiaceae	*Dicrastylis sessilifolia*		+																															+
	Prostanthera albiflora		+														+																	
	Prostanthera althoferi		+																			+												
	Prostanthera althoferi subsp. *althoferi x campbellii*	+	+								+	+			+																			
	Prostanthera althoferi subsp. *althoferi x wilkieana* (Markey & Dillon 4299)	+																																
	Prostanthera campbellii	+	+	+		+	+				+											+		+										
	Prostanthera ferricola (P3)	+	+																																
	Prostanthera wilkieana	+	+				+																												
	Spartothamnella teucriiflora	+	+							+					+		+				+	+						+	+		+		+	
Acanthaceae	*Harnieria kempeana* subsp. *muelleri*	+	+				+				+				+	+						+		+										
Campanulaceae	*Isotoma petraea*	+																																	
	Wahlenbergia tumidifructa	+																																	
Goodeniaceae	*Brunonia australis*	+																																	
	Goodenia havilandii	+	+														+																	
	Goodenia macroplectra	+																																	
	Goodenia peacockiana	+	+																															+	
	Goodenia tenuiloba		+								+																								
	Goodenia triodiophila	+																																	
	Scaevola spinescens	+	+				+				+		+	+	+	+	+	+				+	+	+										
Asteraceae	*Actinobole uliginosum*	+																																	
	*Bidens bipinnata**	+	+														+										+			+				
	Brachyscome ciliocarpa	+																																	
	Calocephalus multiflorus	+																																	
	Calotis hispidula	+																																	
	Chrysocephalum puteale	+																																	
	Chthonocephalus viscosus	+																																	
	Cratystylis subspinescens		+												+																				
	Erymophyllum ramosum subsp. *ramosum*	+																																	

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	Olearia mucronata (P3)	+	+														+					+		+									
	Olearia stuartii		+														+																	
	Pluchea dentex		+												+																			
	Podolepis canescens	+																																
	Podolepis ?capillaris		+												+																			
	Rhodanthe charsleyae	+																																
	Rhodanthe maryonii	+																																
	Streptoglossa liatroides	+																																
	Waitzia acuminata var. *acuminata*	+																																
Araliaceae	*Trachymene ornata*	+	+	+													+																	

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