Mount Gibson Level 2 Flora and Vegetation Survey

(Limited regional)

Prepared for
Mount Gibson Mining Limited

1 April 2016

DOCUMENT TRACKING

Item	Detail
Project Name	Mount Gibson Level 2 Flora and Vegetation Survey (Limited regional)
Project Number	15PER-2632
Project Manager	Joel Collins Suite 1 & 2, 49 Ord Street, West Perth 6005 (08) 9227 1070
Prepared by	Sarah Dalgleish, Nicki Thompson, Joel Collins
Reviewed by	Joel Collins
Approved by	Mark Vile
Status	Final
Version Number	5
Last saved on	1 April 2016
Cover photo	Vegetation on Mount Gibson Range © Eco Logical Australia 2015

This report should be cited as 'Eco Logical Australia 2016. *Mount Gibson Level 2 Flora and Vegetation Survey*. Prepared for Mount Gibson Mining Limited.'

ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from Mount Gibson Mining Limited.

Contents

List of figures

List of tables

Abbreviations

Abbreviation	Description
BIF	Banded Iron Formations
Bennett	Bennett Environmental Consulting
BoM	Bureau of Meteorology
DAFWA	Department of Agriculture and Food WA
DEC	Department of Environment and Conservation
DotE	Department of the Environment
DRF	Declared Rare Flora (Threatened) listed under the latest WA Wildlife Conservation (Rare Flora) Notice
ecologia	*ecologia* Environment
ELA	Eco Logical Australia
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
et al	and others
FG	floristic group
ha	hectare
IBRA	The Interim Biogeographical Regionalisation for Australia
km	Kilometre
m	metre
MGM	Mount Gibson Mining Limited
NMDS	Non-multidimension scaling
P	Priority listed species under Parks and Wildlife
Parks and Wildlife	Department of Parks and Wildlife
PEC	Priority Ecological Community
PMST	EPBC Act Protected Matters Search Tool
T	Threatened species listed under EPBC Act or WC Act
TEC	Threatened Ecological Community
WA	Western Australia
WAH	Western Australian Herbarium
WC Act	*Wildlife Conservation Act 1950* (State)

Executive summary

Mount Gibson Mining Limited (MGM) currently undertakes hematite ore mining operations at the Mt Gibson Ranges in the Shire of Yalgoo, approximately 260 km east-south-east of Geraldton and 350 km north-north-east of Perth. MGM identified areas that have not been previously surveyed, in addition to areas which require infill/resurvey to confirm existing vegetation mapping and floristic analyses. Eco Logical Australia (ELA) was engaged by MGM to undertake these additional works, which were:

- Undertake a Level 2 flora survey and vegetation mapping in spring 2015 of largely unsurveyed areas in the southern parts of Mt Gibson Ranges to assess and further refine mapping of dominant vegetation communities present.
- Install additional quadrats in parts of the Study Area to enable re-analysis / spatial tie in with available floristic data.
- Survey Priority flora species in an area defined by MGM in the Study Area over approximately 100 hectares (ha) on the southern parts of Mt Gibson Ranges.
- Undertake a targeted vegetation survey in certain regional areas outside the Study Area to establish the similarity of vegetation in relation to those which occur on the Mt Gibson Ranges.

The field surveys were undertaken by Joel Collins (Senior Botanist) and Sarah Dalgleish (Botanist). An initial field survey was undertaken from 26 to 31 October 2015. During this survey, 30 quadrats located within part of the Study Area were surveyed and a follow-up survey was conducted from 22 to 29 February 2016 when a further 11 quadrats were installed and surveyed in the part of the Study Area around Iron Hill. An additional 20 quadrats were installed and surveyed in certain regional ridges and slopes in other areas surrounding the Mt Gibson Ranges.

During the survey, a total of 156 native and eight introduced flora taxa were identified within the Study Area with mean native species richness for quadrats being 15 species per quadrat (range: 5 – 26 species/quadrat).

Three Threatened (listed as Vulnerable) flora species had been previously recorded: *Eucalyptus synandra, Darwinia masonii* and *Lepidosperma gibsonii*. These species were observed within the Study Area during this survey.

One Parks and Wildlife listed Priority 1 flora species was recorded at two locations within the Study Area that had not been previously recorded: *Philotheca nutans*. *Acacia cerastes*, another Priority 1 flora species, had been previously recorded and was also recorded during this survey.

Ecologia (2015) reported on the floristic patterns at a local scale on Mt Gibson ranges from the perspective of the Iron Hill Deposits proposal (MGM, 2015). That report relied on 167 quadrats collated and analysed from a number of standard quadrat collection events. In the interests of continuing to build on fine and local scale floristic data, data sets of those 167 quadrats were taken and the additional 41 quadrats collected by ELA in 2015 and 2016 were added to amount to 208 quadrats used for further numerical analysis.

The floristic analysis classified the 208 quadrats into 22 floristic groups (FG1-FG22). Of these floristic groups, six aligned with floristic groups determined in previous analysis undertaken by *ecologia* (2015) and fourteen floristic groups included a mixture of quadrats that were in other floristic groups in the *ecologia* (2015) analysis. Several quadrats installed in the current survey also grouped into two entirely new floristic groups.

Seven of the 22 regional floristic groups determined in the current regional analysis are represented within the Study Area including: FG10, FG11, FG12, FG13, FG16, FG17 and FG22.

Species richness analysis for the ELA quadrats shows that the Plain Woodlands, FG22, has the highest mean species richness of 20 taxa/quadrat. In comparison the Ironstone Outcrop Shrublands, FG13, has 14 taxa/quadrat and Ironstone shrublands, FG12, has 14 taxa/quadrat.

Vegetation condition ranged from very good to excellent. Disturbance observed included some non-aggressive weeds, historic drilling activity such as old tracks and drill lines and rabbit digging and warrens.

1 Introduction

1.1 Project background

Mount Gibson Mining Limited (MGM) currently undertakes hematite ore mining operations at the Mt Gibson Ranges in the Shire of Yalgoo, approximately 260 kilometre (km) east-south-east of Geraldton and 350 km north-north-east of Perth. As part of the approvals process for current and proposed operations, the Mt Gibson Ranges have undergone numerous flora and vegetation surveys, largely focussed on the ironstone ridges of the Mt Gibson Ranges. MGM identified areas that have not been previously surveyed, as well as areas which require infill/resurvey to confirm existing vegetation mapping and floristic analyses.

Eco Logical Australia (ELA) was engaged by MGM to undertake these additional works, which were:

- Undertake a Level 2 flora survey and vegetation mapping in spring 2015 of largely unsurveyed areas in the southern parts of Mt Gibson Ranges to assess and further refine mapping of dominant vegetation communities present.
- Install additional quadrats in parts of the Study Area to enable re-analysis / spatial tie in with available floristic data.
- Survey Priority flora species in an area defined by MGM in the Study Area over approximately 100 hectares (ha) on the southern parts of Mt Gibson Ranges.
- Undertake a targeted vegetation survey in certain regional areas outside the Study Area to establish the similarity of vegetation in relation to those which occur on the Mt Gibson Ranges.

2 Background information

2.1 Study Area

The Study Area comprises southern parts of Mt Gibson and its foothills and surrounding plains, plains extending south-west towards Iron Hill and Gibson Hill South and its surrounding area (**Figure 1**).

2.2 Bioregion

The Interim Biogeographical Regionalisation for Australia (IBRA) Version 7 recognises 89 geographically distinct bioregions based on common climate, geology, landform, native vegetation and species information (Department of the Environment [DotE] 2015a).

The Study Area is located within the Avon Wheatbelt IBRA bioregion, on the boundary with adjacent Yalgoo IBRA bioregion. The Avon Wheatbelt IBRA bioregion comprises gently undulating landscape of low relief with proteaceous scrub-heaths, rich in endemics, on residual lateritic uplands and derived sandplains (Beecham 2001). The Yalgoo bioregion is characterised by sand and alluvial plains, low ranges and lakes with vegetation comprising Mulga, *Callitris-E. salubris*, and Bowgada open woodlands and scrubs (Bastin et al 2008 and Western Australian Herbarium [WAH] 2015a).

2.3 Climate

The climate of the Mt Gibson Ranges is semi-desert Mediterranean with mild wet winters and hot dry summers (Beard 1990). The closest weather station to the Study Area is Paynes Find (Station no. 007139) located approximately 60 km north-east.

Rainfall received in the 12 months preceding the initial survey in October 2015 was below the long term average, with 227.1 millimetres [mm] recorded compared to the average of 282.9 mm (Bureau of Meteorology [BoM] 2015). In the three months prior to the survey in October 2015, 77.3 mm of rain was recorded, which is consistent with average rainfall for the same period (BoM 2015; **Table 1**).

Rainfall received in the 12 months preceding the follow-up survey in February 2016 was below the long term average, with 251.6 millimetres [mm] recorded compared to the average of 282.9 mm (Bureau of Meteorology [BoM] 2015). In the three months prior to the survey in February 2016, approximately 63.6 mm of rain was recorded, which is higher than the average rainfall for the same period (42.9 mm) and higher than the rainfall received in the three months prior to the initial survey in October 2015 (BoM 2016; **Table 1**).

Table 1: Rainfall data recorded at Paynes Find weather station (007139) 12 months prior to the surveys and average monthly rainfall data

Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Average monthly rainfall (mm)	10.6	10.8	12.8	19.3	23.7	24.7	26.0	37.3	40.9	35.4	26.9	14.5	282.9
Total monthly rainfall 2014-15 (mm)	7.7	5.0	8.4	2.8	15.4	54.8	32.6	7.0	16.1	36.6	40.1	0.6	227.1
Total monthly rainfall 2015-2016 (mm)	0.2	14.4	2.0	47.2	4.4	-	-	-	-	-	-	-	68.2

- Data not yet available

2.4 Landform, geology and soils

The Mt Gibson Ranges lies in the Murchison Province of the Yilgarn Craton. The geology of the Mt Gibson area is complex and composed of several fold belts. The Retaliation Belt is represented mainly by the Mt Gibson Ranges and is comprised of banded iron formations (BIF) and cherts in the lower sedimentary association, bounded by volcanic flows with marker bands of BIF (Lipple et al.1983). The Study Area consists of a ridgeline, scree slopes and undulating hills with surface soils being typically shallow and dominated by a high coarse fragment content. Parts of the Study Area are also on the plains with clay and/or sandy soils.

2.5 Vegetation

Vegetation association and extent has been mapped at a regional scale by Beard (1976) who categorised vegetation into broad associations of the Murchison area. Based on Beard's mapping at a scale of 1:1,000,000, the Department of Agriculture and Food Western Australia (DAFWA) has compiled a list of the types and extent of vegetation associations across Western Australia (WA; Shepherd et al. 2002). The Study Area occurs mostly within the vegetation association Jibberding 495: "Shrublands; thickets, *Acacia acuminata* (Jam) and *Allocasuarina acutivalvis*". Small parts of the Study Area also intersect vegetation associations Jibberding 141, 356 and 125. Given the broad nature of Beard's original mapping, these units are only broadly applicable to the vegetation communities occurring in the Mt Gibson Ranges.

Payne et al. (1998) describe Mt Gibson as part of the Tallering Land System. This broad classification also includes ironstone formations from Mt Karara running northwards to Yalgoo and includes Blue Hills and Windanning ironstone ranges to the north.

The Mt Gibson Ranges form part of the ironstone formations of the Yilgarn Craton, which are set in a predominantly flat landscape that can have high plant endemism rates and restricted vegetation communities (Environmental Protection Authority [EPA] 2014; Meissner and Caruso 2008). The Mt Gibson Ranges are made up of a complex of vegetation communities that are strongly influenced by geographical location as well as topography, geology and soil and have high species turnover.

2.6 Priority Ecological Communities

None of the vegetation units within the Study Area are currently listed as a Threatened Ecological Community (TEC) listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act).

There is one Priority Ecological Community (PEC) "Mt Gibson Range vegetation complexes (BIF)" currently listed as Priority 1 that intersects the Study Area. The PEC includes several vegetation communities that are structurally summarised as woodlands, mallees and thickets/shrublands communities.

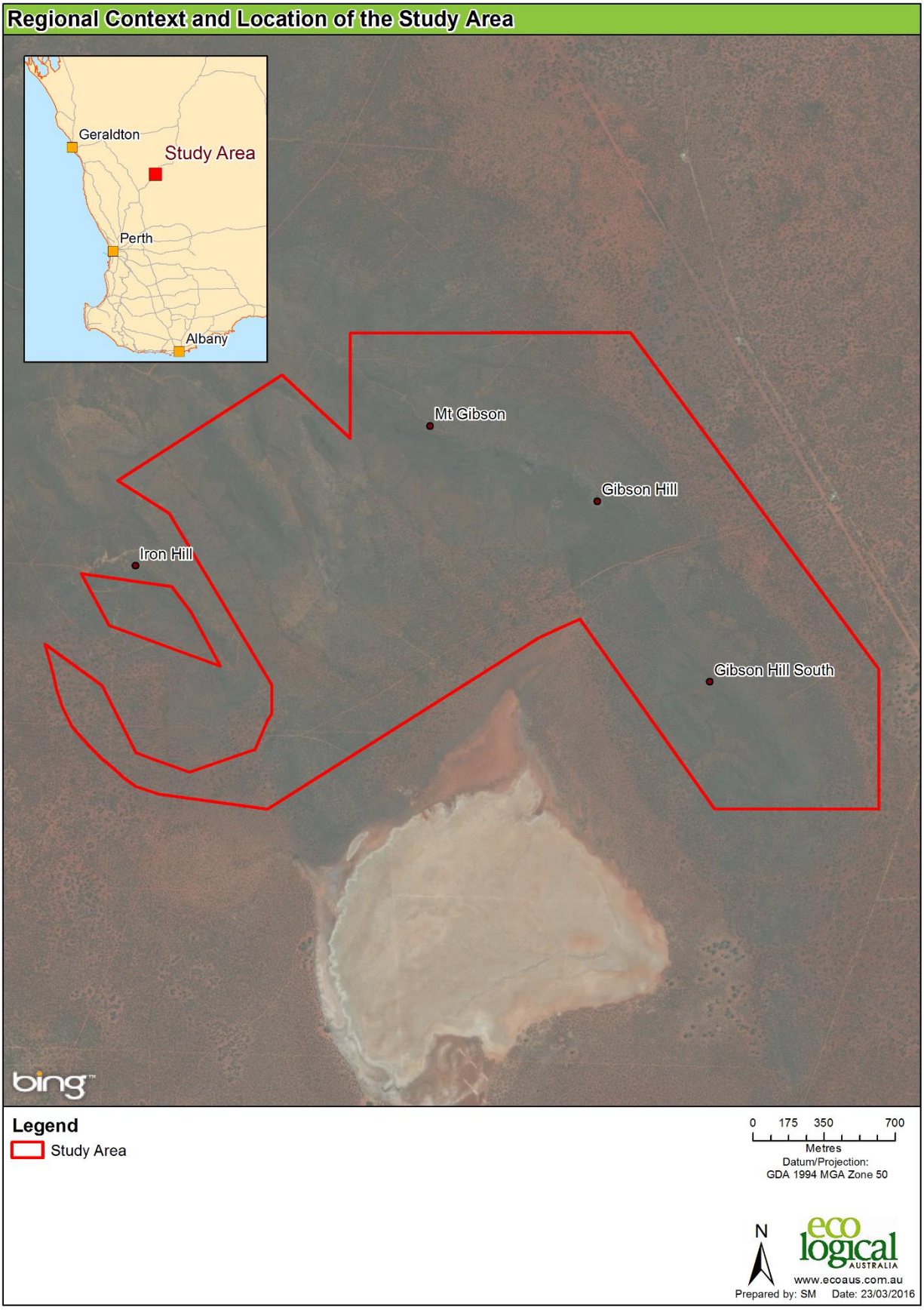


Figure 1: Regional context and location of the Study Area

3 Desktop assessment

3.1 Literature review

Over the past two decades, the Mt Gibson Ranges have been subject to numerous flora and vegetation assessments. Of these, five studies are of most relevance to the current Study Area. A detailed summary of these flora and vegetation assessments is presented in **Appendix A**.

In summary, Bennett Environmental Consulting (Bennett 2000) described 24 vegetation communities from 62 quadrats and broadly grouped these based on structural formation. ATA Environmental (2006) then undertook mapping to complement vegetation communities described by Bennett (2000), however mapping was prepared at a finer level of detail. ATA Environmental (2006) described 35 vegetation communities from 76 quadrats. E. A. Griffin and Associates (2005) also used data collected by ATA Environmental at 100 quadrats in spring 2005, to provide an interpretation of the significance of vegetation associations in the Mt Gibson area at a sub-regional level. E. A. Griffin and Associates found Extension Hill and Iron Hill North contain communities different from other areas. Also in 2005 Meissner and Caruso (2008), completed a detailed floristic survey of Mt Gibson and the surrounding ironstone ranges. This study defined seven vegetation communities from 50 quadrats, based on statistical analysis. Meissner and Caruso (2008) found high species turnover with some vegetation communities restricted to specific parts of the range. This study, however, did not include vegetation mapping so the boundaries and extent of each vegetation community is unknown.

Ecologia (2015) reviewed all of the flora and vegetation field surveys undertaken on Iron Hill, which is adjacent to the Study Area, and on the Mt Gibson Ranges and surrounding landforms. As part of this study, *ecologia* (2015) completed a floristic numerical analysis using previous survey data (including ATA Environmental 2006 and Meissner and Caruso 2008) along with additional data collected as part of their study to complement this analysis. From the analysis *ecologia* (2015) identified 16 floristic groups which were classified, based on 167 quadrats (150 quadrats from previous surveys and an additional 17 established during their study).

3.2 Database searches

In addition to previous reports, the following databases and sources of information were also consulted:

- Commonwealth EPBC Act Protected Matters Search Tool ([PMST]; DotE 2015b)
- Parks and Wildlife and Western Australian Museum NatureMap online database (Parks and Wildlife 2007 - 2015)
- Western Australian Herbarium FloraBase (WAH 2015b).

3.3 Conservation listed flora

Ten conservation listed flora species have been previously recorded within the Study Area:

- *Darwinia masonii* (Threatened [T])
- *Eucalyptus synandra* (T)
- *Lepidosperma gibsonii* (T)
- *Acacia cerastes* (Priority [P] 1)
- *Allocasuarina tessellata* (P1)
- *Micromyrtus trudgenii* (P3)

- *Persoonia pentasticha* (P3)
- *Hibbertia cockertoniana* (P3)
- *Microcorys tenuifolia* (P3)
- *Podotheca uniseta* (P3).

An additional 26 species were identified in the desktop assessment which occur within 20 km of the Study Area:

- *Acacia imitans* (T)
- *Acacia unguicula* (T)
- *Hybanthus cymulosus* (T)
- *Acacia ampliata* (P1)
- *Acacia karina* (P1)
- *Acacia* sp. Kalannie North (B.R. Maslin 7702; P1)
- *Chamelaucium* sp. Yalgoo (Y. Chadwick 1816; P1)
- *Grevillea scabrida* (P1)
- *Hemigenia* sp. Gibson (R. Coveny 7893 & B.R. Maslin; P1)
- *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468; P1)
- *Melichrus* sp. Bungalbin Hill (F.H. & M.P. Mollemans 3069; P1)
- *Micromyrtus mucronulata* (P1)
- *Micromyrtus ninghanensis* (P1)
- *Philotheca nutans* (P1)
- *Acacia synoria* (P2)
- *Baeckea* sp. Perenjori (J.W. Green 1516; P2)
- *Austrostipa blackii* (P3)
- *Euryomyrtus recurva* (P3)
- *Goodenia perryi* (P3)
- *Grevillea granulosa* (P3)
- *Grevillea subtiliflora* (P3)
- *Psammomoya implexa* (P3)
- *Rhodanthe collina* (P3)
- *Thryptomene* sp. Wandana (M.E. Trudgen MET 22016; P3)
- *Verticordia venusta* (P3)
- *Dodonaea amplisemina* (P4).

4 Methodology

4.1 Study team and timing of the survey

The field surveys were undertaken by Joel Collins (Senior Botanist) and Sarah Dalgleish (Botanist). An initial field survey was undertaken from 26 to 31 October 2015. During this survey, 30 quadrats located within part of the Study Area were surveyed and a follow-up survey was conducted from 22 to 29 February 2016 when a further 11 quadrats were installed and surveyed in the part of the Study Area around Iron Hill. An additional 20 quadrats were installed and surveyed in certain regional ridges and slopes in other areas surrounding the Mt Gibson Ranges.

4.2 Flora and vegetation survey

The flora surveys were undertaken in accordance with methodology outlined in EPA Guidance Statement No. 51 (EPA 2004) and EPA Position Statement No. 3 (EPA 2002).

The number of quadrats established to describe vegetation communities was informed using aerial imagery and previous background survey reports. Dominant vegetation communities were described and included dominant species, structure and overall condition. The survey involved the use of 20 m x 20 m quadrats and opportunistic sampling of species not recorded within the quadrats to inform a species inventory of the Study Area. Quadrats were placed in areas which had been under surveyed and also areas which had not been previously surveyed. A minimum of two quadrats per vegetation community were established as per EPA Guidance Statement No. 51 (EPA 2004).

During the initial survey (2015), 30 quadrats were installed within part of the Study Area (**Figure 2**). A further 31 quadrats were installed during the follow-up survey (2016) including:

- Eleven additional quadrats installed in an area around Iron Hill.
- Twenty quadrats installed in regional areas outside the Study Area to establish the presence of vegetation types similar to those which occur on the Mt Gibson Ranges.

Quadrats were located within the Extension Hill mining lease as well as within Ninghan Station and the Mt Gibson Wildlife Sanctuary. The locations of all quadrats both inside and outside the Study Area are shown in **Figure 3**. Information about tenure on which quadrats occur and other location information is presented in **Appendix B**.

The following data was recorded within each quadrat as part of the flora and vegetation survey:

- Vegetation structure classes, cover of all species observed in quadrats and dominant species lists for each vegetation community in accordance with Keighery (1994)
- Full species inventory (angiosperm and gymnosperm) of both native and introduced species across the Study Area
- Vegetation condition assessment in accordance with Keighery (1994)
- A panoramic photograph of each quadrat taken from the north-west corner
- Other observational data such as abiotic/environmental variables.

Conservation listed flora were also recorded during the survey, including:

- Threatened Flora listed under the EPBC Act

- Threatened (Declared Rare) Flora listed under the latest WA Wildlife Conservation (Rare Flora) Notice
- Priority Flora recognised by Parks and Wildlife.

Any encountered conservation listed flora was recorded by taking point locations of each individual and/or a central location for a group of individuals. For the purposes of this study there was not the requirement to systematically survey the Threatened species *Darwinia masonii* and *Lepidosperma gibsonii* as these species have been previously well documented.

Except where specifically noted, the field survey was undertaken using Android Nexus 7 tablet operating the ArcGIS Collector app. These units can have errors of 3 - 20 m (subject to availability of satellites on the day) with an average of +/- 5 m.

4.3 Specimen identification and nomenclature

Nomenclature used for the flora species within this report follows the Western Australian Plant Census as available on FloraBase (WAH 2015b). Voucher specimens were collected in the field of all actual or potential conservation listed flora species where required. Collections were made of other species, if required, that commonly occur in the habitat of the conservation listed species to enable correct identification. All collections were assigned a unique collecting number.

Specimen identification was undertaken by ELA Senior Botanist Joel Collins and ELA Botanist Sarah Dalgleish. Species identification utilised taxonomic literature and keys with all specimens confirmed using the WAH reference collection. Relevant specimens were confirmed by taxonomic specialists where required.

4.4 Statistical analysis

Species presence information from 208 quadrats within the region was analysed by Dr Melissa Bruton, using the statistical program PRIMER v6 (Clarke & Gorley 2006), to identify quadrat groupings based on similarity in floristic composition. The analysis incorporated the following data sources:

- 30 quadrats from the survey “ELA” in Spring 2015
- 11 quadrats from the additional survey “ELA” in early 2016 (note: the 20 regional quadrats shown in **Figure 3** were not included in this current analysis)
- 167 Quadrats collated and previously analysed by *Ecologia* (2015) including:
    - 100 quadrats from ATA (2006) “ATA”
    - 50 quadrats from Meissner and Caruso (2008) “DEC”
    - 17 quadrats from *ecologia* (2015) “ecologia”

Figure 3 shows the regional location of all the quadrats used in the analysis.

The floristic composition resemblance among these quadrats was assessed using Bray-Curtis distances with an unweighted averages method, which is equivalent to the unweighted pair-group mean average (UPGMA) method used in *ecologia* (2015). A CLUSTER analysis of the resulting resemblance matrix resulted in the dendrogram available in **Figure 5**. A maximum likelihood analysis (SIMPROF function in PRIMER) with 500 permutations was used to identify quadrat groupings with high and low certainty. Black lines on the dendrogram indicate quadrat groupings with a high level of certainty (P>0.05), red lines indicate areas where quadrat grouping is uncertain (p >0.05). Using this dendrogram, spatial information and maximum likelihood permutation analyses using the SIMPROF function in PRIMER, 33.5% was

identified as the optimal similarity break for grouping sites as floristically similar. The resulting quadrat groupings are presented and described in **Table 4**.

To aid with visualising the floristic similarity of the quadrats in relation to their spatial position in the landscape, a non-multidimension scaling (NMDS) analysis was undertaken, and is available in **Figure 6**. An NMDS was also undertaken to visualise the similarity of the floristic groupings to each other (**Figure 7**). Some species of annuals and geophytes were excluded from the analysis to allow for a comparable analysis with *ecologia* (2015).

A comparison using a subset of 30 ELA quadrats was also undertaken to investigate the effect inclusion of annual species in the analysis would have on floristic groupings. To do this a CLUSTER analysis of each resemblance matrix (1x with annuals, 1x without annuals) was undertaken which resulted in the dendrograms available in **Figure 11** and **Figure 12**. Using these dendrograms and a maximum likelihood permutation analyses (SIMPROF function in PRIMER), 31% and 33% (without annuals and with annuals respectively) were identified as the optimal similarity breaks for each analysis, for grouping sites as floristically similar. To aid with comparing the similarity of the two grouping structures (with and without annuals), the floristic similarity of the quadrats was plotted for each analysis, using non-multidimensional scaling (NMDS), which is available in **Figure 13** and **Figure 14**.

Plots of mean species richness (number of species) in each floristic group and also by location were also prepared. It should be noted however that these plots show only preliminary indications of trends. Further analysis of species richness data cannot be undertaken due to low number of samples for most of the floristic groups. To understand the relationship of species richness, more targeted quadrats would need undertaken, separate from the floristic analysis.

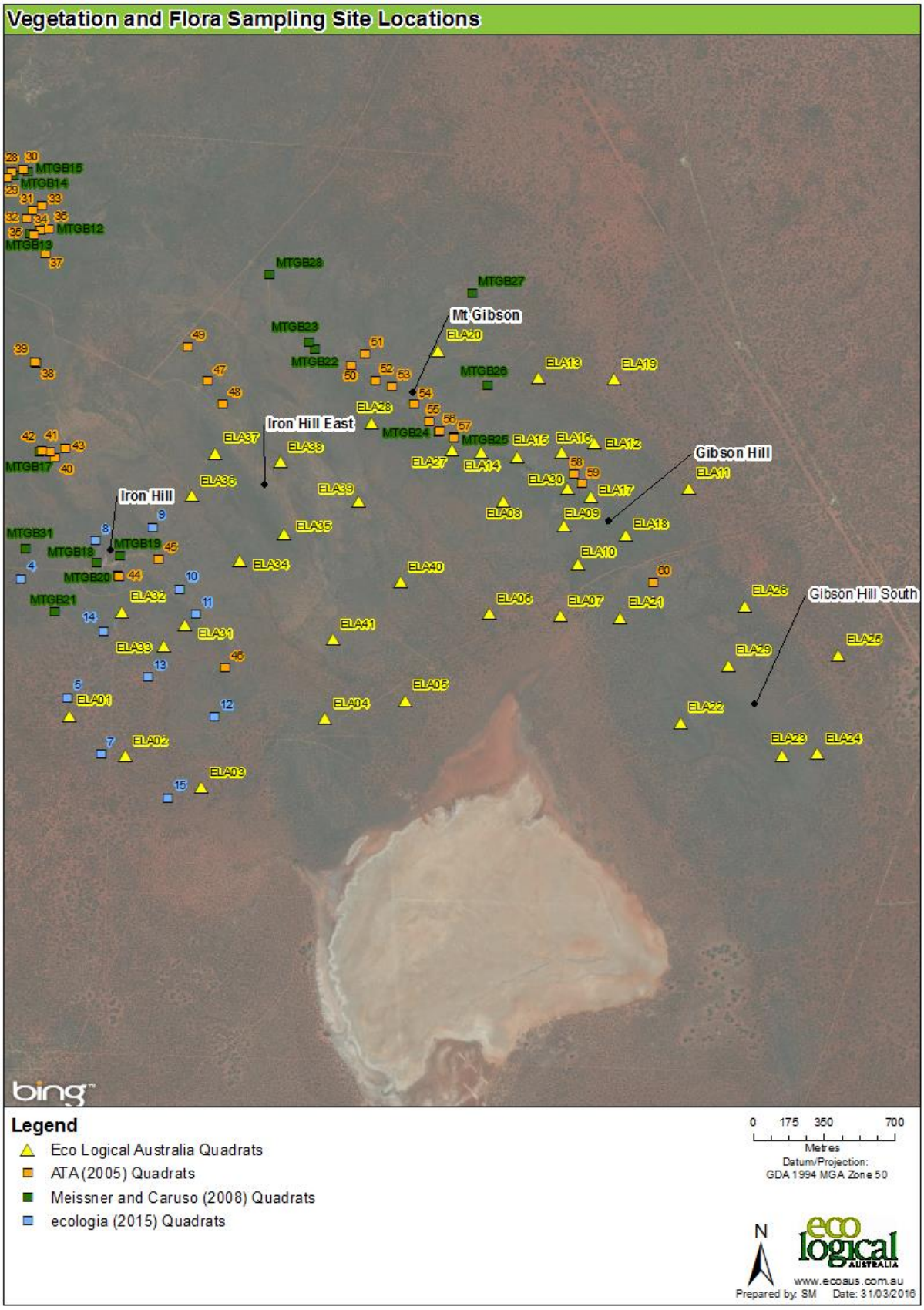


Figure 2: Vegetation and flora sampling site locations. Labelled sites were used in the current statistical analysis

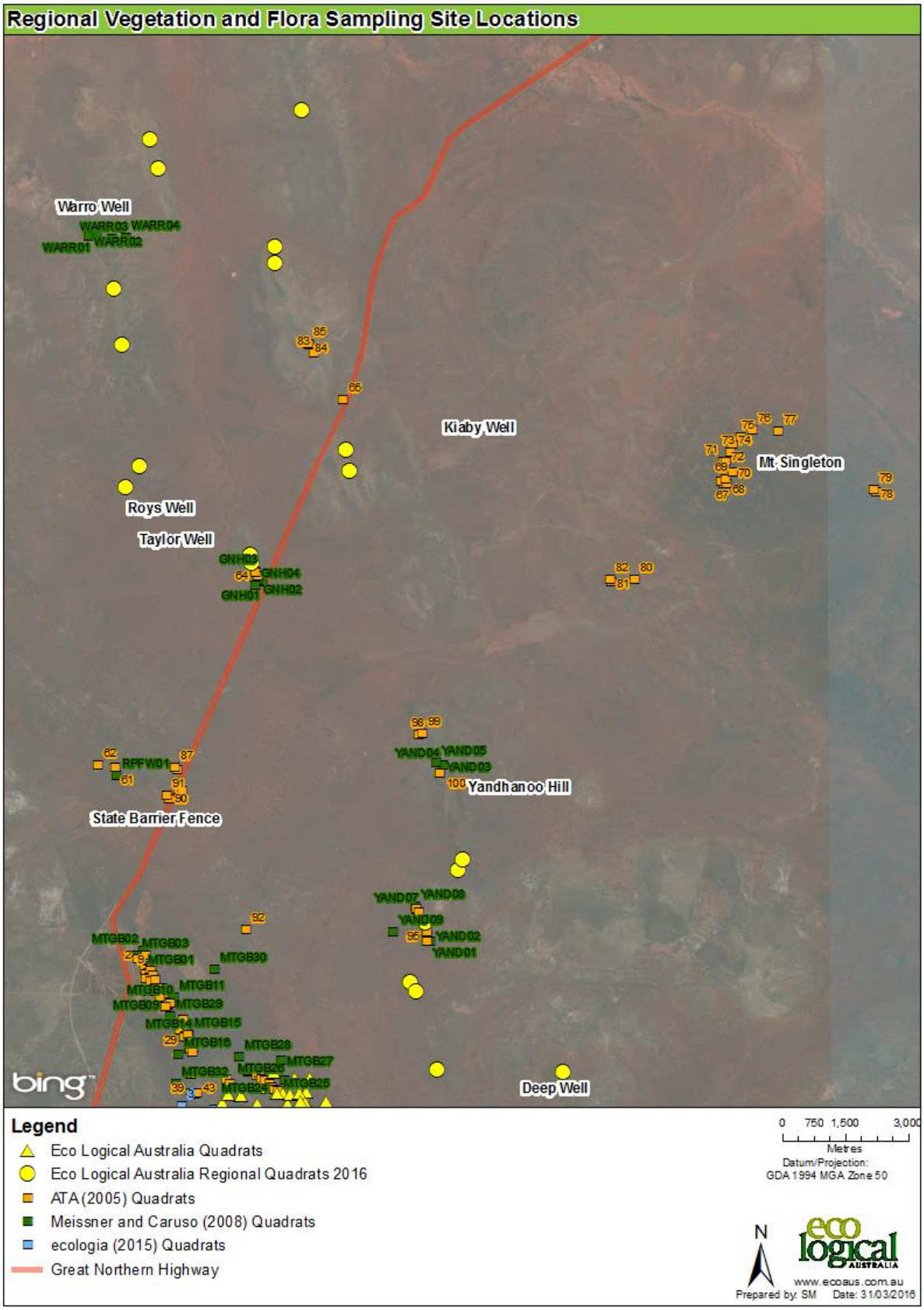


Figure 3: Regional vegetation and flora sampling site locations. Labelled sites were used in the current statistical analysis

5 Results

5.1 Flora of the Study Area

A total of 156 native and eight introduced flora taxa were identified from all records held within the Study Area. The taxa comprised 42 families and 95 genera. The most commonly occurring families were Fabaceae (27 taxa), Myrtaceae (20 taxa) and Asteraceae (18 taxa) (**Table 2**). *Acacia* (Fabaceae) was the most common genus with 17 taxa.

Table 2: Dominant families and genera recorded within the study are during the current survey

Family	No. genera	Genus	No. taxa
Fabaceae	27	*Acacia*	17
Myrtaceae	20	*Melaleuca*	7
Asteraceae	18	*Eremophila*	6
Chenopodiaceae	8	*Eucalyptus*	6

A full flora species list recorded during the survey is presented in **Appendix B**. The mean native species richness for quadrats sampled was 15 species per quadrat (range: 5 – 26 species/quadrat). The flora species matrix is provided in **Appendix D**. Quadrat data is provided in **Appendix E**. The mean species richness per quadrat for each floristic group is shown in **Table 4**. The quadrat locations and species richness for each ELA quadrat is shown in **Figure 4**.

5.2 Conservation significant flora

The Threatened flora species *Eucalyptus synandra* (listed under both the EPBC Act and the *Wildlife Conservation Act 1950* [WC Act] as Vulnerable) was recorded during the current survey; these occurrences coincided with previously known locations of this species and therefore the locations of such records need not be presented in this report. *Lepidosperma gibsonii* (listed under the WC Act as Vulnerable) were also sighted occasionally within the Study Area. These occurrences were not recorded during the current survey as exhaustive surveys for these species have been conducted previously within the Study Area. Neither *E. synandra* or *L. gibsonii* were recorded within quadrats during the current survey. *Darwinia masonii* (listed under both the EPBC Act and the WC Act as Vulnerable) was recorded from quadrats ELA14 and ELA15.

One Parks and Wildlife listed Priority 1 flora taxon was recorded during the current survey: *Philotheca nutans.* Two locations of this species were recorded at ELA04 and ELA05 during the current survey. The species was recorded in *Acacia ramulosa* var. *ramulosa* and *Allocasuarina acutivalvis* subsp. *acutivalvis* shrubland (ELA04) and with *Eucalyptus loxophleba* subsp. *supralaevis* open woodland over *Acacia ramulosa* var. *ramulosa* shrubland (ELA05) on the plains. **Table 3** provides the coordinates and number of plants for this taxon.

The Priority 1 species *Acacia cerastes* was also observed frequently on the crest and slopes the Study Area. This species is very common in these areas and has recruited in large numbers from previous fire events. *Acacia cerastes* was recorded from the quadrats ELA14, ELA22, ELA27 and ELA28 during the current survey. These locations of *Acacia cerastes* have been previously recorded and therefore the locations are not presented in this report.

Table 3: Location of conservation significant flora recorded during the current survey

Species	No. plants	Easting	Northing
Philotheca nutans (P1)	5	517783	6724469
Philotheca nutans (P1)	5	518181	6724551

5.3 Vegetation condition and communities

The floristic analysis classified the quadrats into 22 floristic groups (FG1-FG22), as determined in the CLUSTER analysis of the 208 quadrats (**Figure 5**; **Table 4**). Of these floristic groups, six aligned with floristic groups determined in previous analysis undertaken by *ecologia* (2015) and fourteen floristic groups included a mixture of quadrats that were in other floristic groups in the *ecologia* (2015) analysis. Several quadrats installed in the current survey also grouped into two entirely new floristic groups.

5.3.1 Floristic group comparison with *ecologia* (2015)

The current analysis grouped the quadrats into 22 floristic groups, which is slightly under double the number of floristic groups classified in *ecologia* (2015). The difference is totally expected and caused by:

- The effect of additional 41 quadrats in the numerical analysis; and
- applying the SIMPROF function in PRIMER, where 33.5% was identified as the optimal similarity break for grouping sites as floristically similar.

The additional groupings also indicate a strong spatial component to floristic similarity and dissimilarity i.e. it splits more floristic groups out when compared to *ecologia* (2015) however the groups were spatially related.

Changes to the *ecologia* (2015) floristic groups in the current analysis included:

- Quadrats which made up the E floristic group in the *ecologia* (2015) analysis, are now included in the ELA FG13, except:
    - Quadrats MTGB17, MTGB24 and MTGB25 which are now included in the large ELA FG12.
    - Quadrats GHH3 and YAND3 which are now included in the ELA FG8.
- Quadrats which made up the C2 floristic group in the *ecologia* (2015) analysis, are now included in ELA FG17, with the exception of one quadrat, MTGB21 which was classified into its own floristic group: FG20 (this group is however very similar to other groups (formerly floristic groups C1 and C2) on plains around Iron Hill).
- Quadrats which represented the C1 floristic group in the *ecologia* (2015) analysis, are now mostly included in ELA FG22 with the exception of quadrats MTGB30 and YAND9 which now represent FG21 and quadrat ecologia_13 which now represents FG19.
- Quadrats which made up the L floristic groups in the *ecologia* (2015) analysis, are now included in ELA FG11, except for quadrat MTGB29, which is now included in the large FG12.
- Almost all quadrats in the K floristic group in the *ecologia* (2015) analysis, are now included in the large FG12. Former K floristic groups which didn't group with FG12 in the current analysis include quadrats ecologia_10, ecologia_12, ATA 15 and MTGB02. These quadrats are now included in FG17.
- Quadrats which made up the A, B, D, M, I and H floristic groups in the *ecologia* (2015) analysis, are now included in ELA FG2, FG1, FG18, FG3, FG5 and FG9 respectively.

5.3.2 Floristic groups of the Study Area

Seven of the 22 regional floristic groups determined in the current regional analysis are represented within the ELA 2015/2016 Study Area:

- FG10 – This floristic group comprises *Acacia ramulosa* var. *ramulosa*, *Melaleuca hamata* and *Allocasuarina acutivalvis* tall open scrub over *Aluta aspera* subsp. *hesperia* and *Philotheca sericea* open shrubland over *Cheilanthes adiantoides* very open herbland. This floristic group is new and has no equivalent from the previous analysis undertaken by *ecologia* (2015). Seven quadrats made up this floristic group, all of which are from the current survey (ELA10, ELA12, ELA18, ELA21, ELA24, ELA26 and ELA 29) Within the study area, this floristic group occurs on the mid to lower slopes of Gibson Hill and Gibson Hill South.
- FG11 – This floristic group comprises *Eucalyptus oldfieldii* open woodland over *Allocasuarina acutivalvis*, *Aluta aspera* subsp. *hesperia*, *Enekbatus stowardii*, *Melaleuca fabri* and *Acacia coolgardiensis* subsp. *effusa* shrubland over *Amphipogon caricinus* var. *caricinus* grassland and *Cheilanthes adiantoides* herbland. Seven quadrats make up the floristic group including one from both the current analysis (ELA13) and ATA (2006; ATA2) and five quadrats from the Meissner and Caruso study (2008; MTGB03, MTGB05, MTGB07, MTGB11 and MTGB16). Within the study area this floristic group is located on footslopes to plains north of Gibson Hill.
- FG12 – This floristic group comprises shrublands on hilltops and slopes of the ranges including Gibson Hill, Gibson Hill South, Extension Hill and Iron Hill with *Allocasuarina acutivalvis*, *Melaleuca nematophylla* and *Grevillea obliquistigma* shrubland over *Cheilanthes adiantoides* ferns. This floristic group is the largest being represented by 88 of the 208 quadrats used in the analysis. Fourteen quadrats from the current survey are included in this floristic group (ELA08, ELA09, ELA14, ELA15, ELA16, ELA20, ELA22, ELA23, ELA27, ELA28, ELA30, ELA37, ELA38 and ELA39). Within the study area this floristic group is widespread across the hill tops and occasionally on lower slopes.
- FG13 – This floristic group comprises ironstone shrublands on the Mt Gibson Ranges with *Calycopeplus paucifolius*, *Acacia tetragonophylla* and *Ptilotus obovatus* open shrubland over *Cheilanthes adiantoides* ferns and *Austrostipa elegantissima* tussock grasses. Twelve quadrats made up this floristic group in the current analysis of the Mt Gibson Ranges, including two quadrats from the current survey (ELA17 and ELA35), one quadrat from *ecologia* (2015; Quadrat 8), three quadrats from Meissner and Caruso (2008; MTGB18, MTGB19 and MTGB20) six quadrats from ATA (2006; Quadrats 42, 44, 58, 59, 63 and 64). This floristic group occurs in small pockets on the hilltop of Gibson Hill and Iron Hill East within the study area.
- FG16 – This floristic group comprises *Eucalyptus horistes* and *Eucalyptus oldfieldii* very open tree mallee over *Acacia ramulosa* var. *ramulosa*, *Acacia anthochaera* and *Melaleuca leiocarpa* tall open shrubland over *Acacia andrewsii*, *Enekbatus stowardii* and *Westringia* sp. Mt Gibson Retrorse Leaves (G Cockerton & J Warden WB37992) open shrubland. This floristic group is new and comprises two quadrats from the current survey (ELA34 and ELA36). This floristic group occurs within a drainage line between Iron Hill and Iron Hill East.
- FG17 – This floristic group comprises *Eucalyptus loxophleba* subsp. *supralaevis* and *Callitris columellaris* open woodland over *Acacia acuminata*, *Allocasuarina acutivalvis* and *Acacia anthochaera* tall open shrubland over *Dodonaea inaequifolia*, *Eremophila clarkei*, *Grevillea paradoxa* and *Philotheca brucei* open shrubland over *Amphipogon caricinus* var. *caricinus* very open grassland. Fourteen quadrats are included in this floristic group in the current analysis, these include one ATA (2006) quadrat (ATA15), four Meissner and Caruso (2008; MTGB02, MTGB27, MTGB31 and MTGB32), three *ecologia* (2015; ecologia_10, ecologia_12 and ecologia_14) and six from the current survey (ELA04, ELA31, ELA32, ELA33, ELA40 andELA41).

Within the study area, this floristic group occurs on lower slopes and plains surrounding Iron Hill and Iron Hill East.

- FG22 – This floristic group comprises *Eucalyptus loxophleba* subsp. *supralaevis* and *Callitris columellaris* open woodland over *Acacia anthochaera*, *Acacia assimilis* subsp. *assimilis*, *Hakea recurva* and *Acacia tetragonophylla* tall open shrubland over *Acacia andrewsii*, *Eremophila granitica*, *Senna artemisioides* subsp. *filifolia* and *Olearia pimeleoides* open shrubland over *Austrostipa elegantissima* tussock grasses. Twelve quadrats are included in this floristic group, these include three ecologia (2015) quadrats (ecologia_05, ecologia_07 and ecologia_15) and nine quadrats from the current survey (ELA01, ELA02, ELA03, ELA05, ELA06, ELA07, ELA11, ELA19 and ELA25). This floristic group occurs on plains surrounding Iron Hill and Gibson Hill within the study area.

The floristic groups relevant to the Study Area are summarised in **Table 4**.

Figure 6 gives a spatial interpretation (NMDS) of how the quadrats group together, based on floral composition. The two-dimensional stress score of 0.23 indicates that the floristic similarity among the sites as a two-dimensional representation of multidimensional space. Consequently, the conclusions drawn from the NMDS must be considered to be generalisations, and the dendrogram in **Figure 5** provides detailed interpretation. The NMDS in **Figure 6** indicates that the floral species composition of ridgeline and slopes (filled triangles and unfilled triangles) and plains (crosses) quadrats differ, with minimal floristic similarity between these two general groupings. In contrast, there is no clear spatial separation among the Mt Gibson, Gibson Hill, Extension Hill and Iron Hill ridgeline quadrats, indicating no clear distinctions in floristic species composition. Similarly, there is a lot of overlap among the Mt Gibson and Iron Hill plains quadrats in terms of flora species composition. The Mt Singleton and Yandhanoo Hill ridgeline quadrats separate quite clearly from the Mt Gibson/Gibson Hill/Extension Hill/Iron Hill ridgeline quadrats, and from each other, in terms of flora species composition, with the Mt Singleton quadrats being quite unique, and the Yandhanoo Hill quadrats clustering with the quadrats at the three Well locations. These generalised results are well-reflected in the quadrat groupings displayed in the dendrogram in **Figure 5**.

A NMDS plot of the 208 quadrats classified by their floristic groups from the current analysis (FG1 – FG22) is available in **Figure 7.** The NMDS plot indicates there is a high degree of overlap among the floristic groups, with few clearly distinct clusters separating out. The exceptions are the clear delineations between the predominantly hilltop floristic groups FG11/FG12, FG5/FG6, and FG8/FG9. There is also some evidence of a separation between the floristic groups that are comprised of quadrats predominantly from hilltops (triangles and diamonds on the left), and floristic groups that are comprised of quadrats predominantly from plains (crosses on the right). However, due to the large number of sites, and the high stress level for this plot (2D stress = 0.24), the location of the plots in this diagram in relation to each other must be considered an approximation only.

Floristic groups determined for each quadrat (current and previous surveys) within the Study Area with *ecologia* (2015) vegetation mapping is shown in **Figure 8.** The updated floristic grouping mapping, as informed by the new analysis, is shown in **Figure 9**.

5.3.3 Floristic groups of the local area

Throughout the Mt Gibson Ranges, 13 of the 22 floristic groups determined in the ELA regional analysis occur including: FG1, FG2, FG6, FG10, FG11, FG12, FG13, FG16, FG17, FG19, FG20, FG21 and FG22. The location and extent of these floristic groups is as follows:

- FG1 and FG2 are currently only found on the Mt Gibson Ranges and are located on the plains surrounding Iron Hill. It is likely however that the current geographic distribution of these floristic groups is a result of limited analysis in plains type habitat around the Mt Gibson Ranges.
- FG6 is represented by a quadrat in the Mt Gibson Ranges as well as quadrats near Mt Singleton.
- FG10 and FG11 are represented by quadrats which occur on footslopes and plains surrounding Gibson Hill and Gibson Hill South (FG10 and one quadrat representing FG11) and Extension Hill (FG11).
- FG12 is the most extensive group on the Mt Gibson Ranges and occurs on the hilltops and hillslopes of all hills throughout the range. Based on the current analysis, this floristic group is not represented by any quadrats outside the Mt Gibson Range.
- FG13 is represented by ten quadrats in the Mt Gibson Range and two quadrats on a hill approximately 11 km north of the Mt Gibson Range. This floristic group occurs on hill tops.
- FG16 is represented by two quadrats both of which occur within the Mt Gibson Range in a drainage line between Iron Hill and Iron Hill East.
- FG17 is represented by several quadrats all of which occur scattered throughout the Mt Gibson Range on lower slopes and plains.
- FG19 and FG20 are represented by one quadrat each, both of which occur on the footslopes/plains surrounding Iron Hill (but known in *ecologia* (2015) to be part of floristic group C).
- FG21 is represented by two quadrats, one of which occurs on the plains surrounding Extension Hill and the other is located on a nearby hill, 4 km to the east.
- FG22 is represented by 12 quadrats, all of which occur in the Mt Gibson Range on plains surrounding Iron Hill and Gibson Hill.

It should be noted that no quadrats on the hill to the east of the Mt Gibson Range, which has been previously mapped as the PEC "Mt Gibson Range vegetation complexes (BIF)", grouped with any of the floristic groups considered to represent the PEC in the current analysis. These quadrats grouped with FG8 and FG9. Floristic groups which may be considered to represent the PEC from the current analysis include FG10, FG11, FG12 and FG13. These floristic groups occur on the ridgelines and hills of the Mt Gibson Range. Some quadrats representing one of these floristic groups, FG13, occur on a hill outside of the Mt Gibson Range. These quadrats don't necessarily indicate the occurrence of the PEC on this regional hill as the PEC is made up of several other floristic groups which are currently known at the Mt Gibson Range. Furthermore, FG13 comprises a very small part of vegetation on the Mt Gibson Range and is not large enough to be considered as representative of the PEC in its entirety.

5.3.4 Additional mapping

In the previously unmapped portion of the Study Area (Gibson Hill South), six quadrats (ELA22, ELA23, ELA24, ELA25, ELA26 and ELA29) were established which were assigned to three floristic groups in the analysis. These floristic groups included FG10, FG12 and FG22. ELA24, ELA26 and ELA29 form part of FG10. Quadrats ELA22 and ELA23 form part of FG12 and ELA25 forms part of FG22. These floristic groups are also largely represented elsewhere in the Study Area (**Figure 9**). The most notable changes to the vegetation mapping include inclusion of FG10 which reduced the coverage of FG12. The new FG16 was mapped along a minor drainage line between Iron Hill and Iron Hill East. A new area of FG13 was also included on Iron Hill East, however this this was restricted.

Mapping of ELA floristic groups, incorporating amendments, at the extent of the Mt Gibson Ranges is presented in **Figure 10**.

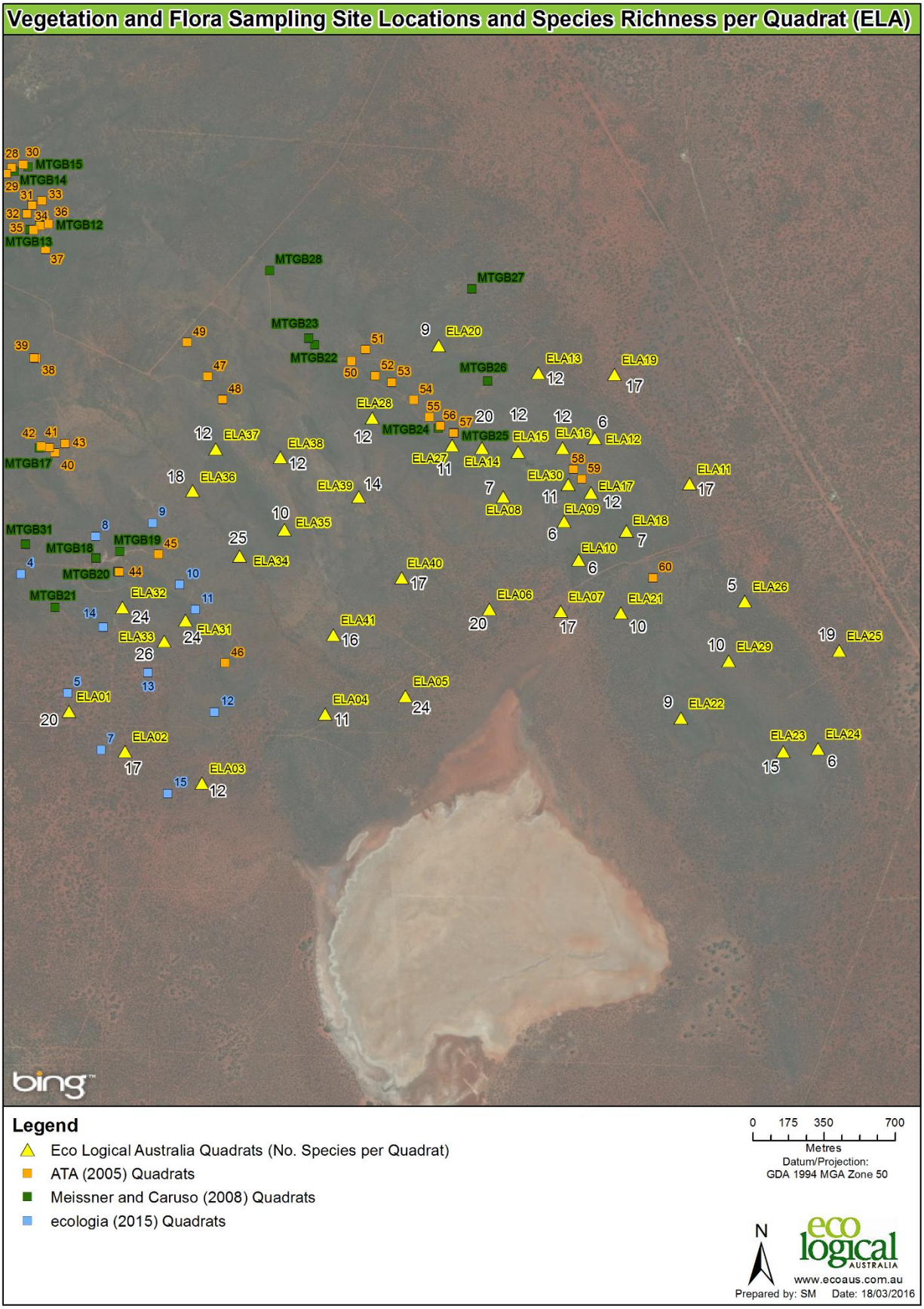
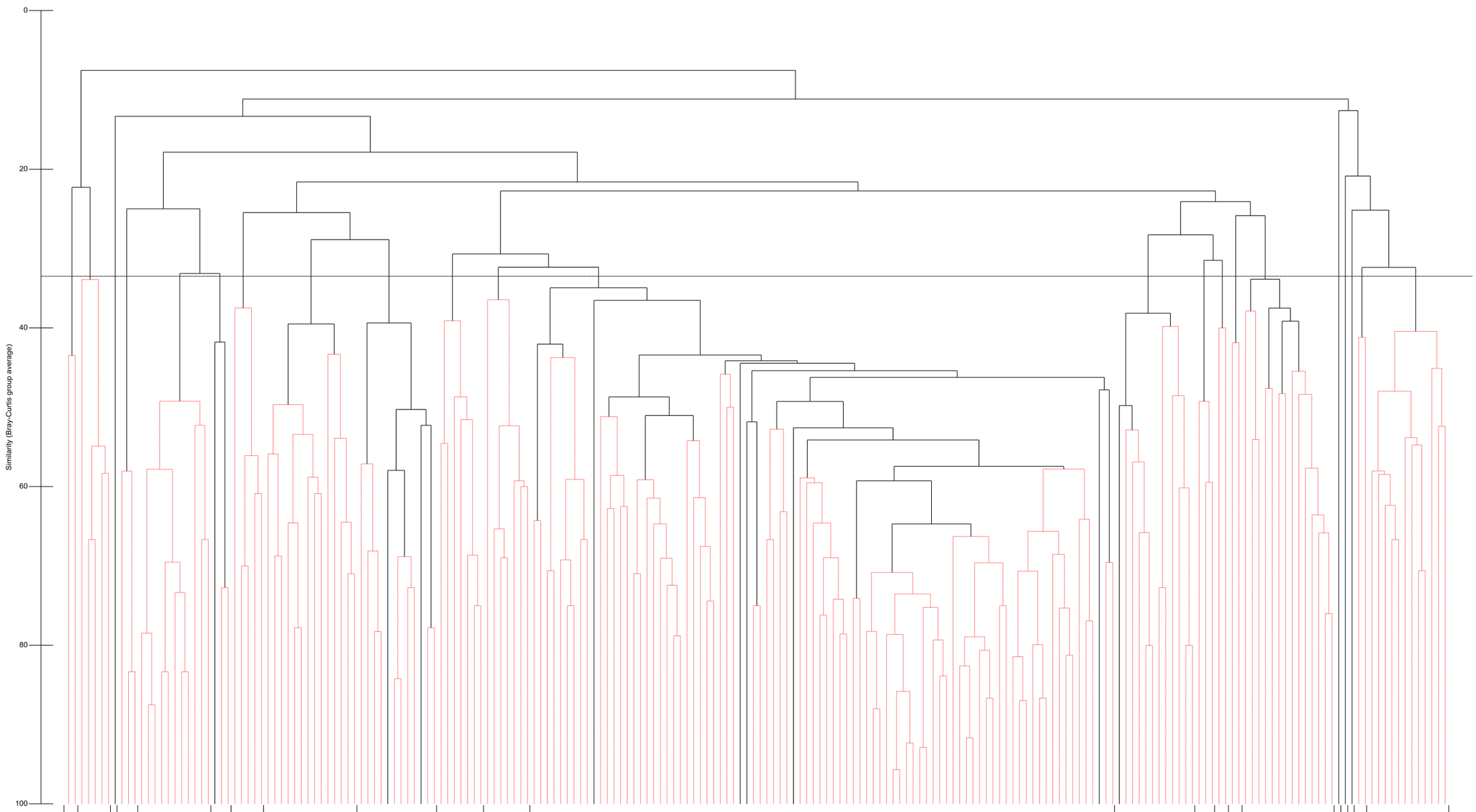


Figure 4: Vegetation and Flora Sampling Site Locations and Species Richness per Quadrat (ELA) in the Study Area.

Floristic Similarity



Group	Location	Landform	Ecologia	ELA
	Iron Hill	Plains	B	1
	Iron Hill	Plains	A	2
	State Barrier Fence	Plains	M	3
	Mount Singleton SW of Mount Singleton	Hill	J (part)	4
	Mount Singleton	Hill	I	5
	SE Mount Singleton Low Hill NE Extension Hill	Hill	J (part)	6
	State Barrier Fence Taylor Well	Plains	F G (part)	7
	Yandhanoo Hill South Warro Well	Hill	E (part) G (part)	8
	Yandhanoo Hill Yandhanoo Hill South NW Kiaby Well	Hill	H	9
	Gibson Hill South Gibson Hill Mount Gibson	Lower Slope Hill Plains	new	10
	Extension Hill Iron Hill	Hill Lower Slope	L (part)	11
	Extension Hill Iron Hill Mount Gibson Gibson Hill Iron Hill East Extension Hill South Iron Hill South	Hill Lower Slope Plain	K (part) E (part) L (part)	12
	Iron Hill Iron Hill North Gibson Hill Iron Hill East	Hill	E (part)	13
	State Barrier Fence	Plains	J (part)	14
	State Barrier Fence Taylor Well	Plains	G (part) J (part)	15
	Iron Hill East	Drainage Line	new	16
	Iron Hill Iron Hill North Extension Hill Mount Gibson	Lower Slope Plains Hill	K (part) C2 (part)	17
	SE Mount Singleton	Hill	D	18
	Iron Hill	Plains	C1 (part)	19
	Iron Hill	Plains	G2 (part)	20
	Extension Hill Yandhanoo Hill South	Plains	C1 (part)	21
	Iron Hill Mount Gibson	Plains	C1 (part)	22

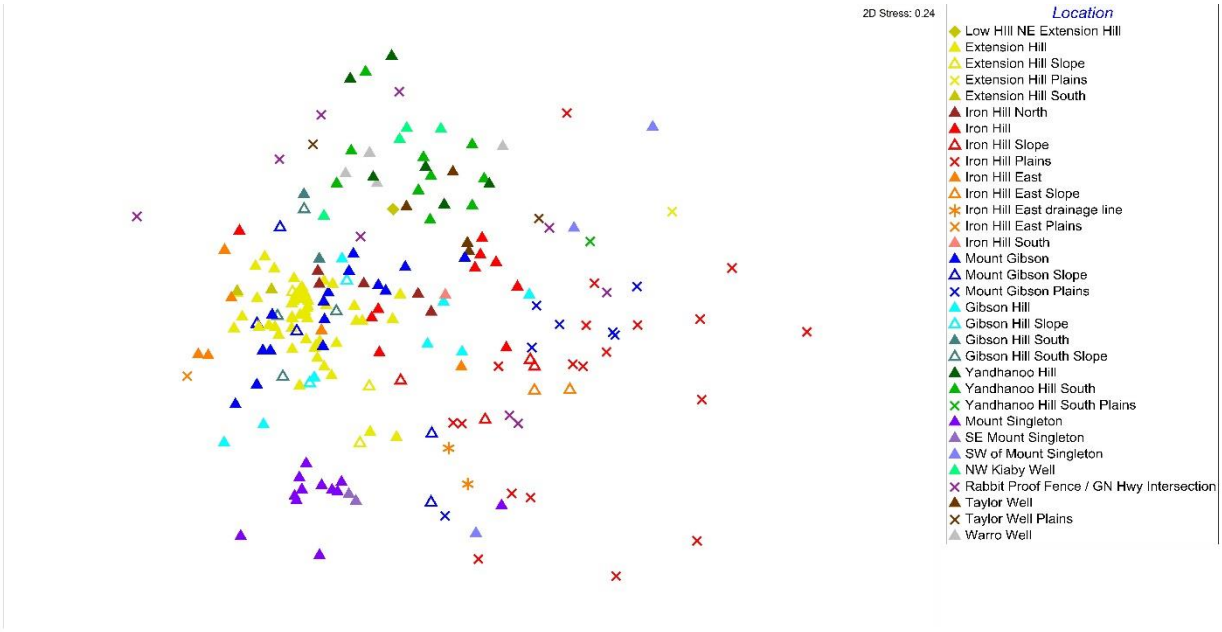


Figure 6: NMDS analysis showing floristic similarity of the quadrats in relation to their spatial position in the landscape

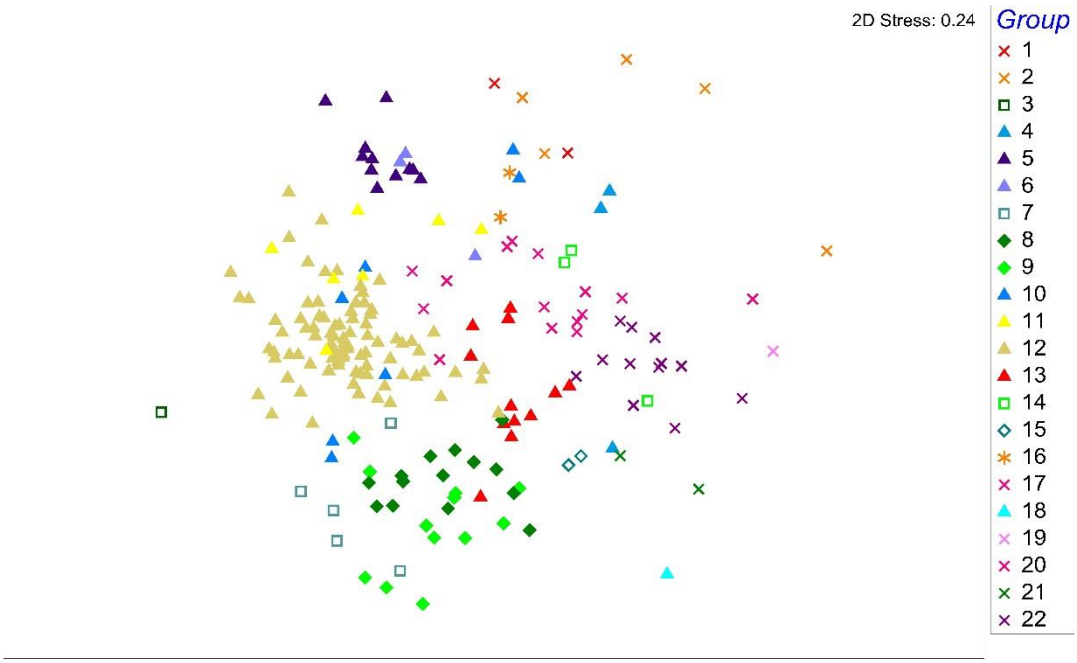


Figure 7: NMDS analysis showing the similarity of the quadrats in relation to floristic grouping

Table 4: Floristic groups from ELA floristic analysis compared to ecologia (2016) floristic groups, relevant to the Study Area

ELA floristic groups	Location	*ecologia* (2015) floristic group	Description	Quadrats*			
				Current survey	*ecologia* (2015)	Meissner and Caruso (2008)	ATA (2006)
FG10	Gibson Hill South, Gibson Hill and Mt Gibson	N/A	*Acacia ramulosa* var. *ramulosa, Melaleuca hamata* and *Allocasuarina acutivalvis* tall open scrub over *Aluta aspera subsp. hesperia* and *Philotheca sericea* open shrubland over *Cheilanthes adiantoides* very open herbland. Other indicator species include: *Acacia assimilis* subsp. *assimilis, Acacia effusifolia, Calycopeplus paucifolius, Grevillea paradoxa, Melaleuca nematophylla* and *Xanthosia kochii.* Mean species richness per ELA quadrat - 8 taxa/quadrat	ELA_10 ELA_12 ELA_18 ELA_21 ELA_24 ELA_26 ELA_29			
FG11	Extension Hill and Mt Gibson	L (part)	*Eucalyptus oldfieldii* open woodland over *Allocasuarina acutivalvis, Aluta aspera* subsp. *hesperia, Enekbatus stowardii, Melaleuca fabri* and *Acacia coolgardiensis* subsp. *effusa* shrubland over *Amphipogon caricinus* var. *caricinus* grassland and *Cheilanthes adiantoides* herbland. Other indicator species include: *Calycopeplus paucifolius, Grevillea obliquistigma* subsp. *obliquistigma, Hemigenia sp* and *Stylidium confluens.* Mean species richness per ELA quadrat - 13 taxa/quadrat	ELA_13		MTGB03, MTGB05, MTGB07, MTGB11, MTGB16	2

ELA floristic groups	Location	*ecologia* (2015) floristic group	Description	Quadrats*			
				Current survey	*ecologia* (2015)	Meissner and Caruso (2008)	ATA (2006)
FG12	Extension Hill, Extension Hill South, Iron Hill, Iron Hill North, Iron Hill East, Iron Hill South Mt Gibson and Gibson Hill	K (part), E (part) and L (part)	*Allocasuarina acutivalvis*, *Melaleuca nematophylla, Acacia assimilis* subsp. *assimilis* and *Grevillea obliquistigma* subsp. *obliquistigma* tall open scrub over *Aluta aspera* subsp. *hesperia, Grevillea paradoxa* and *Philotheca sericea* shrubland over *Cheilanthes adiantoides* herbland. Other indicator species include: *Calycopeplus paucifolius, Darwinia masonii, Eremophila clarkei, Grevillea paradoxa, Hibbertia hypericoides, Leucopogon* sp. Clyde Hill (M.A. Burgman 1207) and *Xanthosia kochii.* Mean species richness per ELA quadrat - 15 taxa/quadrat	ELA_08 ELA_09 ELA_14 ELA_15 ELA_16 ELA_20 ELA_22 ELA_23 ELA_27 ELA_28 ELA_30 ELA_37 ELA_38 ELA_39	9, 11	MTGB01, MTGB04, MTGB06, MTGB08, MTGB09, MTGB10, MTGB12, MTGB13, MTGB14, MTGB15, MTGB17, MTGB22, MTGB23, MTGB24, MTGB25, MTGB26, MTGB28, MTGB29	1, 3, 4, 9, 10, 11, 12, 13, 14, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 33, 35, 36, 37, 38, 39, 40, 41, 43, 45, 46, 47, 48, 49, 51, 52

ELA floristic groups	Location	*ecologia* (2015) floristic group	Description	Quadrats*			
				Current survey	*ecologia* (2015)	Meissner and Caruso (2008)	ATA (2006)
FG13	Iron Hill, Iron Hill North, Gibson Hill and Iron Hill East	E (part)	*Calycopeplus paucifolius*, *Acacia tetragonophylla* and *Allocasuarina acutivalvis* tall open scrub over *Acacia exocarpoides*, *Ptilotus obovatus* and *Dodonaea inaequifolia* open shrubland over *Cheilanthes adiantoides* ferns and *Austrostipa elegantissima* tussock grasses Other indicator species include: *Acacia ramulosa* var. *ramulosa*, *Alyxia buxifolia, Darwinia masonii*, *Eremophila clarkei, Hakea recurva, Philotheca brucei* and *Solanum lasiophyllum* Mean species richness per ELA quadrat - 15 taxa/quadrat	ELA_17 ELA_35	8	MTGB18, MTGB19, MTGB20,	42, 44, 58, 59, 63, 64
FG16	Iron Hill East	N/A	*Eucalyptus horistes* and *Eucalyptus oldfieldii* very open tree mallee over *Acacia ramulosa* var. *ramulosa, Acacia anthochaera* and *Melaleuca leiocarpa* tall open shrubland over *Acacia andrewsii, Enekbatus stowardii* and *Westringia* sp. Mt Gibson Retrorse Leaves (G Cockerton & J Warden WB37992) open shrubland. Other indicator species include: *Acacia acuminata, Acacia assimilis* subsp. *assimilis, Anthocercis anisantha* subsp. *anisantha, Grevillea obliquistigma* subsp. *obliquistigma, Hemigenia sp, Melaleuca eleuterostachya, Melaleuca radula,* and *Mirbelia* sp. Bursarioides (T.R. Lally 760). Mean species richness per ELA quadrat - 22 taxa/quadrat	ELA_34 ELA_36			

ELA floristic groups	Location	*ecologia* (2015) floristic group	Description	Quadrats*			
				Current survey	*ecologia* (2015)	Meissner and Caruso (2008)	ATA (2006)
FG17	Iron Hill, Iron Hill East, Extension Hill and Mount Gibson	K (part) and C2 (part)	*Eucalyptus loxophleba* subsp. *supralaevis* and *Callitris columellaris* open woodland over *Acacia acuminata, Allocasuarina acutivalvis* and *Acacia anthochaera* tall open shrubland over *Dodonaea inaequifolia, Eremophila clarkei, Grevillea paradoxa* and *Philotheca brucei* open shrubland over *Amphipogon caricinus* var. *caricinus* very open grassland. Other indicator species include: *Acacia tetragonophylla, Alyxia buxifolia, Cheilanthes adiantoides, Micromyrtus sp., Olearia humilis* and *Scaevola spinescens.* Mean species richness per ELA quadrat - 19 taxa/quadrat	ELA_04 ELA_31 ELA_32 ELA_33 ELA_40 ELA_41	10, 12 14	MTGB2, MTGB27, MTGB31, MTGB32,	15
FG22	Iron Hill and Mt Gibson	C1 (part)	*Eucalyptus loxophleba* subsp. *supralaevis* and *Callitris columellaris* open woodland over *Acacia anthochaera, Acacia assimilis* subsp. *assimilis, Hakea recurva* and *Acacia tetragonophylla* tall open shrubland over *Acacia andrewsii, Eremophila granitica, Senna artemisioides* subsp. *filifolia* and *Olearia pimeleoides* open shrubland over *Austrostipa elegantissima* tussock grasses. Other indicator species include: *Alyxia buxifolia, Exocarpos aphyllus*, *Maireana georgei, Olearia humilis, Olearia muelleri, Ptilotus obovatus, Rhagodia drummondii* and *Xanthosia kochii.* Mean species richness per ELA quadrat - 20 taxa/quadrat	ELA_01 ELA_02 ELA_03 ELA_05 ELA_06 ELA_07 ELA_11 ELA_19 ELA_25	5, 7, 15		

*As per ELA analysis floristic groupings

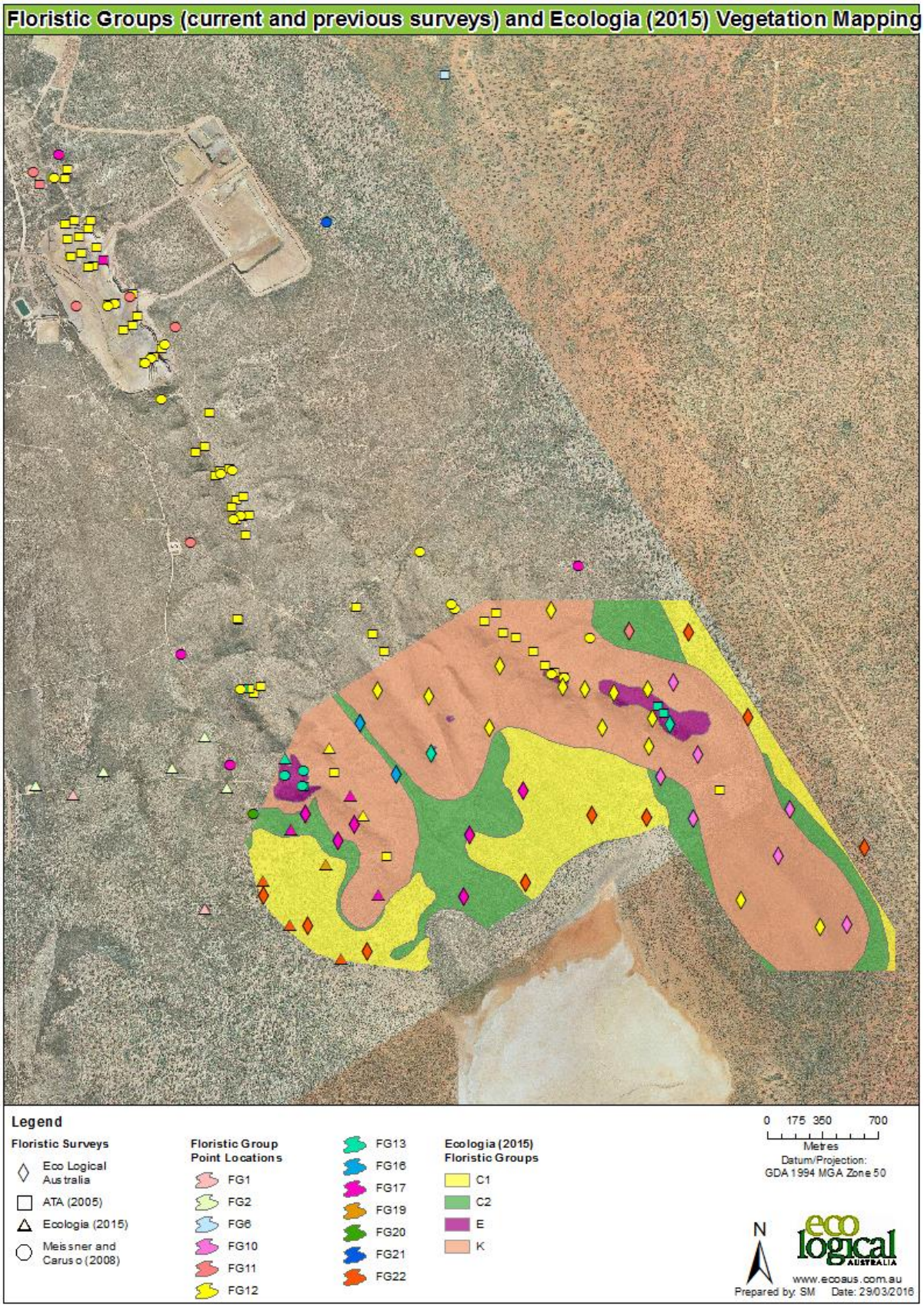


Figure 8: Floristic groups mapping determined for each quadrat (current and previous surveys) within the Study Area using *ecologia* (2015) floristic groups

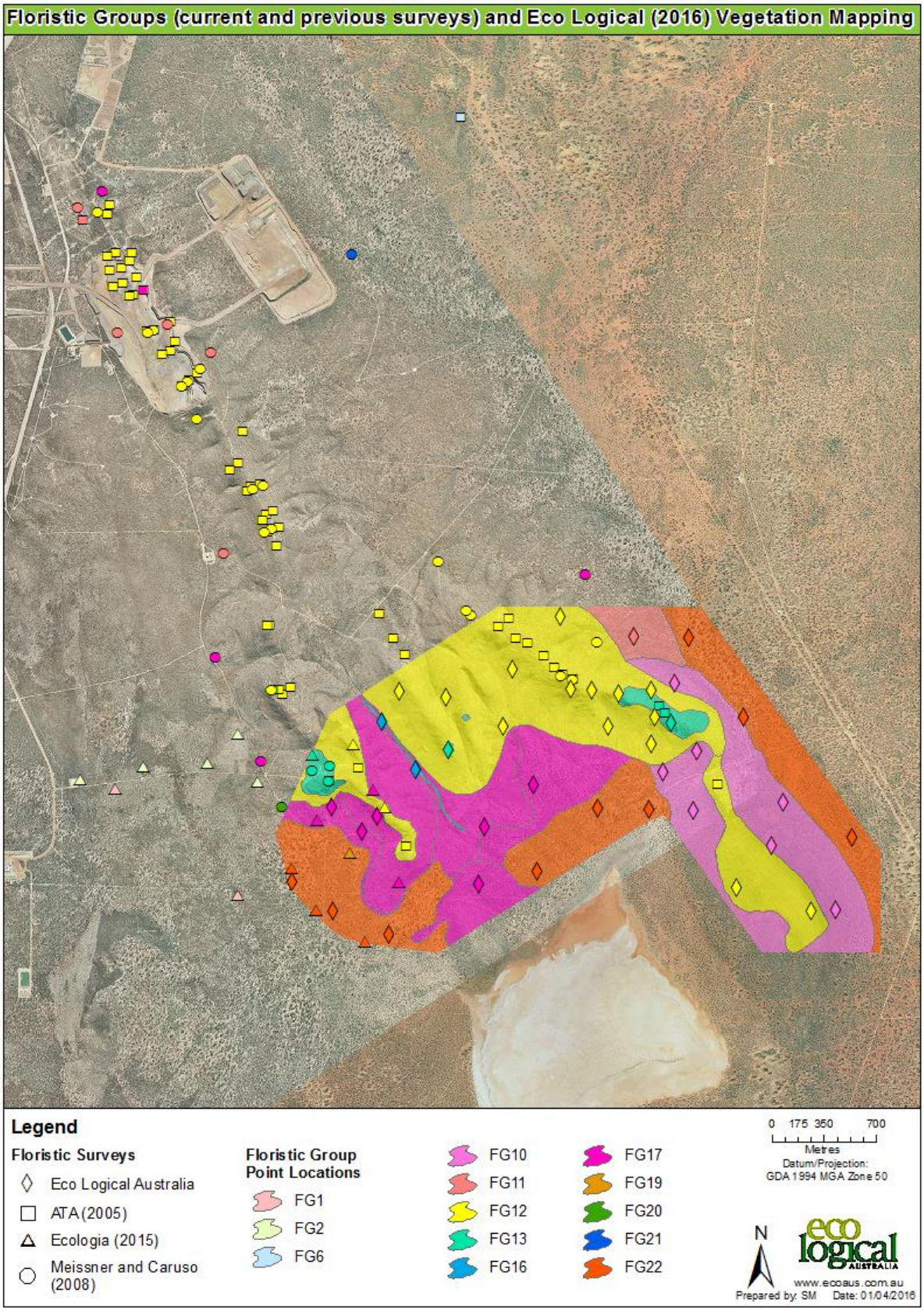


Figure 9: Advanced floristic groups mapping within the Study Area based on ELA survey (spring 2015/early 2016)

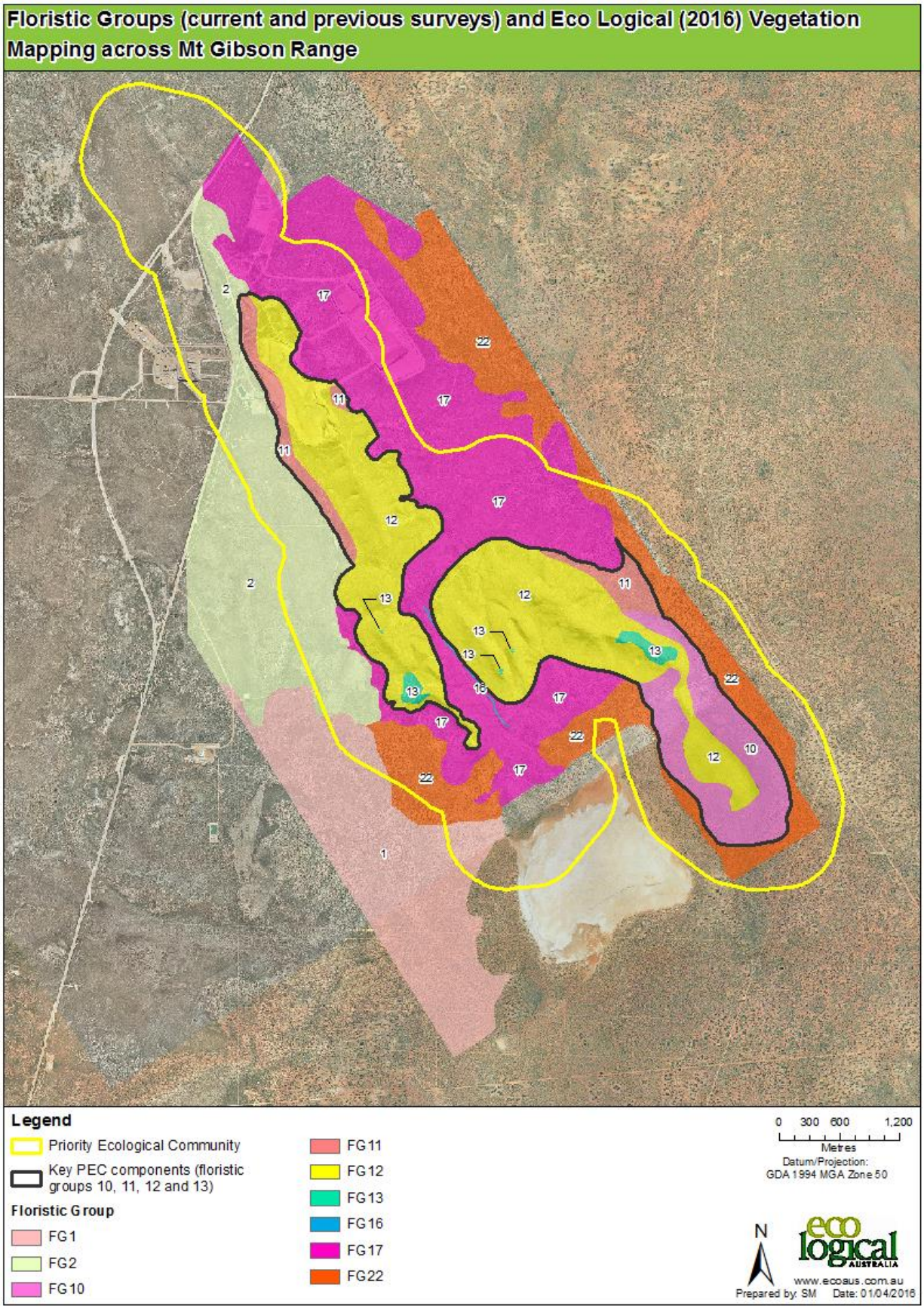


Figure 10: Local floristic group mapping using ELA vegetation analysis

5.3.5 Vegetation condition

Vegetation condition within the Study Area ranged from very good to excellent. Disturbance observed within the Study Area was minor and included some non-aggressive weeds, historic drilling activity such as old tracks and drill lines and rabbit digging and warrens.

5.3.6 Annual/perennial species analysis comparison

Comparisons between the inclusions and exclusions of annual species in the analysis demonstrate there is a re-structuring of (change in) floristic group delineations as provided below (**Figure 11** to **Figure 14**). However, the NMDS plots demonstrate that, despite the change in quadrat clustering pattern, there is little variation among the sites between the NMDS analyses in **Figure 13** and **Figure 14**. This indicates that the similarity distance between the sites is more stable than indicated by the dendrogram cluster analyses alone, and the floristic group delineations are likely to be more stable when more quadrats are included in the analysis. As such, the inclusion of annuals in the final analysis of the quadrats has little effect on the final quadrat clustering analysis.

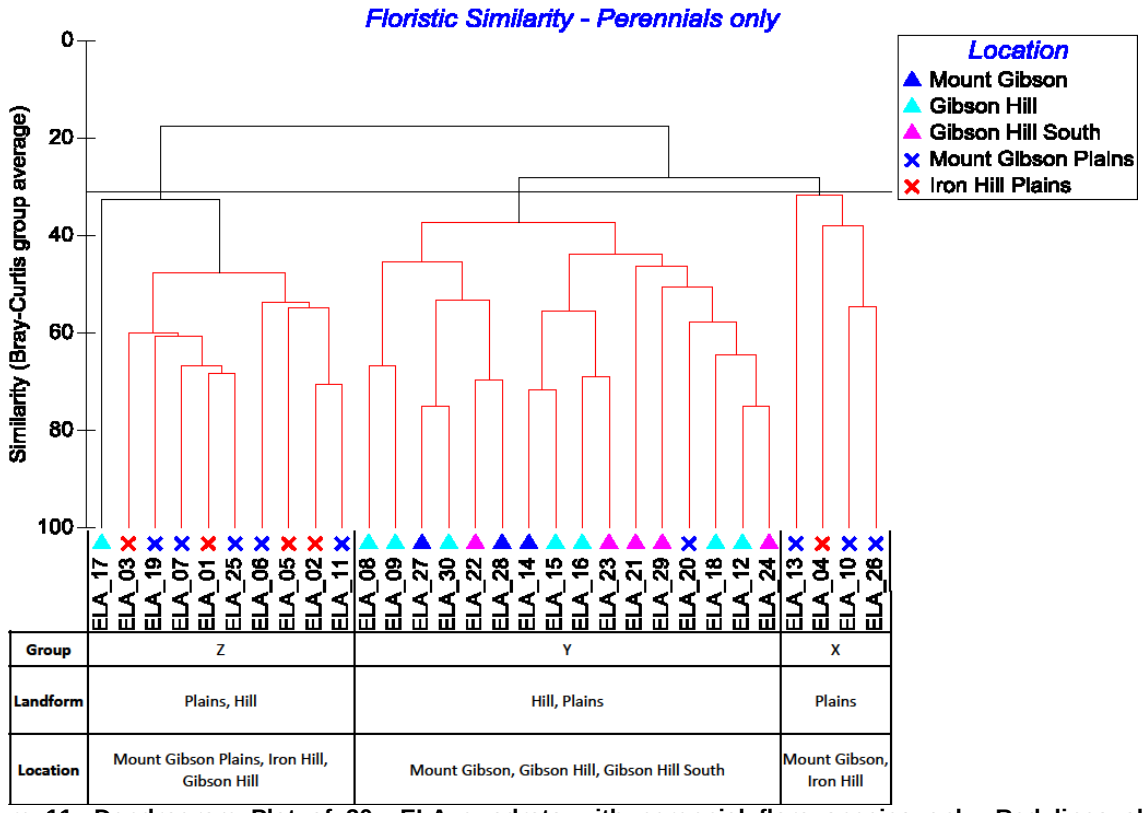


Figure 11: Dendrogram Plot of 30x ELA quadrats with perennial flora species only. Red lines show uncertainty in groupings. Three groups were delineated using a 31% similarity

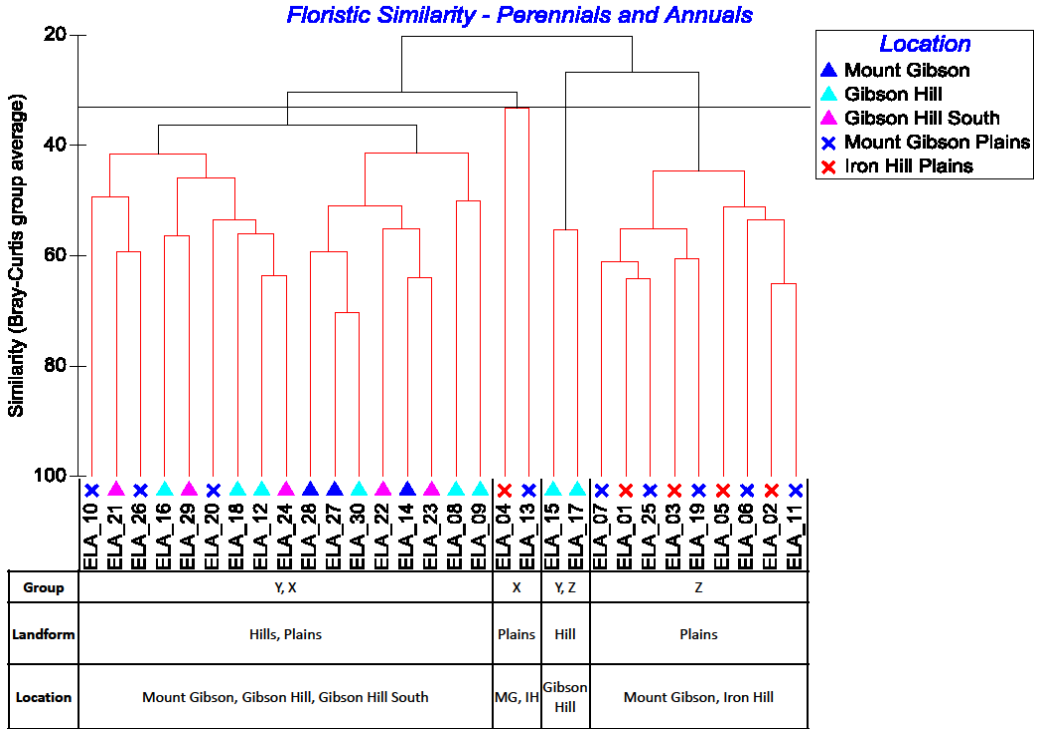


Figure 12: Dendrogram Plot of 30x ELA quadrats with annual and perennial flora species. Red lines show uncertainty in groupings. Four groups were delineated using a 33% similarity break.

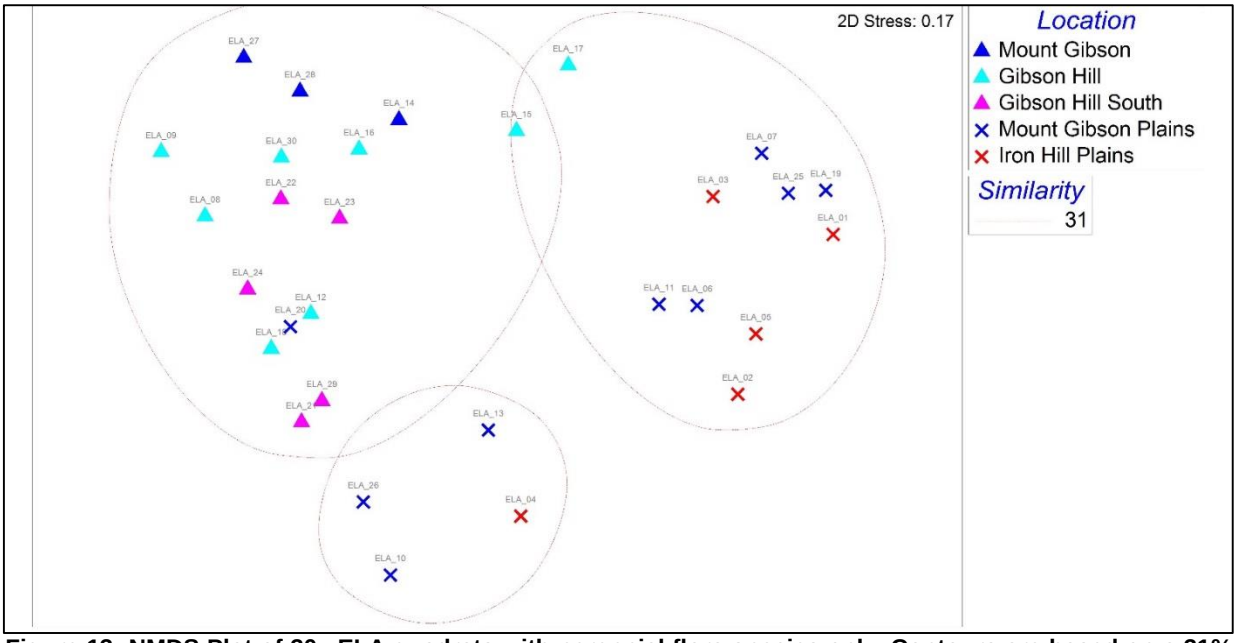


Figure 13: NMDS Plot of 30x ELA quadrats with perennial flora species only. Contours are based on a 31% similarity level derived from the Dendrogram in Figure 11

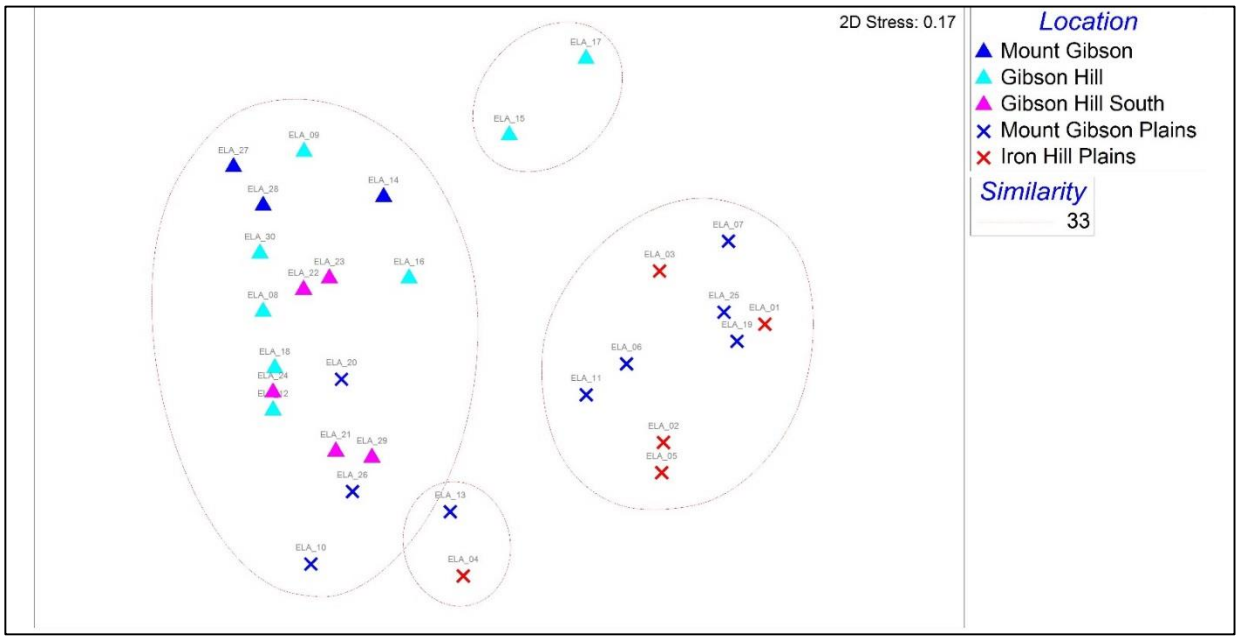


Figure 14: NMDS Plot of 30x ELA quadrats with annual and perennial flora species. Contours are based on a 33% similarity level derived from the Dendrogram in Figure 12.

5.4 Species richness

Species richness analysis for the ELA quadrats shows that the Plain Woodlands, FG22, has the highest mean species richness of 20 taxa/quadrat based on good representation (n=12). In comparison the Ironstone Outcrop Shrublands, FG13, has 14 taxa/quadrat and Ironstone shrublands, FG12, has 14 taxa/quadrat. The single highest species richness was FG16 with an average of 22 taxa/quadrat (n=2). The mean species richness per quadrat for each floristic group is shown in **Table 4**.

The quadrat locations and species richness for each ELA quadrat is shown in **Table 4**.

Species richness bar graphs are provided below in **Figure 15** and **Figure 16**. These graphs indicate that flora species richness is generally higher on the ridgelines of the Mt Gibson Range, however, the spatial spread of the quadrats is heavily skewed towards ridgeline locations and the Mt Gibson Range, with few (66 out of 208) quadrats located outside the Mt Gibson Range. A higher number of quadrats need to be included in the analysis outside the Mt Gibson Range, particularly in under surveyed habitats such as plains, before more definitive conclusions can be made about overall biodiversity trends.

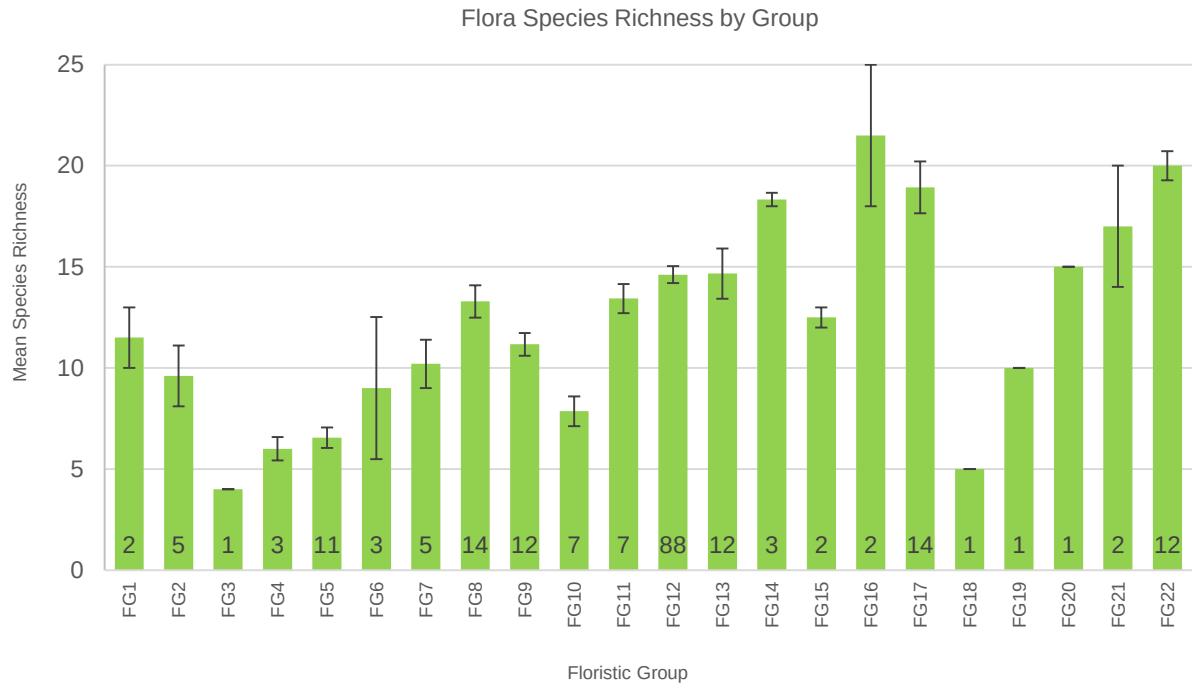


Figure 15: Mean flora species richness of 208 quadrats, grouped by floristic group as per the dendrogram analysis. The number at the base of the bar graph indicates the number of quadrats within the group.

Figure 16: Mean flora species richness of 208 quadrats, grouped by location and setting. The number at the base of the bar graph indicates the number of quadrats within the group.

5.5 Preliminary qualitative assessment of regional quadrats

This table provides a qualitative assessment on the likelihood of the (unanalysed) regional quadrats being similar to FG12 and FG13.

Location	Quadrats	Dominant species	Qualitative Assessment
Taylor Well	ELA42, ELA43	*Acacia ramulosa* var. *ramulosa, Calycopeplus paucifolius, Hakea recurva, Ptilotus obovatus, Acacia exocarpoides*	Most similar to FG13, however, missing species such as *Acacia tetragonophylla*. ELA quadrats are in close proximity to quadrats ATA_63 and ATA_64, which previously have been assigned FG13 through statistical analysis
South Yandhanoo Hill	ELA44, ELA45, ELA50	*Allocasuarina acutivalvis* subsp. *acutivalvis, Calycopeplus paucifolius, Eremophila clarkei, Aristida contorta, Mirbelia* sp. Bursarioides (T.R. Lally 760), *Philotheca brucei* subsp. *brucei*	Unlikely to represent FG12 and FG13. The quadrats lack such species as *Acacia tetragonophylla, Acacia exocarpoides*, *Ptilotus obovatus* to represent FG13. The quadrats lack such species as *Melaleuca nematophylla, Acacia assimilis* subsp. *assimilis and Aluta aspera* subsp. *hesperia* to represent FG12
Hill near Deep Well	ELA46, ELA47	*Acacia acuminata, Acacia kochii, Allocasuarina tessellata, Grevillea levis, Melaleuca radula*	Unlikely to represent FG12 and FG13 as these quadrats contain species that are not recorded in FG12 and FG13, such as *Acacia kochii* and *Allocasuarina tessellata*
Yandhanoo Hill	ELA48, ELA49	*Acacia exocarpoides, Acacia umbraculiformis, Dodonaea inaequifolia, Eremophila clarkei, Olearia humilis, Philotheca brucei* subsp. *brucei, Ptilotus obovatus, Solanum cleistogamum*	Unlikely to represent FG12 and FG13, as these quadrats contain species that are not recorded in FG12 and FG13, such as *Acacia umbraculiformis*

Location	Quadrats	Dominant species	Qualitative Assessment
East Warro Well	ELA51, ELA52	*Acacia exocarpoides, Acacia incurvaneura, Acacia umbraculiformis, Cheilanthes sieberi* subsp. *sieberi, Ptilotus obovatus, Santalum spicatum, Sida* sp. Golden calyces glabrous (H.N. Foote 32)	Unlikely to represent FG12 and FG13, as these quadrats contain species that are not recorded in FG12 and FG13, such as *Acacia incurvaneura, Acacia umbraculiformis* and *Santalum spicatum*
South Warro Well	ELA53, ELA54	*Acacia incurvaneura, Calycopeplus paucifolius, Mirbelia* sp. Bursarioides (T.R. Lally 760), *Olearia humilis, Philotheca sericea*	Unlikely to represent FG12 and FG13, as these quadrats contain species that are not recorded in FG12 and FG13, such as *Acacia incurvaneura* and *Olearia humilis*
North Warro Well	ELA58, ELA59	*Abutilon oxycarpum, Acacia ramulosa* var. *ramulosa, Acacia umbraculiformis, Calycopeplus paucifolius, Euphorbia boophthona, Philotheca sericea, Santalum spicatum, Sida* sp. dark green fruits (S. van Leeuwen 2260)	Unlikely to represent FG12 and FG13. The quadrats lack such species as *Acacia tetragonophylla* and *Acacia exocarpoides* to represent FG13. The quadrats lack such species as *Melaleuca nematophylla* and *Acacia assimilis* subsp. *assimilis* to represent FG12
Between Kiaby Well and Great Northern Highway	ELA55, ELA61	*Acacia assimilis* subsp. *assimilis, Acacia exocarpoides, Acacia ramulosa* var. *ramulosa, Acacia umbraculiformis, Philotheca nutans*	Unlikely to represent FG12 and FG13 as these quadrats contain species that are not recorded in FG12 and FG13, such as *Acacia umbraculiformis* and *Acacia ramulosa* var. *ramulosa*
Roys Well	ELA56, ELA57	*Acacia assimilis* subsp. *assimilis, Acacia ramulosa* var. *ramulosa, Calycopeplus paucifolius, Eremophila clarkei, Philotheca sericea*	Unlikely to represent FG12 and FG13 as these quadrats contain species that are not recorded in FG12 and FG13, such as *Acacia ramulosa* var. *ramulosa*
South Six Mile Well	ELA60	*Acacia exocarpoides, Acacia incurvaneura, Acacia tetragonophylla, Eremophila clarkei, Grevillea hakeoides* subsp. *stenophylla, Philotheca brucei subsp. brucei, Ptilotus obovatus*	Unlikely to represent FG12 and FG13, as these quadrats contain species that are not recorded in FG12 and FG13, such as *Acacia incurvaneura*

Re-analysis of some of the past regional data shows that a parcel of the PEC mapped by the Department of Parks and Wildlife to the east is comprised of vegetation clustering as FG8 and FG9. It does not show strong similarity to the more frequent vegetation groups at the Mt Gibson ranges predominantly comprised of the related groups FG10, FG11, FG12 and FG13.

5.6 Limitations

EPA Guidance Statement No. 51 (EPA 2004) recommends including a discussion of the constraints and limitations of the survey methods used. Constraints and limitations are summarised in **Table 5**.

Table 5: Constraints and limitations of the Mt Gibson vegetation survey

Constraint	Limitations
Sources of Information	The Study Area and broader region has been relatively well surveyed, with increasing survey work occurring due to mining in the region. There are several other flora surveys which have been undertaken in the Study Area and wider area; therefore, sources of information are not considered to be a limitation.
Scope of works	The survey requirements of the flora and vegetation assessment were adequately met. Quadrat sampling and floristic analysis was undertaken, in combination with conservation listed flora searches.
Completeness of survey	The Study Area was fully surveyed to the satisfaction of the scope as specified by Mt Gibson Mining.
Intensity of survey	The survey effort was satisfactory. A sufficient number of quadrats were established to determine the floristic groups and also to delineate vegetation associations in unmapped areas. The Study Area was also searched for conservation listed species.
Timing, weather, season, cycle	The timing of the first phase of the survey was optimal for this type of assessment, with majority of species flowering and/or having sufficient material to confidently identify specimens. The second survey was conducted out of season, however this did not present a significant limitation as most annual species had retained sufficient material to facilitate confident identification.
Disturbances	There were some minor disturbances throughout the Study Area associated with rabbits and historic mining activities (e.g. tracks, drill lines).
Resources	The botanists undertaking the surveys were suitably qualified to identify flora specimens. There were no limitations due to resourcing.
Accessibility / remoteness	The entire Study Area was easily accessed via 4WD vehicle and surveyed on foot.

6 Summary and conclusions

6.1 The Study Area

- A total of 156 native and eight introduced flora taxa were identified from all records held within the Study Area. The taxa comprised 42 families and 95 genera. The mean native species richness for quadrats sampled was 15 species per quadrat (range: 5 – 26 species/quadrat).
- The floristic analysis classified the quadrats into 22 floristic groups (FG1-FG22). Of these floristic groups, six aligned with floristic groups determined in previous analysis undertaken by *ecologia* (2015) and fourteen floristic groups included a mixture of quadrats that were in other related groups in the *ecologia* (2015) analysis. Several quadrats installed in the current survey also grouped into two entirely new floristic groups.
- Ten of the floristic groups are represented by quadrats which are only known at the Mt Gibson Range (FG1, FG2, FG10, FG11, FG12, FG16, FG17, FG19, FG20 and FG22), nine occur only in regional areas outside the Mt Gibson Range (floristic groups FG3, FG4, FG5, FG7, FG8, FG9, FG14, FG15 and FG18) and three are represented by quadrats which occur within both the Mt Gibson Range and regional areas (FG6, FG13 and FG21). It should be noted however, that most of the floristic groups which are represented by quadrats which occur only on the Mt Gibson Range may be a product of limited survey effort in regional areas in a range of habitat types (Note: most regional quadrats are on hilltops and ridgelines).
- Seven of the 22 regional floristic groups determined in the current analysis are represented within the Study Area including: FG10, FG11, FG12, FG13, FG16, FG17 and FG22.
- Species richness analysis for the ELA quadrats shows that the Plain Woodlands, FG22, has the highest mean species richness of 20 taxa/quadrat based on good representation (n=12). The single highest species richness was FG16 with an average of 22 taxa/quadrat (n=2). In comparison the Ironstone Outcrop Shrublands, FG13, has 14 taxa/quadrat and Ironstone shrublands, FG12, has 14 taxa/quadrat.
- Vegetation condition ranged from very good to excellent. Disturbance observed included some non-aggressive weeds, historic drilling activity such as old tracks and drill lines and rabbit digging and warrens.
- The most notable changes to the vegetation mapping include separating FG10 which reduced the coverage of FG12 (but collectively are key components of the PEC). The new FG16 was mapped along a minor drainage line between Iron Hill and Iron Hill East. A new area of FG13 was also included on Iron Hill East, however this area appears spatially restricted.

6.2 The local analysis

- Throughout the Mt Gibson Ranges, 13 of the 22 floristic groups determined in the ELA analysis occur including: FG1, FG2, FG6, FG10, FG11, FG12, FG13, FG16, FG17, FG19, FG20, FG21 and FG22.
- FG12 is the most extensive group on the Mt Gibson Range and occurs on the hilltops and hillslopes of all hills throughout the range. Based on the current analysis, this floristic group is not represented by any quadrats outside the Mt Gibson Range.
- FG13 is represented by ten quadrats in the Mt Gibson Range and two quadrats on a hill approximately 11 km north of the Mt Gibson Range. This floristic group occurs on hill tops, over rock outcrops.
- The new FG16 is represented by two quadrats both of which occur within the Mt Gibson Range in a drainage line between Iron Hill and Iron Hill East

- Floristic groups FG1, FG2, FG10, FG11, FG17, FG19, FG20 and FG22 are represented by quadrats which occur only on the Mt Gibson Range.
- FG6 and FG21 are represented by quadrats on Mt Gibson Range as well as in the surrounding regional area.

6.3 Preliminary regional analysis

- The preliminary qualitative assessment on the likelihood of the 20 regional quadrats being similar to FG12 and FG13 is based on dominant species recorded and their similarity with the vegetation descriptions and key indicator species of FG12 and FG13. Generally the regional quadrats did not appear to align with FG12 and FG13. While some indicator species were present and abundant, such as *Calycopeplus paucifolius*, *Acacia exocarpoides*, *Ptilotus obovatus* and *Philotheca sericea* other species were often recorded that would not likely be recorded in FG12 and FG13, such as *Acacia incurvaneura*, *Acacia umbraculiformis*, *Acacia kochii* and *Allocasuarina tessellata*. It would be assumed that most of the regional quadrats would likely group out into a different floristic group than FG12 and FG13. Two regional quadrats, however, may have a higher similarity with FG13, quadrats ELA42 and ELA43. These quadrats were the most similar to FG13, however, were missing species such as *Acacia tetragonophylla*. ELA quadrats ELA42 and ELA43 in close proximity to quadrats ATA_63 and ATA_64, which previously have been assigned FG13 through statistical analysis.
- Re-analysis of some of the past regional data shows that a parcel of the PEC mapped by the Department of Parks and Wildlife to the east, is comprised of vegetation clustering as FG8 and FG9. It does not show strong similarity to the more frequent vegetation groups at the Mt Gibson ranges predominantly comprised of the related groups FG10, FG11, FG12 and FG13.

References

ATA Environmental. 2006. *Mt Gibson Magnetite Project Supplementary Vegetation and Flora Surveys*. Report prepared for Mount Gibson Mining Limited. Report 2005/149. Version 2. March 2006.

Bastin G and the ACRIS Management Committee. 2008. *Rangelands 2008 — Taking the Pulse*. Published on behalf of the ACRIS Management Committee by the National Land & Water Resources Audit, Canberra

Beard, J.S. 1976. Vegetation Survey of Western Australia: Murchison 1:1000000, Vegetation Series, University of Western Australia Press, Perth, Western Australia.

Beard, J. S. 1990. *Plant Life of Western Australia*. Kangaroo Press.

Beecham, B. 2001. *Avon Wheatbelt 1 (AW1 - Ancient Drainage subregion).* In: A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002

Bennett Environmental Consulting Pty Ltd. 2000. *Flora and Vegetation of Mt Gibson*. Report prepared for Mount Gibson Iron Limited. December 2000.

Bureau of Meteorology. 2015. Climate Data Online: Paynes Find. Available: http://www.bom.gov.au/climate/data/?ref=ftr

Clarke K R & Gorley R N. 2006. *PRIMER v6.* Available: http://www.primer-e.com/index.htm

Department of the Environment. 2015a. *Australia's bioregions (IBRA)* [WWW Document]. Available: https://www.environment.gov.au/land/nrs/science/ibra.

Department of the Environment. 2015b. EPBC Act Protected Matters Search Tool. Available: http://www.environment.gov.au/epbc/pmst/index.html

Department of Parks and Wildlife (Parks and Wildlife). 2007 - 2015. *NatureMap*. Department of Parks and Wildlife and WA Museum. Available: http://naturemap.dpaw.wa.gov.au/default.aspx

ecologia. 2015. *Iron Hill Flora and Vegetation Assessment and Floristic Analysis*. Report prepared by MacDonald M of *ecologia* Ltd for Mount Gibson Mining Limited. Revision 13. September 2015.

Environmental Protection Authority (EPA). 2002. *Terrestrial Biological Surveys as an Element of Biodiversity Protection*. Position Statement No. 3. Perth, Western Australia.

Environmental Protection Authority. 2004. *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia*. Guidance Statement No. 51. Perth, Western Australia.

Environmental Protection Authority 2014. *Environmental Protection Authority 2013—14 Annual Report*. Environmental Protection Authority, Perth, Western Australia.

E. A. Griffin & Associates 2005. *Numerical Analysis of Floristic Data in Mt Gibson Area*. Report prepared for ATA Environmental.

Lipple, S.L., Baxter, J.L., Marston, R.J. 1983. *1:250 000 Geological Series – Explanatory Notes*. Ninghan, Western Australia. Geological Survey of Western Australia, Perth.

Markey, A.S., and Dillon, S.J. 2008. Flora and vegetation of the banded ironstone formations of the Yilgarn Craton: the Central Tallering Land System. *Conservation Science Western Australia*. 7: 121-149.

Mount Gibson Mining Limited. 2015. *Mt Gibson Range Mine Operations - Iron Hill Deposits Environmental Protection Act 1986 (WA) Environmental Impact Assessment (Public Environmental Review).* Revision 2. November 2015.

Meissner R and Caruso Y 2008. Flora and vegetation of banded iron formations of the Yilgarn Craton: Mount Gibson and surrounding area. *Conservation Science Western Australia*. 7 (1) 105-120.

Outback Ecology. 2014. *Mt Gibson Iron Limited, Iron Hill Deposit Soil Assessment*. Unpublished report prepared for Mount Gibson Iron, September 2014.

Payne A.L., Van Vreeswyk, A.M.E., Pringle, H.J.R., Leighton, K.A., Henning, P. 1998. *An inventory and condition survey of the Sandstone-Yalgoo-Paynes Find area, Western Australia*. Agriculture Western Australia, Technical Bulletin No. 90, South Perth.

Shepherd, D.P., Beeston, G.R., and A.J.M. Hopkins. 2002. *Native Vegetation in Western Australia – Extent, Type and Status*. Resource Management Technical Report 249, Department of Agriculture, Western Australia.

Western Australian Herbarium (WAH). 2015a. *A visual guide to the Interim Biogeographic Regionalisation for Australia (IBRA) in WA.* Department of Parks and Wildlife. Available: https://florabase.dpaw.wa.gov.au/help/ibra/

Western Australian Herbarium (WAH). 2015b. *FloraBase—the Western Australian Flora.* Department of Parks and Wildlife. Available: https://florabase.dpaw.wa.gov.au/

Appendix A Previous flora and vegetation survey summary

Author	Report title	Year	Study Area	Type of survey and timing	Flora	Conservation listed flora	Vegetation	Vegetation of significance	Other notes
Bennett Environmental Consulting Pty Ltd	Flora and Vegetation of Mt Gibson	2000	Mt Gibson mining lease	Baseline flora and vegetation. Established 62 quadrats on the 11th and 16th September.	264 native and 21 introduced taxa	*Darwinia masonii* (T), *Eucalyptus synandra* (T), *Acacia cerastes* (P1) and *Acacia acanthoclada* subsp. g*laucescens* (P3)	25 vegetation communities	None of the vegetation associations described from the survey areas were of significance at the time of the survey	Vegetation mapping was undertaken by structural classification grouped by the dominant stratum.
E. A. Griffin and Associates	Numerical Analysis of Floristic Data in Mt Gibson Area	2005	Mt Gibson and its vicinity	Vegetation survey conducted by ATA Environmental. Established 100 quadrats in spring 2005.	-	-	-	Vegetation communities on Extension Hill and Iron Hill North contain communities different from other areas.	This report provided an interpretation of the significance of vegetation associations in the Mt Gibson area at a sub-regional level.

Author	Report title	Year	Study Area	Type of survey and timing	Flora	Conservation listed flora	Vegetation	Vegetation of significance	Other notes
ATA Environmental	Mt Gibson Magnetite Project Supplementary Vegetation and Flora Surveys	2006	Three main areas associated with the Mt Gibson Magnetite project area	Level 2 flora and vegetation survey. Established 62 quadrats from the 3rd - 5th November 2004 and 19th - 22nd January 2005.	192 native and 1 introduced taxa	*Acacia cerastes* (P1), *Grevillea scabrida* (P3) and *Persoonia pentasticha* (P3)	35 vegetation associations	None of the vegetation associations described from the survey areas were of significance at the time of the survey	Mapping was undertaken to complement the Bennett (2000) vegetation unit mapping and included mapping additional areas of the Mt Gibson leases that were not surveyed by Bennett. Mapping was also prepared at a finer level of detail than the Bennett mapping

Author	Report title	Year	Study Area	Type of survey and timing	Flora	Conservation listed flora	Vegetation	Vegetation of significance	Other notes
Rachel Meissner and Yvette Caruso	Flora and vegetation of banded iron formations of the Yilgarn Craton: Mt Gibson and surrounding area	2008	Mt Gibson Range and surrounding ironstone ranges on the Ninghan pastoral lease	Vegetation community assessment. Established 50 quadrats in September - October 2005.	243 native and 10 introduced taxa	*Darwinia masonii* (T), *Lepidosperma gibsonii* (T), *Acacia cerastes* (P1), *Micromyrtus* sp. Warriedar (S. Patrick 1879A) (P1), *Rhodanthe collina* (P1), *Persoonia pentasticha* (P2), *Austrostipa blackii* (P3), *Dodonaea amplisemina* (P3), *Podotheca uniseta* (P3)	Seven community types	Vegetation communities 6 and 7 are restricted to specific parts of the Mt Gibson Range.	-

Author	Report title	Year	Study Area	Type of survey and timing	Flora	Conservation listed flora	Vegetation	Vegetation of significance	Other notes
ecologia	Iron Hill Flora and Vegetation Assessment and Floristic Analysis	2015	Within and adjacent to the proposed Iron Hill developmen t envelope	Flora and vegetation assessment incorporating data from previous studies as well as additional sample plots. Used 150 quadrats from previous surveys and established an additional 17 from 29th April to 2nd May 2015.	115 native and 1 introduced taxa	*Darwinia masonii* (T)	14 floristic groups were classified	Two of the floristic groups (E and K) are associated with the Priority 1 Mt Gibson Range vegetation complexes (banded ironstone formation) PEC	*ecologia* undertook floristics numerical analysis which incorporated data from the ATA (2006) and Meissner and Caruso (2008) surveys as well as additional data they collected in April-May 2015. From this analysis, *ecologia* delineated floristic groups for Iron Hill and its surrounds.

Appendix B Quadrat location summary

Easting	Northing	Quadrat No.	Nearest named place	Landform	Tenure
516521	6724482	ELA_01	Iron Hill Plains	Plains	Extension Hill Mining Lease
516798	6724285	ELA_02	Iron Hill Plains	Plains	Extension Hill Mining Lease
517177	6724128	ELA_03	Iron Hill Plains	Plains	Extension Hill Mining Lease
517784	6724469	ELA_04	Iron Hill Plains	Plains	Extension Hill Mining Lease
518180	6724557	ELA_05	Iron Hill Plains	Plains	Extension Hill Mining Lease
518594	6724986	ELA_06	Mount Gibson Plains	Plains	Extension Hill Mining Lease
518945	6724975	ELA_07	Mount Gibson Plains	Plains	Extension Hill Mining Lease
518661.5	6725540	ELA_08	Gibson Hill	Hill	Extension Hill Mining Lease
518960.4	6725419	ELA_09	Gibson Hill	Hill	Extension Hill Mining Lease
519033	6725229	ELA_10	Mount Gibson Plains	Plains	Extension Hill Mining Lease
519580	6725604	ELA_11	Mount Gibson Plains	Plains	Extension Hill Mining Lease
519113	6725828	ELA_12	Gibson Hill Slope	lower slope	Extension Hill Mining Lease
518835	6726150	ELA_13	Mount Gibson Slope	lower slope	Mt Gibson Wildlife Sanctuary
518556.1	6725780	ELA_14	Mount Gibson	Hill	Extension Hill Mining Lease
518734.1	6725760	ELA_15	Gibson Hill	Hill	Extension Hill Mining Lease
518953.6	6725780	ELA_16	Gibson Hill	Hill	Extension Hill Mining Lease
519093	6725560	ELA_17	Gibson Hill	Hill	Extension Hill Mining Lease
519268	6725371	ELA_18	Gibson Hill Slope	lower slope	Extension Hill Mining Lease
519209	6726143	ELA_19	Mount Gibson Plains	Plains	Mt Gibson Wildlife Sanctuary
518342.2	6726284	ELA_20	Mount Gibson Slope	lower slope	Extension Hill Mining Lease
519240	6724967	ELA_21	Gibson Hill South	Low hill	Extension Hill Mining Lease
519537.8	6724449	ELA_22	Gibson Hill South Slope	lower slope	Extension Hill Mining Lease
520041.4	6724283	ELA_23	Gibson Hill South Slope	lower slope	Mt Gibson Wildlife Sanctuary
520212	6724297	ELA_24	Gibson Hill South Slope	lower slope	Mt Gibson Wildlife Sanctuary
520317	6724782	ELA_25	Mount Gibson Plains	Plains	Mt Gibson Wildlife Sanctuary
519852	6725024	ELA_26	Mount Gibson Slope	lower slope	Extension Hill Mining Lease
518409.4	6725794	ELA_27	Mount Gibson	Hill	Extension Hill Mining Lease
518015.9	6725928	ELA_28	Mount Gibson	Hill	Extension Hill Mining Lease
519773	6724730	ELA_29	Gibson Hill South Slope	lower slope	Extension Hill Mining Lease
518981	6725601	ELA_30	Gibson Hill	Hill	Extension Hill Mining Lease
517095	6724930	ELA_31	Iron Hill	Hill	Extension Hill Mining Lease
516785	6724995	ELA_32	Iron Hill Slope	lower slope	Extension Hill Mining Lease

Easting	Northing	Quadrat No.	Nearest named place	Landform	Tenure
516991	6724828	ELA_33	Iron Hill Slope	lower slope	Extension Hill Mining Lease
517361	6725247	ELA_34	Iron Hill East drainage line	Drainage line	Extension Hill Mining Lease
517583	6725377	ELA_35	Iron Hill East	Hill	Extension Hill Mining Lease
517130	6725568	ELA_36	Iron Hill East drainage line	Drainage line	Extension Hill Mining Lease
517244.6	6725776	ELA_37	Iron Hill East	Hill	Extension Hill Mining Lease
517562.9	6725735	ELA_38	Iron Hill East	Hill	Extension Hill Mining Lease
517949.5	6725540	ELA_39	Iron Hill East Plains	Hill	Extension Hill Mining Lease
518160	6725141	ELA_40	Iron Hill East Slope	lower slope	Extension Hill Mining Lease
517823	6724859	ELA_41	Iron Hill East Slope	lower slope	Extension Hill Mining Lease
517822.7	6738362	ELA_42	Taylor Well	Hill	Ninghan Station
517778.8	6738578	ELA_43	Taylor Well	Hill	Ninghan Station
521593.8	6728425	ELA_44	South of Yandhanoo Hill	Hill	Mt Gibson Wildlife Sanctuary
521732.8	6728189	ELA_45	South of Yandhanoo Hill	Hill	Mt Gibson Wildlife Sanctuary
522232.5	6726356	ELA_46	Hill Near Deep Well	Hill	Mt Gibson Wildlife Sanctuary
525211.5	6726291	ELA_47	Hill Near Deep Well	Hill	Mt Gibson Wildlife Sanctuary
522715.1	6731078	ELA_48	Yandhanoo Hill	Hill	Ninghan Station
522826.6	6731329	ELA_49	Yandhanoo Hill	Hill	Ninghan Station
521946.5	6729845	ELA_50	South of Yandhanoo Hill	Hill	Ninghan Station
518362.8	6745877	ELA_51	East Warro Well	Hill	Ninghan Station
518369.5	6745510	ELA_52	East Warro Well	Hill	Ninghan Station
514527	6744892	ELA_53	South Warro Well	Hill	Ninghan Station
514739.3	6743561	ELA_54	South Warro Well	Hill	Ninghan Station
520044.5	6741068	ELA_55	Between Kiaby Well and GN Hwy	Low hill	Ninghan Station
515159	6740680	ELA_56	Roys Well	Hill	Ninghan Station
514820	6740166	ELA_57	Roys Well	Hill	Ninghan Station
515588.2	6747736	ELA_58	North Warro Well	Hill	Ninghan Station
515396.7	6748433	ELA_59	North Warro Well	Hill	Ninghan Station
518992.6	6749121	ELA_60	South Six Mile Well	Hill	Ninghan Station
520148.7	6740564	ELA_61	Between Kiaby Well and GN Hwy	Low hill	Ninghan Station

Appendix C Flora species list

Family	Species	ELA (2016)	*ecologia* (2015)	Meissner and Caruso (2008)	ATA (2006)	Species included in ELA 2016 analysis
Aizoaceae	**Cleretum papulosum*			x		
Amaranthaceae	*Ptilotus drummondii*	x	x	x		x
	Ptilotus exaltatus			x	x	x
	Ptilotus gaudichaudii var. *parviflorus*			x		
	Ptilotus helopteroides			x		x
	Ptilotus nobilis	x				
	Ptilotus obovatus var. *obovatus*	x	x	x	x	x
	Ptilotus schwartzii var. *schwartzii*				x	
Apiaceae	*Daucus glochidiatus*	x		x		
	Platysace trachymenioides		x			x
	Xanthosia	x	x	x		x
	Xanthosia bungei			x		
	Xanthosia kochii	x	x			
Apocynaceae	*Alyxia buxifolia*	x	x	x	x	x
	Rhyncharrhena linearis			x		x
Araliaceae	*Hydrocotyle rugulosa*			x		
	Trachymene cyanopetala			x		
	Trachymene ornata	x		x		
	Trachymene pilosa			x		
Asparagaceae	*Anthropodium curvipes*			x		
	Arthropodium dyeri	x		x		
	Chamaexeros macranthera			x	x	x
	Chamaexeros sp.				x	
	Dichopogon tyleri			x		
	Lomandra effusa				x	
	Thysanotus sp.	x			x	
	Thysanotus manglesianus		x	x		
	Thysanotus patersonii				x	
	Thysanotus pyramidalis			x		
Ashphodelaceae	*Bulbine semibarbata*			x		
Asteraceae	**Urospermum picroides*	x		x		
	**Ursinia anthemoides* subsp. *anthemoides*	x		x		
	Angianthus tomentosus	x				
	Actinobole ?uliginosum		x			
	Asteraceae sp.	x				
	Bellida graminea			x		
	Blennospora drummondii			x		
	Brachyscome cheilocarpa			x		
	Brachyscome ciliaris	x				

Family	Species	ELA (2016)	*ecologia* (2015)	Meissner and Caruso (2008)	ATA (2006)	Species included in ELA 2016 analysis
	Brachyscome ciliocarpa			x		
	Brachyscome perpusilla			x		
	Brachyscome pusilla			x		
	Brachyscome sp.				x	
	Calocephalus multiflorus	x		x		
	Calotis hispidula			x		
	Calotis multicaulis			x		
	Cephalipterum drummondii	x		x	x	
	Ceratogyne obionoides			x		
	Chthonocephalus pseudevax	x		x		
	Cratystylis subspinescens				x	x
	Feldstonia nitens			x		
	Gilberta tenuifolia	x		x		
	Gilruthia osbornei			x		
	Gnephosis tenuissima			x		
	Hyalosperma demissum			x		
	Hyalosperma glutinosum subsp. *glutinosum*			x	x	
	Hyalosperma glutinosum subsp. *venustum*			x	x	
	**Hypochaeris glabra*			x		
	Isoetopsis graminifolia			x		
	Lawrencella davenportii			x		
	Lawrencella rosea	x		x		
	Millotia myosotidifolia			x		
	Myriocephalus guerinae			x		
	Myriocephalus pygmaeus			x		
	Olearia dampieri				x	x
	Olearia humilis	x	x	x		x
	Olearia muelleri	x	x	x	x	x
	Olearia pimeleoides	x	x	x	x	x
	Olearia sp.				x	
	Podolepis canescens			x		
	Podolepis lessonii	x				
	Podotheca gnaphalioides			x		
	Podotheca uniseta			x		
	Rhodanthe battii			x		
	Rhodanthe chlorocephala subsp. *rosea*			x		
	Rhodanthe chlorocephala subsp. *splendida*			x		
	Rhodanthe citrina			x		
	Rhodanthe collina			x		
	Rhodanthe battii	x		x		
	Rhodanthe laevis	x		x		

Family	Species	ELA (2016)	*ecologia* (2015)	Meissner and Caruso (2008)	ATA (2006)	Species included in ELA 2016 analysis
	Rhodanthe manglesii			x		
	Rhodanthe maryonii			x		
	Rhodanthe polycephala			x		
	Rhodanthe pygmaea			x		
	Rhodanthe sp.				x	
	Rhodanthe spicata			x		
	Rhodanthe stricta			x		
	Schoenia cassiniana			x		
	Schoenia filifolia subsp. *filifolia*			x		
	**Sonchus oleraceus*			x		
	Waitzia acuminata var. *acuminata*			x		
	Waitzia nitida	x				
Boraginaceae	*Halgania integerrima*		x			
Boryaceae	**Echium plantagineum*				x	
	Borya sphaerocephala				x	x
Brassicaceae	**Sisymbrium erysimoides*	x				
	Lepidium oxytrichum	x		x		
	Stenopetalum anfractum			x		
	Stenopetalum filifolium	x		x		
Campanulaceae	*Lobelia* sp.	x				
	Lobelia winfridae			x		
	Wahlenbergia gracilenta	x		x		
	Wahlenbergia tumidifructa			x		
Casuarinaceae	*Allocasuarina acutivalvis* subsp. *acutivalvis*	x	x			x
	Allocasuarina acutivalvis subsp. *prinsepiana*			x	x	
	Allocasuarina campestris				x	x
	Allocasuarina dielsiana	x				
	Allocasuarina tessellata (P1)	x				
Celastraceae	*Psammomoya grandiflora*	x		x		x
Chenopodiaceae	*Atriplex bunburyana*	x			x	
	Atriplex lindleyi subsp. *inflata*				x	
	Atriplex nummularium				x	
	Chenopodium melanocarpum			x		
	Dysphania melanocarpa forma *melanocarpa*	x				
	Enchylaena lanata	x				
	Enchylaena tomentosa	x	x		x	x
	Halosarcia indica				x	
	Maireana carnosa	x				
	Maireana georgei	x		x	x	x
	Maireana marginata			x		x
	Maireana thesioides	x				x

Family	Species	ELA (2016)	*ecologia* (2015)	Meissner and Caruso (2008)	ATA (2006)	Species included in ELA 2016 analysis
	Maireana tomentosa				x	
	Maireana trichoptera			x		x
	Maireana triptera		x			
	Rhagodia baccata				x	
	Rhagodia drummondii	x	x			x
	Rhagodia ?latifolia				x	
	Rhagodia sp. Watheroo (R.J. Cranfield & P.J. Spencer 8183)			x		x
	Salsola tragus				x	
	Sclerolaena cuneata		x			x
	Sclerolaena diacantha				x	
	Sclerolaena eriacantha		x			x
	Sclerolaena fusiformis	x		x	x	x
	Sclerolaena gardneri			x		x
Colchicaceae	*Wurmbea densiflora*		x	x		
Convolvulaceae	**Cuscuta epithymum*			x		
	**Cuscuta planiflora*	x				
Crassulaceae	*Crassula closiana*			x		
	Crassula colorata var. *acuminata*			x		
	Crassula colorata var. *colorata*	x		x		
	Crassula extrorsa			x		
	Crassula tetramera			x		
Cupressaceae	*Callitris columellaris*	x	x	x		x
	Callitris glaucophylla				x	
Cyperaceae	*Lepidosperma costale*				x	x
	Lepidosperma gibsonii (T)	x		x		x
	Lepidosperma gracile				x	
	Lepidosperma tenue				x	
	Schoenus nanus			x		
	Schoenus sp.				x	
Dilleniaceae	*Hibbertia arcuata*		x	x		x
	Hibbertia acerosa	x			x	x
	Hibbertia ancistrophylla				x	x
	Hibbertia aff. *rostellata* (R.Meissner & Y.Caruso 27)			x		x
	Hibbertia crassifolia				x	x
	Hibbertia glomerata var. *glomerata*		x			x
	Hibbertia glomerosa var. *glomerosa*	x	x	x	x	x
	Hibbertia hypericoides	x	x	x		x
	Hibbertia sp.				x	
Dioscoreaceae	*Dioscorea hastifolia*				x	x
Droseraceae	*Drosera glanduligera*				x	

Family	Species	ELA (2016)	*ecologia* (2015)	Meissner and Caruso (2008)	ATA (2006)	Species included in ELA 2016 analysis
	Drosera macrantha	x	x	x		
	Drosera sp.				x	
Ecdeiocoleaceae	*Ecdeiocolea monostachya*		x		x	x
Ericaceae	*Leucopogon* sp. Clyde Hill (M.A. Burgman 1207)	x	x	x		x
Euphorbiaceae	*Calycopeplus paucifolius*	x	x	x	x	x
	Euphorbia boophthona	x		x		
	Euphorbia tannensis subsp*. eremophila*			x		
Fabaceae	*Acacia acanthoclada*				x	x
	Acacia acuaria	x		x	x	x
	Acacia acuminata	x	x	x	x	x
	Acacia alata				x	
	Acacia andrewsii	x	x	x	x	x
	Acacia aneura			x	x	x
	Acacia anthochaera	x	x	x	x	x
	Acacia assimilis subsp. *assimilis*	x	x	x	x	x
	Acacia aulacophylla	x				
	Acacia burkittii	x			x	
	Acacia cerastes (P1)	x		x	x	x
	Acacia colletioides		x	x	x	x
	Acacia coolgardiensis subsp. *effusa*			x	x	x
	Acacia duriuscula				x	
	Acacia effusifolia	x	x			x
	Acacia erinacea				x	x
	Acacia exocarpoides	x	x	x		x
	Acacia ?heteroneura	x				
	Acacia incurvaneura	x				
	Acacia kochii	x			x	x
	Acacia longispinea		x		x	x
	Acacia masliniana				x	
	Acacia neurophylla subsp. *erugata*	x		x		x
	Acacia obtecta	x	x	x		x
	Acacia oswaldii				x	x
	Acacia prainii				x	
	Acacia quadrimarginea				x	x
	Acacia ramulosa var. *linophylla*		x			x
	Acacia ramulosa var. *ramulosa*	x	x	x	x	x
	Acacia resinimarginea				x	
	Acacia sibina		x			x
	Acacia sibirica	x		x		x
	Acacia sp.	x			x	
	Acacia stereophylla var*. stereophylla*			x	x	x

Family	Species	ELA (2016)	*ecologia* (2015)	Meissner and Caruso (2008)	ATA (2006)	Species included in ELA 2016 analysis
	Acacia stowardii				x	
	Acacia tetragonophylla	x	x	x	x	x
	Acacia umbraculiformis	x		x		x
	Daviesia benthamii subsp. *benthamii*		x			
	Daviesia divaricata				x	
	Gastrolobium laytonii	x	x	x	x	x
	Leptosema aphyllum	x				x
	Mirbelia ramulosa				x	
	Mirbelia	x	x	x	x	x
	Mirbelia sp. Bursarioides (T.R. Lally 760)	x	x	x		
	Petalostylis cassioides				x	
	Senna artemisioides subsp. *artemisioides*				x	x
	Senna artemisioides subsp. *filifolia*	x		x	x	x
	Senna charlesiana	x	x		x	x
	Senna glutinosa subsp. *chatelainiana*			x		x
	Senna glutinosa subsp. *luerssenii*				x	x
	Senna sp. Austin (A. Strid 20210)	x		x	x	x
	Senna sp.	x				
	Senna stowardii	x	x			x
	Templetonia smithiana	x				
Frankeniaceae	*Frankenia pauciflora*	x			x	
Geraniaceae	**Erodium cicutarium*			x		
	Erodium cygnorum	x		x		
	Erodium sp.		x			
Goodeniaceae	*Brunonia australis*			x		
	Brunonia sp. Goldfields (K.R. Newbey 6044)	x				
	Goodenia berardiana			x		
	Goodenia havilandii			x		
	Goodenia mimuloides			x		
	Goodenia occidentalis			x		
	Goodenia pinifolia			x		x
	Goodenia pinnatifida			x		
	Scaevola spinescens	x	x	x	x	x
	Velleia cycnopotamica			x		
	Velleia hispida			x		
	Velleia rosea			x		
Gyrostemonaceae	*Codonocarpus cotinifolius*				x	x
Haloragaceae	*Glischrocaryon aureum*	x			x	x
	Glischrocaryon favescens				x	x
	Gonocarpus nodulosus			x		
	Haloragis odontocarpa forma rugosa			x		

Family	Species	ELA (2016)	*ecologia* (2015)	Meissner and Caruso (2008)	ATA (2006)	Species included in ELA 2016 analysis
	Haloragis trigonocarpa			x		
Hemerocallidaceae	*Caesia* sp. Wongan (K.F. Kenneally 8820)			x		
	Dianella revoluta	x	x			x
	Dianella revoluta var. *divaricata*			x	x	
	Tricoryne elatior			x		
Juncaginaceae	*Triglochin* sp. B Flora of Australia (P.G. Wilson 4294)			x		
Lamiaceae	*Dicrastylis ?parvifolia*			x		
	Dicrastylis sp.			x		
	Hemigenia	x	x	x		x
	Hemigenia macphersonii		x	x		
	Hemigenia botryphylla		x			
	Hemigenia ciliata	x	x			
	Hemigenia sp. Sticky Terete (B.H. Smith 449)			x		
	Hemigenia sp. Yuna (A.C. Burns 95)	x				
	Hemigenia sp. Yalgoo (A.M. Ashby 2624)			x		
	Microcorys sp. Mt Gibson (S. Patrick 2098)		x			x
	Physopsis spicata				x	
	Prostanthera althoferi subsp. *althoferi*		x	x		x
	Prostanthera eckersleyana				x	
	Prostanthera magnifica	x		x	x	x
	Prostanthera patens	x	x	x		x
	Prostanthera prostantheroides	x				
	Prostanthera sp.				x	
	Westringia sp. Mt Gibson Retrorse Leaves (G Cockerton & J Warden WB37992)	x				x
Lauraceae	*Cassytha ?flava*	x				
	Cassytha glabella				x	
	Cassytha nodiflora	x		x	x	x
	Cassytha sp.	x			x	
Loganiaceae	*Phyllangium sulcatum*			x		
Loranthaceae	*Amyema gibberula* var. *tatei*			x		x
	Lysiana casuarinae	x				
Malvaceae	*Abutilon oxycarpum*	x				
	Androcalva luteiflora	x		x		x
	Alyogyne hakeifolia	x			x	x
	Brachychiton gregorii	x		x		x
	Keraudrenia integrifolia				x	
	Keraudrenia velutina subsp. *velutina*	x	x		x	x
	Rulingia kempeana				x	x
	Rulingia luteiflora				x	x
	Sida atrovirens			x		x

Family	Species	ELA (2016)	*ecologia* (2015)	Meissner and Caruso (2008)	ATA (2006)	Species included in ELA 2016 analysis
	Sida chrysocalyx			x		x
	Sida excedentifolia				x	x
	Sida sp. dark green fruits (S. van Leeuwen 2260)	x	x			x
	Sida sp. Golden calyces glabrous (H.N. Foote 32)	x	x			x
Myrtaceae	*Aluta aspera* subsp. *hesperia*	x	x	x	x	x
	Astus subroseus				x	
	Baeckea benthamii				x	
	Baeckea sp. Mt Gibson (R.Meissner & Y.Caruso 19)			x		x
	Baeckea sp. Wanarra (M.E. Trudgen MET 5376)		x	x	x	x
	Balaustion pulcherrimum				x	
	Calothamnus chrysantherus					
	Calothamnus gilesii	x			x	x
	Calothamnus rupestris					
	Calytrix leschenaultii				x	x
	Calytrix strigosa				x	
	Chamelaucium pauciflorum subsp. *pauciflorum*				x	
	Darwinia capitellata				x	
	Darwinia masonii (T)	x	x	x		x
	Darwinia sp.				x	
	Enekbatus stowardii	x	x	x	x	x
	Eremaea sp.				x	
	Eucalyptus celastroides subsp. *virella*	x				x
	Eucalyptus brachycorys				x	
	Eucalyptus ebbanoensis subsp. *ebbanoensis*				x	
	Eucalyptus horistes	x	x	x		x
	Eucalyptus kochii				x	x
	Eucalyptus kochii subsp. *amaryssia*		x	x		
	Eucalyptus kochii subsp. *borealis*		x			
	Eucalyptus kochii subsp. *plenissima*		x	x	x	
	Eucalyptus leptopoda subsp. *arctata*	x			x	
	Eucalyptus leptopoda subsp. *leptopoda*				x	x
	Eucalyptus loxophleba				x	
	Eucalyptus loxophleba subsp. *supralaevis*	x	x	x	x	x
	Eucalyptus oldfieldii	x	x	x	x	x
	Eucalyptus petraea				x	
	Eucalyptus salicola				x	
	Eucalyptus synandra (T)	x				
	Homalocalyx aureus				x	
	Malleostemon roseus	x				
	Malleostemon tuberculatus		x			x
	Melaleuca atroviridis			x		x

Family	Species	ELA (2016)	*ecologia* (2015)	Meissner and Caruso (2008)	ATA (2006)	Species included in ELA 2016 analysis
	Melaleuca brophyi				x	
	Melaleuca conothamnoides				x	
	Melaleuca cordata			x	x	x
	Melaleuca eleuterostachya	x	x	x	x	x
	Melaleuca fabri	x	x	x	x	x
	Melaleuca filifolia				x	
	Melaleuca fulgens subsp. fulgens				x	x
	Melaleuca hamata	x	x	x		x
	Melaleuca laterifolia subsp*. acutifolia*				x	
	Melaleuca leiocarpa	x	x	x	x	x
	Melaleuca nematophylla	x	x	x	x	x
	Melaleuca radula	x	x	x	x	x
	Melaleuca ?reflugens	x				
	Melaleuca scalena				x	
	Melaleuca uncinata				x	x
	Micromyrtus clavata			x	x	
	Micromyrtus racemosa	x	x			
	Micromyrtus	x	x	x	x	x
	Micromyrtus sp. Warriedar (S. Patrick 1879A)			x	x	
	Thryptomene costata				x	x
	Thryptomene cuspidata	x			x	x
Orchidaceae	*Cyanicula amplexans*			x		
	Cyanicula sp.			x		
Phyllanthaceae	*Poranthera microphylla*			x		
Pittosporaceae	*Cheiranthera filifolia* var. *simplicifolia*			x		x
Plantaginaceae	*Plantago* aff. *hispida* (R.Meissner & Y.Caruso 121)			x		
Poaceae	**Bromus rubens*	x				x
	**Elymus scaber*			x		x
	**Pentameris airoides*	x	x			x
	**Pentaschistis airoides* subsp*. airoides*			x		
	**Rostraria pumila*	x				
	**Vulpia muralis*			x		
	Amphipogon caricinus var. *caricinus*	x	x	x	x	x
	Amphipogon turbinatus				x	
	Aristida contorta	x		x	x	x
	Austrodanthonia caespitosa			x		x
	Austrodanthonia sp.		x			
	Austrostipa blackii			x		
	Austrostipa elegantissima	x	x	x		
	Austrostipa eremophila			x		
	Austrostipa hemipogon			x		

Family	Species	ELA (2016)	*ecologia* (2015)	Meissner and Caruso (2008)	ATA (2006)	Species included in ELA 2016 analysis
	Austrostipa nitida			x		
	Austrostipa scabra			x		
	Austrostipa	x	x	x	x	x
	Austrostipa trichophylla			x		
	Bromus arenarius			x		
	Eragrostis sp.				x	
	Lachnagrostis plebeia			x		
	Monachather paradoxus	x	x	x	x	x
	Neurachne alopecuroidea				x	x
	Poaceae sp.	x				
	Triodia scariosa		x			x
Polygalaceae	*Comesperma*	x	x	x	x	x
	Comesperma ?ciliatum				x	
	Comesperma integerrimum			x		
	Comesperma scoparium		x			
	Comesperma volubile	x				
Portulacaceae	*Calandrinia eremaea*	x		x		
	Calandrinia polyandra				x	
	Calandrinia sp.	x				
	Calandrinia sp. Blackberry (D.M. Porter 171)			x		
	Calandrinia sp. Bungalbin (G.J. Keighery & N. Gibson 1656)			x		
	Calandrinia sp. Truncate capsules (A. Markey & S. Dillon 3474)			x		
	Calandrinia translucens	x		x		
Proteaceae	*Grevillea acacioides*		x			x
	Grevillea dielsiana				x	
	Grevillea eriostachya				x	
	Grevillea extorris				x	x
	Grevillea hakeoides subsp. *stenophylla*	x				x
	Grevillea integrifolia				x	
	Grevillea juncifolia				x	x
	Grevillea juncifolia subsp. *temulenta*		x			x
	Grevillea levis	x			x	
	Grevillea nematophylla subsp. *supraplana*	x				x
	Grevillea obliquistigma subsp. *obliquistigma*		x	x	x	x
	Grevillea paradoxa	x	x	x	x	x
	Grevillea pityophylla			x		x
	Grevillea scabrida	x			x	x
	Grevillea sp.			x		
	Hakea francisiana				x	
	Hakea invaginata				x	

Family	Species	ELA (2016)	*ecologia* (2015)	Meissner and Caruso (2008)	ATA (2006)	Species included in ELA 2016 analysis
	Hakea minyma	x	x		x	x
	Hakea preissii				x	x
	Hakea recurva	x	x	x	x	x
	Hakea subsulcata				x	
	Persoonia pentasticha			x	x	
	Persoonia saundersiana				x	
	Persoonia sp.			x		x
	Persoonia sp. Paynes Find (D. Edinger et al. 313)			x		
Pteridaceae	*Cheilanthes adiantoides*	x	x	x		
	Cheilanthes sieberi subsp. *sieberi*	x	x	x		
	Cheilanthes	x	x	x		x
Rhamnaceae	*Cryptandra apetala* var. *apetala*		x			
	Cryptandra micrantha	x				
	Cryptandra	x	x	x	x	x
Ranunculaceae	*Clematis linearifolia*				x	x
Rubiaceae	*Opercularia vaginata*				x	x
Rutaceae	*Phebalium megaphyllum*	x				
	Phebalium tuberculosum			x	x	x
	Philotheca brucei subsp. *brevifolia*		x			
	Philotheca brucei subsp. *brucei*	x	x	x	x	x
	Philotheca deserti subsp. *deserti*		x			x
	Philotheca nutans (P1)	x				x
	Philotheca sericea	x	x	x		x
	Philotheca thryptomenoides				x	x
	Philotheca tomentella			x	x	x
Santalaceae	*Exocarpos aphyllus*	x	x		x	x
	Santalum acuminatum	x		x	x	x
	Santalum spicatum		x	x	x	x
Sapindaceae	*Dodonaea adenophora*	x				x
	Dodonaea inaequifolia	x	x	x	x	x
	Dodonaea sp.	x		x		x
Scrophulariaceae	*Eremophila caperata*	x			x	
	Eremophila clarkei	x	x	x	x	x
	Eremophila eriocalyx		x			x
	Eremophila forrestii subsp. *forrestii*	x		x		x
	Eremophila georgei				x	x
	Eremophila glutinosa			x		x
	Eremophila granitica	x	x		x	x
	Eremophila latrobei subsp. *latrobei*	x	x	x	x	x
	Eremophila longifolia				x	
	Eremophila miniata				x	

Family	Species	ELA (2016)	*ecologia* (2015)	Meissner and Caruso (2008)	ATA (2006)	Species included in ELA 2016 analysis
	Eremophila oldfieldii subsp. *angustifolia*			x		
	Eremophila oldfieldii subsp. *oldfieldii*				x	x
	Eremophila oppositifolia				x	x
	Eremophila oppositifolia subsp. *angustifolia*	x			x	
	Eremophila oppositifolia subsp. *oppositifolia*	x			x	
	Eremophila pantonii				x	
	Eremophila serrulata				x	x
	Eremophila sp.	x			x	
Solanaceae	*Anthocercis anisantha* subsp. *anisantha*	x	x			x
	Duboisia hopwoodii				x	
	Nicotiana rosulata			x		
	Solanum cleistogamum	x				x
	Solanum ellipticum			x		x
	Solanum lasiophyllum		x	x	x	x
	Solanum nummularium	x				x
	Solanum orbiculatum subsp. *orbiculatum*			x		
Stylidiaceae	*Stylidium confluens*			x		x
	Stylidium sp.		x			
Thymelaeaceae	*Pimelea avonensis*	x		x		x
	Pimelea brevistyla				x	
	Pimelea microcephala	x	x		x	x
Urticaceae	*Parietaria cardiostegia*		x	x		x
Zygophyllaceae	*Zygophyllum eremaeum*	x	x	x	x	
	Zygophyllum glaucum				x	
	Zygophyllum ovatum			x		
	Zygophyllum tesquorum			x		

Appendix D Site by species matrix

Species	ELA 01	ELA 02	ELA 03	ELA 04	ELA 05	ELA 06	ELA 07	ELA 08	ELA 09	ELA 10	ELA 11	ELA 12	ELA 13	ELA 14	ELA 15	ELA 16	ELA 17	ELA 18	ELA 19	ELA 20	ELA 21	ELA 22	ELA 23	ELA 24	ELA 25	ELA 26	ELA 27	ELA 28	ELA 29	ELA 30	ELA 31	ELA 32	ELA 33	ELA 34	ELA 35	ELA 36	ELA 37	ELA 38	ELA 39	ELA 40	ELA 41
**Bromus rubens*																																		1							
**Pentameris airoides*			1											1	1		1						1			1	1	1		1	1				1						
Acacia acanthoclada																																									
Acacia acuaria						1																																		1	
Acacia acuminata									1								1														1	1	1			1					1
Acacia andrewsii	1		1		1	1	1				1		1		1										1							1	1	1		1				1	1
Acacia aneura																																									
Acacia anthochaera	1	1				1					1														1						1	1	1		1					
Acacia assimilis subsp. *assimilis*		1	1				1	1	1		1		1			1					1	1	1		1		1	1	1	1			1	1		1	1	1	1		1
Acacia cerastes														1								1					1	1							1	1	1	1	1		
Acacia colletioides	1																																								
Acacia coolgardiensis subsp. *effusa*																																									
Acacia effusifolia																					1			1																	
Acacia erinacea																																									
Acacia exocarpoides							1						1	1	1	1	1														1		1	1	1						
Acacia kochii																																									
Acacia longispinea																																									
Acacia neurophylla subsp. *erugata*									1				1																												
Acacia obtecta																			1						1																
Acacia oswaldii																																									
Acacia quadrimarginea																																									
Acacia ramulosa var. *linophylla*																																									

Species	ELA 01	ELA 02	ELA 03	ELA 04	ELA 05	ELA 06	ELA 07	ELA 08	ELA 09	ELA 10	ELA 11	ELA 12	ELA 13	ELA 14	ELA 15	ELA 16	ELA 17	ELA 18	ELA 19	ELA 20	ELA 21	ELA 22	ELA 23	ELA 24	ELA 25	ELA 26	ELA 27	ELA 28	ELA 29	ELA 30	ELA 31	ELA 32	ELA 33	ELA 34	ELA 35	ELA 36	ELA 37	ELA 38	ELA 39	ELA 40	ELA 41
Acacia ramulosa var. *ramulosa*		1		1	1	1				1	1	1	1					1		1	1					1			1					1		1			1	1	
Acacia sibina																																									
Acacia sibirica								1																															1		
Acacia stereophylla var. *stereophylla*																																									
Acacia tetragonophylla	1	1			1	1	1				1			1	1		1		2						1					1	1	1							1	1
Acacia umbraculiformis																																									
Allocasuarina acutivalvis				1				1	1			1	1	1		1		1		1		1	1	1			1	1		1	1	1	1	1	1	1	1	1	1	1
Allocasuarina campestris																																									
Aluta aspera												1	1	1		1		1		1	1		1	1				1			1									
Alyogyne hakeifolia								1	1																		1	1									1				
Alyxia buxifolia	1			1	1	1																									1	1	1		1				1	1
Amphipogon caricinus var. *caricinus*				1	1						1															1			1		1	1	1	1						1
Amyema gibberula var. *tatei*																																									
Androcalva luteiflora																																		1							
Anthocercis anisantha subsp. *anisantha*																											1	1						1							
Aristida contorta															1										1						1	1							1	1
Austrodanthonia caespitosa																																									
Austrostipa	1	1	1		1	1					1						1		1						1								1								
Baeckea sp. Mt Gibson (R.Meissner & Y.Caruso 19)																																									
Baeckea sp. Wanarra (M.E. Trudgen MET 5376)																																									

Species	ELA 01	ELA 02	ELA 03	ELA 04	ELA 05	ELA 06	ELA 07	ELA 08	ELA 09	ELA 10	ELA 11	ELA 12	ELA 13	ELA 14	ELA 15	ELA 16	ELA 17	ELA 18	ELA 19	ELA 20	ELA 21	ELA 22	ELA 23	ELA 24	ELA 25	ELA 26	ELA 27	ELA 28	ELA 29	ELA 30	ELA 31	ELA 32	ELA 33	ELA 34	ELA 35	ELA 36	ELA 37	ELA 38	ELA 39	ELA 40	ELA 41
Borya sphaerocephala																																									
Brachychiton gregorii														1																											
Callitris columellaris		1	1	1	1	1					1														1					1	1	1							1	1
Calothamnus gilesii																											1	1													
Calycopeplus paucifolius												1		1	1	1	1						1	1			1		1	1					1						
Calytrix leschenaultii																																									
Cassytha nodiflora			1			1					1			1	1				1	1		1	1					1								1	1	1	1		
Chamaexeros macranthera																																									
Cheilanthes			1	1		1		1		1	1	1		1	1		1	1			1	1	1	1		1	1	1		1	1				1						
Cheiranthera filifolia																																									
Clematis linearifolia																																									
Codonocarpus cotinifolius																																									
Comesperma																															1	1									
Cratystylis subspinescens																																									
Cryptandra																																									
Darwinia masonii														1	1																			1							
Dianella revoluta			1																																						
Dioscorea hastifolia																																									
Dodonaea adenophora																																		1					1		
Dodonaea inaequifolia																	1										1			1	1		1		1				1	1
Dodonaea sp. Ninghan (H. Demarz 5111)																																									
Ecdeiocolea monostachya																																									
Elymus scaber																																									

Species	ELA 01	ELA 02	ELA 03	ELA 04	ELA 05	ELA 06	ELA 07	ELA 08	ELA 09	ELA 10	ELA 11	ELA 12	ELA 13	ELA 14	ELA 15	ELA 16	ELA 17	ELA 18	ELA 19	ELA 20	ELA 21	ELA 22	ELA 23	ELA 24	ELA 25	ELA 26	ELA 27	ELA 28	ELA 29	ELA 30	ELA 31	ELA 32	ELA 33	ELA 34	ELA 35	ELA 36	ELA 37	ELA 38	ELA 39	ELA 40	ELA 41
Enchylaena tomentosa			1				1																																		
Enekbatus stowardii										1			1								1													1		1					
Eremophila clarkei						1						1		1	1	1							1							1	1	1							1	1
Eremophila eriocalyx																																									
Eremophila forrestii subsp. *forrestii*																																									
Eremophila georgei																																									
Eremophila glutinosa																																									
Eremophila granitica	1	1	1		1		1				1								2																						
Eremophila latrobei subsp. *latrobei*		1			1						1								1											1										
Eremophila oldfieldii																																									
Eremophila oppositifolia																																	1							1	
Eremophila serrulata																																									
Eucalyptus celastroides subsp. *virella*																																	1								
Eucalyptus horistes		1			1													1																	1					
Eucalyptus kochii																																									
Eucalyptus leptopoda subsp. *leptopoda*																																									
Eucalyptus loxophleba subsp. *supralaevis*	1		1		1		1																		1						1	1	1						1	1
Eucalyptus oldfieldii																																				1					
Exocarpos aphyllus	1		1				1										1		1						1														1	
Gastrolobium laytonii																						1					1	1							1		1		1		
Glischrocaryon aureum																												1								1					
Glischrocaryon flavescens																																									
Goodenia pinifolia																																									

Species	ELA 01	ELA 02	ELA 03	ELA 04	ELA 05	ELA 06	ELA 07	ELA 08	ELA 09	ELA 10	ELA 11	ELA 12	ELA 13	ELA 14	ELA 15	ELA 16	ELA 17	ELA 18	ELA 19	ELA 20	ELA 21	ELA 22	ELA 23	ELA 24	ELA 25	ELA 26	ELA 27	ELA 28	ELA 29	ELA 30	ELA 31	ELA 32	ELA 33	ELA 34	ELA 35	ELA 36	ELA 37	ELA 38	ELA 39	ELA 40	ELA 41
Grevillea ?juncifolia																																									
Grevillea acacioides																																									
Grevillea extorris																																									
Grevillea hakeoides subsp. *stenophylla*	1																																								
Grevillea juncifolia subsp. *temulenta*																																									
Grevillea nematophylla subsp. *supraplana*																														1					1						
Grevillea obliquistigma subsp. *obliquistigma*																																		1			1	1	1		
Grevillea paradoxa					1			1	1					1	1			1		1	1	1	1				1			1	1	1	1	1			1	1	1		
Grevillea pityophylla																																									
Grevillea sarissa subsp. *sarissa*																																									
Grevillea scabrida (P3)																																									
Hakea minyma										1																										1					
Hakea preissii																																									
Hakea recurva	1	1	1			1	1				1				1				1											1	1	1								1
Hemigenia																						1						1			1	1	1	1		1	1	1	1		
Hibbertia acerosa																										1				1											
Hibbertia aff. *rostellata*																																									
Hibbertia ancistrophylla																																									
Hibbertia arcuata																																1	1	1				1	1		
Hibbertia crassifolia																																									
Hibbertia glomerata subsp. *glomerata*																																									
Hibbertia glomerosa var. *glomerosa*								1																						1											
Hibbertia hypericoides														1																											

Species	ELA 01	ELA 02	ELA 03	ELA 04	ELA 05	ELA 06	ELA 07	ELA 08	ELA 09	ELA 10	ELA 11	ELA 12	ELA 13	ELA 14	ELA 15	ELA 16	ELA 17	ELA 18	ELA 19	ELA 20	ELA 21	ELA 22	ELA 23	ELA 24	ELA 25	ELA 26	ELA 27	ELA 28	ELA 29	ELA 30	ELA 31	ELA 32	ELA 33	ELA 34	ELA 35	ELA 36	ELA 37	ELA 38	ELA 39	ELA 40	ELA 41
Keraudrenia velutina subsp. *velutina*					1																																				
Lepidosperma costale																																									
Lepidosperma gibsonii																																					1				
Leptosema aphyllum								1	1																		1									1	1	1			
Leucopogon				1	1	1														1			1															1	1	
Maireana georgei	1	1	1		1	1	1												1						1							1									
Maireana marginata																																									
Maireana thesioides																																									
Maireana trichoptera																																									
Malleostemon tuberculatus																																									
Melaleuca atroviridis																																									
Melaleuca cordata																																									
Melaleuca eleuterostachya						1																												1							
Melaleuca fabri													1																									1			
Melaleuca fulgens subsp. *fulgens*																																									
Melaleuca hamata		1								1			1																												
Melaleuca leiocarpa				1																														1		1					1
Melaleuca nematophylla												1		1	1	1		1		1		1	1	1			1	1	1	1							1	1			
Melaleuca radula																											1			1				1							
Melaleuca uncinata																																									
Microcorys sp. Mt Gibson (S. Patrick 2098)																																									
Micromyrtus																1				1		1	1																		
Mirbelia														1		1					1		1						1					1							

Species	ELA 01	ELA 02	ELA 03	ELA 04	ELA 05	ELA 06	ELA 07	ELA 08	ELA 09	ELA 10	ELA 11	ELA 12	ELA 13	ELA 14	ELA 15	ELA 16	ELA 17	ELA 18	ELA 19	ELA 20	ELA 21	ELA 22	ELA 23	ELA 24	ELA 25	ELA 26	ELA 27	ELA 28	ELA 29	ELA 30	ELA 31	ELA 32	ELA 33	ELA 34	ELA 35	ELA 36	ELA 37	ELA 38	ELA 39	ELA 40	ELA 41
Monachather paradoxus		1		1																																					
Neurachne alopecuroidea																																									
Olearia dampieri																																									
Olearia humilis	1	1	1	1	1						1								1												1	1	1	1			1				1
Olearia muelleri	1		1																1						1																
Olearia pimeleoides	1				1	1	1												1						1															1	
Opercularia vaginata																																									
Parietaria cardiostegia																																									
Persoonia sp.																																									
Phebalium tuberculosum																																									
Philotheca brucei				1		1							1	1	1								1								1	1	1			1					1
Philotheca deserti subsp. *deserti*																																									
Philotheca nutans				1	1																																				
Philotheca sericea												1		1	1	1				1									1													
Philotheca thryptomenoides																																									
Philotheca tomentella																																									
Pimelea avonensis																																		1							
Pimelea microcephala							1																																		
Platysace trachymenioides																																									
Prostanthera althoferi subsp. *althoferi*																																									
Prostanthera magnifica														1																1											
Prostanthera magnifica														1																											
Prostanthera patens		1																																							

Species	ELA 01	ELA 02	ELA 03	ELA 04	ELA 05	ELA 06	ELA 07	ELA 08	ELA 09	ELA 10	ELA 11	ELA 12	ELA 13	ELA 14	ELA 15	ELA 16	ELA 17	ELA 18	ELA 19	ELA 20	ELA 21	ELA 22	ELA 23	ELA 24	ELA 25	ELA 26	ELA 27	ELA 28	ELA 29	ELA 30	ELA 31	ELA 32	ELA 33	ELA 34	ELA 35	ELA 36	ELA 37	ELA 38	ELA 39	ELA 40	ELA 41
Psammomoya grandiflora																																				1					
Ptilotus drummondii					1																																				
Ptilotus exaltatus	1																																								
Ptilotus helipteroides																																									
Ptilotus obovatus	1				1		1				1			1	1	1	1								1						1	1	1		1						
Rhagodia drummondii	1		1		1	1	1								1		1		1						1							1									
Rhagodia sp. Watheroo (R.J. Cranfield & P.J. Spencer 8183)																																									
Rhyncharrhena linearis																																									
Rulingia kempeana																																									
Rulingia luteiflora																																									
Santalum acuminatum			1																								1												1	
Santalum spicatum																																	1								
Scaevola spinescens					1																									1	1	1							1	
Sclerolaena cuneata																																									
Sclerolaena eriacantha																																									
Sclerolaena fusiformis	1		1																1						1																
Sclerolaena gardneri																																									
Senna artemisioides subsp. *artemisioides*																																									
Senna artemisioides subsp. *filifolia*	1	1	1		1	1	1				1		1						1						1																
Senna charlesiana																																1	1								
Senna glutinosa subsp. *chatelainiana*																																									
Senna glutinosa subsp. x *luerssenii*																																									

Species	ELA 01	ELA 02	ELA 03	ELA 04	ELA 05	ELA 06	ELA 07	ELA 08	ELA 09	ELA 10	ELA 11	ELA 12	ELA 13	ELA 14	ELA 15	ELA 16	ELA 17	ELA 18	ELA 19	ELA 20	ELA 21	ELA 22	ELA 23	ELA 24	ELA 25	ELA 26	ELA 27	ELA 28	ELA 29	ELA 30	ELA 31	ELA 32	ELA 33	ELA 34	ELA 35	ELA 36	ELA 37	ELA 38	ELA 39	ELA 40	ELA 41
Senna sp. Austin (A. Strid 20210)																																									
Senna stowardii																			1						1																
Sida atrovirens																																									
Sida chrysocalyx																																									
Sida excedentifolia (ms)																																									
Sida sp. dark green fruits (S. van Leeuwen 2260)					1																								1		1									
Sida sp. Golden calyces glabrous (H.N. Foote 32)																1							1																		
Solanum cleistogamum																1														1											
Solanum ellipticum																																									
Solanum lasiophyllum																																		1							
Solanum nummularium			1																																						
Stylidium confluens																																									
Thryptomene costata																																									
Thryptomene cuspidata																					1																				
Triodia scariosa																																									
Westringia sp. Mt Gibson Retrorse Leaves (G Cockerton & J Warden WB37992)																																		1		1					
Xanthosia		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1											

Appendix E Quadrat data

* U = upper stratum, M = middle stratum, L = lower stratum

Site number	Date	Site type	Observer
ELA01	27/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Plain	Clay/sand	516521	6724482
Condition	Disturbance	Fire	Geology
Excellent	Nil	Old (>20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Eucalyptus loxophleba subsp. *supralaevis*	20	U	Trees 10 - 30 m
Acacia anthochaera	10	M	Shrubs over 2 m
Acacia andrewsii	1	M	Shrubs 1 - 2 m
Acacia tetragonophylla	1	M	Shrubs 1 - 2 m
Senna artemisioides subsp. filifolia	0.5	M	Shrubs 1 - 2 m
Alyxia buxifolia	0.25	M	Shrubs 1 - 2 m
Exocarpos aphyllus	0.1	M	Shrubs 1 - 2 m
Grevillea hakeoides subsp. *stenophylla*	0.1	M	Shrubs 1 - 2 m
Eremophila granitica	0.5	M	Shrubs under 1 m
Hakea recurva	0.1	L	Shrubs under 1 m
Olearia humilis	0.1	L	Shrubs under 1 m
Olearia muelleri	0.1	L	Shrubs under 1 m
Olearia pimeleoides	0.1	L	Shrubs under 1 m
Ptilotus obovatus	0.1	L	Shrubs under 1 m
Rhagodia drummondii	0.1	L	Shrubs under 1 m
Austrostipa elegantissima	0.1	L	Grasses, Sedges, Herbs
Cephalipterum drummondii	0.1	L	Grasses, Sedges, Herbs
Erodium cygnorum	0.1	L	Grasses, Sedges, Herbs
Maireana carnosa	0.1	L	Grasses, Sedges, Herbs
Maireana georgei	0.1	L	Grasses, Sedges, Herbs

Species	Cover (%)	Stratum*	Sub-Stratum
Ptilotus nobilis	0.1	L	Grasses, Sedges, Herbs
Sclerolaena fusiformis	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs
Xanthosia kochii	0.1	L	Grasses, Sedges, Herbs
Zygophyllum eremaeum	0.1	L	Grasses, Sedges, Herbs
Cassytha sp	0.1		Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA02	27/20/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Plain	Clay/sand	516798	6724285
Condition	Disturbance	Fire	Geology
Excellent	Rabbits	Old (>20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Callitris columellaris	1	U	Trees under 10 m
Eucalyptus horistes	2	U	Trees under 10 m
Acacia anthochaera	1	M	Shrubs over 2 m
Acacia assimilis subsp. *assimilis*	0.5	M	Shrubs over 2 m
Acacia ramulosa var. *ramulosa*	10	M	Shrubs over 2 m
Melaleuca hamata	5	M	Shrubs over 2 m
Acacia ?heteroneura	0.1	M	Shrubs 1 - 2 m
Acacia tetragonophylla	0.5	M	Shrubs 1 - 2 m
Hakea recurva	0.1	M	Shrubs 1 - 2 m
Senna artemisioides subsp. *filifolia*	0.5	M	Shrubs 1 - 2 m
Eremophila granitica	0.75	M	Shrubs under 1 m
Eremophila latrobei subsp. *latrobei*	0.5	M	Shrubs under 1 m
Olearia humilis	0.1	M	Shrubs under 1 m
Prostanthera patens	0.1	M	Shrubs under 1 m
Maireana georgei	0.5	L	Shrubs under 1 m
Angianthus tomentosus	0.1	L	Grasses, Sedges, Herbs
Austrostipa elegantissima	0.1	L	Grasses, Sedges, Herbs
Cephalipterum drummondii	0.1	L	Grasses, Sedges, Herbs
Erodium cygnorum	0.1	L	Grasses, Sedges, Herbs
Monachather paradoxus	0.1	L	Grasses, Sedges, Herbs

Species	Cover (%)	Stratum*	Sub-Stratum
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs
Xanthosia kochii	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA03	27/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Plain	Clay	517177	6724128
Condition	Disturbance	Fire	Geology
Excellent	Rabbits	Old (>20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Eucalyptus loxophleba subsp. *supralaevis*	10	U	Trees 10 - 30 m
Exocarpos aphyllus	3	M	Shrubs over 2 m
Santalum acuminata	0.25	M	Shrubs over 2 m
Acacia assimilis subsp. *assimilis*	20	M	Shrubs 1 - 2 m
Acacia andrewsii	10	M	Shrubs 1 - 2 m
Senna artemisioides subsp. *filifolia*	1	M	Shrubs 1 - 2 m
Callitris columellaris	0.5	M	Shrubs 1 - 2 m
Eremophila granitica	0.25	L	Shrubs under 1 m
Enchylaena tomentosa	0.1	L	Shrubs under 1 m
Hakea recurva	0.1	L	Shrubs under 1 m
Maireana georgei	0.1	L	Shrubs under 1 m
Olearia humilis	0.1	L	Shrubs under 1 m
Olearia muelleri	0.1	L	Shrubs under 1 m
Ptilotus nobilis	0.1	L	Shrubs under 1 m
Rhagodia drummondii	0.1	L	Shrubs under 1 m
Solanum nummularium	0.1	L	Shrubs under 1 m
**Pentameris airoides*	0.1	L	Grasses, Sedges, Herbs
Angianthus tomentosus	0.1	L	Grasses, Sedges, Herbs
Austrostipa elegantissima	0.1	L	Grasses, Sedges, Herbs
Calandrinia translucens	0.1	L	Grasses, Sedges, Herbs

Species	Cover (%)	Stratum*	Sub-Stratum
Calocephalus multiflorus	0.1	L	Grasses, Sedges, Herbs
Cephalipterum drummondii	0.1	L	Grasses, Sedges, Herbs
Cheilanthes adiantoides	0.1	L	Grasses, Sedges, Herbs
Chthonocephalus pseudevax	0.1	L	Grasses, Sedges, Herbs
Crassula colorata var. *colorata*	0.1	L	Grasses, Sedges, Herbs
Dianella revoluta	0.1	L	Grasses, Sedges, Herbs
Erodium cygnorum	0.1	L	Grasses, Sedges, Herbs
Maireana carnosa	0.1	L	Grasses, Sedges, Herbs
Rhodanthe laevis	0.1	L	Grasses, Sedges, Herbs
Sclerolaena fusiformis	0.1	L	Grasses, Sedges, Herbs
Stenopetalum filifolium	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs
Xanthosia kochii	0.1	L	Grasses, Sedges, Herbs
Zygophyllum eremaeum	0.1	L	Grasses, Sedges, Herbs
Cassytha sp.	0.1	-	Grasses, Sedges, Herbs
Lysiana casuarinae	0.1	-	Aerial shrub

Site number	Date	Site type	Observer
ELA04	27/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Low hillslope	Clay	517784	6724469
Condition	Disturbance	Fire	Geology
Excellent	Nil	Old (>20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Eucalyptus synandra (T)	5	U	Trees under 10 m
Acacia ramulosa var. *ramulosa*	30	M	Shrubs over 2 m
Allocasuarina acutivalvis subsp. *acutivalvis*	5	M	Shrubs over 2 m
Melaleuca leiocarpa	5	M	Shrubs over 2 m
Callitris columellaris	3	M	Shrubs over 2 m
Alyxia buxifolia	0.5	M	Shrubs over 2 m
Leucopogon sp. Clyde Hill (M.A. Burgman 1207)	0.1	M	Shrubs under 1 m
Philotheca nutans (P1)	0.1	M	Shrubs under 1 m
Olearia humilis	0.1	L	Shrubs under 1 m
Philotheca brucei subsp. *brucei*	0.1	L	Shrubs under 1 m
Prostanthera prostantheroides	0.1	L	Shrubs under 1 m
Amphipogon caricinus var. *caricinus*	0.1	L	Grasses, Sedges, Herbs
Brunonia sp. Goldfields (K.R. Newbey 6044)	0.1	L	Grasses, Sedges, Herbs
Calandrinia sp.	0.1	L	Grasses, Sedges, Herbs
Cheilanthes adiantoides	0.1	L	Grasses, Sedges, Herbs
Gilberta tenuifolia	0.1	L	Grasses, Sedges, Herbs
Monachather paradoxus	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs
Xanthosia kochii	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA05	27/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Plain	Clay	518180	6724557
Condition	Disturbance	Fire	Geology
Excellent	Nil	Old (>20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Eucalyptus loxophleba subsp. *supralaevis*	25	U	Trees 10 - 30 m
Eucalyptus horistes	1	U	Trees 10 - 30 m
Acacia ramulosa var. *ramulosa*	10	M	Shrubs over 2 m
Callitris columellaris	5	M	Shrubs over 2 m
Acacia andrewsii	5	M	Shrubs 1 - 2 m
Eremophila latrobei subsp. *latrobei*	2	M	Shrubs 1 - 2 m
Acacia tetragonophylla	1	M	Shrubs 1 - 2 m
Eremophila granitica	0.25	M	Shrubs 1 - 2 m
Alyxia buxifolia	0.1	M	Shrubs 1 - 2 m
Maireana georgei	0.1	M	Shrubs 1 - 2 m
Grevillea paradoxa	0.1	M	Shrubs under 1 m
Keraudrenia velutina subsp. *velutina*	0.1	M	Shrubs under 1 m
Leucopogon sp. Clyde Hill (M.A. Burgman 1207)	0.1	M	Shrubs under 1 m
Olearia humilis	0.1	M	Shrubs under 1 m
Olearia pimeleoides	0.1	M	Shrubs under 1 m
Philotheca nutans (P1)	0.1	M	Shrubs under 1 m
Rhagodia drummondii	0.1	M	Shrubs under 1 m
Scaevola spinescens	0.1	M	Shrubs under 1 m
Senna artemisioides subsp. *filifolia*	0.1	M	Shrubs under 1 m

Species	Cover (%)	Stratum*	Sub-Stratum
Sida sp. dark green fruits (S. van Leeuwen 2260)	0.1	M	Shrubs under 1 m
Waitzia nitida	0.25	L	Grasses, Sedges, Herbs
Amphipogon caricinus var. *caricinus*	0.1	L	Grasses, Sedges, Herbs
Austrostipa elegantissima	0.1	L	Grasses, Sedges, Herbs
Calandrinia eremaea	0.1	L	Grasses, Sedges, Herbs
Gilberta tenuifolia	0.1	L	Grasses, Sedges, Herbs
Lawrencella rosea	0.1	L	Grasses, Sedges, Herbs
Ptilotus drummondii	0.1	L	Grasses, Sedges, Herbs
Ptilotus obovatus	0.1	L	Grasses, Sedges, Herbs
Stenopetalum filifolium	0.1	L	Grasses, Sedges, Herbs
Xanthosia kochii	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA06	28/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Plain/foot slope	Clay	518594	6724986
Condition	Disturbance	Fire	Geology
Excellent	Nil	Old (>20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Callitris columellaris	15	U	Trees 10 - 30 m
Acacia ramulosa var. *ramulosa*	10	M	Shrubs over 2 m
Acacia anthochaera	0.5	M	Shrubs over 2 m
Callitris columellaris	3	M	Shrubs 1 - 2 m
Acacia tetragonophylla	2	M	Shrubs 1 - 2 m
Philotheca brucei subsp. *brucei*	2	M	Shrubs 1 - 2 m
Melaleuca eleuterostachya	1	M	Shrubs 1 - 2 m
Acacia andrewsii	0.5	M	Shrubs 1 - 2 m
Eremophila clarkei	0.25	M	Shrubs 1 - 2 m
Acacia acuaria	0.1	M	Shrubs 1 - 2 m
Alyxia buxifolia	0.1	M	Shrubs 1 - 2 m
Hakea recurva	0.1	M	Shrubs 1 - 2 m
Leucopogon sp. Clyde Hill (M.A. Burgman 1207)	0.1	M	Shrubs 1 - 2 m
Maireana georgei	0.1	M	Shrubs under 1 m
Olearia pimeleoides	0.1	M	Shrubs under 1 m
Rhagodia drummondii	0.1	M	Shrubs under 1 m
Senna artemisioides subsp. *filifolia*	0.1	M	Shrubs under 1 m
Xanthosia kochii	0.1	M	Shrubs under 1 m
Angianthus tomentosus	0.1	L	Grasses, Sedges, Herbs
Austrostipa elegantissima	0.1	L	Grasses, Sedges, Herbs

Species	Cover (%)	Stratum*	Sub-Stratum
Cheilanthes adiantoides	0.1	L	Grasses, Sedges, Herbs
Erodium cygnorum	0.1	L	Grasses, Sedges, Herbs
Lawrencella rosea	0.1	L	Grasses, Sedges, Herbs
Stenopetalum filifolium	0.1	L	Grasses, Sedges, Herbs
Wahlenbergia gracilenta	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs
Cassytha sp.	0.1	-	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA07	28/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Plain	Clay	518945	6724975
Condition	Disturbance	Fire	Geology
Very good	Vehicle tracks	Old (>20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Eucalyptus loxophleba subsp. *supralaevis*	25	U	Trees 10 - 30 m
Exocarpos aphyllus	5	M	Shrubs 1 - 2 m
Acacia andrewsii	3	M	Shrubs 1 - 2 m
Senna artemisioides subsp. *filifolia*	3	M	Shrubs 1 - 2 m
Acacia assimilis	2	M	Shrubs 1 - 2 m
Acacia tetragonophylla	2	M	Shrubs 1 - 2 m
Templetonia smithiana	0.25	M	Shrubs 1 - 2 m
Acacia exocarpoides	0.1	M	Shrubs 1 - 2 m
Enchylaena tomentosa	0.1	M	Shrubs 1 - 2 m
Eremophila caperata	0.1	M	Shrubs 1 - 2 m
Pimelea microcephala	0.1	M	Shrubs 1 - 2 m
Maireana triptera	3	M	Shrubs under 1 m
Atriplex bunburyana	2	M	Shrubs under 1 m
Maireana georgei	0.25	M	Shrubs under 1 m
Rhagodia drummondii	0.25	M	Shrubs under 1 m
Enchylaena tomentosa	0.1	M	Shrubs under 1 m
Eremophila granitica	0.1	M	Shrubs under 1 m
Hakea recurva	0.1	M	Shrubs under 1 m
Olearia pimeleoides	0.1	M	Shrubs under 1 m
Ptilotus obovatus	0.25	L	Grasses, Sedges, Herbs

Species	Cover (%)	Stratum*	Sub-Stratum
**Bromus rubens*	0.1	L	Grasses, Sedges, Herbs
**Rostraria pumila*	0.1	L	Grasses, Sedges, Herbs
**Ursinia anthemoides* subsp. *anthemoides*	0.1	L	Grasses, Sedges, Herbs
Cephalipterum drummondii	0.1	L	Grasses, Sedges, Herbs
Crassula colorata var. *colorata*	0.1	L	Grasses, Sedges, Herbs
Frankenia pauciflora	0.1	L	Grasses, Sedges, Herbs
Maireana georgei	0.1	L	Grasses, Sedges, Herbs
Poaceae sp.	0.1	L	Grasses, Sedges, Herbs
Ptilotus nobilis	0.1	L	Grasses, Sedges, Herbs
Sclerolaena fusiformis	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs
Xanthosia kochii	0.1	L	Grasses, Sedges, Herbs
Zygophyllum eremaeum	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA08	28/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Foot slope	Clay	518662	6725540
Condition	Disturbance	Fire	Geology
Excellent	Nil	Moderate (10-20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Acacia assimilis subsp. *assimilis*	10	M	Shrubs 1 - 2 m
Allocasuarina acutivalvis subsp. *acutivalvis*	10	M	Shrubs 1 - 2 m
Grevillea nematophylla subsp. *supraplana*	5	M	Shrubs 1 - 2 m
Grevillea paradoxa	5	M	Shrubs 1 - 2 m
Acacia acuminata	0.25	M	Shrubs 1 - 2 m
Acacia sibirica	0.25	M	Shrubs 1 - 2 m
Leptosema aphyllum	0.25	M	Shrubs 1 - 2 m
Alyogyne hakeifolia	0.1	M	Shrubs 1 - 2 m
Dodonaea adenophora	0.1	M	Shrubs under 1 m
Hibbertia glomerosa var. *glomerosa*	0.1	M	Shrubs under 1 m
Calandrinia translucens	0.1	L	Grasses, Sedges, Herbs
Cheilanthes adiantoides	0.1	L	Grasses, Sedges, Herbs
Erodium cygnorum	0.1	L	Grasses, Sedges, Herbs
Podolepis lessonii	0.1	L	Grasses, Sedges, Herbs
Thysanotus sp.	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs
Xanthosia kochii	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA09	28/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Mid slope	Skeletal clay	518960	6725419
Condition	Disturbance	Fire	Geology
Excellent	Nil	Moderate (10-20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Acacia neurophylla subsp. *erugata*	30	M	Shrubs 1 - 2 m
Acacia assimilis subsp. *assimilis*	3	M	Shrubs 1 - 2 m
Grevillea nematophylla subsp. *supraplana*	1	M	Shrubs 1 - 2 m
Grevillea paradoxa	1	M	Shrubs 1 - 2 m
Acacia acuminata	0.25	M	Shrubs 1 - 2 m
Allocasuarina acutivalvis subsp. *acutivalvis*	0.25	M	Shrubs 1 - 2 m
Alyogyne hakeifolia	0.1	M	Shrubs 1 - 2 m
Dodonaea adenophora	0.1	M	Shrubs 1 - 2 m
Leptosema aphyllum	0.1	M	Shrubs 1 - 2 m
Melaleuca fabri	0.1	M	Shrubs 1 - 2 m
Cassytha ?flava	0.1	L	Grasses, Sedges, Herbs
Podolepis lessonii	0.1	L	Grasses, Sedges, Herbs
Rhodanthe laevis	0.1	L	Grasses, Sedges, Herbs
Stenopetalum filifolium	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs
Xanthosia kochii	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA10	28/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Foot slope	Clay	519033	6725229
Condition	Disturbance	Fire	Geology
Excellent	Nil	Old (>20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Melaleuca hamata	30	U	Shrubs over 2 m
Acacia ramulosa var. *ramulosa*	25	U	Shrubs over 2 m
Hakea minyma	0.1	M	Shrubs 1 - 2 m
Enekbatus ?stowardii	0.5	M	Shrubs under 1 m
Waitzia nitida	5	L	Grasses, Sedges, Herbs
Cheilanthes adiantoides	0.1	L	Grasses, Sedges, Herbs
Lawrencella rosea	0.1	L	Grasses, Sedges, Herbs
Thysanotus sp.	0.1	L	Grasses, Sedges, Herbs
Xanthosia kochii	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA11	28/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Plain	Clay	519580	6725604
Condition	Disturbance	Fire	Geology
Very Good	Old tracks	Old (>20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Acacia ramulosa var. *ramulosa*	10	U	Shrubs over 2 m
Callitris columellaris	10	U	Shrubs over 2 m
Hakea recurva	1	M	Shrubs over 2 m
Acacia assimilis subsp. *assimilis*	2	M	Shrubs 1 - 2 m
Acacia tetragonophylla	2	M	Shrubs 1 - 2 m
Acacia andrewsii	1	M	Shrubs 1 - 2 m
Acacia anthochaera	1	M	Shrubs 1 - 2 m
Eremophila latrobei subsp. *latrobei*	1	M	Shrubs 1 - 2 m
Senna artemisioides subsp. *filifolia*	0.1	M	Shrubs 1 - 2 m
Eremophila granitica	0.1	M	Shrubs under 1 m
Olearia humilis	0.1	M	Shrubs under 1 m
Ptilotus obovatus	0.1	M	Shrubs under 1 m
Amphipogon caricinus var. *caricinus*	0.1	L	Grasses, Sedges, Herbs
Austrostipa elegantissima	0.1	L	Grasses, Sedges, Herbs
Calandrinia translucens	0.1	L	Grasses, Sedges, Herbs
Cheilanthes adiantoides	0.1	L	Grasses, Sedges, Herbs
Erodium cygnorum	0.1	L	Grasses, Sedges, Herbs
Gilberta tenuifolia	0.1	L	Grasses, Sedges, Herbs
Thysanotus sp	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs

Species	Cover (%)	Stratum*	Sub-Stratum
Xanthosia kochii	0.1	L	Grasses, Sedges, Herbs
Cassytha sp.	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA12	28/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Mid slope	Skeletal clay	519113	6725828
Condition	Disturbance	Fire	Geology
Excellent	Nil	Old (>20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Acacia incurvaneura	10	U	Shrubs over 2 m
melaleuca nematophylla	5	U	Shrubs over 2 m
Acacia ramulosa var. *ramulosa*	3	M	Shrubs over 2 m
Allocasuarina acutivalvis subsp. *acutivalvis*	5	M	Shrubs 1 - 2 m
Aluta aspera subsp. *hesperia*	5	M	Shrubs 1 - 2 m
Calycopeplus paucifolius	1	M	Shrubs 1 - 2 m
Philotheca sericea	1	M	Shrubs 1 - 2 m
Grevillea nematophylla subsp. *supraplana*	0.75	M	Shrubs 1 - 2 m
Phebalium megaphyllum	0.25	M	Shrubs 1 - 2 m
Eremophila clarkei	0.25	M	Shrubs under 1 m
Calandrinia translucens	0.1	L	Grasses, Sedges, Herbs
Cephalipterum drummondii	0.1	L	Grasses, Sedges, Herbs
Cheilanthes adiantoides	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs
Xanthosia kochii	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA13	28/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Foot slope	Clay	518835	6726150
Condition	Disturbance	Fire	Geology
Excellent	Rabbits	Old (>20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Eucalyptus leptopoda subsp. *arctata*	2	U	Trees under 10 m
Acacia ramulosa var. *ramulosa*	20	M	Shrubs over 2 m
Grevillea nematophylla subsp. *supraplana*	5	M	Shrubs over 2 m
Allocasuarina acutivalvis subsp. *acutivalvis*	5	M	Shrubs 1 - 2 m
Melaleuca fabri	3	M	Shrubs 1 - 2 m
Acacia andrewsii	2	M	Shrubs 1 - 2 m
Acacia assimilis subsp. *assimilis*	1	M	Shrubs 1 - 2 m
Melaleuca hamata	1	M	Shrubs 1 - 2 m
Philotheca brucei subsp. *brucei*	0.5	M	Shrubs 1 - 2 m
Senna artemisioides subsp. *filifolia*	0.5	M	Shrubs 1 - 2 m
Acacia exocarpoides	0.1	M	Shrubs 1 - 2 m
Acacia neurophylla subsp. *erugata*	0.1	M	Shrubs 1 - 2 m
Aluta aspera subsp. *hesperia*	1	M	Shrubs under 1 m
Enekbatus ?stowardii	0.1	M	Shrubs under 1 m
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs
Xanthosia kochii	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA14	29/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Hill crest	Skeletal clay	518556	6725780
Condition	Disturbance	Fire	Geology
Excellent	Nil	Old (>20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Calycopeplus paucifolius	15	M	Shrubs over 2 m
melaleuca nematophylla	15	M	Shrubs over 2 m
Allocasuarina acutivalvis subsp. *acutivalvis*	5	M	Shrubs over 2 m
Brachychiton gregorii	0.5	M	Shrubs over 2 m
Darwinia masonii (T)	2	M	Shrubs 1 - 2 m
Philotheca sericea	2	M	Shrubs 1 - 2 m
Acacia tetragonophylla	1	M	Shrubs 1 - 2 m
Aluta aspera subsp. *hesperia*	0.5	M	Shrubs 1 - 2 m
Hibbertia hypericoides	0.5	M	Shrubs 1 - 2 m
Melaleuca ?refulgens	0.5	M	Shrubs 1 - 2 m
Phebalium megaphyllum	0.5	M	Shrubs 1 - 2 m
Acacia cerastes (P1)	0.25	M	Shrubs 1 - 2 m
Eremophila clarkei	0.25	M	Shrubs 1 - 2 m
Grevillea nematophylla subsp. *supraplana*	0.25	M	Shrubs 1 - 2 m
Mirbelia sp. Bursarioides (T.R. Lally 760)	0.25	M	Shrubs 1 - 2 m
Prostanthera magnifica	0.25	M	Shrubs 1 - 2 m
Grevillea paradoxa	0.1	M	Shrubs 1 - 2 m
Ptilotus obovatus	0.5	M	Shrubs under 1 m
**Pentameris airoides*	0.1	L	Grasses, Sedges, Herbs
**Ursinia anthemoides* subsp. *anthemoides*	0.1	L	Grasses, Sedges, Herbs

Species	Cover (%)	Stratum*	Sub-Stratum
Calandrinia sp.	0.1	L	Grasses, Sedges, Herbs
Calandrinia translucens	0.1	L	Grasses, Sedges, Herbs
Cassytha sp.	0.1	L	Grasses, Sedges, Herbs
Cheilanthes adiantoides	0.1	L	Grasses, Sedges, Herbs
Podolepis lessonii	0.1	L	Grasses, Sedges, Herbs
Rhodanthe laevis	0.1	L	Grasses, Sedges, Herbs
Wahlenbergia gracilenta	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs
Xanthosia kochii	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA15	29/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Hill crest	Clay	518734	6725760
Condition	Disturbance	Fire	Geology
Excellent	Nil	Old (>20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Acacia incurvaneura	2	U	Shrubs over 2 m
Calycopeplus paucifolius	20	M	Shrubs over 2 m
Hakea recurva	5	M	Shrubs over 2 m
Phebalium megaphyllum	3	M	Shrubs 1 - 2 m
Acacia tetragonophylla	2	M	Shrubs 1 - 2 m
Philotheca brucei subsp. *brucei*	2	M	Shrubs 1 - 2 m
Philotheca sericea	2	M	Shrubs 1 - 2 m
Rhagodia drummondii	2	M	Shrubs 1 - 2 m
Acacia andrewsii	1	M	Shrubs 1 - 2 m
Acacia exocarpoides	1	M	Shrubs 1 - 2 m
Darwinia masonii (T)	1	M	Shrubs 1 - 2 m
Eremophila clarkei	1	M	Shrubs 1 - 2 m
melaleuca nematophylla	1	M	Shrubs 1 - 2 m
Grevillea paradoxa	0.25	M	Shrubs 1 - 2 m
Ptilotus obovatus	20	M	Shrubs under 1 m
**Pentameris airoides*	0.1	L	Grasses, Sedges, Herbs
**Sisymbrium erysimoides*	0.1	L	Grasses, Sedges, Herbs
Aristida contorta	0.1	L	Grasses, Sedges, Herbs
Brunonia sp. Goldfields (K.R. Newbey 6044)	0.1	L	Grasses, Sedges, Herbs
Calandrinia sp.	0.1	L	Grasses, Sedges, Herbs

Species	Cover (%)	Stratum*	Sub-Stratum
Calandrinia translucens	0.1	L	Grasses, Sedges, Herbs
Cassytha nodiflora	0.1	L	Grasses, Sedges, Herbs
Cheilanthes adiantoides	0.1	L	Grasses, Sedges, Herbs
Crassula colorata var. *colorata*	0.1	L	Grasses, Sedges, Herbs
Erodium cygnorum	0.1	L	Grasses, Sedges, Herbs
Lepidium oxytrichum	0.1	L	Grasses, Sedges, Herbs
Podolepis lessonii	0.1	L	Grasses, Sedges, Herbs
Rhodanthe battii	0.1	L	Grasses, Sedges, Herbs
Xanthosia kochii	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA16	29/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Mid slope	Skeletal clay	518954	6725780
Condition	Disturbance	Fire	Geology
Excellent	Nil	Old (>20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Acacia incurvaneura	1	U	Shrubs over 2 m
Calycopeplus paucifolius	10	M	Shrubs 1 - 2 m
melaleuca nematophylla	5	M	Shrubs 1 - 2 m
Philotheca sericea	5	M	Shrubs 1 - 2 m
Allocasuarina acutivalvis subsp. *acutivalvis*	2	M	Shrubs 1 - 2 m
Aluta aspera subsp. hesperia	2	M	Shrubs 1 - 2 m
Acacia assimilis subsp. *assimilis*	1	M	Shrubs 1 - 2 m
Acacia exocarpoides	1	M	Shrubs 1 - 2 m
Eremophila clarkei	1	M	Shrubs 1 - 2 m
Grevillea nematophylla subsp. *supraplana*	1	M	Shrubs 1 - 2 m
Phebalium megaphyllum	1	M	Shrubs 1 - 2 m
Micromyrtus racemosa	0.5	M	Shrubs 1 - 2 m
Mirbelia sp. Bursarioides (T.R. Lally 760)	0.5	M	Shrubs 1 - 2 m
Ptilotus obovatus	0.5	M	Shrubs under 1 m
Solanum cleistogamum	0.1	M	Shrubs under 1 m
Calandrinia translucens	0.1	L	Grasses, Sedges, Herbs
Cephalipterum drummondii	0.1	L	Grasses, Sedges, Herbs
Erodium cygnorum	0.1	L	Grasses, Sedges, Herbs
Euphorbia boophthona	0.1	L	Grasses, Sedges, Herbs
Lawrencella rosea	0.1	L	Grasses, Sedges, Herbs

Rhodanthe battii	0.1	L	Grasses, Sedges, Herbs
Species	Cover (%)	Stratum*	Sub-Stratum
Sida sp. Golden calyces glabrous (H.N. Foote 32)	0.1	L	Grasses, Sedges, Herbs
Wahlenbergia gracilenta	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs
Xanthosia kochii	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA17	29/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Hill crest	Skeletal clay	519093	6725560
Condition	Disturbance	Fire	Geology
Very Good	Nil	Old (>20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Acacia acuminata	0.5	U	Shrubs over 2 m
Melaleuca ?refulgens	1	M	Shrubs over 2 m
Calycopeplus paucifolius	10	M	Shrubs 1 - 2 m
Acacia tetragonophylla	1	M	Shrubs 1 - 2 m
Exocarpos aphyllus	1	M	Shrubs 1 - 2 m
Rhagodia drummondii	1	M	Shrubs 1 - 2 m
Acacia exocarpoides	0.5	M	Shrubs 1 - 2 m
Dodonaea inaequifolia	0.5	M	Shrubs 1 - 2 m
Ptilotus obovatus	30	M	Shrubs under 1 m
Enchylaena lanata	0.1	L	Shrubs under 1 m
**Bromus rubens*	0.1	L	Grasses, Sedges, Herbs
**Pentameris airoides*	0.1	L	Grasses, Sedges, Herbs
**Sisymbrium erysimoides*	0.1	L	Grasses, Sedges, Herbs
**Urospermum picroides*	0.1	L	Grasses, Sedges, Herbs
Austrostipa elegantissima	0.1	L	Grasses, Sedges, Herbs
Brachyscome ciliaris	0.1	L	Grasses, Sedges, Herbs
Cheilanthes adiantoides	0.1	L	Grasses, Sedges, Herbs
Crassula colorata var. *colorata*	0.1	L	Grasses, Sedges, Herbs
Erodium cygnorum	0.1	L	Grasses, Sedges, Herbs
Lepidium oxytrichum	0.1	L	Grasses, Sedges, Herbs

Species	Cover (%)	Stratum*	Sub-Stratum
Lobelia sp.	0.1	L	Grasses, Sedges, Herbs
Poaceae sp.	0.1	L	Grasses, Sedges, Herbs
Podolepis lessonii	0.1	L	Grasses, Sedges, Herbs
Xanthosia kochii	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA18	29/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Foot slope	Clay	519268	6725371
Condition	Disturbance	Fire	Geology
Excellent	Nil	Old (>20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Eucalyptus horistes	20	U	Trees 10 - 30 m
Allocasuarina acutivalvis subsp. *acutivalvis*	40	M	Shrubs over 2 m
Acacia ramulosa var. *ramulosa*	5	M	Shrubs over 2 m
Melaleuca nematophylla	5	M	Shrubs over 2 m
Micromyrtus racemosa	3	M	Shrubs 1 - 2 m
Grevillea nematophylla subsp. *supraplana*	2	M	Shrubs 1 - 2 m
Aluta aspera subsp. *hesperia*	1	M	Shrubs 1 - 2 m
Grevillea paradoxa	0.5	M	Shrubs under 1 m
Hemigenia ciliata	0.1	M	Shrubs under 1 m
Cheilanthes adiantoides	0.1	L	Grasses, Sedges, Herbs
Dianella revoluta	0.1	L	Grasses, Sedges, Herbs
Lawrencella rosea	0.1	L	Grasses, Sedges, Herbs
Lepidosperma gibsonii (T)	0.1	L	Grasses, Sedges, Herbs
Podolepis lessonii	0.1	L	Grasses, Sedges, Herbs
Thysanotus sp	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs
Xanthosia kochii	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA19	29/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Plain	Clay	519209	6726143
Condition	Disturbance	Fire	Geology
Very Good	Old tracks	Old (>20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Acacia burkittii	10	M	Shrubs over 2 m
Acacia obtecta	5	M	Shrubs 1 - 2 m
Senna stowardii	4	M	Shrubs 1 - 2 m
Acacia tetragonophylla	1	M	Shrubs 1 - 2 m
Exocarpos aphyllus	1	M	Shrubs 1 - 2 m
Hakea recurva	0.75	M	Shrubs 1 - 2 m
Acacia sp.	0.25	M	Shrubs 1 - 2 m
Atriplex bunburyana	0.25	M	Shrubs 1 - 2 m
Senna artemisioides subsp. *filifolia*	0.1	M	Shrubs 1 - 2 m
Maireana georgei	0.75	M	Shrubs under 1 m
Eremophila granitica	0.25	M	Shrubs under 1 m
Eremophila latrobei subsp. *latrobei*	0.25	M	Shrubs under 1 m
Olearia muelleri	0.25	M	Shrubs under 1 m
Olearia humilis	0.1	M	Shrubs under 1 m
Olearia pimeleoides	0.1	M	Shrubs under 1 m
Ptilotus nobilis	0.1	M	Shrubs under 1 m
Rhagodia drummondii	0.25	M	Grasses, Sedges, Herbs
Maireana triptera	0.1	M	Grasses, Sedges, Herbs
Angianthus tomentosus	0.1	L	Grasses, Sedges, Herbs
Austrostipa elegantissima	0.1	L	Grasses, Sedges, Herbs

Species	Cover (%)	Stratum*	Sub-Stratum
Cephalipterum drummondii	0.1	L	Grasses, Sedges, Herbs
Erodium cygnorum	0.1	L	Grasses, Sedges, Herbs
Lawrencella rosea	0.1	L	Grasses, Sedges, Herbs
Maireana carnosa	0.1	L	Grasses, Sedges, Herbs
Maireana georgei	0.1	L	Grasses, Sedges, Herbs
Poaceae sp.	0.1	L	Grasses, Sedges, Herbs
Sclerolaena fusiformis	0.1	L	Grasses, Sedges, Herbs
Stenopetalum filifolium	0.1	L	Grasses, Sedges, Herbs
Wahlenbergia gracilenta	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs
Xanthosia kochii	0.1	L	Grasses, Sedges, Herbs
Cassytha sp.	0.1		Grasses, Sedges, Herbs
Lysiana casuarinae	0.1		Aerial shrub

Site number	Date	Site type	Observer
ELA20	29/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Mid slope	Clay	518342	6726284
Condition	Disturbance	Fire	Geology
Excellent	Nil	Old (>20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Allocasuarina acutivalvis subsp. *acutivalvis*	20	M	Shrubs over 2 m
melaleuca nematophylla	10	M	Shrubs over 2 m
Aluta aspera subsp. *hesperia*	3	M	Shrubs 1 - 2 m
Philotheca sericea	3	M	Shrubs 1 - 2 m
Acacia ramulosa var. *ramulosa*	1	M	Shrubs 1 - 2 m
Micromyrtus racemosa	1	M	Shrubs 1 - 2 m
Grevillea paradoxa	0.75	M	Shrubs 1 - 2 m
Grevillea nematophylla subsp. *supraplana*	0.5	M	Shrubs 1 - 2 m
Leucopogon sp. Clyde Hill (M.A. Burgman 1207)	0.5	M	Shrubs 1 - 2 m
Calandrinia translucens	0.1	L	Grasses, Sedges, Herbs
Cassytha nodiflora	0.1	L	Grasses, Sedges, Herbs
Cephalipterum drummondii	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs
Xanthosia kochii	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA21	29/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Low rise	Clay	519240	6724967
Condition	Disturbance	Fire	Geology
Excellent	Nil	Old (>20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Acacia ramulosa var. *ramulosa*	10	M	Shrubs over 2 m
Acacia effusifolia	5	M	Shrubs over 2 m
Aluta aspera subsp. *hesperia*	10	M	Shrubs 1 - 2 m
Grevillea nematophylla subsp. *supraplana*	1	M	Shrubs 1 - 2 m
Acacia assimilis subsp. *assimilis*	0.5	M	Shrubs 1 - 2 m
Mirbelia sp. Bursarioides (T.R. Lally 760)	0.1	M	Shrubs 1 - 2 m
Enekbatus ?stowardii	0.1	M	Shrubs under 1 m
Thryptomene cuspidata	0.1	M	Shrubs under 1 m
Grevillea paradoxa	0.1	L	Shrubs under 1 m
Prostanthera prostantheroides	0.1	L	Shrubs under 1 m
**Cuscuta planiflora*	0.1	L	Grasses, Sedges, Herbs
Calandrinia translucens	0.1	L	Grasses, Sedges, Herbs
Cephalipterum drummondii	0.1	L	Grasses, Sedges, Herbs
Cheilanthes adiantoides	0.1	L	Grasses, Sedges, Herbs
Drosera macrantha	0.1	L	Grasses, Sedges, Herbs
Gilberta tenuifolia	0.1	L	Grasses, Sedges, Herbs
Lawrencella rosea	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs
Xanthosia kochii	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA22	29/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Hill slope	Clay	519538	6724449
Condition	Disturbance	Fire	Geology
Excellent	Nil	Moderate (10-20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Allocasuarina acutivalvis subsp. *acutivalvis*	30	M	Shrubs 1 - 2 m
Acacia assimilis subsp. *assimilis*	15	M	Shrubs 1 - 2 m
melaleuca nematophylla	5	M	Shrubs 1 - 2 m
Grevillea nematophylla subsp. *supraplana*	3	M	Shrubs 1 - 2 m
Gastrolobium laytonii	1	M	Shrubs 1 - 2 m
Grevillea paradoxa	0.5	M	Shrubs 1 - 2 m
Micromyrtus racemosa	0.5	M	Shrubs 1 - 2 m
Acacia cerastes (P1)	0.1	M	Shrubs 1 - 2 m
Hemigenia ciliata	0.25	M	Shrubs under 1 m
**Ursinia anthemoides* subsp. *anthemoides*	0.1	L	Grasses, Sedges, Herbs
Calandrinia translucens	0.1	L	Grasses, Sedges, Herbs
Cassytha nodiflora	0.1	L	Grasses, Sedges, Herbs
Cheilanthes adiantoides	0.1	L	Grasses, Sedges, Herbs
Drosera macrantha	0.1	L	Grasses, Sedges, Herbs
Gilberta tenuifolia	0.1	L	Grasses, Sedges, Herbs
Lawrencella rosea	0.1	L	Grasses, Sedges, Herbs
Lawrencella rosea	0.1	L	Grasses, Sedges, Herbs
Rhodanthe laevis	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs
Xanthosia kochii	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA23	30/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Hill crest	Skeletal clay	520041	6724283
Condition	Disturbance	Fire	Geology
Excellent	Nil	Old (>20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Allocasuarina acutivalvis subsp. *acutivalvis*	20	M	Shrubs over 2 m
melaleuca nematophylla	10	M	Shrubs over 2 m
Calycopeplus paucifolius	5	M	Shrubs over 2 m
Eremophila clarkei	3	M	Shrubs 1 - 2 m
Acacia assimilis subsp. *assimilis*	2	M	Shrubs 1 - 2 m
Grevillea paradoxa	1	M	Shrubs 1 - 2 m
Mirbelia sp. Bursarioides (T.R. Lally 760)	1	M	Shrubs 1 - 2 m
Phebalium megaphyllum	1	M	Shrubs 1 - 2 m
Philotheca brucei subsp. *brucei*	1	M	Shrubs 1 - 2 m
Aluta aspera subsp. *hesperia*	0.5	M	Shrubs 1 - 2 m
Grevillea nematophylla subsp. *supraplana*	0.5	M	Shrubs 1 - 2 m
Micromyrtus racemosa	0.5	M	Shrubs 1 - 2 m
Leucopogon sp. Clyde Hill (M.A. Burgman 1207)	0.25	M	Shrubs under 1 m
Sida sp. Golden calyces glabrous (H.N. Foote 32)	0.1	M	Shrubs under 1 m
**Cuscuta planiflora*	0.1	L	Grasses, Sedges, Herbs
**Pentameris airoides*	0.1	L	Grasses, Sedges, Herbs
Calandrinia translucens	0.1	L	Grasses, Sedges, Herbs
Cassytha nodiflora	0.1	L	Grasses, Sedges, Herbs
Cheilanthes adiantoides	0.1	L	Grasses, Sedges, Herbs

Species	Cover (%)	Stratum*	Sub-Stratum
Lawrencella rosea	0.1	L	Grasses, Sedges, Herbs
Poaceae sp.	0.1	L	Grasses, Sedges, Herbs
Podolepis lessonii	0.1	L	Grasses, Sedges, Herbs
Rhodanthe laevis	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs
Xanthosia kochii	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA24	30/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Foot slope	Clay	520212	6724297
Condition	Disturbance	Fire	Geology
Excellent	Nil	Old (>20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Acacia effusifolia	15	M	Shrubs over 2 m
melaleuca nematophylla	10	M	Shrubs over 2 m
Grevillea nematophylla subsp. *supraplana*	3	M	Shrubs over 2 m
Allocasuarina acutivalvis subsp. *acutivalvis*	0.5	M	Shrubs over 2 m
Aluta aspera subsp. *hesperia*	10	M	Shrubs 1 - 2 m
Calycopeplus paucifolius	0.5	M	Shrubs 1 - 2 m
Phebalium megaphyllum	0.25	M	Shrubs 1 - 2 m
Prostanthera prostantheroides	0.1	L	Shrubs under 1 m
**Cuscuta planiflora*	0.1	L	Grasses, Sedges, Herbs
Calandrinia translucens	0.1	L	Grasses, Sedges, Herbs
Cheilanthes adiantoides	0.1	L	Grasses, Sedges, Herbs
Gilberta tenuifolia	0.1	L	Grasses, Sedges, Herbs
Lawrencella rosea	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs
Xanthosia kochii	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA25	30/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Plain	Clay	520317	6724782
Condition	Disturbance	Fire	Geology
Very Good	Tracks	Old (>20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Eucalyptus loxophleba subsp. *supralaevis*	25	U	Trees 10 - 30 m
Acacia tetragonophylla	5	M	Shrubs over 2 m
Acacia anthochaera	2	M	Shrubs over 2 m
Exocarpos aphyllus	1	M	Shrubs over 2 m
Acacia obtecta	0.5	M	Shrubs over 2 m
Acacia burkittii	0.25	M	Shrubs over 2 m
Callitris columellaris	0.25	M	Shrubs over 2 m
Senna artemisioides subsp. *filifolia*	1	M	Shrubs 1 - 2 m
Olearia muelleri	0.1	L	Shrubs under 1 m
Olearia pimeleoides	0.1	L	Shrubs under 1 m
Sclerolaena fusiformis	0.1	L	Shrubs under 1 m
Cephalipterum drummondii	0.5	L	Grasses, Sedges, Herbs
Aristida contorta	0.1	L	Grasses, Sedges, Herbs
Austrostipa elegantissima	0.1	L	Grasses, Sedges, Herbs
Brunonia sp. Goldfields (K.R. Newbey 6044)	0.1	L	Grasses, Sedges, Herbs
Calandrinia translucens	0.1	L	Grasses, Sedges, Herbs
Lysiana casuarinae	0.1	L	Grasses, Sedges, Herbs
Maireana georgei	0.1	L	Grasses, Sedges, Herbs
Maireana triptera	0.1	L	Grasses, Sedges, Herbs
Ptilotus nobilis	0.1	L	Grasses, Sedges, Herbs

Species	Cover (%)	Stratum*	Sub-Stratum
Ptilotus obovatus	0.1	L	Grasses, Sedges, Herbs
Rhagodia drummondii	0.1	L	Grasses, Sedges, Herbs
Stenopetalum filifolium	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs
Xanthosia kochii	0.1	L	Grasses, Sedges, Herbs
Zygophyllum eremaeum	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA26	30/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Plain / foot slope	Clay	519852	6725024
Condition	Disturbance	Fire	Geology
Very Good	Drilling, rabbits	Old (>20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Eucalyptus synandra (T)	1	U	Trees 10 - 30 m
Acacia ramulosa var. *ramulosa*	40	M	Shrubs over 2 m
Waitzia nitida	0.5	L	Grasses, Sedges, Herbs
**Pentameris airoides*	0.1	L	Grasses, Sedges, Herbs
Amphipogon caricinus var. *caricinus*	0.1	L	Grasses, Sedges, Herbs
Asteraceae sp.	0.1	L	Grasses, Sedges, Herbs
Calandrinia translucens	0.1	L	Grasses, Sedges, Herbs
Cephalipterum drummondii	0.1	L	Grasses, Sedges, Herbs
Cheilanthes adiantoides	0.1	L	Grasses, Sedges, Herbs
Gilberta tenuifolia	0.1	L	Grasses, Sedges, Herbs
Lawrencella rosea	0.1	L	Grasses, Sedges, Herbs
Xanthosia kochii	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA27	30/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Hill slope	Skeletal clay	518409	6725794
Condition	Disturbance	Fire	Geology
Excellent	Nil	Moderate (10-20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Alyogyne hakeifolia	0.1	M	Shrubs over 2 m
Acacia cerastes (P1)	30	M	Shrubs 1 - 2 m
Calycopeplus paucifolius	10	M	Shrubs 1 - 2 m
Allocasuarina acutivalvis subsp. *acutivalvis*	10	M	Shrubs 1 - 2 m
Melaleuca radula	5	M	Shrubs 1 - 2 m
melaleuca nematophylla	5	M	Shrubs 1 - 2 m
Grevillea nematophylla subsp. *supraplana*	5	M	Shrubs 1 - 2 m
Gastrolobium laytonii	5	M	Shrubs 1 - 2 m
Acacia assimilis subsp. *assimilis*	5	M	Shrubs 1 - 2 m
Dodonaea inaequifolia	3	M	Shrubs 1 - 2 m
Grevillea paradoxa	1	M	Shrubs 1 - 2 m
Calothamnus gilesii	1	M	Shrubs 1 - 2 m
Anthocercis anisantha subsp. *anisantha*	0.75	M	Shrubs 1 - 2 m
Hibbertia acerosa	0.25	M	Shrubs 1 - 2 m
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs
Wahlenbergia gracilenta	0.1	L	Grasses, Sedges, Herbs
Rhodanthe laevis	0.1	L	Grasses, Sedges, Herbs
Podolepis lessonii	0.1	L	Grasses, Sedges, Herbs
Lepidosperma gibsonii (T)	0.1	L	Grasses, Sedges, Herbs
Cheilanthes adiantoides	0.1	L	Grasses, Sedges, Herbs
**Pentameris airoides*	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA28	30/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Foot slope	Clay	518016	6725928
Condition	Disturbance	Fire	Geology
Excellent	Nil	Moderate (10-20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Acacia assimilis subsp. *assimilis*	0.5	M	Shrubs over 2 m
Alyogyne hakeifolia	0.5	M	Shrubs over 2 m
Allocasuarina acutivalvis subsp. *acutivalvis*	25	M	Shrubs 1 - 2 m
Acacia cerastes (P1)	15	M	Shrubs 1 - 2 m
Calothamnus gilesii	10	M	Shrubs 1 - 2 m
melaleuca nematophylla	5	M	Shrubs 1 - 2 m
Grevillea nematophylla subsp. *supraplana*	3	M	Shrubs 1 - 2 m
Gastrolobium laytonii	1	M	Shrubs 1 - 2 m
Anthocercis anisantha subsp. *anisantha*	0.5	M	Shrubs 1 - 2 m
Leptosema aphyllum	0.5	M	Shrubs 1 - 2 m
Santalum acuminata	0.25	M	Shrubs 1 - 2 m
Hemigenia ciliata	0.25	M	Shrubs under 1 m
Lepidosperma gibsonii (T)	0.5	L	Grasses, Sedges, Herbs
**Pentameris airoides*	0.1	L	Grasses, Sedges, Herbs
Cassytha nodiflora	0.1	L	Grasses, Sedges, Herbs
Cheilanthes adiantoides	0.1	L	Grasses, Sedges, Herbs
Glischrocaryon aureum	0.1	L	Grasses, Sedges, Herbs
Podolepis lessonii	0.1	L	Grasses, Sedges, Herbs
Rhodanthe laevis	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs
Xanthosia kochii	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA29	30/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Mid slope of low hill	Clay	519773	6724730
Condition	Disturbance	Fire	Geology
Excellent	Nil	Old (>20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Calycopeplus paucifolius	10	M	Shrubs over 2 m
melaleuca nematophylla	5	M	Shrubs over 2 m
Acacia ramulosa var. *ramulosa*	0.5	M	Shrubs over 2 m
Aluta aspera subsp. *hesperia*	5	M	Shrubs 1 - 2 m
Phebalium megaphyllum	5	M	Shrubs 1 - 2 m
Philotheca sericea	5	M	Shrubs 1 - 2 m
Acacia assimilis subsp. *assimilis*	0.5	M	Shrubs 1 - 2 m
Mirbelia sp. Bursarioides (T.R. Lally 760)	0.1	M	Shrubs 1 - 2 m
Sida sp. dark green fruits (S. van Leeuwen 2260)	0.1	L	Shrubs under 1 m
**Cuscuta planiflora*	0.1	L	Grasses, Sedges, Herbs
Amphipogon caricinus var. *caricinus*	0.1	L	Grasses, Sedges, Herbs
Calandrinia eremaea	0.1	L	Grasses, Sedges, Herbs
Cephalipterum drummondii	0.1	L	Grasses, Sedges, Herbs
Euphorbia boophthona	0.1	L	Grasses, Sedges, Herbs
Lawrencella rosea	0.1	L	Grasses, Sedges, Herbs
Poaceae sp.	0.1	L	Grasses, Sedges, Herbs
Stenopetalum filifolium	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs
Xanthosia kochii	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA30	31/10/2015	20 x 20 quadrat	JC and SD
Landform	Soils	Easting	Northing
Mid slope	Clay	518981	6725601
Condition	Disturbance	Fire	Geology
Excellent	Nil	Moderate (10-20)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Allocasuarina acutivalvis subsp. acutivalvis	15	M	Shrubs over 2 m
melaleuca nematophylla	15	M	Shrubs over 2 m
Grevillea nematophylla subsp*. supraplana*	10	M	Shrubs over 2 m
Melaleuca radula	3	M	Shrubs over 2 m
Acacia assimilis subsp. *assimilis*	1	M	Shrubs over 2 m
Grevillea paradoxa	0.75	M	Shrubs 1 - 2 m
Calycopeplus paucifolius	0.5	M	Shrubs 1 - 2 m
Hibbertia glomerosa var. *glomerosa*	0.5	M	Shrubs 1 - 2 m
Dodonaea inaequifolia	0.25	M	Shrubs 1 - 2 m
Prostanthera magnifica	0.1	M	Shrubs 1 - 2 m
Solanum cleistogamum	0.1	L	Shrubs under 1 m
**Cuscuta planiflora*	0.1	L	Grasses, Sedges, Herbs
**Pentameris airoides*	0.1	L	Grasses, Sedges, Herbs
Cheilanthes adiantoides	0.1	L	Grasses, Sedges, Herbs
Lawrencella rosea	0.1	L	Grasses, Sedges, Herbs
Lepidosperma gibsonii (T)	0.1	L	Grasses, Sedges, Herbs
Poaceae sp.	0.1	L	Grasses, Sedges, Herbs
Podolepis lessonii	0.1	L	Grasses, Sedges, Herbs
Rhodanthe laevis	0.1	L	Grasses, Sedges, Herbs
Thysanotus sp.	0.1	L	Grasses, Sedges, Herbs

Species	Cover (%)	Stratum*	Sub-Stratum
Trachymene ornata	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs
Xanthosia kochii	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA31	22/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Hill slope	Clay	517095	6724930
Condition	Disturbance	Fire	Geology
Excellent	Track	Old (>10)	BIF

Species	Cover (%)	Stratum*	Sub-Stratum
Callitris columellaris	3	U	Trees under 10 m
Acacia tetragonophylla	2	M	Shrubs over 2 m
Allocasuarina acutivalvis subsp. *acutivalvis*	1	M	Shrubs over 2 m
Grevillea paradoxa	2	M	Shrubs 1 - 2 m
Philotheca brucei subsp. *brucei*	2	M	Shrubs 1 - 2 m
Alyxia buxifolia	1	M	Shrubs 1 - 2 m
Eremophila clarkei	1	M	Shrubs 1 - 2 m
Acacia exocarpoides	0.75	M	Shrubs 1 - 2 m
Acacia acuminata	0.1	M	Shrubs 1 - 2 m
Dodonaea inaequifolia	0.1	M	Shrubs 1 - 2 m
Grevillea nematophylla subsp. *supraplana*	0.1	M	Shrubs 1 - 2 m
Hibbertia acerosa	0.1	M	Shrubs 1 - 2 m
Eremophila latrobei subsp. *latrobei*	0.1	M	Shrubs under 1 m
Hakea recurva	0.1	M	Shrubs under 1 m
Scaevola spinescens	0.1	M	Shrubs under 1 m
Olearia humilis	0.1	L	Shrubs under 1 m
Sida sp. dark green fruits (S. van Leeuwen 2260)	0.1	L	Shrubs under 1 m
Platysace sp.	0.1	L	Shrubs under 1 m
Aristida contorta	0.1	L	Grasses, Sedges, Herbs

Species	Cover (%)	Stratum*	Sub-Stratum
Amphipogon caricinus var. *caricinus*	0.1	L	Grasses, Sedges, Herbs
Cheilanthes adiantoides	0.1	L	Grasses, Sedges, Herbs
Comesperma volubile	0.1	L	Grasses, Sedges, Herbs
Crassula colorata var. *colorata*	0.1	L	Grasses, Sedges, Herbs
Erodium cygnorum	0.1	L	Grasses, Sedges, Herbs
**Pentameris airoides*	0.1	L	Grasses, Sedges, Herbs
Podolepis lessonii	0.1	L	Grasses, Sedges, Herbs
Ptilotus obovatus	0.1	L	Grasses, Sedges, Herbs
Thysanotus sp.	0.1	L	Grasses, Sedges, Herbs
**Ursinia anthemoides*	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs
Xanthosia sp.	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA32	22/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Slope	Clay	516785	6724995
Condition	Disturbance	Fire	Geology
Excellent	Track	Old (>10)	BIF

Species	Cover (%)	Stratum*	Sub-Stratum
Eucalyptus loxophleba subsp. *supralaevis*	0.1	U	Trees 10 - 30 m
Callitris columellaris	1	U	Trees under 10 m
Acacia anthochaera	2	M	Shrubs over 2 m
Acacia andrewsii	0.75	M	Shrubs 1 - 2 m
Eremophila clarkei	0.75	M	Shrubs 1 - 2 m
Allocasuarina acutivalvis subsp. *acutivalvis*	0.5	M	Shrubs 1 - 2 m
Acacia acuminata	0.1	M	Shrubs 1 - 2 m
Acacia tetragonophylla	0.1	M	Shrubs 1 - 2 m
Alyxia buxifolia	0.1	M	Shrubs 1 - 2 m
Comesperma volubile	0.1	M	Shrubs 1 - 2 m
Grevillea paradoxa	0.1	M	Shrubs 1 - 2 m
Hakea recurva	0.1	M	Shrubs 1 - 2 m
Rhagodia drummondii	0.1	M	Shrubs 1 - 2 m
Senna charlesiana	0.1	M	Shrubs 1 - 2 m
Philotheca brucei subsp. *brucei*	1	M	Shrubs under 1 m
Scaevola spinescens	0.1	M	Shrubs under 1 m
Aluta aspera subsp. *hesperia*	0.1	L	Shrubs under 1 m
Hibbertia arcuata	0.1	L	Shrubs under 1 m
Olearia humilis	0.1	L	Shrubs under 1 m
Maireana georgei	0.1	L	Shrubs under 1 m

Species	Cover (%)	Stratum*	Sub-Stratum
Amphipogon caricinus var. *caricinus*	0.1	L	Grasses, Sedges, Herbs
Aristida contorta	0.1	L	Grasses, Sedges, Herbs
Ptilotus obovatus	0.1	L	Grasses, Sedges, Herbs
**Ursinia anthemoides*	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs
Xanthosia sp.	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA33	22/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Slope	Clay	516991	6724828
Condition	Disturbance	Fire	Geology
Very Good	Track Drilling	Old (>10)	BIF

Species	Cover (%)	Stratum*	Sub-Stratum
Eucalyptus loxophleba subsp. *supralaevis*	1	U	Trees 10 - 30 m
Callitris columellaris	0.75	U	Trees under 10 m
Eucalyptus celastroides subsp. *virella*	1	M	Trees under 10 m
Acacia acuminata	2	M	Shrubs over 2 m
Acacia anthochaera	0.1	M	Shrubs over 2 m
Allocasuarina acutivalvis subsp. *acutivalvis*	2	M	Shrubs 1 - 2 m
Eremophila sp.	1	M	Shrubs 1 - 2 m
Alyxia buxifolia	1	M	Shrubs 1 - 2 m
Dodonaea inaequifolia	0.75	M	Shrubs 1 - 2 m
Eremophila clarkei	0.75	M	Shrubs 1 - 2 m
Santalum spicatum	0.25	M	Shrubs 1 - 2 m
Acacia andrewsii	0.1	M	Shrubs 1 - 2 m
Acacia assimilis subsp. *assimilis*	0.1	M	Shrubs 1 - 2 m
Acacia exocarpoides	0.1	M	Shrubs 1 - 2 m
Acacia tetragonophylla	0.1	M	Shrubs 1 - 2 m
Eremophila oppositifolia subsp. *angustifolia*	0.1	M	Shrubs 1 - 2 m
Hakea recurva	0.1	M	Shrubs 1 - 2 m
Hemigenia sp. Yuna (A.C. Burns 95)	0.1	M	Shrubs 1 - 2 m
Senna charlesiana	0.1	M	Shrubs 1 - 2 m

Species	Cover (%)	Stratum*	Sub-Stratum
Philotheca brucei subsp. *brucei*	2	M	Shrubs under 1 m
Grevillea paradoxa	0.5	M	Shrubs under 1 m
Hibbertia arcuata	0.1	M	Shrubs under 1 m
Olearia humilis	0.1	L	Shrubs under 1 m
Scaevola spinescens	0.1	M	Shrubs under 1 m
Platysace sp.	0.1	L	Shrubs under 1 m
Amphipogon caricinus var. *caricinus*	0.1	L	Grasses, Sedges, Herbs
Austrostipa elegantissima	0.1	L	Grasses, Sedges, Herbs
Calandrinia eremaea	0.1	L	Grasses, Sedges, Herbs
Podolepis lessonii	0.1	L	Grasses, Sedges, Herbs
Ptilotus obovatus	0.1	L	Grasses, Sedges, Herbs
**Ursinia anthemoides* subsp *anthemoides*	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs
Xanthosia sp.	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA34	22/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Drainage line	Clay/sand	517361	6725247
Condition	Disturbance	Fire	Geology
Excellent	Grazing	Young (<5)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Melaleuca eleuterostachya	2	U	Shrubs over 2 m
Melaleuca leiocarpa	2	U	Shrubs over 2 m
Acacia ramulosa var. *ramulosa*	3	U	Shrubs 1 - 2 m
Allocasuarina acutivalvis subsp. *acutivalvis*	5	M	Shrubs over 2 m
Acacia anthochaera	0.1	M	Shrubs over 2 m
Grevillea obliquistigma subsp. *obliquistigma*	2	M	Shrubs 1 - 2 m
Senna sp.	0.5	M	Shrubs 1 - 2 m
Acacia andrewsii	0.1	M	Shrubs 1 - 2 m
Acacia assimilis subsp. *assimilis*	0.1	M	Shrubs 1 - 2 m
Acacia exocarpoides	0.1	M	Shrubs 1 - 2 m
Androcalva luteiflora	0.1	M	Shrubs 1 - 2 m
Anthocercis anisantha subsp. *anisantha*	0.1	M	Shrubs 1 - 2 m
Darwinia masonii	0.1	M	Shrubs 1 - 2 m
Dodonaea adenophora	0.1	M	Shrubs 1 - 2 m
Melaleuca radula	0.1	M	Shrubs 1 - 2 m
Mirbelia sp. Bursarioides (T.R. Lally 760)	0.1	M	Shrubs 1 - 2 m
Pimelea avonensis	0.1	M	Shrubs 1 - 2 m
Westringia sp. Mt Gibson Retrorse Leaves (G Cockerton & J Warden WB37992)	0.1	M	Shrubs 1 - 2 m
Hemigenia ciliata	0.1	M	Shrubs under 1 m

Species	Cover (%)	Stratum*	Sub-Stratum
Hibbertia arcuata	0.1	M	Shrubs under 1 m
Grevillea paradoxa	0.1	M	Shrubs under 1 m
Enekbatus stowardii	0.1	L	Shrubs under 1 m
Olearia humilis	0.1	L	Shrubs under 1 m
Solanum lasiophyllum	0.1	L	Shrubs under 1 m
Amphipogon caricinus var. *caricinus*	0.1	L	Grasses, Sedges, Herbs
**Bromus rubens*	0.1	L	Grasses, Sedges, Herbs
Calandrinia eremaea	0.1	L	Grasses, Sedges, Herbs
Cassytha sp.	0.1	L	Grasses, Sedges, Herbs
**Cuscuta planiflora*	0.1	L	Grasses, Sedges, Herbs
Crassula colorata var. *colorata*	0.1	L	Grasses, Sedges, Herbs
Lawrencella rosea	0.1	L	Grasses, Sedges, Herbs
Podolepis lessonii	0.1	L	Grasses, Sedges, Herbs
Rhodanthe laevis	0.1	L	Grasses, Sedges, Herbs
**Sisymbrium erysimoides*	0.1	L	Grasses, Sedges, Herbs
Wahlenbergia gracilenta	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA35	23/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Hill top	Clay	517583	6725377
Condition	Disturbance	Fire	Geology
Excellent	Weeds	Old (>10)	BIF

Species	Cover (%)	Stratum*	Sub-Stratum
Allocasuarina acutivalvis subsp. *acutivalvis*	3	M	Shrubs 1 - 2 m
Calycopeplus paucifolius	2	M	Shrubs 1 - 2 m
Gastrolobium laytonii	0.5	M	Shrubs 1 - 2 m
Dodonaea inaequifolia	0.25	M	Shrubs 1 - 2 m
Acacia exocarpoides	0.1	M	Shrubs 1 - 2 m
Acacia cerastes	0.75	L	Shrubs 1 - 2 m
Alyxia buxifolia	0.1	L	Shrubs 1 - 2 m
Ptilotus obovatus	2	L	Grasses, Sedges, Herbs
Cheilanthes adiantoides	0.1	L	Grasses, Sedges, Herbs
Crassula colorata var. *colorata*	0.1	L	Grasses, Sedges, Herbs
**Pentameris airoides*	0.1	L	Grasses, Sedges, Herbs
**Ursinia anthemoides* subsp *anthemoides*	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA36	23/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Drainage line	Clay/sand	517130	6725568
Condition	Disturbance	Fire	Geology
Excellent	Track	Young (<5)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Eucalyptus horistes	2	U	Trees under 10 m
Eucalyptus oldfieldii	1	U	Trees under 10 m
Acacia acuminata	4	M	Shrubs over 2 m
Acacia ramulosa var. *ramulosa*	2	M	Shrubs over 2 m
Acacia anthochaera	0.1	M	Shrubs over 2 m
Allocasuarina acutivalvis subsp. *acutivalvis*	0.1	M	Shrubs over 2 m
Acacia assimilis subsp. *assimilis*	0.1	M	Shrubs 1 - 2 m
Acacia cerastes	0.1	M	Shrubs 1 - 2 m
Hakea minyma	0.1	M	Shrubs 1 - 2 m
Psammomoya grandiflora	0.1	M	Shrubs 1 - 2 m
Westringia sp. Mt Gibson Retrorse Leaves (G Cockerton & J Warden WB37992)	0.5	L	Shrubs 1 - 2 m
Melaleuca leiocarpa	0.1	M	Shrubs over 2 m
Acacia andrewsii	0.1	L	Shrubs 1 - 2 m
Grevillea nematophylla subsp. *supraplana*	0.1	L	Shrubs 1 - 2 m
Hemigenia sp. Yuna (A.C. Burns 95)	0.1	L	Shrubs 1 - 2 m
Philotheca brucei subsp. *brucei*	0.1	L	Shrubs 1 - 2 m
Enekbatus stowardii	0.1	L	Shrubs under 1 m
Cassytha nodiflora	0.1	L	Grasses, Sedges, Herbs
Crassula colorata var. *colorata*	0.1	L	Grasses, Sedges, Herbs

Species	Cover (%)	Stratum*	Sub-Stratum
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA37	23/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Slope	Clay	517245	6725776
Condition	Disturbance	Fire	Geology
Excellent	Track	Young (<5)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Melaleuca nematophylla	1	M	Shrubs over 2 m
Allocasuarina acutivalvis subsp. *acutivalvis*	20	M	Shrubs 1 - 2 m
Acacia cerastes	6	M	Shrubs 1 - 2 m
Gastrolobium laytonii	4	M	Shrubs 1 - 2 m
Acacia assimilis subsp. *assimilis*	0.1	M	Shrubs 1 - 2 m
Leptosema aphyllum	0.1	M	Shrubs 1 - 2 m
Grevillea obliquistigma subsp. *obliquistigma*	0.1	M	Shrubs 1 - 2 m
Grevillea paradoxa	0.1	M	Shrubs 1 - 2 m
Olearia humilis	0.75	L	Shrubs under 1 m
Platysace sp.	0.5	L	Shrubs under 1 m
Hemigenia ciliata	0.1	L	Shrubs under 1 m
Calandrinia eremaea	0.1	L	Grasses, Sedges, Herbs
Cassytha nodiflora	0.1	L	Grasses, Sedges, Herbs
Glischrocaryon aureum	0.1	L	Grasses, Sedges, Herbs
**Ursinia anthemoides*	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA38	23/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Slope	Clay	517563	6725735
Condition	Disturbance	Fire	Geology
Excellent	Track	Young (<5)	BIF

Species	Cover (%)	Stratum*	Sub-Stratum
Alyogyne hakeifolia	0.1	M	Shrubs over 2 m
Melaleuca nematophylla	0.1	M	Shrubs over 2 m
Allocasuarina acutivalvis subsp. *acutivalvis*	30	M	Shrubs 1 - 2 m
Acacia assimilis subsp. *assimilis*	8	M	Shrubs 1 - 2 m
Acacia cerastes	3	M	Shrubs 1 - 2 m
Grevillea paradoxa	0.5	M	Shrubs 1 - 2 m
Grevillea obliquistigma subsp. *obliquistigma*	0.1	L	Shrubs 1 - 2 m
Leptosema aphyllum	0.1	L	Shrubs 1 - 2 m
Hibbertia arcuata	0.1	L	Shrubs under 1 m
Platysace sp.	0.1	L	Shrubs under 1 m
Hemigenia ciliata	0.1	L	Shrubs under 1 m
Calandrinia eremaea	0.1	L	Grasses, Sedges, Herbs
Cassytha nodiflora	0.1	L	Grasses, Sedges, Herbs
Lepidosperma gibsonii	0.1	L	Grasses, Sedges, Herbs
**Ursinia anthemoides*	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA39	23/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Low slope	Clay	517950	6725540
Condition	Disturbance	Fire	Geology
Excellent	Track	Young (<5)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Allocasuarina acutivalvis subsp. *acutivalvis*	35	M	Shrubs 1 - 2 m
Melaleuca fabri	1	M	Shrubs 1 - 2 m
Acacia assimilis subsp. *assimilis*	4	M	Shrubs 1 - 2 m
Acacia sibirica	0.75	M	Shrubs 1 - 2 m
Grevillea paradoxa	0.75	M	Shrubs 1 - 2 m
Grevillea obliquistigma subsp. *obliquistigma*	0.1	M	Shrubs 1 - 2 m
Acacia cerastes	0.1	L	Shrubs 1 - 2 m
Dodonaea adenophora	0.1	L	Shrubs 1 - 2 m
Gastrolobium laytonii	0.1	L	Shrubs 1 - 2 m
Leucopogon sp. Clyde Hill (M.A. Burgman 1207)	0.1	L	Shrubs 1 - 2 m
Leptosema aphyllum	0.1	L	Shrubs 1 - 2 m
Hemigenia ciliata	1	L	Shrubs under 1 m
Hibbertia arcuata	0.5	L	Shrubs under 1 m
Platysace sp.	0.1	L	Shrubs under 1 m
Cassytha nodiflora	0.1	L	Grasses, Sedges, Herbs
Thysanotus sp	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA40	23/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Plain	Clay	518161	6725141
Condition	Disturbance	Fire	Geology
Excellent	Track	Old (>10)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Eucalyptus loxophleba subsp. *supralaevis*	4	U	Trees 10 - 30 m
Callitris columellaris	1	U	Trees under 10 m
Acacia ramulosa var. *ramulosa*	0.25	M	Shrubs over 2 m
Santalum acuminatum	0.1	M	Shrubs over 2 m
Acacia acuaria	0.1	M	Shrubs 1 - 2 m
Allocasuarina acutivalvis subsp. *acutivalvis*	2	M	Shrubs 1 - 2 m
Acacia andrewsii	1	M	Shrubs 1 - 2 m
Alyxia buxifolia	1	M	Shrubs 1 - 2 m
Exocarpos aphyllus	1	M	Shrubs 1 - 2 m
Eremophila clarkei	0.5	M	Shrubs 1 - 2 m
Acacia tetragonophylla	0.1	M	Shrubs 1 - 2 m
Dodonaea inaequifolia	0.1	M	Shrubs 1 - 2 m
Eremophila oppositifolia subsp. *angustifolia*	0.1	M	Shrubs 1 - 2 m
Scaevola spinescens	0.5	M	Shrubs under 1 m
Olearia pimeleoides	0.1	M	Shrubs under 1 m
Leucopogon sp. Clyde Hill (M.A. Burgman 1207)	0.1	L	Shrubs 1 - 2 m
Aristida contorta	0.1	L	Grasses, Sedges, Herbs
Calandrinia eremaea	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs

Species	Cover (%)	Stratum*	Sub-Stratum
**Ursinia anthemoides*	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA41	23/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Plain	Clay	517823	6724859
Condition	Disturbance	Fire	Geology
Excellent	Track	Old (>10)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Eucalyptus loxophleba subsp. *supralaevis*	1	U	Trees 10 - 30 m
Callitris columellaris	8	U	Trees under 10 m
Acacia acuminata	2	M	Shrubs 1 - 2 m
Allocasuarina acutivalvis subsp. *acutivalvis*	2	M	Shrubs 1 - 2 m
Acacia andrewsii	1	M	Shrubs 1 - 2 m
Alyxia buxifolia	1	M	Shrubs 1 - 2 m
Melaleuca leiocarpa	1	M	Shrubs 1 - 2 m
Acacia tetragonophylla	0.5	M	Shrubs 1 - 2 m
Acacia assimilis subsp. *assimilis*	0.1	M	Shrubs 1 - 2 m
Dodonaea inaequifolia	0.1	M	Shrubs 1 - 2 m
Eremophila clarkei	0.1	M	Shrubs 1 - 2 m
Hakea recurva	0.1	M	Shrubs 1 - 2 m
Philotheca brucei subsp. *brucei*	0.5	L	Shrubs 1 - 2 m
Olearia humilis	0.1	L	Shrubs under 1 m
Amphipogon caricinus var. *caricinus*	0.1	L	Grasses, Sedges, Herbs
Aristida contorta	0.1	L	Grasses, Sedges, Herbs
Calandrinia eremaea	0.1	L	Grasses, Sedges, Herbs
**Ursinia anthemoides*	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA42	24/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Hill	Clay	517823	6738362
Condition	Disturbance	Fire	Geology
Excellent	Grazing	Old (>10)	BIF

Species	Cover (%)	Stratum*	Sub-Stratum
Acacia ramulosa var. ramulosa	5	U	Shrubs over 2 m
Calycopeplus paucifolius	4	M	Shrubs 1 - 2 m
Acacia exocarpoides	0.1	M	Shrubs 1 - 2 m
Mirbelia sp. Bursarioides (T.R. Lally 760)	0.1	M	Shrubs 1 - 2 m
Philotheca nutans (P1)	1	L	Shrubs under 1 m
Cheilanthes sieberi subsp. *sieberi*	0.1	L	Shrubs under 1 m
Hakea recurva	0.1	L	Shrubs under 1 m
Philotheca sericea	0.1	L	Shrubs under 1 m
Solanum cleistogamum	0.1	L	Shrubs under 1 m
Ptilotus obovatus	5	L	Grasses, Sedges, Herbs
Calandrinia eremaea	0.1	L	Grasses, Sedges, Herbs
**Cuscuta planiflora*	0.1	L	Grasses, Sedges, Herbs
Erodium cygnorum	0.1	L	Grasses, Sedges, Herbs
**Pentameris airoides*	0.1	L	Grasses, Sedges, Herbs
Podolepis lessonii	0.1	L	Grasses, Sedges, Herbs
Monachather paradoxus	0.1	L	Grasses, Sedges, Herbs
**Ursinia anthemoides*	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA43	24/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Hill	Clay	517779	6738578
Condition	Disturbance	Fire	Geology
Excellent	Grazing	Old (>10)	BIF

Species	Cover (%)	Stratum*	Sub-Stratum
Acacia ramulosa var. *ramulosa*	4	U	Shrubs over 2 m
Calycopeplus paucifolius	2	U	Shrubs 1 - 2 m
Mirbelia sp. Bursarioides (T.R. Lally 760)	0.1	M	Shrubs 1 - 2 m
Hakea recurva	3	L	Shrubs under 1 m
Philotheca nutans (P1)	0.5	L	Shrubs under 1 m
Philotheca sericea	0.1	L	Shrubs under 1 m
Solanum cleistogamum	0.1	L	Shrubs under 1 m
Ptilotus obovatus	12	L	Grasses, Sedges, Herbs
Calandrinia eremaea	0.1	L	Grasses, Sedges, Herbs
Cheilanthes sieberi subsp. *sieberi*	0.1	L	Grasses, Sedges, Herbs
Crassula colorata var. *colorata*	0.1	L	Grasses, Sedges, Herbs
**Pentameris airoides*	0.1	L	Grasses, Sedges, Herbs
Xanthosia sp.	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA44	24/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Hill	Clay	521594	6728425
Condition	Disturbance	Fire	Geology
Excellent	Grazing	Old (>10)	BIF

Species	Cover (%)	Stratum*	Sub-Stratum
Allocasuarina acutivalvis subsp. *acutivalvis*	1	M	Shrubs over 2 m
Melaleuca nematophylla	4	M	Shrubs over 2 m
Acacia assimilis subsp. *assimilis*	1	M	Shrubs 1 - 2 m
Calycopeplus paucifolius	0.75	M	Shrubs 1 - 2 m
Eremophila clarkei	0.1	M	Shrubs 1 - 2 m
Hibbertia hypericoides	0.1	M	Shrubs 1 - 2 m
Mirbelia sp. Bursarioides (T.R. Lally 760)	0.1	L	Shrubs 1 - 2 m
Philotheca brucei subsp. *brucei*	0.1	L	Shrubs 1 - 2 m
Prostanthera magnifica	0.1	L	Shrubs 1 - 2 m
Philotheca nutans (P1)	7	L	Shrubs under 1 m
Cheilanthes sieberi subsp. *Sieberi*	0.1	L	Shrubs under 1 m
Sida sp. dark green fruits (S. van Leeuwen 2260)	0.1	L	Shrubs under 1 m
Aristida contorta	0.1	L	Grasses, Sedges, Herbs
Austrostipa elegantissima	0.1	L	Grasses, Sedges, Herbs
Arthropodium dyeri	0.1	L	Grasses, Sedges, Herbs
Calandrinia eremaea	0.1	L	Grasses, Sedges, Herbs
**Cuscuta planiflora*	0.1	L	Grasses, Sedges, Herbs
**Pentameris airoides*	0.1	L	Grasses, Sedges, Herbs
Podolepis lessonii	0.1	L	Grasses, Sedges, Herbs

Species	Cover (%)	Stratum*	Sub-Stratum
Wahlenbergia gracilenta	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA45	24/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Hill	Clay	521733	6728189
Condition	Disturbance	Fire	Geology
Excellent	Grazing	Old (>10)	BIF

Species	Cover (%)	Stratum*	Sub-Stratum
Allocasuarina acutivalvis subsp. *acutivalvis*	1	M	Shrubs over 2 m
Acacia tetragonophylla	1	M	Shrubs 1 - 2 m
Calycopeplus paucifolius	1	M	Shrubs 1 - 2 m
Melaleuca radula	1	M	Shrubs 1 - 2 m
Mirbelia sp. Bursarioides (T.R. Lally 760)	1	M	Shrubs 1 - 2 m
Acacia kochii	0.75	M	Shrubs 1 - 2 m
Dodonaea inaequifolia	0.1	M	Shrubs 1 - 2 m
Eremophila clarkei	0.1	M	Shrubs 1 - 2 m
Hakea recurva	0.1	M	Shrubs 1 - 2 m
Hibbertia hypericoides	0.1	M	Shrubs 1 - 2 m
Philotheca brucei subsp. *brucei*	0.1	M	Shrubs 1 - 2 m
Prostanthera magnifica	0.1	M	Shrubs 1 - 2 m
Philotheca nutans (P1)	4	L	Shrubs under 1 m
Grevillea scabrida	0.1	L	Shrubs under 1 m
Sida sp. dark green fruits (S. van Leeuwen 2260)	0.1	L	Shrubs under 1 m
Aristida contorta	0.1	L	Grasses, Sedges, Herbs
Calandrinia eremaea	0.1	L	Grasses, Sedges, Herbs
Cephalipterum drummondii	0.1	L	Grasses, Sedges, Herbs
Crassula colorata var. *colorata*	0.1	L	Grasses, Sedges, Herbs

Species	Cover (%)	Stratum*	Sub-Stratum
**Cuscuta planiflora*	0.1	L	Grasses, Sedges, Herbs
**Pentameris airoides*	0.1	L	Grasses, Sedges, Herbs
Ptilotus obovatus	0.1	L	Grasses, Sedges, Herbs
Rhodanthe battii	0.1	L	Grasses, Sedges, Herbs
Thysanotus sp.	0.1	L	Grasses, Sedges, Herbs
**Ursinia anthemoides*	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA46	25/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Slope	Clay	522233	6726356
Condition	Disturbance	Fire	Geology
Excellent	Grazing	Old (>10)	Granite

Species	Cover (%)	Stratum*	Sub-Stratum
Allocasuarina tessellata	14	U	Shrubs over 2 m
Acacia acuminata	5	U	Shrubs 1 - 2 m
Eremophila clarkei	1	M	Shrubs 1 - 2 m
Grevillea levis	1	M	Shrubs 1 - 2 m
Acacia kochii	0.25	M	Shrubs 1 - 2 m
Melaleuca radula	0.1	M	Shrubs 1 - 2 m
Cheilanthes sieberi subsp. *sieberi*	0.1	L	Shrubs under 1 m
Aristida contorta	0.1	L	Grasses, Sedges, Herbs
Austrostipa elegantissima	0.1	L	Grasses, Sedges, Herbs
Calandrinia eremaea	0.1	L	Grasses, Sedges, Herbs
Dianella revoluta	0.1	L	Grasses, Sedges, Herbs
Gilberta tenuifolia	0.1	L	Grasses, Sedges, Herbs
Rhodanthe battii	0.1	L	Grasses, Sedges, Herbs
Rhodanthe laevis	0.1	L	Grasses, Sedges, Herbs
Thysanotus sp.	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA47	25/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Hill	Clay	525211	6726291
Condition	Disturbance	Fire	Geology
Excellent	Grazing	Old (>10)	Granite

Species	Cover (%)	Stratum*	Sub-Stratum
Allocasuarina tessellata	10	M	Shrubs over 2 m
Allocasuarina dielsiana	0.1	M	Shrubs over 2 m
Acacia kochii	1	M	Shrubs 1 - 2 m
Melaleuca radula	1	M	Shrubs 1 - 2 m
Acacia acuminata	0.75	M	Shrubs 1 - 2 m
Grevillea levis	0.75	M	Shrubs 1 - 2 m
Acacia tetragonophylla	0.1	L	Shrubs 1 - 2 m
Hemigenia ciliata	0.1	L	Shrubs under 1 m
Solanum cleistogamum	0.1	L	Shrubs under 1 m
Anthocercis anisantha subsp. *anisantha*	0.1	L	Grasses, Sedges, Herbs
Calandrinia eremaea	0.1	L	Grasses, Sedges, Herbs
Cephalipterum drummondii	0.1	L	Grasses, Sedges, Herbs
**Cuscuta planiflora*	0.1	L	Grasses, Sedges, Herbs
**Pentameris airoides*	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA48	26/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Hill	Clay	522715	6731078
Condition	Disturbance	Fire	Geology
Very Good	Grazing	Old (>10)	Granite

Species	Cover (%)	Stratum*	Sub-Stratum
Acacia umbraculiformis	5	M	Shrubs over 2 m
Calycopeplus paucifolius	4	M	Shrubs 1 - 2 m
Acacia tetragonophylla	1	M	Shrubs 1 - 2 m
Dodonaea inaequifolia	1	M	Shrubs 1 - 2 m
Eremophila clarkei	0.75	M	Shrubs 1 - 2 m
Acacia exocarpoides	0.5	M	Shrubs 1 - 2 m
Gastrolobium laytonii	0.1	M	Shrubs 1 - 2 m
Prostanthera magnifica	0.1	M	Shrubs 1 - 2 m
Acacia kochii	0.1	L	Shrubs 1 - 2 m
Grevillea levis	0.1	L	Shrubs 1 - 2 m
Philotheca brucei subsp. *brucei*	0.1	L	Shrubs 1 - 2 m
Solanum cleistogamum	0.1	L	Shrubs 1 - 2 m
Enchylaena tomentosa	0.1	L	Shrubs under 1 m
Aristida contorta	0.1	L	Grasses, Sedges, Herbs
Austrostipa elegantissima	0.1	L	Grasses, Sedges, Herbs
Calandrinia eremaea	0.1	L	Grasses, Sedges, Herbs
Cephalipterum drummondii	0.1	L	Grasses, Sedges, Herbs
**Cuscuta planiflora*	0.1	L	Grasses, Sedges, Herbs
Daucus glochidiatus	0.1	L	Grasses, Sedges, Herbs
Lepidium oxytrichum	0.1	L	Grasses, Sedges, Herbs

Species	Cover (%)	Stratum*	Sub-Stratum
Olearia humilis	0.1	L	Grasses, Sedges, Herbs
**Pentameris airoides*	0.1	L	Grasses, Sedges, Herbs
Podolepis lessonii	0.1	L	Grasses, Sedges, Herbs
Ptilotus obovatus	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA49	26/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Hill	Clay	522827	6731329
Condition	Disturbance	Fire	Geology
Very Good	Grazing	Old (>10)	BIF

Species	Cover (%)	Stratum*	Sub-Stratum
Acacia umbraculiformis	2	M	Shrubs over 2 m
Acacia exocarpoides	2	M	Shrubs 1 - 2 m
Hakea recurva	2	M	Shrubs 1 - 2 m
Calycopeplus paucifolius	1	M	Shrubs 1 - 2 m
Alyxia buxifolia	0.75	M	Shrubs 1 - 2 m
Grevillea hakeoides subsp. *stenophylla*	0.5	M	Shrubs 1 - 2 m
Eremophila clarkei	0.25	M	Shrubs 1 - 2 m
Acacia andrewsii	0.1	M	Shrubs 1 - 2 m
Dodonaea inaequifolia	0.1	M	Shrubs 1 - 2 m
Mirbelia sp. Bursarioides (T.R. Lally 760)	0.1	M	Shrubs 1 - 2 m
Philotheca brucei subsp. *brucei*	1	M	Shrubs under 1 m
Philotheca nutans (P1)	0.1	M	Shrubs under 1 m
Abutilon oxycarpum	0.1	L	Shrubs under 1 m
Hibbertia arcuata	0.1	L	Shrubs under 1 m
Olearia humilis	0.1	L	Shrubs under 1 m
Senna sp. Austin (A. Strid 20210)	0.1	L	Shrubs under 1 m
Solanum cleistogamum	0.1	L	Shrubs under 1 m
Ptilotus obovatus	15	L	Grasses, Sedges, Herbs
Aristida contorta	0.1	L	Grasses, Sedges, Herbs
**Cuscuta planiflora*	0.1	L	Grasses, Sedges, Herbs

Species	Cover (%)	Stratum*	Sub-Stratum
Daucus glochidiatus	0.1	L	Grasses, Sedges, Herbs
Lepidium oxytrichum	0.1	L	Grasses, Sedges, Herbs
**Pentameris airoides*	0.1	L	Grasses, Sedges, Herbs
Wahlenbergia gracilenta	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA50	26/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Hill	Clay	521947	6729845
Condition	Disturbance	Fire	Geology
Very Good	Grazing	Old (>10)	BIF

Species	Cover (%)	Stratum*	Sub-Stratum
Acacia umbraculiformis	1	M	Shrubs over 2 m
Calycopeplus paucifolius	2	M	Shrubs 1 - 2 m
Hakea recurva	2	M	Shrubs 1 - 2 m
Acacia exocarpoides	1	M	Shrubs 1 - 2 m
Santalum spicatum	1	M	Shrubs 1 - 2 m
Philotheca nutans (P1)	0.75	M	Shrubs 1 - 2 m
Eremophila clarkei	0.5	M	Shrubs 1 - 2 m
Mirbelia sp. Bursarioides (T.R. Lally 760)	0.1	M	Shrubs 1 - 2 m
Philotheca brucei subsp. *Brucei*	0.1	M	Shrubs 1 - 2 m
Philotheca sericea	0.1	M	Shrubs under 1 m
Olearia humilis	0.1	L	Shrubs under 1 m
Solanum cleistogamum	0.1	L	Shrubs under 1 m
Ptilotus obovatus	15	L	Grasses, Sedges, Herbs
Aristida contorta	0.1	L	Grasses, Sedges, Herbs
**Cuscuta planiflora*	0.1	L	Grasses, Sedges, Herbs
Crassula colorata var. *colorata*	0.1	L	Grasses, Sedges, Herbs
Dysphania melanocarpa forma. *melanocarpa*	0.1	L	Grasses, Sedges, Herbs
Erodium cygnorum	0.1	L	Grasses, Sedges, Herbs
Lepidium oxytrichum	0.1	L	Grasses, Sedges, Herbs
Monachather paradoxus	0.1	L	Grasses, Sedges, Herbs

Species	Cover (%)	Stratum*	Sub-Stratum
**Pentameris airoides*	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA51	26/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Hill	Clay	518363	6745877
Condition	Disturbance	Fire	Geology
Very Good	Grazing	Old (>10)	Granite

Species	Cover (%)	Stratum*	Sub-Stratum
Acacia incurvaneura	2	M	Shrubs over 2 m
Acacia umbraculiformis	0.1	M	Shrubs over 2 m
Hakea recurva	0.1	M	Shrubs 1 - 2 m
Santalum spicatum	0.1	M	Shrubs 1 - 2 m
Acacia exocarpoides	0.1	L	Shrubs 1 - 2 m
Dodonaea sp.	0.1	L	Shrubs 1 - 2 m
Cheilanthes sieberi subsp. *sieberi*	0.1	L	Shrubs under 1 m
Solanum cleistogamum	0.1	L	Shrubs under 1 m
Ptilotus obovatus	25	L	Grasses, Sedges, Herbs
Aristida contorta	0.1	L	Grasses, Sedges, Herbs
Calandrinia eremaea	0.1	L	Grasses, Sedges, Herbs
Monachather paradoxus	0.1	L	Grasses, Sedges, Herbs
Sida sp. Golden calyces glabrous (H.N. Foote 32)	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA52	26/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Hill	Clay	518370	6745510
Condition	Disturbance	Fire	Geology
Very Good	Grazing	Old (>10)	Granite

Species	Cover (%)	Stratum*	Sub-Stratum
Acacia umbraculiformis	4	M	Shrubs over 2 m
Acacia ramulosa var. *ramulosa*	2	M	Shrubs over 2 m
Acacia incurvaneura	1	M	Shrubs over 2 m
Calycopeplus paucifolius	1	M	Shrubs 1 - 2 m
Santalum spicatum	0.5	M	Shrubs 1 - 2 m
Acacia exocarpoides	0.25	L	Shrubs 1 - 2 m
Dodonaea sp.	0.1	L	Shrubs 1 - 2 m
Aristida contorta	0.1	L	Grasses, Sedges, Herbs
Calandrinia eremaea	0.1	L	Grasses, Sedges, Herbs
Cheilanthes sieberi subsp. *sieberi*	0.1	L	Shrubs under 1 m
Philotheca nutans (P1)	0.1	L	Shrubs under 1 m
Philotheca sericea	0.1	L	Shrubs under 1 m
Solanum cleistogamum	0.1	L	Shrubs under 1 m
Ptilotus obovatus	20	L	Grasses, Sedges, Herbs
Aristida contorta	0.1	L	Grasses, Sedges, Herbs
**Pentameris airoides*	0.1	L	Grasses, Sedges, Herbs
Sida sp. Golden calyces glabrous (H.N. Foote 32)	0.1	L	Grasses, Sedges, Herbs
Wahlenbergia gracilenta	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA53	26/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Hill	Clay	514527	6744892
Condition	Disturbance	Fire	Geology
Very Good	Grazing	Old (>10)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Acacia ramulosa var. *ramulosa*	2	M	Shrubs over 2 m
Acacia aulacophylla	1	M	Shrubs over 2 m
Acacia incurvaneura	0.75	M	Shrubs over 2 m
Calycopeplus paucifolius	2	M	Shrubs 1 - 2 m
Acacia exocarpoides	0.1	M	Shrubs 1 - 2 m
Grevillea hakeoides subsp. *stenophylla*	0.1	M	Shrubs 1 - 2 m
Halgania integerrima	0.1	M	Shrubs 1 - 2 m
Leucopogon sp. Clyde Hill (M.A. Burgman 1207)	0.75	L	Shrubs 1 - 2 m
Eremophila clarkei	0.1	L	Shrubs 1 - 2 m
Mirbelia sp. Bursarioides (T.R. Lally 760)	0.1	L	Shrubs 1 - 2 m
Philotheca sericea	6	L	Shrubs under 1 m
Philotheca nutans (P1)	1	L	Shrubs under 1 m
Cheilanthes sieberi subsp. *sieberi*	0.1	L	Shrubs under 1 m
Olearia humilis	0.1	L	Shrubs under 1 m
Calandrinia eremaea	0.1	L	Grasses, Sedges, Herbs
Aristida contorta	0.1	L	Grasses, Sedges, Herbs
Dysphania melanocarpa forma. *melanocarpa*	0.1	L	Grasses, Sedges, Herbs
**Pentameris airoides*	0.1	L	Grasses, Sedges, Herbs
Podolepis lessonii	0.1	L	Grasses, Sedges, Herbs

Species	Cover (%)	Stratum*	Sub-Stratum
Ptilotus drummondii	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA54	27/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Hill	Clay	514739	6743561
Condition	Disturbance	Fire	Geology
Very Good	Grazing	Old (>10)	Ironstone

Species	Cover (%)	Stratum*	Sub-Stratum
Acacia incurvaneura	15	U	Shrubs over 2 m
Acacia assimilis subsp. *assimilis*	0.1	M	Shrubs 1 - 2 m
Calycopeplus paucifolius	0.75	M	Shrubs 1 - 2 m
Eremophila forrestii subsp. *forrestii*	3	M	Shrubs 1 - 2 m
Malleostemon roseus	0.1	M	Shrubs 1 - 2 m
Mirbelia sp. Bursarioides (T.R. Lally 760)	0.1	M	Shrubs 1 - 2 m
Aluta aspera subsp. *hesperia*	8	M	Shrubs under 1 m
Philotheca nutans (P1)	1	M	Shrubs under 1 m
Philotheca sericea	1	M	Shrubs under 1 m
Olearia humilis	0.25	L	Shrubs under 1 m
Arthropodium dyeri	0.1	L	Grasses, Sedges, Herbs
Calandrinia eremaea	0.1	L	Grasses, Sedges, Herbs
Sida sp. Golden calyces glabrous (H.N. Foote 32)	0.1	L	Grasses, Sedges, Herbs
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA55	27/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Slope	Clay	520045	6741068
Condition	Disturbance	Fire	Geology
Very Good	Grazing	Old (>10)	Granite

Species	Cover (%)	Stratum*	Sub-Stratum
Acacia ramulosa var. *ramulosa*	3	M	Shrubs over 2 m
Acacia umbraculiformis	0.1	M	Shrubs over 2 m
Malleostemon roseus	4	M	Shrubs 1 - 2 m
Acacia assimilis subsp. *assimilis*	2	M	Shrubs 1 - 2 m
Grevillea obliquistigma subsp. *obliquistigma*	2	M	Shrubs 1 - 2 m
Acacia exocarpoides	0.1	M	Shrubs 1 - 2 m
Eremophila forrestii subsp. *forrestii*	0.1	M	Shrubs 1 - 2 m
Philotheca brucei subsp. *brucei*	0.1	M	Shrubs 1 - 2 m
Aluta aspera subsp. *hesperia*	12	M	Shrubs under 1 m
Philotheca nutans (P1)	2	M	Shrubs under 1 m
Aristida contorta	0.1	L	Grasses, Sedges, Herbs
Calandrinia eremaea	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA56	27/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Low hill	Clay	515159	6740680
Condition	Disturbance	Fire	Geology
Very Good	Grazing	Old (>10)	BIF

Species	Cover (%)	Stratum*	Sub-Stratum
Acacia aulacophylla	2	M	Shrubs over 2 m
Acacia ramulosa var. *ramulosa*	2	M	Shrubs over 2 m
Grevillea obliquistigma subsp. *obliquistigma*	4	M	Shrubs 1 - 2 m
Calycopeplus paucifolius	1	M	Shrubs 1 - 2 m
Acacia assimilis subsp. *assimilis*	0.5	M	Shrubs 1 - 2 m
Acacia exocarpoides	0.1	M	Shrubs 1 - 2 m
Eremophila clarkei	0.1	M	Shrubs 1 - 2 m
Exocarpos aphyllus	0.1	M	Shrubs 1 - 2 m
Philotheca sericea	4	M	Shrubs under 1 m
Philotheca nutans (P1)	1	M	Shrubs under 1 m
Aluta aspera subsp. *hesperia*	0.5	M	Shrubs under 1 m
Cheilanthes sieberi subsp. *sieberi*	0.1	L	Shrubs under 1 m
Olearia humilis	0.1	L	Shrubs under 1 m
Philotheca sericea	0.1	L	Shrubs under 1 m
Solanum cleistogamum	0.1	L	Shrubs under 1 m
Aristida contorta	0.1	L	Grasses, Sedges, Herbs
Crassula colorata var. *colorata*	0.1	L	Grasses, Sedges, Herbs
**Pentameris airoides*	0.1	L	Grasses, Sedges, Herbs
Podolepis lessonii	0.1	L	Grasses, Sedges, Herbs
Wahlenbergia gracilenta	0.1	L	Grasses, Sedges, Herbs

Species	Cover (%)	Stratum*	Sub-Stratum
Waitzia nitida	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA57	27/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Hill	Clay	514820	6740166
Condition	Disturbance	Fire	Geology
Very Good	Grazing	Old (>10)	BIF

Species	Cover (%)	Stratum*	Sub-Stratum
Melaleuca nematophylla	15	M	Shrubs over 2 m
Acacia ramulosa var. *ramulosa*	4	M	Shrubs over 2 m
Calycopeplus paucifolius	5	M	Shrubs 1 - 2 m
Acacia tetragonophylla	1	M	Shrubs 1 - 2 m
Santalum spicatum	1	M	Shrubs 1 - 2 m
Acacia assimilis subsp. *assimilis*	0.1	M	Shrubs 1 - 2 m
Eremophila clarkei	0.1	M	Shrubs 1 - 2 m
Philotheca sericea	1	M	Shrubs under 1 m
Philotheca nutans (P1)	0.75	M	Shrubs under 1 m
Aristida contorta	0.1	L	Grasses, Sedges, Herbs
Arthropodium dyeri	0.1	L	Grasses, Sedges, Herbs
Cheilanthes sieberi subsp. *sieberi*	0.1	L	Grasses, Sedges, Herbs
Crassula colorata var. *colorata*	0.1	L	Grasses, Sedges, Herbs
**Pentameris airoides*	0.1	L	Grasses, Sedges, Herbs
Ptilotus obovatus	0.1	L	Grasses, Sedges, Herbs
Rhodanthe battii	0.1	L	Grasses, Sedges, Herbs
Wahlenbergia gracilenta	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA58	27/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Hill	Clay	515588	6747736
Condition	Disturbance	Fire	Geology
Very Good	Grazing	Old (>10)	Granite

Species	Cover (%)	Stratum*	Sub-Stratum
Acacia incurvaneura	1	M	Shrubs over 2 m
Acacia umbraculiformis	1	M	Shrubs over 2 m
Acacia ramulosa var. *ramulosa*	0.1	M	Shrubs over 2 m
Calycopeplus paucifolius	4	M	Shrubs 1 - 2 m
Acacia tetragonophylla	2	M	Shrubs 1 - 2 m
Eremophila forrestii subsp. *Forrestii*	0.75	M	Shrubs 1 - 2 m
Santalum spicatum	0.75	M	Shrubs 1 - 2 m
Eremophila clarkei	0.1	M	Shrubs 1 - 2 m
Mirbelia sp. Bursarioides (T.R. Lally 760)	0.1	M	Shrubs 1 - 2 m
Philotheca sericea	2	M	Shrubs under 1 m
Aluta aspera subsp. *hesperia*	1	M	Shrubs under 1 m
Abutilon oxycarpum	0.1	L	Shrubs under 1 m
Cheilanthes sieberi subsp. *sieberi*	0.1	L	Shrubs under 1 m
Philotheca nutans (P1)	0.1	L	Shrubs under 1 m
Sida sp. dark green fruits (S. van Leeuwen 2260)	0.1	L	Shrubs under 1 m
Solanum cleistogamum	0.1	L	Shrubs under 1 m
Aristida contorta	0.1	L	Grasses, Sedges, Herbs
Arthropodium dyeri	0.1	L	Grasses, Sedges, Herbs
Calandrinia eremaea	0.1	L	Grasses, Sedges, Herbs

Species	Cover (%)	Stratum*	Sub-Stratum
Euphorbia boophthona	0.1	L	Grasses, Sedges, Herbs
Monachather paradoxus	0.1	L	Grasses, Sedges, Herbs
**Pentameris airoides*	0.1	L	Grasses, Sedges, Herbs
Wahlenbergia gracilenta	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA59	27/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Hill	Clay	515397	6748433
Condition	Disturbance	Fire	Geology
Very Good	Grazing	Old (>10)	Granite

Species	Cover (%)	Stratum*	Sub-Stratum
Acacia umbraculiformis	5	M	Shrubs over 2 m
Acacia ramulosa var. *ramulosa*	3	M	Shrubs over 2 m
Brachychiton gregorii	1	M	Shrubs over 2 m
Calycopeplus paucifolius	5	M	Shrubs 1 - 2 m
Santalum spicatum	1	M	Shrubs 1 - 2 m
Philotheca nutans (P1)	1	L	Shrubs 1 - 2 m
Philotheca sericea	1	L	Shrubs under 1 m
Solanum cleistogamum	1	L	Shrubs under 1 m
Abutilon oxycarpum	0.1	L	Shrubs under 1 m
Cryptandra micrantha	0.1	L	Shrubs under 1 m
Sida sp. dark green fruits (S. van Leeuwen 2260)	0.1	L	Shrubs under 1 m
Aristida contorta	0.1	L	Grasses, Sedges, Herbs
Crassula colorata var. *colorata*	0.1	L	Grasses, Sedges, Herbs
**Cuscuta planiflora*	0.1	L	Grasses, Sedges, Herbs
Euphorbia boophthona	0.1	L	Grasses, Sedges, Herbs
Monachather paradoxus	0.1	L	Grasses, Sedges, Herbs
**Pentameris airoides*	0.1	L	Grasses, Sedges, Herbs
Ptilotus obovatus	0.1	L	Grasses, Sedges, Herbs
Wahlenbergia gracilenta	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA60	28/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Hill	Clay	518993	6749121
Condition	Disturbance	Fire	Geology
Very Good	Grazing	Old (>10)	Granite

Species	Cover (%)	Stratum*	Sub-Stratum
Acacia incurvaneura	5	M	Shrubs over 2 m
Acacia burkittii	4	M	Shrubs over 2 m
Acacia tetragonophylla	1	M	Shrubs 1 - 2 m
Grevillea hakeoides subsp. *stenophylla*	0.1	M	Shrubs 1 - 2 m
Acacia exocarpoides	0.1	L	Shrubs 1 - 2 m
Eremophila clarkei	0.1	L	Shrubs 1 - 2 m
Philotheca brucei subsp. *brucei*	0.1	L	Shrubs 1 - 2 m
Sida sp. dark green fruits (S. van Leeuwen 2260)	0.1	L	Shrubs under 1 m
Ptilotus obovatus	20	L	Grasses, Sedges, Herbs
Aristida contorta	0.1	L	Grasses, Sedges, Herbs
**Pentameris airoides*	0.1	L	Grasses, Sedges, Herbs

Site number	Date	Site type	Observer
ELA61	28/02/2016	20x20 quadrat	SD & JC
Landform	Soils	Easting	Northing
Low hill	Clay	520149	6740564
Condition	Disturbance	Fire	Geology
Very Good	Grazing	Old (>10)	Granite

Species	Cover (%)	Stratum*	Sub-Stratum
Acacia ramulosa var. *ramulosa*	2	M	Shrubs over 2 m
Acacia umbraculiformis	1	M	Shrubs over 2 m
Calycopeplus paucifolius	8	M	Shrubs 1 - 2 m
Acacia assimilis subsp. *assimilis*	2	L	Shrubs 1 - 2 m
Acacia exocarpoides	1	L	Shrubs 1 - 2 m
Philotheca nutans (P1)	1	L	Shrubs 1 - 2 m
Mirbelia sp. Bursarioides (T.R. Lally 760)	0.75	L	Shrubs 1 - 2 m
Philotheca sericea	6	L	Shrubs under 1 m
Sida sp. dark green fruits (S. van Leeuwen 2260)	0.1	L	Shrubs under 1 m
Amphipogon caricinus var. *caricinus*	0.1	L	Grasses, Sedges, Herbs
Aristida contorta	0.1	L	Grasses, Sedges, Herbs
Calandrinia eremaea	0.1	L	Grasses, Sedges, Herbs
Crassula colorata var. *colorata*	0.1	L	Grasses, Sedges, Herbs
**Pentameris airoides*	0.1	L	Grasses, Sedges, Herbs
Podolepis lessonii	0.1	L	Grasses, Sedges, Herbs

ecological AUSTRALIA

ISO 14001 Environmental Management

AS/NZS 4801:2001 Occupational Health and Safety Management

ISO 9001 Quality Management

HEAD OFFICE
Suite 2, Level 3
668-672 Old Princes Highway
Sutherland NSW 2232
T 02 8536 8600
F 02 9542 5622

SYDNEY
Suite 1, Level 1
101 Sussex Street
Sydney NSW 2000
T 02 8536 8650
F 02 9542 5622

HUSKISSON
Unit 1 51 Owen Street
Huskisson NSW 2540
T 02 4201 2264
F 02 4443 6655

CANBERRA
Level 2
11 London Circuit
Canberra ACT 2601
T 02 6103 0145
F 02 6103 0148

NEWCASTLE
Suites 28 & 29, Level 7
19 Bolton Street
Newcastle NSW 2300
T 02 4910 0125
F 02 4910 0126

NAROOMA
5/20 Canty Street
Narooma NSW 2546
T 02 4476 1151
F 02 4476 1161

COFFS HARBOUR
35 Orlando Street
Coffs Harbour Jetty NSW 2450
T 02 6651 5484
F 02 6651 6890

ARMIDALE
92 Taylor Street
Armidale NSW 2350
T 02 8081 2681
F 02 6772 1279

MUDGEE
Unit 1, Level 1
79 Market Street
Mudgee NSW 2850
T 02 4302 1230
F 02 6372 9230

PERTH
Suite 1 & 2
49 Ord Street
West Perth WA 6005
T 08 9227 1070
F 08 9322 1358

WOLLONGONG
Suite 204, Level 2
62 Moore Street
Austinmer NSW 2515
T 02 4201 2200
F 02 4268 4361

GOSFORD
Suite 5, Baker One
1-5 Baker Street
Gosford NSW 2250
T 02 4302 1220
F 02 4322 2897

DARWIN
16/56 Marina Boulevard
Cullen Bay NT 0820
T 08 8989 5601
F 08 8941 1220

BRISBANE
Suite 1 Level 3
471 Adelaide Street
Brisbane QLD 4000
T 07 3503 7191
F 07 3854 0310

1300 646 131
www.ecoaus.com.au