Clearing Permit: CPS 8482/1 - Application to Clear

2019

Vegetation survey Eatts property Manjimup

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Summary

Clearing Permit: CPS 8482/1 - Application to Clear

Permit Applicant: Bevan Eatts

Permit Duration: To be determined.

Location: Lot– Shire of Manjimup

Clearing area: Area A ~50 Ha within Lot 9602 (plan 203007), Area B ~1Ha within Lot 12140 (plan 203044)

Site visit

An inspection of the property was undertaken on 24th November

Area A: The whole of this site had been burnt by a prescribed fire about three years previously and vegetation has recovered and would be at the peak in species richness. The area was mixed jarrah and marri forest, which has been modified by previous harvesting operations. The stand contained immature trees, which may be in the region of 50-60 years old based on stem diameter. There were occasional over mature remnant trees from the original stand, but many of these were already dead (about 30-40%) and the remainder in poor condition. Many trees had already fallen and littered the forest floor. The vegetation appeared to be similar throughout the site with a narrow strip of riparian vegetation along a drainage line.

Area B: This area was a moisture gaining site subject to inundation annually. It had been totally cleared in the past as part of farm development and converted to pasture. However, the site had some regeneration of *Taxandria linearifolia*, which had developed into a thicket and was retained as a refuge for sheep and cattle. Inundation by water annually and the continued grazing by livestock modified the site such that very few native plant species appeared to be present. The thicket of *T. linearfolia* appeared to be mostly interspersed with weed species and blackberry thickets.

Introduction

The jarrah-marri forest occurs uniformly on lateritic soils throughout the south-west where annual rainfall ranges from 700mm to 1100mm. The most dominant small trees in the understorey are bull banksia (*Banksia grandis*) and sheoak (*Allocasuarina fraseriana*). The sclerophyllous understorey vegetation superficially appears uniform, but in reality it is a complex multi-dimensional continuum of species responding to a number of environmental variables. The jarrah forest has been mapped according to vegetation associations (Mattiske and Havel 1998, 2000, Beard *et al.* 2013). The climate of the South West of Australia, with hot dry summers and cool moist winters make this a very fire prone environment and fires occur in most vegetation systems.

Species richness and species diversity have been observed to increase following fire, peaking at 3-5years post fire (Bell and Koch 1980). Peet (1971) concluded that mild intensity fires promoted a richer ground flora whereas, high intensity fires resulted in a predominance of leguminous fire weeds, *Bossiaea aquifolium*, *Acacia browniana*, *Acacia pulchella*. Vegetation complexes of the jarrah forest are considered to be relatively stable and resilient to natural disturbances such as fire. In most circumstances, and in time, species that were present before disturbance are generally present after the event, although abundances may temporarily change.

To satisfy conditions of the clearing permit CPS 8482/1 - Application to clear under section 51E of the *Environmental Protection Act 1986.* A survey of the proposed 52.45 hectares of lot 9602 on plan 203044 (Area A) was undertaken on 28th November 2019 and a survey of a one hectare area was conducted on 26th November of Lot 12140 plan 203044 (Area C) .

Method

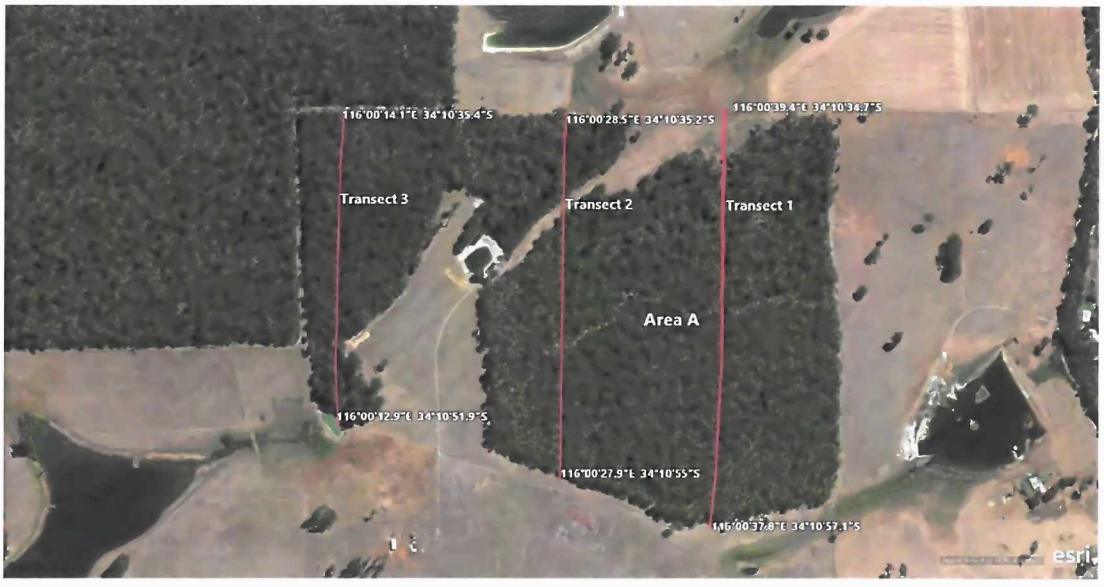
Desk top survey:

Revealed site A and site B as Bevan 1 from vegetation mapping (Mattiske and Havel 1998, 2000). This land system has potentially 8 priority plants listed which formed the focus of the flora survey.

Area A

Sampling method: A targeted transect was used in preference to quadrats as this covered more area and was across all land forms from ridge tops to valley floors. All species detected within 5 meters of the transect line were recorded (See species list Appendix 1). Three transects from north to south through the entire site was undertaken with special care to locate the potential priority species (Figure1).

Figure 1 Eatts property, Site A with location of transect lines



The co-ordinates for the end of each transect line are as follows;

Table 1 The co-ordinates for the end of each transect line in Area A of Bevan Eatts property.

	Co-ordinate north end		Co-ordinate south end	
	East	South	East	South
Transect 1	116 0039.4	34 1034.7	116 0037.8	34 1057.1
Transect 2	116 0028.5	34 1035.2	116 0027.9	34 1055.0
Transect 3	116 0014.1	34 1035.4	116 0012.9	34 1051.9

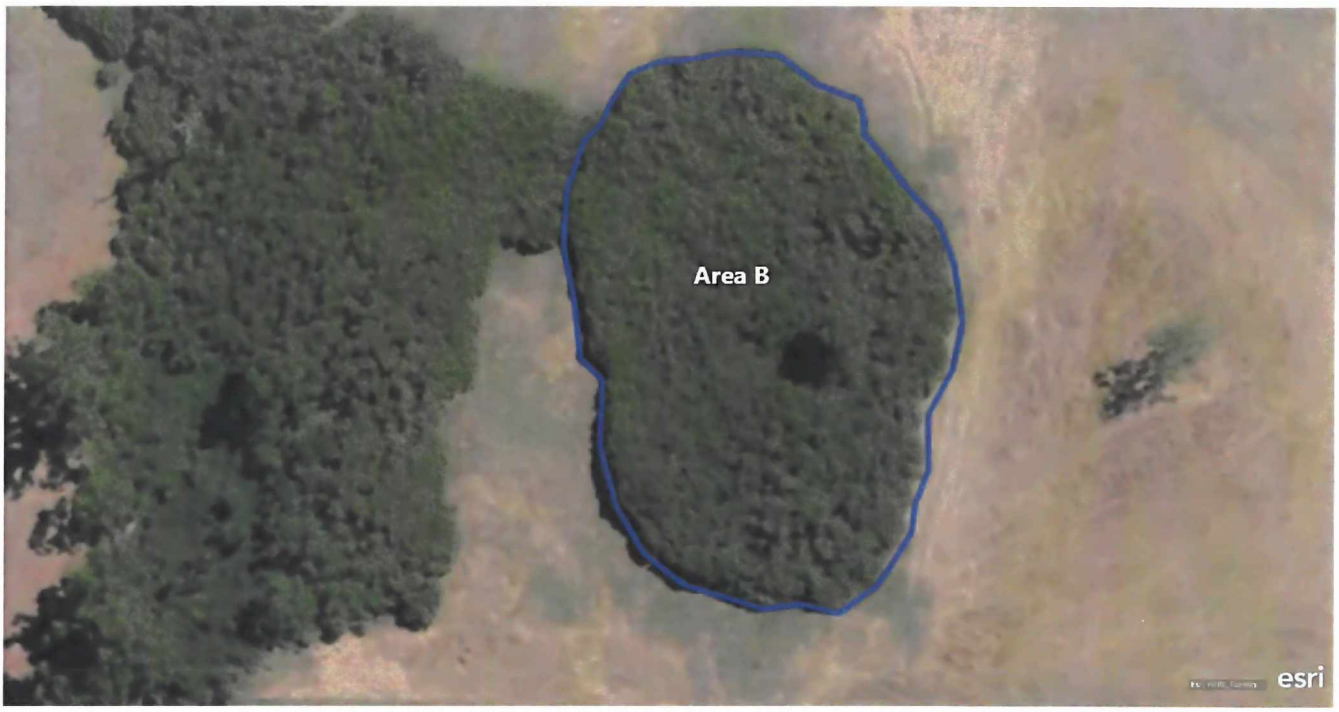
The targeted plants were as follows;

Specie Name	*Conservation code*
Caladenia harringtoniae	Threatened
Deyeuxia inaequalis	Priority 1
Amanita kalamundae	Priority 3
Hemigenia microphylla	Priority 3
Lepyrodia heleochariodes	Priority 3
Tetraria sp. Blackwood river (A.R.Annels 3043)	Priority 3
Stylidium ireneae	Priority 4
Pultenaea pinifolia	Priority 3

Area B

Sampling method: Since this site was quite small, the entire site was traversed and all plants recorded (Figure 2). Where identification could not be made samples were collected, pressed and returned to the laboratory where they were keyed out using taxonomic keys. None of the priority species listed above was detected by the survey (See appendix 2).

Figure 2 Eatts property, SiteB showing survey area



Results

Flora Survey

Area A

A total of 108 species were recorded representing 37 families, which included six weed species. None of the priority species listed for vegetation complex was detected, which is not surprising given that for most of these species it would have involved a large range extension. The transect survey revealed that the entire site shared the same vegetation, with the exception of a small riparian zone around the edge of a drainage line that extended from the south west corner of the site in a north-easterly direction to the northern boundary of the property.

An examination of the species revealed that the flora was made up of mostly perennial plant species with only a handful (7%) of annual species (Table 1). This ratio is considerably lower when compared to five sites in the jarrah forest (Ward et al. 2011), which ranged from 13-19% and an overall average of 16%.

Table 1 Comparison of perennial and seeder species detected with a flora survey in site A of Bevan Eatts property November 2019.

Life style	Number of species
Perennial species	101
Annual species	7

The most dominant species included; *Bossiaea aquifolium*, *Acacia browniana*, *Acacia pulchella* with occasional patches of *Banksia grandis* and *Podocarpus drouynianus*. The plant community was made up of 42% of species that rely on seed for regeneration and 58 % that resprout from underground organs (table 2).

Table 2 Regeneration strategy of plant species detected with a flora survey in site A of Bevan Eatts property, November 2019.

Regeneration strategy	Number of species
Seed stored in soil	41
Seed stored on plant (serotinous)	5
No seed on site	0
From Epicormics	1
From woody rootstock/lignotuber	37
From fleshy underground organ (corm, bulb, tuber, rhizome)	24

When plants are organised by life form, small and large woody shrubs form the majority (60%) of the species assemblage (Table 3). Geophytes were about 5% of the total species but their numbers were less than a third when compared with other jarrah sites (Ward *et al.* 2011). Herbs and grasses were also down by about half the number of species and was likely to be the result of selective browsing by domestic and native herbivores. Many plants have defensive mechanisms to protect themselves from herbivores, such as, hard thorny prickles or Toxins (Provenza 1995) and therefore the more palatable plants are targeted. Just over 5% (6 sp) were introduced weeds and is consistent with other jarrah sites.

Table 3 Plants organised by life form categories from a flora survey in site A of Bevan Eatts property, November 2019

Life form	Number of species
Herb	9
Fern	2
Geophyte	6
Grass	5
Sedge	7
Tree	6
Shrub (over 31 cm)	35
Dwarf Shrub (1-30 cm)	29
Parasite	1
Vine (climber/runner)	4
Rush	0
Cycad	1
Xanthorrhoea/Kingia	3

Vegetation condition:

Area A: The structure of the forest and vegetation has been modified by past disturbance and would rate on the condition scale (adapted from Keighery 1994 and Trudgen 1988) as good. There are incursions of tracks associated with harvesting many of which are still trafficable. The vegetation shows some obvious signs of disturbance by grazing from domestic stock with possibly some species missing. The basic vegetation structure appears to be intact, with no signs of dieback present.

Flora Survey

Area B

This area had a total of 15 species representing eight families including more than a third (5 sp) were weed species. This area was dominated by *Taxandria linearfolia* to 5m in height and all other species scattered throughout. Two species were annual (13%) and the remainder were perennials. Eight of the species were seeders (53%) and the rest were resprouters (Table 4).

Table 4 Plants organised by life form categories from a flora survey in Area B of Bevan Eatts property, November 2019

Life form	Number of species
Herb	3
Fern	0
Geophyte	0
Grass	4
Sedge	0
Tree	1
Shrub (over 31 cm)	4
Dwarf Shrub (1-30 cm)	2
Parasite	0
Vine (climber/runner)	0
Rush	1
Cycad	0
Xanthorrhoea/Kingia	0

Vegetation condition:

Area B: The structure of the vegetation across the entire site has been highly modified and rates on the condition scale as completely degraded (Keighery 1994 and Trudgen 1988). The upper strata and mid strata were completely missing, while the structure of the lower strata is comprised of some native shrubs interspersed with weed species.

Discussion

The survey of two areas within private property was prompted by an application for clearing, which may have contained several priority plant species. The survey has shown that none of the target priority plants were detected and that a combination of fire and grazing for area A and grazing for area C has impacted on the flora. This is the combined effects of grazing by sheep, cattle and western grey kangaroos (*Macropus fuliginosus melanops*) and we found that grazing had most likely reduced the number of species in several lifeform categories. In a grazing study, Shepherd et al (1997) used exclosure plots at the Perup Nature Reserve and also found after a ten-year period there was a reduction of species in various life form categories and a significantly decreased vegetative cover when exposed to herbivory after fire and grazing by western grey kangaroos. The level of grazing is largely influenced by time since fire and the size of the burn area (Hobbs 1996). If a burn area is small (10-50 hectares) it may attract the same number of herbivores from the surrounding area as a larger fire, but results in a

higher density of herbivores, which may cause some species to be eaten out (Main 1981, Pastor 1988). A larger area (100-200 hectares) may have some species targeted by herbivores but not eaten to extinction, while a very large area (>1000 hectares) may escape the effects of herbivory (Pastor 1988).

Palatability is influenced by the nutrient and toxin content of the food, the nutritional needs of the animal, and the animal's past experience with the food. The senses (smell, taste and sight) enable animals to discriminate among foods and provide pleasant or unpleasant feelings associated with eating. Whether or not an animal readily eats a food is not determined by flavour alone, rather it is determined by the experiences associated with eating the food (Provenza 1995). Herbivores have the ability to shape natural systems, by favouring particular plant species, while having negligible effects on others (Koch et al. 2004). Many plants have developed natural defence systems to discourage herbivores such as, produce specific chemical constituents which are mildly toxic or develop structures on leaves and stems such as thorny prickles. Other indirect methods include seedlings that develop close to other species which are emitting toxic chemicals are avoided by herbivores in that vicinity (Jones et al. 2003) or others simply hide beneath other plants.

Main Findings

Area A

- Vegetation on the condition scale was rated as good
- No priority plants listed for the vegetation association were detected by the survey
- Grazing by introduced and native herbivores had impacted some life form groups of vegetation.
- Previous harvesting of the forest had modified the stand structure and made incursions of tracks, which has allowed entry points for grazing animals and feral predators.

Area B

- Vegetation on the condition scale was rated as completely degraded
- No priority plants listed for the vegetation association were detected by the survey
- Upper and midstorey layers missing
- Lower vegetation layer was highly modified

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Appendix 1

Species located in Area A organised by family

* Alien	SpCode	Current Species Name	Family	Lifeform
	PLAFIL	*Platysace filiformis*	Apiaceae	S
	PLATEN	*Platysace tenuissima*	Apiaceae	DS
	XANCAN	*Xanthosia candida*	Apiaceae	DS
	Xantas	*Xanthosia tasmanica*	Apiaceae	DS
	TRAPIL	*Trachymene pilosa*	Araliaceae	H
	CHACOR	*Chamaescilla corymbosa*	Asparagaceae	GP
	LOMINT	*Lomandra integra*	Asparagaceae	DS
	LOMPAU	*Lomandra pauciflora*	Asparagaceae	DS
	LOMSER	*Lomandra sericea*	Asparagaceae	DS
	LOMSP.	*Lomandra sp*	Asparagaceae	DS
	THYMAN	*Thysanotus manglesianus*	Asparagaceae	GP
	THYMUL	*Thysanotus multiflorus*	Asparagaceae	GP
	CRAVAR	*Craspedia variabilis*	Asteraceae	GP
	LAGHUE	*Lagenophora huegelii*	Asteraceae	GP
*	CARSP.	*Carduus sp*	Asteraceae	H
	ISOHYP	*Isotoma hypocrateriformis*	Campanulaceae	H
	STAMON	*Stackhousia monogyna*	Celastraceae	S
	BURCON	*Burchardia congesta*	Colchicaeae	GP
	GAHTRI	*Gahnia trifida*	Cyperaceae	Z
	LEPLEP	*Lepidosperma leptostachyum*	Cyperaceae	Z
	TETCAP	*Tetraria capillaris*	Cyperaceae	Z
	TETOCT	*Tetraria octandra*	Cyperaceae	Z
	KINAUS	*Kingia australis*	Dasypogonaceae	X
	PTEESC	*Pteridium esculentum*	Dennstaedtiaceae	F
	HIBAMP	*Hibbertia amplexicaulis*	Dilleniaceae	S
	HIBCOM	*Hibbertia commutata*	Dilleniaceae	S
	HIBMON	*Hibbertia montana*	Dilleniaceae	DS
	HIBRAC	*Hibbertia racemosa*	Dilleniaceae	S
	HIBPER	*Hibbertia perfoliata*	Dilleniaceae	DS
	TREDIF	*Tremandra diffusa*	Elaeocarpaceae	S
	TRESTE	*Tremandra stelligera*	Elaeocarpaceae	S
	ANDCAE	*Andersonia caerulea*	Ericaceae	DS
	LEUAUS	*Leucopogon australis*	Ericaceae	S
	LEUCAP	*Leucopogon capitellatus*	Ericaceae	S
	LEUPEN	*Leucopogon pendulus*	Ericaceae	DS
	LEUPRO	*Leucopogon propinquus*	Ericaceae	S
	LEUVER	*Leucopogon verticillatus*	Ericaceae	S
	AMPERI	*Amperea simulans*	Euphorbiaceae	DS
	ACABRO	*Acacia browniana*	Fabaceae	S
	ACADIV	*Acacia divergens*	Fabaceae	S

	ACAEXT	*Acacia extensa*	Fabaceae	S
	BOSAQU	*Bossiaea aquifolium*	Fabaceae	S
	BOSORN	*Bossiaea ornata*	Fabaceae	S
	CALLAN	*Callistachys lanceolata*	Fabaceae	S
	CHONAN	*Chorizema nanum*	Fabaceae	DS
	CHORHO	*Chorizema rhombeum*	Fabaceae	DS
	GOMCON	*Gompholobium confertum*	Fabaceae	S
	GOMPOL	*Gompholobium polymorphum*	Fabaceae	DS
	HOVCHO	*Hovea chorizemifolia*	Fabaceae	DS
	HOVELL	*Hovea elliptica*	Fabaceae	S
	KENCOC	*Kennedia coccinea*	Fabaceae	V
*	TRICAM	*Trifolium campestre*	Fabaceae	H
	DAMALA	*Damperiea alata*	Goodeniaceae	S
	GOOEAT	*Goodenia eatoniana*	Goodeniaceae	DS
	SCAMIC	*Scaevola microphylla*	Goodeniaceae	DS
	SCASTR	*Scaevola striata*	Goodeniaceae	DS
	VELTRI	*Velleia trinervis*	Goodeniaceae	DS
	DAMHED	*Dampiera hederacea*	Goodeniaceae	H
	ANIFLA	*Anigozanthos flavidus*	Haemodoraceae	S
	HAEPAN	*Haemodorum paniculatum*	Haemodoraceae	H
	TRIELA	*Tricoryne elatior*	Hemerocallidaceae	H
	PATBAB	*Patersonia babianoides*	Iridaceae	DS
	PATUMB	*Patersonia umbrosa*	Iridaceae	DS
	CASRAC	*Cassytha racemosa*	Lauraceae	V
	LINLIN	*Lindsaea linearis*	Lindsaeaceae	F
	ORISER	*Orianthera serpyllifolia*	Loganiaceae	DS
	THOSP.	*Thomasia sp. Vasse (C. Wilkins & K. Shepherd CW 581)*	Malvaceae	S
	ASTFAS	*Astartea fascicularis*	Myrtaceae	S
	CORCAL	*Corymbia calophylla*	Myrtaceae	T
	EUCDIV	*Eucalyptus diversicolor*	Myrtaceae	T
	EUCMAR	*Eucalyptus marginata*	Myrtaceae	T
	EUCPAT	*Eucalyptus patens*	Myrtaceae	T
	HYPCOR	*Hypocalymma cordifolium*	Myrtaceae	S
	MELTHY	*Melaleuca thymoides*	Myrtaceae	S
	MELPRE	*Melaleuca priesiana*	Myrtaceae	T
	TAXLIN	*Taxandria linearis*	Myrtaceae	S
	TAXPAR	*Taxandria parviceps*	Myrtaceae	S
	THECRI	*Thelymitra crinita*	Orchidaceae	H
	BILFLO	*Billardiera floribunda*	Pittosporaceae	V
	BILVAR	*Billardiera variifolia*	Pittosporaceae	V
*	AIRCUP	*Aira cupaniana*	Poaceae	GR
	AMPAMP	*Amphipogon amphipogonoides*	Poaceae	DS
*	BRIMAX	*Briza maxima*	Poaceae	GR
*	HOLLAN	*Holcus lanatus*	Poaceae	GR
	TETLAE	*Tetrarrhena laevis*	Poaceae	GR

	PODDRO	*Podocarpus drouynianus*	Podocarpaceae	S
	COMCAL	*Comesperma calymega*	Polygalaceae	DS
	COMCON	*Comesperma confertum*	Polygalaceae	S
	BANGRA	*Banksia grandis*	Proteaceae	T
	BANLIT	*Banksia littoralis*	Proteaceae	S
	HAKAMP	*Hakea amplexicaulis*	Proteaceae	S
	PERLON	*Persoonia longifolia*	Proteaceae	S
	XYLOCC	*Xylomelum occidentale*	Proteaceae	S
*	ANTHUM	*Anthoxanthum odoratum*	Proteaceae	GR
	CLEPUB	*Clematis pubescens*	Ranunculaceae	V
	DESFAS	*Desmocladus fasciculatus*	Restionaceae	Z
	DESFLE	*Desmocladus flexuosus*	Restionaceae	Z
	HYPFAS	*Hypolaena fastigiata*	Restionaceae	H
	LEPSP.	*Leptocarpus sp*	Restionaceae	Z
	OPEHIS	*Opercularia hispidula*	Rubiaceae	S
	STYADN	*Stylidium caespitosum*	Stylidiaceae	DS
	STYAMO	*Stylidium amoenum*	Stylidiaceae	DS
	STYCAL	*Stylidium calcaratum*	Stylidiaceae	S
	STYRHY	*Stylidium rhynchocarpum*	Stylidiaceae	DS
	HYBDEB	*Hybanthus debilissimus*	Violaceae	DS
	XANGRA	*Xanthorrhoea gracilis*	Xanthorrhoeaceae	X
	XANPRE	*Xanthorrhoea preissii*	Xanthorrhoeaceae	X
	MACRIE	*Macrozamia riedlei*	Zamiaceae	CY

Appendix 2

Species located in Area C organised by family

* Alien	SpCode	Current Species Name	Family	Lifeform	LifeStyle	Fire Resp
*	SONASP	*Sonchus asper*	Asteraceae	H	A	A1
	LEPTET	*Lepidosperma tetraquetrum*	Cyperaceae	R	P	B3
	SCHSP.	*Schoenus Sp*	Cyperaceae	H	P	A1
	BAUART	*Baumea articulata*	Cyperaceae	GR	P	B3
	HIBPER	*Hibbertia perfoliata*	Dilleniaceae	DS	P	B2
	GOOEAT	Goodenia eatoniana	Goodeniaceae	DS	P	A1
	ASTFAS	*Astartea fascicularis*	Myrtaceae	S	P	B2
	EUCDIV	*Eucalyptus diversicolor*	Myrtaceae	T	P	A2
	TAXPAR	*Taxandria parviceps*	Myrtaceae	S	P	A1
	TAXLIN	*Taxandria linearifolia*	Myrtaceae	S	P	B2
	MICSTI	*Microlaena stipoides*	Poaceae	GR	P	B3
*	ANTODO	*Anthoxanthum odoratum*	Poaceae	GR	P	A1
*	BRODIA	*Bromus diandrus*	Poaceae	GR	A	A1
*	RUMCRI	*Rumex crispus*	Polygonaceae	H	P	A1
*	RUBANG	*Rubus anglocandicans*	Rosaceae	S	P	A1