

# Vegetation Inventory Report: Western Grassland Reserve - Wilsons Block

Melbourne Strategic Assessment



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## Terms and abbreviations

BCS	Biodiversity Conservation Strategy for Melbourne’s Growth Areas (DEPI (2013a)).
CaLP Act	The Victorian Catchment and Land Protection Act 1994
DELWP	The Victorian Department of Environment, Land, Water and Planning.
DEPI	The former Victorian Department of Environment and Primary Industries (now DELWP)
DPCD	The former Victorian Department for Planning and Community Development.
DSE	The former Victorian Department of Sustainability and Environment (now DELWP).
EPBC Act	The Federal <i>Environment Protection and Biodiversity Conservation Act 1999</i> .
EVC	Ecological Vegetation Class, the units used to describe vegetation type.
FFG Act	The Victorian <i>Flora and Fauna Guarantee Act 1988</i> .
MNES	Matters of National Environmental Significance, listed under the EPBC Act.
VBA	Victorian Biodiversity Atlas. DELWP’s central database of biological data, including species location records.

# Introduction

The Victorian Government has committed to establish a series of Conservation Areas on the periphery of Melbourne for the conservation of threatened plants, animals and ecological communities (DEPI 2013a). They include a network of small areas within Melbourne's Urban Growth Boundary, as well as the larger Western Grassland Reserve (WGR, 15,000 ha) and the Grassy Eucalypt Woodland Reserve (approximately 1,200 ha).

The establishment of the reserves is the result of the Melbourne Strategic Assessment, which aims to mitigate environmental losses caused by the expansion of Melbourne's Urban Growth Boundary. This expansion will impact 'Matters of National Environmental Significance (MNES)' listed under the Federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). A 'Strategic Impact Assessment' conducted by the Victorian Government recommended ways of mitigating environmental impacts. The mitigation measures agreed to by the Victorian and Australian governments are outlined in the 'Program Report' and the 'Biodiversity Conservation Strategy (DSE 2009, DEPI 2013a). The commitments include regular reporting on ecological outcomes. A Monitoring and Reporting Framework (MRF) provides the logic and basis for monitoring target species and communities (DELWP 2015a). The MRF gives specific Key Performance Indicators (KPIs) for each listed species and vegetation community.

All Conservation Areas will be managed to achieve these management targets. The precise management strategy required to achieve the targets will, however, vary from place to place. Each area is different, and each supports a wide range of plant and animal species, different vegetation patterns, management issues, and other features. Detailed information about the type and distribution of assets and threats is required for each property that is protected. Much of that information will be contained in Fauna Inventory and Vegetation Inventory documents for each property.

## Purpose and scope

This Vegetation Inventory report forms part of the basic information required to start managing protected land. It should serve as a useful reference for managers, and also the logical basis of management actions. The specific purpose of this document is to:

- Identify and map any EPBC-listed plant species or ecological communities that are the targets of conservation measures under the MSA.
- Provide enough information about the distribution of vegetation on the land to allow management planning to proceed. That information includes the distribution of native vegetation types, significant species, and exotic species which threaten natural values.
- Fulfil (for the survey area) DELWP's commitment to produce a detailed inventory of the vegetation values within the WGR (DSE 2011, p38).
- Provide a qualitative baseline describing the vegetation when the survey area is brought into the WGR.

This document does not:

- constitute a management plan,
- describe the fauna of the survey area,
- make any claims about the likely presence or absence of values not recorded.

## The Survey Area

This report covers a large block of land within the Western Grassland Reserve (564 ha) on the corner of Ballan Rd and Cobbledicks Ford Rd, encompassing several parcels. The block is divided into three paddocks known informally as Wilsons South (201ha), Wilsons North (256 ha) and Far River (107 ha). Multiple parcels were selected to be covered by this report, as they form a cohesive management unit, and formerly constituted part of a single property. The paddocks do not correspond to the parcels, making the parcel boundaries inconspicuous on ground. The land is traversed by a road easement which has long been unfenced and managed as part of the paddocks. This land is treated as part of the property. The subject land is referred to collectively as “Wilsons Block”.

The northern boundary of the property is defined by the southern bank of an ephemeral Creekline (known locally as Wild Dog Gully). The fence along this boundary deviates slightly from the actual boundary, given the steep, cliffed terrain and the winding course of the creek. Those few species which were only recorded on the creek bank or in the indistinct upper creekline are indicated as being doubtfully recorded on the property. The survey area is shown in Figure 1.

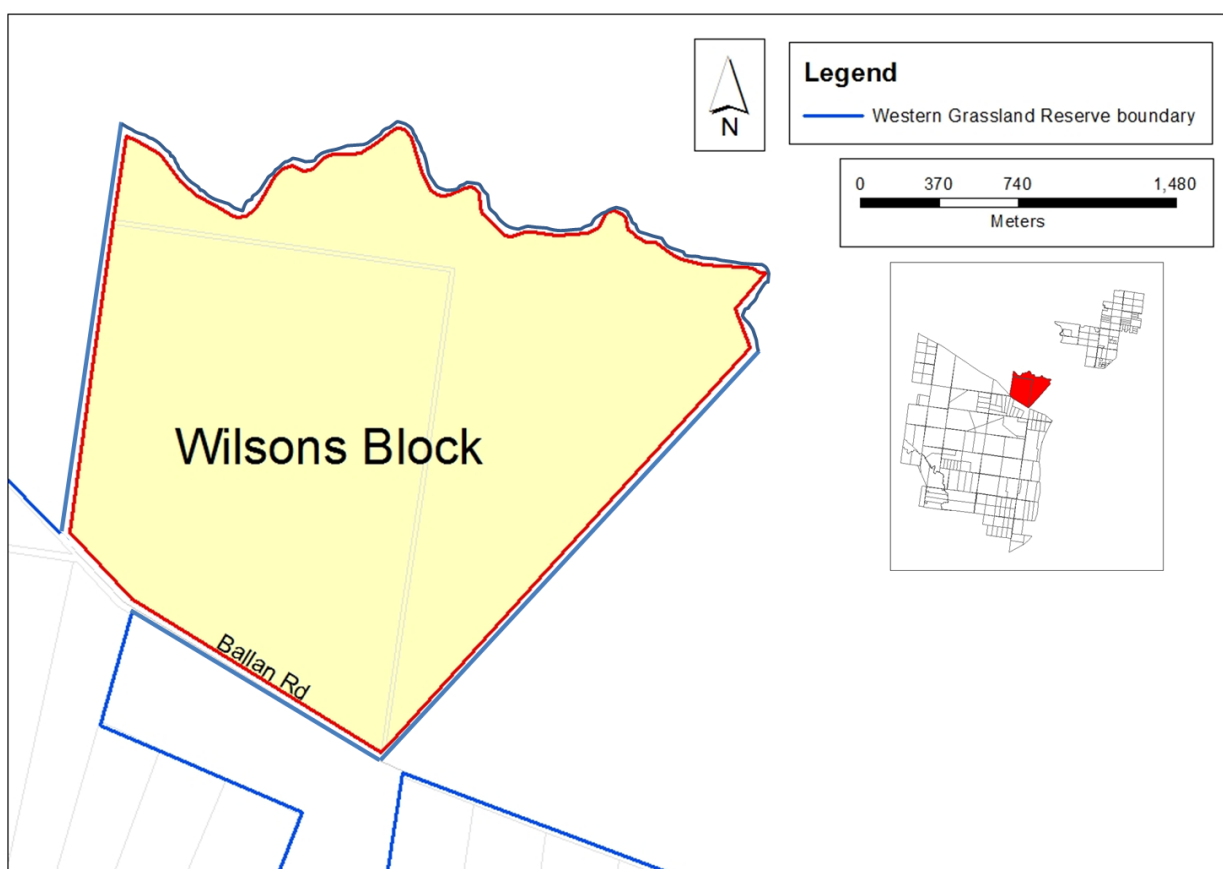


Figure 1. The survey area.

## Previous survey information

This area has been the subject of three known previous formal vegetation surveys:

- Australian Ecosystems (AE, Dylan Osler, Ana Backstrom and Karl Just) were commissioned in 2011 to survey and comment on targeted wetlands when they filled for the first time after many years of drought. Those surveys did not result in a published report, but all of the survey information received by DELWP is incorporated into this report.

- Biosis Research (2013) surveyed vegetation in detail on the large Eynesbury property, which once included the survey area. It was commissioned by the former owners of the land, and was provided with permission by Biosis Research.
- Cook et al. (2013) surveyed those areas of the property which were then thought to be Seasonal Herbaceous Wetlands. The resulting report was provided by Melbourne Water.

This property has also been visited by Val Stajsic, senior botanist from the Royal Botanic Gardens Melbourne, resulting in some additional species records being provided directly to the author.

# Survey Methods

The site was surveyed using the methods described in DELWP (2015b).

## Coverage and intensity

The land was surveyed over 15 days between August and January in 2012 and 2013, as well as one day in March 2013. These survey days include vegetation mapping, species searches and point-intercept quadrats for grassland monitoring (as described in DELWP 2015a). The land was also visited briefly on other occasions between November 2011 and May 2013, providing a few additional species records.

## Definitions

### Native vegetation

‘Native vegetation’ is defined according to DEPI 2013b (“...either...an area of vegetation where at least 25 per cent of the total perennial understory plant cover is native, or any area with three or more canopy trees where the canopy foliage cover is at least 20 per cent of the area”).

### EPBC-listed communities

EPBC-listed communities are described according to the listing advice provided by the Threatened Species Scientific Committee, posted on the Department of Environment website (TSSC 2008, TSSC 2012).

### Plant taxonomy

Plant taxonomy follows the Royal Melbourne Botanic Gardens *Census of Vascular Plants in Victoria* (Walsh and Stajsic 2008), unless otherwise noted. Departures from this standard have only been made to follow more recent taxonomic publications (as cited). Occasionally, apparently distinct but unrecognized forms are noted, if they were considered important to record (Appendix 2).

### Significance of plants

Several sources are used to describe the conservation status or significance of plant species:

- EBPC listed (Critically Endangered, Endangered, Vulnerable). Follows the lists of species and communities maintained by the Australian Department of the Environment, available on the internet.
- Listed under the Victorian Government *Flora and Fauna Guarantee Act 1988* (FFG Act). Follows the list maintained by DELWP (updated 2013).
- Victorian Rare or Threatened (VROT; Endangered in Victoria, Vulnerable in Victoria, Rare in Victoria, Poorly Known). Defined by inclusion on either the ‘Advisory List of Rare or Threatened Plants in Victoria (DEPI 2014)’, maintained by DELWP, or as indicated in the Census (Walsh and Stajsic 2008).

### Categories of Weeds

The *Catchment and Land Protection Act 1994* (CaLP Act) lists noxious weeds in several categories, used here:



- State prohibited weeds “either do not occur in Victoria but pose a significant threat if they invade, or are present, pose a serious threat and can reasonably be expected to be eradicated. If present, infestations of a State prohibited weed are relatively small. They are to be eradicated from Victoria if possible or excluded from the State.”
- Regionally prohibited weeds “are not widely distributed in a region but are capable of spreading further. It is reasonable to expect that they can be eradicated from a region and they must be managed with that goal. Land owners, including public authorities responsible for crown land management, must take all reasonable steps to eradicate regionally prohibited weeds on their land”.
- Restricted weeds are “plants that pose an unacceptable risk of spreading in this State and are a serious threat to another State or Territory of Australia. Trade in these weeds and their propagules; either as plants, seeds or contaminants in other materials is prohibited”.
- Regionally Controlled weeds are “usually widespread in a region. To prevent their spread, ongoing control measures are required. Land owners have the responsibility to take all reasonable steps to prevent the growth and spread of Regionally controlled weeds on their land.”

# Survey results

## EPBC-listed ‘Matters of National Environmental Significance’

Matters of National Environmental Significance (MNES) are those species or communities listed under the EPBC Act. MNES are the specific environmental values referred to by the Key Performance Indicators and targets (DELWP 2015a).

Two matters of national environmental significance occur naturally on the property, both ecological communities, both listed as ‘Critically Endangered’:

- Natural Temperate Grassland of the Victorian Volcanic Plain (hereafter NTG)
- Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (hereafter SHW)

### Natural Temperate Grassland of the Victorian Volcanic Plain (NTG)

NTG is a treeless grassland community occurring on heavy soils on basalt terrain, dominated in intact stands by native tussock-forming grasses of the genera *Themeda*, *Poa*, *Rytidosperma* and/or *Austrostipa*. It also contains a variety of native herbs (notably daisies, Asteraceae), which may be dominant in some cases (TSSC 2008). NTG corresponds closely to ‘Western (Basalt) Plains Grassland Community’ listed under the FFG Act (see below).

On the property it encompasses the following Ecological Vegetation Classes (EVCs, see below):

- ‘Plains Grassland’,
- ‘Stony Knoll Shrubland’,
- ‘Creekline Tussock Grassland’.

NTG may also correspond to parts of some wetland EVCs, where they are dominated by appropriate grass species (locally *Poa* and *Rytidosperma*), however, those wetland EVCs correspond far more closely and fully with another EPBC-listed community (‘Seasonal Herbaceous Wetlands’, see below), and are not included here as NTG (The only EVC concerned on Wilsons Block is ‘Plains Grassy Wetland’).

NTG covers most of the surveyed land (432 ha, 77% of ‘Wilsons Block’). An example of NTG on the property is shown in Figure 2. Figure 4 shows the extent of NTG.



Figure 2. NTG on the southern boundary of the surveyed land (adjacent to Ballan Rd).

### Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (SHW)

SHW is a treeless grassland, sedgeland or herbfield, occurring on heavy soils in fertile terrain which are periodically inundated by shallow water (TSSC 2012).

On the property, this community corresponds closely to the following EVCs (see below):

- Plains Grassy Wetland

The surveyed property supports 13 ha of SHW (2% of property), in 2 relatively large patches (>3 ha), and numerous smaller patches. Figure 3 shows an example of SHW on the surveyed land. Figure 4 shows the extent of SHW.

The listing advice (TSSC 2012) distinguishes examples of SHW that are of particularly high quality by their species composition. Both of the 2 large patches and many of the small patches can be considered high quality. Together, they contain 11 of the indicator species for High quality SHW. These occur on the property as follows, with some observations only coming from previous surveys:

- |                                     |   |
|-------------------------------------|---|
| ▪ <i>Asperula conferta</i>          | common in most patches                                      |
| ▪ <i>Brachyscome basaltica</i>      | rare, 3 plants noted  |
| ▪ <i>Isoetes drummondii</i>         | occasional, in season (observed by AE and Cook et al. 2013) |
| ▪ <i>Lobelia pratioides</i>         | rare  |
| ▪ <i>Marsilea drummondii</i>        | common, subdominant in all patches                          |
| ▪ <i>Marsilea hirsuta</i>           | rare (observed by AE and Cook et al. 2013)                  |
| ▪ <i>Marsilea costulifera</i>       | rare (observed by AE and Cook et al. 2013)                  |
| ▪ <i>Ottelia ovalifolia</i>         | rare (observed by Cook et al. 2013)                         |
| ▪ <i>Pilularia novae-hollandiae</i> | scattered in season, uncommon                               |
| ▪ <i>Potamogeton cheesmanii</i>     | rare (observed by Cook et al. 2013)                         |





Figure 3. SHW on the surveyed land (when inundated). This patch is dominated by *Eleocharis acuta* and *Marselia drummondii*.

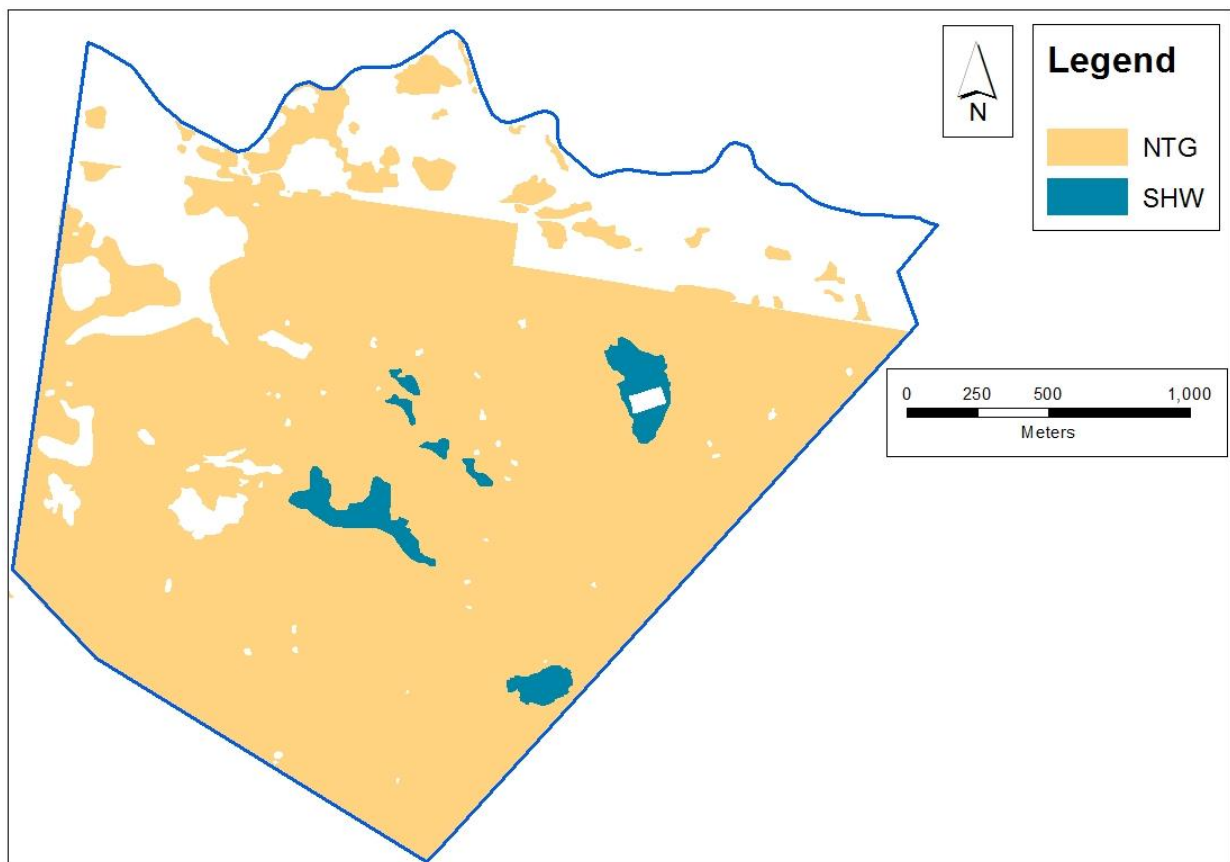


Figure 4. The distributions of Natural Temperate Grassland (NTG) and Seasonal Herbaceous Wetland (SHW) on Wilsons Block.



## FFG-listed values

The *Flora and Fauna Guarantee Act 1988* (FFG Act) is the primary Victorian legislation dedicated to the conservation of threatened species and communities and for the management of potentially threatening processes. Although the structure of the MSA and the goals of the WGR do not directly relate to the FFG Act, FFG-listed assets are the responsibility of Victoria to manage, and they provide a useful structure for considering the status of the values on the property.

- One FFG-listed community occurs. The 'Natural Temperate Grassland' community noted above corresponds directly (on this property) with the 'Western (Basalt) Plains Grassland Community' listed under the FFG Act.
- One FFG-listed species occurs. Buloke (*Allocasuarina luehmannii*) occurs in a few scattered patches. Most individuals of this species have recently died (one as recently as 2013), and only 4 trees remained alive in early 2014 (Figure 5).



Figure 5. A Buloke stand. Note the dead trees, the removal of bark (foreground) by livestock, and the non-native understorey.

## Native vegetation according to Ecological Vegetation Classes

The survey area contains 448 ha of native vegetation (77.5 % of 'Wilsons Block').

The patterns of vegetation on the property can be described using 8 EVCs, described here in order of coverage. The distribution of EVCs is shown in Figures 11 and 12, below.

### Plains Grassland (EVC 132)

This EVC corresponds directly (in this region) to NTG, described above. DELWP recognizes several variants of Plains Grassland, with all in the surveyed area referable to 'Low rainfall plains grassland'. This variant has

floristic affinities with more arid areas in northern Victoria. It is characterised by the common occurrence of chenopods (*Maireana decalvans* and *Maireana enchylaenoides* are abundant on the surveyed land); the prominence of summer-growing (C4) grasses including *Bothriochloa macra* (see species list- which distinguishes C4 from C3 grasses). On the surveyed land, the majority of Plains Grassland is modified by grazing and has lost many of its original species (including the former-dominant *Themeda triandra*), as described below under 'states'. Some areas of Plains Grassland are similar in composition to Ephemeral Drainage-line Grassy Wetland in DSE (2012). These areas are on depressions or drainage lines, on heavy clay soils which often form gilgai.

This EVC covers 404 ha of the Wilsons property (72%). Its coverage is less than NTG because some areas of NTG are assigned to other EVCs (Stony Knoll Shrubland, Creekline Tussock Grassland).

### **Stony Knoll Shrubland (EVC 649).**

This EVC occurs on low stony rises (or 'knolls' or 'barriers') on basalt flows. The land surface is covered with large rocks, and between them the soil is fertile and well drained, but often shallow. The factors which exclude most trees and shrubs from Plains Grassland (heavy clays which produce water stress in summer, frequent fire, etc.), are ameliorated on stony knolls, allowing shrubs and small trees to occur (locally Hedge Wattle (*Acacia paradoxa*) with Drooping Sheoak (*Allocasuarina verticillata*) stumps and dead branches showing this species also occurred in this EVC in the recent past. The surface stones create microclimates with locally varied moisture characteristics, allowing delicate ferns to persist alongside plants otherwise characteristic of arid places. On the surveyed land, this EVC is dominated by Rough Spear-grass (*Austrostipa scabra*) and Plains Spear-grass (*Austrostipa bigeniculata*). It also supports a range of native species at low abundance which are absent from other parts of the property (e.g. *Dianella* sp. aff. *longifolia* (Benambra), *Glycine tabacina*). This EVC forms part of NTG. It is shown in Figure 6.

This EVC covers 21 ha of the Wilsons property (4%).



Figure 6. Stony knoll Shrubland, showing the rocky terrain. The shrub is Hedge Wattle (*Acacia paradoxa*).



### Plains Grassy Wetland (EVC 125)

This EVC describes low lying areas that are inundated after rains. Most patches of this EVC correspond to SHW, apart from those too small to meet the size thresholds. The description of SHW provided above applies to this EVC.

On the surveyed land, Plains Grassy Wetland is in relatively good condition, with a diversity of native species. When not inundated, this EVC often appears to be non-native vegetation (bare ground or high levels of ephemeral weeds).

This EVC covers 15 ha of the Wilsons property (3%). Its coverage is slightly more than SHW, because some patches of Plains Grassy Wetland are too small to meet the criteria for SHW.

### Creekline Tussock Grassland (EVC 654)

This EVC describes tussock grassland that grows along ephemeral creeklines. It is usually dominated by Common Tussock Grass (*Poa labillardierei*); however on Wilsons Block this grass is only occasionally prominent. Instead, much of the vegetation is dominated by grasses typical of rocky grasslands (*Bothriochloa macra*, *Microlaena stipoides*, *Chloris truncata*), several hardy sedges capable of surviving or avoiding prolonged drought (*Eleocharis acuta*, *Eleocharis pusilla*, *Carex inversa*, *Cyperus lhotskianus*) along with numerous herbs of ephemeral wetlands (most notably *Haloragis aspera* and *Persicaria prostrata*). This combination of species results from the particularly rocky nature of many of the drainage lines on Wilsons Block. Much of the vegetation corresponds to the informally used EVC name 'Lava Plain Ephemeral Wetland', which occurs in small linear bands along minor rocky drainage lines. It experiences occasional inundation by flowing water, and holds some water in pools among the rocks when flows subside. This EVC is shown in Figure 7.

This EVC covers 7 ha of the Wilsons property (1%).



Figure 7. Creekline Tussock Grassland (close-up), showing the exposed basalt blocks, small areas where water pools, and Creeping Knotweed (*Persicaria prostrata*) growing in the rock cracks.



### **Escarpment Shrubland (EVC 895) (<1 ha)**

Escarpment Shrubland occupies rocky cliffs or steep slopes above the watercourse along the northern boundary of Wilsons Block. The soils are fertile but shallow, very well drained and easily mobile; particularly when disturbed by rabbits. Like Stony Knoll Shrubland, this EVC supports a range of microclimates, and its vegetation is physiologically diverse. On the surveyed land, Escarpment Shrubland is dominated by the weedy species Blanket Weed (*Galenia pubescens*) and African Boxthorn (*Lycium ferocissimum*), along with the native grasses Rough Spear-grass, Plains Spear-grass, and the native shrub Scented Saltbush (*Rhagodia parabolica*). Although it only covers a small area, numerous species are restricted on the property to this EVC (e.g. the ferns of rock crevices *Pallaea falcata*, *Asplenium flabefolium* and *Pleurosorus rutifolius*, the drought-tolerant C4 grasses *Enneapogon nigricans*, *Paspalidium constrictum*, and Rye Beetle-grass (*Tripogon loliiformis*), and the shrubs Sweet Bursaria (*Bursaria spinosa*) and Sticky Hop-bush (*Dodonaea viscosa*). The EVC is shown in Figure 8.

This EVC covers <1 ha of the Wilsons property (<1%).



Figure 8. Escarpment shrubland, showing a steeply-cliffed section, with Austral Stork's-bill (*Pelargonium australe*) and Tree Violet (*Melicytus dentatus*).

### **Riparian Woodland (EVC 641)**

Riparian Woodland occurs in a narrow strip along the bank of the Werribee River, on fertile alluvial soils and sand deposits, in places which are occasionally flooded. It is dominated by tall, spreading River Red Gums (*Eucalyptus camaldulensis*), with a tall shrub layer of Blackwood (*Acacia melanoxylon*) and Woolly Tea-tree (*Leptospermum lanigerum*). On the banks and in the water, a wide range of moisture-loving and semi-aquatic species occur, most of them restricted to this habitat. This EVC is shown in Figure 9.

This EVC covers <1 ha of the Wilsons property (<1%), and is restricted to the Northern boundary.





Figure 9. Riparian Woodland, Werribee River, showing River Red Gum (*Eucalyptus camaldulensis*) and a young plant of Wirilda (*Acacia provincialis*) in the foreground. Wilsons Block is only on the right (south) bank.

#### Plains Woodland (EVC 803) (< 1 ha).

This EVC is characterized locally by the presence of Bulokes (*Allocasuarina luehmannii*). On the surveyed land this EVC is virtually extinct, but would have occurred in several live-stock camps now dominated by introduced species. Generally, this EVC occupies a very similar niche to Plains Grassland, but where the factors which exclude woody species are relaxed, allowing an overstorey of trees to persist. Often this EVC occupies slightly lighter soils than Plains Grassland, however sometimes no easily-discernable ecological difference between the EVCs exists, and it is likely that Plains Grassland and Plains Woodland occurred interspersed with each other, forming an open and patchy savannah. Buloke stands have long been used as camps by live-stock. Many trees have had their bark removed by rubbing, and most are dead or dying. The understory is mostly non-native, dominated by disturbance and nutrient-loving weeds (*Chenopodium album*, *Erodium botrys*, *Galenia pubescens*, *Lepidium africanum*, etc.).

This EVC is shown in Figures 5 and 10. This EVC is not mapped (See Figure 10), as it occurs only in very tiny patches (<0.05 ha in total). Furthermore, it is almost indistinguishable from Plains Grassland once its trees have been removed, and many of the areas mapped as Plains Grassland were probably referable to Plains Woodland pre-1750.



Figure 10. Plains Woodland, shown in the background. Although only a small patch of woodland in amongst Plains Grassland / NTG, this is the largest of several patches on the surveyed land. It is notable that most of the FFG-listed Buloke trees have died since this photograph was taken in 2010.

**Tall Marsh (EVC 821) (< 1 ha).**

This EVC is represented by a stand of *Typha domingensis* on the creekline that defines the northern boundary of the property. A negligible quantity (<0.001 ha) may occur on the property itself.

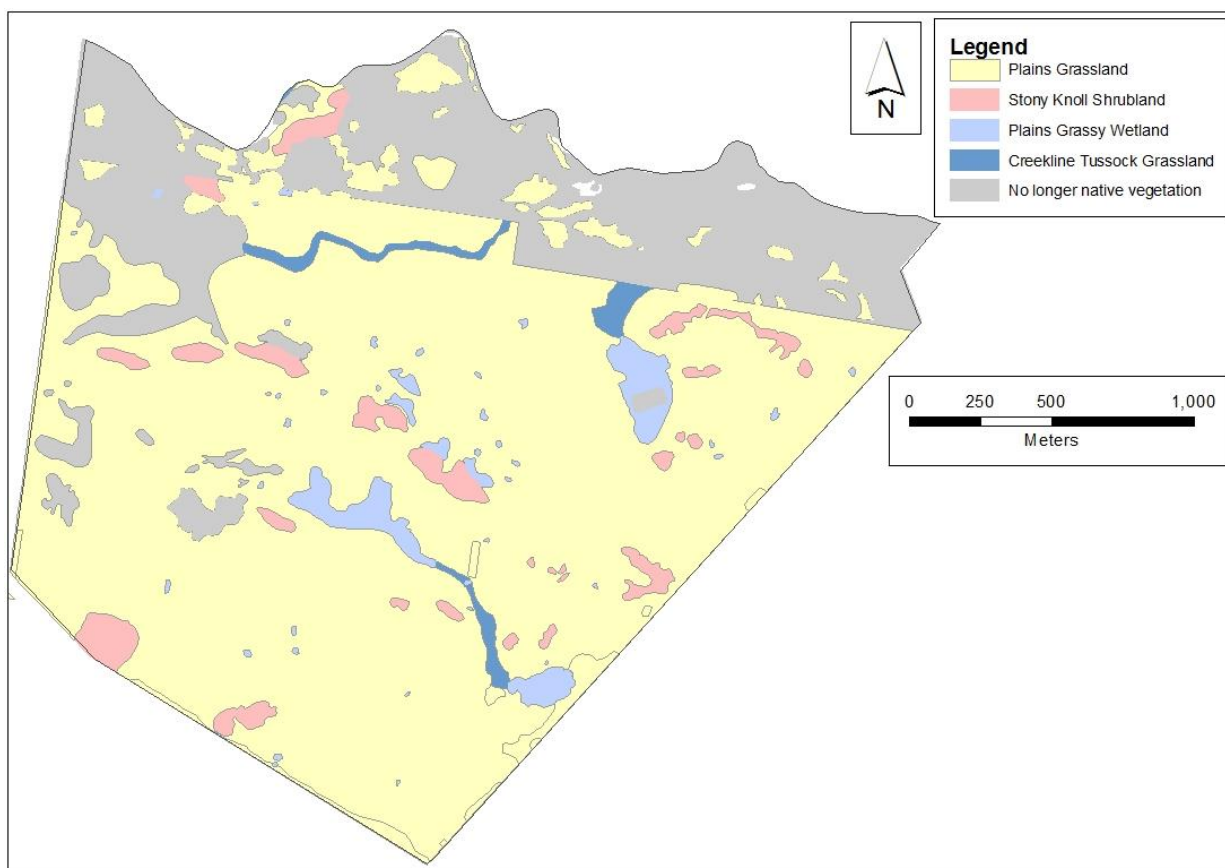


Figure 11. The current distribution of native vegetation classified according to EVC on the property.

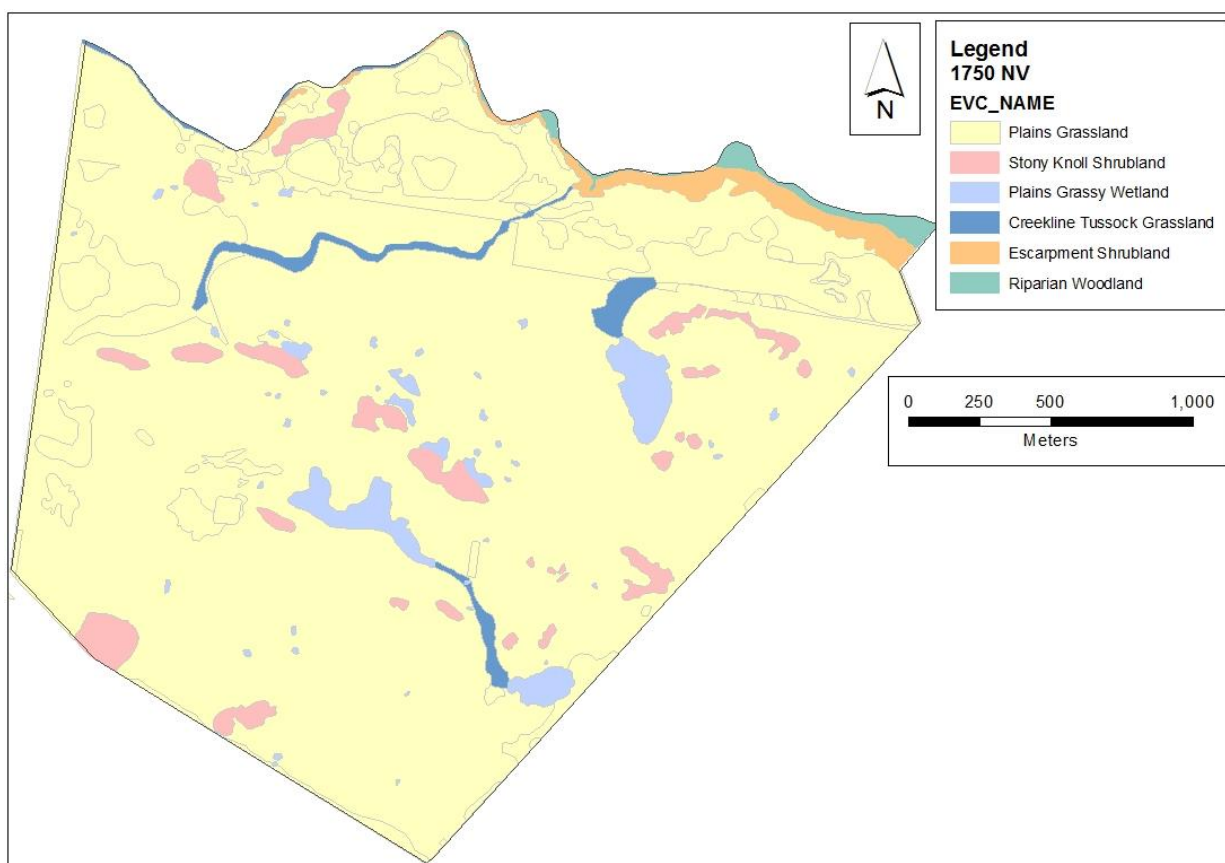


Figure 12. The likely pre-1750 distribution of native vegetation according to EVCs.



## Vegetation patterns - Natural Temperate Grassland 'states'

To assist the management of NTG, DELWP has created a State-transition model (STM) of this ecosystem. This is a conceptual model which describes the structure and dynamics of NTG in a way that is useful for management and planning. Any location within the NTG ecosystem (current native vegetation or cleared land) can be described as being in a particular 'state'. Locations may 'transition' (change) between states over time, as a result of natural disturbance or management. The ability to maintain and enhance NTG condition (i.e. reach management targets) depends on the ability to manipulate the transitions between states. Mapping the states is important because locations in a given 'state' share a particular set of management constraints and opportunities.

While some states are generally more intact than others, it is important to acknowledge that condition (or 'quality' or 'value') may vary substantially within a given state; and the assignment of a site to a particular state is not the same as a condition assessment. Certain states (or condition classes within a state) may be degraded to the point that they are no longer part of a listed community (Beeton and McGrath 2009). Natural temperate Grassland was identified in several states, described below. These are mapped on Figure 15.

### Themeda Grassland

This 'state' includes areas with >10% Kangaroo Grass (*Themeda triandra*) cover, few native herbs, and no history of cropping. It is considered of relatively high value, and is rare in the landscape. On the surveyed land, it covers small, narrow areas concentrated around the perimeter of the property (notably on the south, along Ballan Rd). This distribution may reflect the gradual re-colonisation of *Themeda triandra* into the paddocks after the relaxation of stocking rates, from the roadsides which has acted as a refuge for this species. Figure 13 shows 'Themeda grassland' on the surveyed land.

*Themeda* grassland covers 7 ha of the Wilson's Block property (1%).



Figure 13. *Themeda* grassland on the boundary of the surveyed land (*Themeda triandra* is the red-brown grass, *Austrostipa bigeniculata* and *Rytidosperma* spp. are straw-coloured.).

### Nutrient-enriched Grassland

This state includes areas which have not been de-rocked, but which have elevated nutrient levels as a result of grazing and fertilizer application (as indicated by a high cover of nutrient-loving weeds). These areas have also largely lost the naturally-dominant Kangaroo Grass. Many areas assigned to this state approach 'C3 grassland' (C3G, including the area shown in Figure 3). The transition between these two states is gradual, as it involves the slow process of de-nutrification. In summer and autumn, the vegetation is dominated by perennial native grasses (Spear-grasses and Wallaby-grasses), but in winter and spring, annual nutrient-loving weeds dominate (notably Soft Brome and Wimmera Rye Grass). Nutrient-enriched Grasslands retains high numbers of a few native herb species that are relatively tolerant of elevated nutrients and grazing (Creeping Saltbush (*Atriplex semibaccata*), Kidney Weed (*Dichondra repens*), Slender Dock (*Rumex brownii*), Grassland Wood-sorrel). Figure 14 shows 'nutrient-enriched grassland' on the surveyed land.

Nutrient-enriched Grassland covers 509 ha of the Wilson's Block Property (90%).



Figure 14. 'Nutrient-enriched grassland' on the surveyed land. The visible vegetation is dominated by the native Plains Spear-grass, and the weed Artichoke Thistle (*Cynara cardunculus*).

### De-rocked nutrient-enriched Pasture

This state describes vegetation that has been de-rocked, ploughed and fertilized for the purposes of growing crops. On the surveyed land, cropping only ceased in 2011. The vegetation is dominated by a range of nutrient loving weeds. No photograph of this state on the property is provided.

De-rocked nutrient-enriched pasture covers 29 ha of the Wilson's Block property (5%).



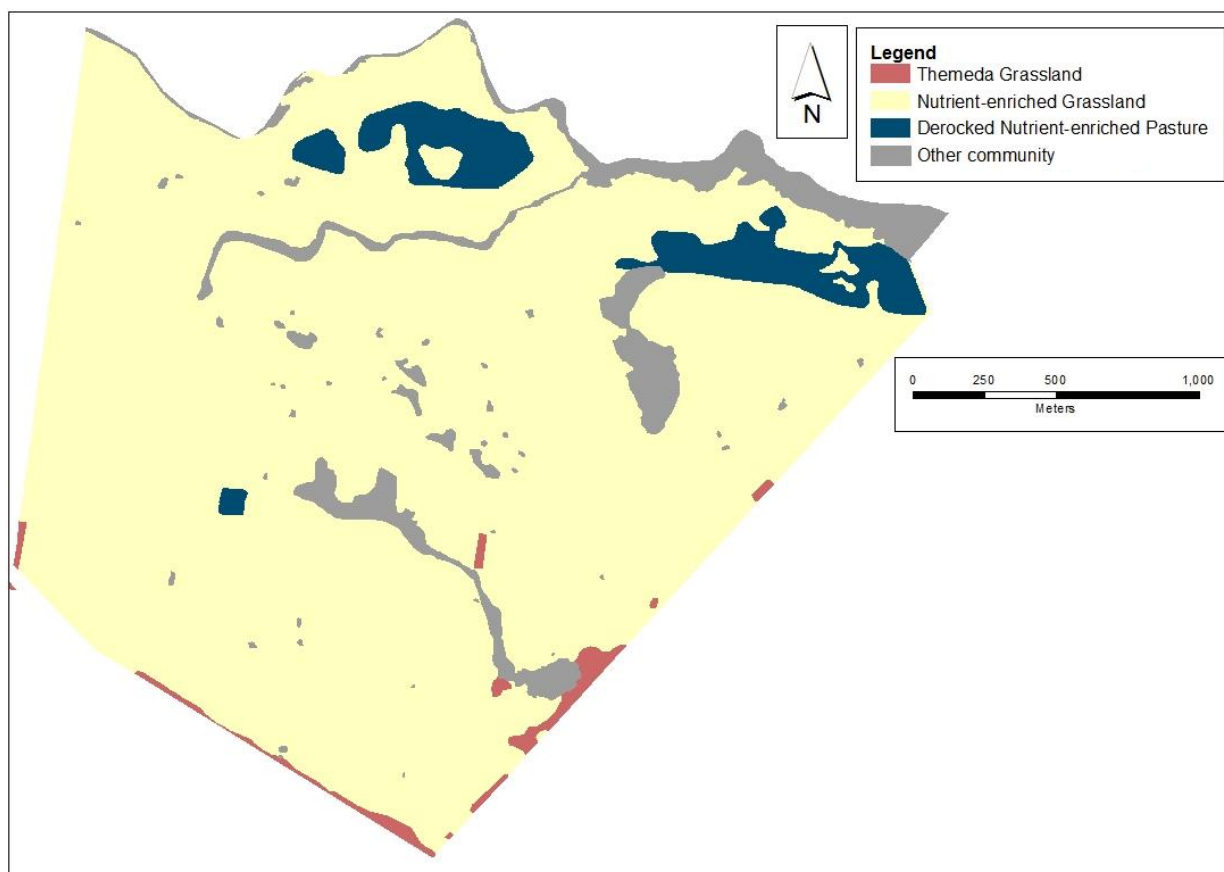


Figure 15. The distribution of grassland 'states' on the surveyed land.

## Plant species

Two hundred and sixty one vascular plants were recorded on the surveyed land. While this tally represents a high richness, the abundance of the species was markedly uneven. A small number of species covered most of the property (those that are relatively grazing tolerant, such as the natives *Austrostipa bigeniculata*, *Bothriochloa macra*, *Chloris truncata*, *Rytidosperma caespitosum*, *R. duttonianum* and the introduced species *Erodium botrys*, *Galenia pubescens*, *Nassella trichotoma* and *Lolium rigidum*). Most species were recorded in few places, and in low abundance.

One hundred and sixty-six of the 261 species were native (64%).

Appendix 1 lists all of the species recorded, and describes their observed abundance according to EVC. This list is intended to be a useful reference guide for managers. Appendix 2 presents notes on plant identification, recording identification difficulties and the occurrence of notable forms that are not currently named.

## Significant native species

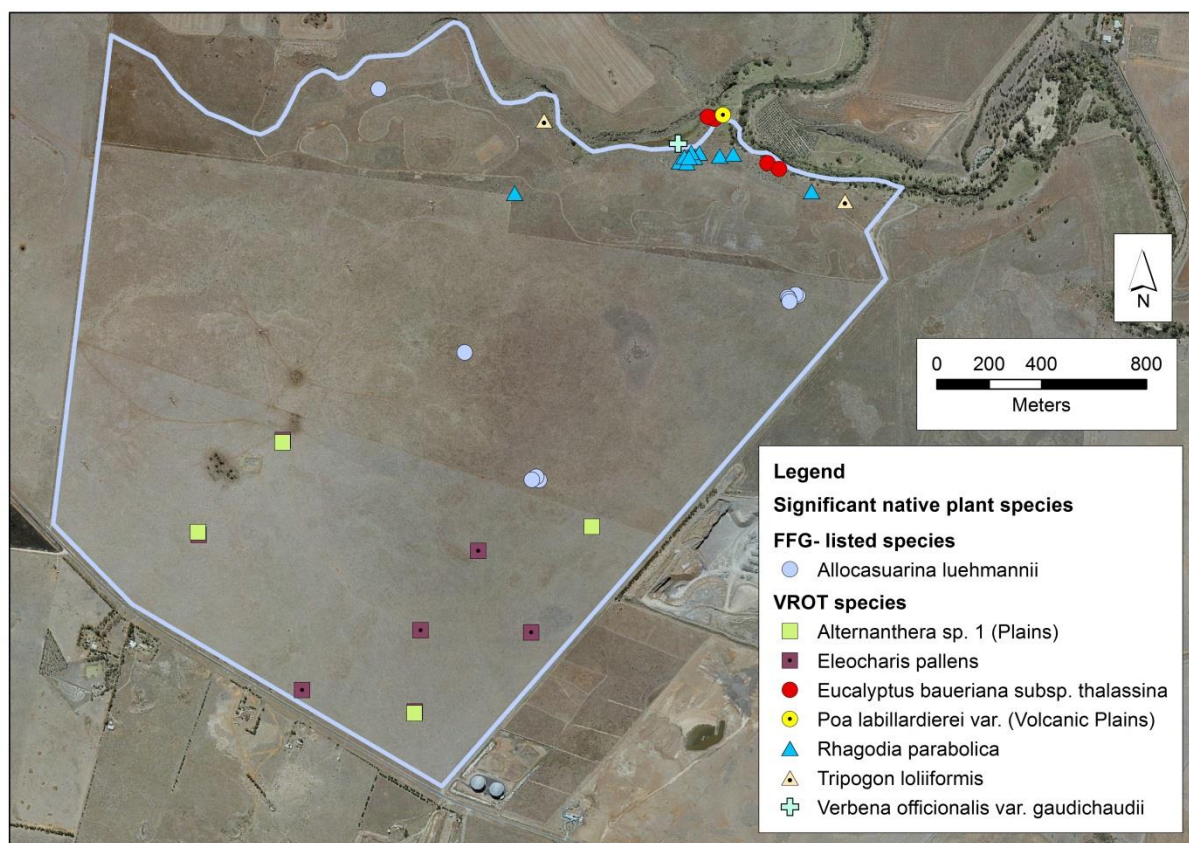
As noted above, no EPBC-listed species were recorded on the property, and one FFG-listed species was recorded (Buloke *Allocasuarina luehmannii*). Many other species are, however, considered significant in Victoria (VROTs). These species are scattered across the surveyed land, with concentrations along the escarpment and watercourses, and on the stony rises. Table 2 lists the species recorded on the property that are either FFG listed or VROTs, with some brief notes about their local occurrence. Figure 16 shows the distribution of some of these species. Figure 17 shows photographs some of the species on the property.

**Table 1: Significant native species that are listed under the EPBC-Act, FFG-Act or on the DEPI VROT Advisory List (DEPI 2014). CE= critically endangered, EN=endangered, V=vulnerable, F = FFG listed, e= endangered, r= rare, k= poorly known.**

Species	FFG	VROT*	Observations of distribution and abundance
<i>Allocasuarina luehmannii</i> (Buloke)	Yes	--	Scattered, 4 live trees (as of spring 2013)
<i>Alternanthera</i> sp. 1 (Plains) (Plains Joyweed)		k	Common in depressions
<i>Convolvulus angustissimus</i> subsp. <i>omnigracilis</i>		k	Very common everywhere (not shown in Figure 16).
<i>Dianella</i> sp. aff. <i>longifolia</i> (Benambra) (Arching Flax-lily)		v	3 individuals, on stony rises (not shown in Figure 16).
<i>Eleocharis macbarronii</i>		k	Not seen by DELWP. Only recorded by Cook <i>et al.</i> (2013), (not shown in Figure 16).
<i>Eleocharis pallens</i>		k	Common in wetlands
<i>Eucalyptus baueriana</i> subsp. <i>thalassina</i> (Werribee Blue Box)		v	4 individual mature trees (see Figure 16)
<i>Gratiola pumilo</i> (Dwarf Brooklime)		r	Not seen by DELWP. Only recorded by Cook <i>et al.</i> (2013) (not shown in Figure 16).
<i>Poa labillardierei</i> var. (Volcanic Plains) Basalt Tussock Grass		k	Rare, only recorded on riparian terraces (see Figure 16)
<i>Rhagodia parabolica</i> (Scented Saltbush)		r	Very common on escarpment
<i>Tripogon loliiformis</i> (Rye Beetle-grass)		r	3 small scattered colonies on escarpment (see Figure 16)
<i>Verbena officinalis</i> var. <i>gaudichaudii</i> (Native Verbena)		k	7 individuals, lower escarpment (see Figure 16).

\*k – Poorly known in Victoria, r – rare in Victoria, v – vulnerable in Victoria





**Figure 16. The locations of selected significant species.** Selected species include FFG-listed and VROT species. Species that are widespread are not shown.



**Figure 17. Selected significant native species.** Clockwise from top left: *Verbena officinalis* subsp. *gaudichaudii*, *Rhagodia parabolica*, *Alternanthera* sp. 1, *Tripogon loliiformis*.



## Weeds

Of the 261 species recorded, 95 were introduced. Some of the introduced species identified pose serious risks to native vegetation on or near the surveyed land, or to agriculture in the surrounding areas. The identification and mapping of those species is necessary to assist management.

Table 2 lists the species recorded on the property which are listed under the CaLP Act 1994, and notes their category of listing in the Port Phillip region. Figure 18 shows the distribution on the surveyed land of some of these species. Some near-ubiquitous species are not shown on the map, for the sake of clarity (e.g. *Nassella trichotoma*).

**Table 2. Declared noxious weeds observed on the surveyed land.**

CaLP Act Category	Weed species	Observations on surveyed land
State Prohibited	---	---
Regionally Prohibited	<i>Onopordum acaulon</i> (Stemless Thistle)	Single plant (see Figure 18)
Regionally Controlled	<i>Cirsium vulgare</i> (Spear Thistle)	Widespread and abundant
	<i>Cynara cardunculus</i> (Artichoke Thistle)	Widespread and abundant
	<i>Dipsacus fullonum</i> (Wild Teasel)	Few plants, localized, riparian (see Figure 17)
	<i>Echium plantagineum</i> (Patersons Curse)	Widely scattered, notably stock camps
	<i>Juncus acutus</i> (Spiny Rush)	Occasional, riparian only
	<i>Lycium ferrocissimum</i> (African Boxthorn)	Widely scattered, abundant on escarpment
	<i>Marrubium vulgare</i> (Horehound)	Scattered, mostly stock camps
	<i>Nassella trichotoma</i> (Serrated Tussock)	Widespread and very abundant
	<i>Rosa rubiginosa</i> (Sweet Briar)	Occasional, mostly rocky places
	<i>Silybum marianum</i> (Variegated Thistle)	Occasional, mostly stock camps
	<i>Solanum linnaeanum</i> (Apple of Sodom)	Scattered
	<i>Scolymus hispanicus</i> (Golden Thistle)	Scattered patches, mostly stony rises
	<i>Ulex europaeus</i> (Gorse)	Occasional, lower escarpment only
	<i>Xanthium spinosum</i> (Bathurst Burr)	Localized in depressions
	<i>Foeniculum vulgare</i> (Fennel)	Occasional, escarpment only
Restricted	<i>Nassella neesiana</i> (Chilean Needle Grass)	Localised patches (see figure 17)
	<i>Salix</i> spp. (Willows)	Single plant, riparian
	<i>Verbascum thapsus</i> (Great Mullein)	Scattered, rocky areas

In addition to these declared noxious weeds, DEPI (2011b) identified 10 species that were considered to be the most seriously threatening in the WGR. Four of these occur on the surveyed property, but only two are declared noxious weeds in the Port Phillip and Westernport region:

- *Gazania linearis* (Gazania) (Not declared noxious, but serious emerging threat)
- *Nassella hyalina* (Cane Needle Grass) (Not declared noxious, but serious emerging threat)
- *Nassella neesiana* (Chilean Needle Grass) (declared noxious, above)
- *Scolymus hispanicus* (Golden Thistle) (declared noxious, above)

The distribution of *Nassella hyalina* is shown in Figure 18, along with the declared noxious weeds.

Several other un-listed introduced species are considered by to be high threat weeds in the context of the surveyed land:

- *Galenia pubescens* (Blanket Weed) dominates large areas on the escarpment, and in former grassland in the north and west of the property. It is scattered elsewhere. Figure 19 shows a serious infestation.
- *Opuntia ficus-indica* (a cactus) is seriously invasive on the escarpment to the north of the property, as it is on adjoining land. It is shown in Figure 19.

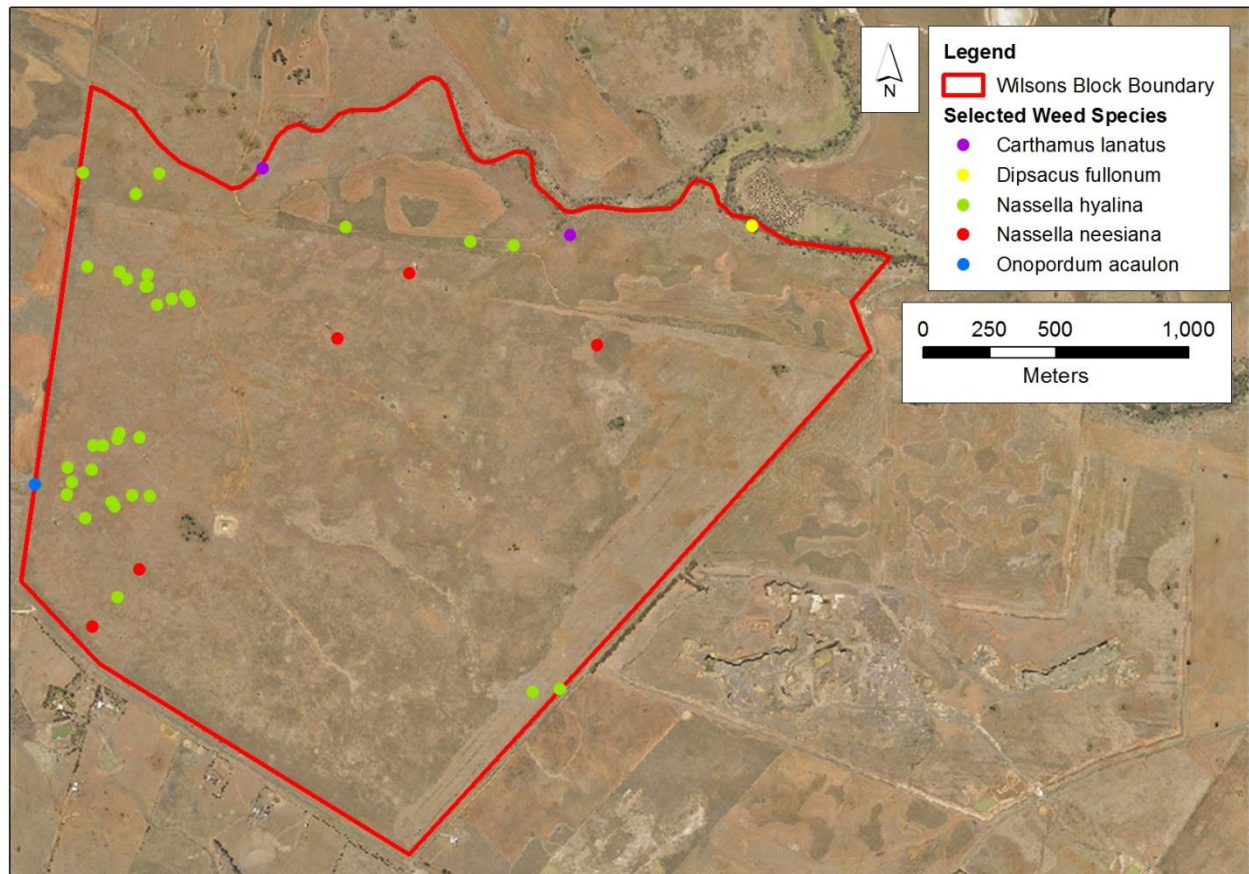


Figure 18. The distribution of selected weed species.



Figure 19. Serious weed invasion, by *Galenia pubescens* (most of understorey), *Nassella trichotoma* (visible as scattered tussocks), and the cactus *Opuntia ficus-indica*. This area is in the north-eastern portion of the property, just above the escarpment.

### ‘Hot spots’

The information presented above provides a formal spatial assessment of the values. This section provides a subjective assessment of where these values intersect to create conspicuous concentrations of biological values, called here “hot spots”. These are the places of particular interest on the property; the places that display its values to full advantage. The ‘hot spots’ are thus places where intensive or intricate management may best be undertaken to protect the values of the site. Figure 20 shows the ‘hot spots’.

The assessment of ‘hot spots’ is necessarily subjective, because it takes into account some intangible quantities, including interesting or unusual juxtapositions of biological values for educational purposes or visual amenity, etc.

Four themes are apparent among the hot spots:

- Escarpment and Drainage lines of ‘Wild Dog Gully’. The jumbled rocky cliffs, slopes and creek beds create a visually impressive landscape, and provide niches for many plant species not found elsewhere on the property. The area identified as a hot spot is an assemblage that brings together vertical cliffs, a seasonal waterfall and cascades, tall rocky embankments, and winding drainage lines.
- Seasonal Herbaceous Wetlands of large extent. ‘Plains grassy wetlands’ are scattered all over the property (Figure 11). Two wetlands, however, are particularly large (>3 ha) and intact, and represent high quality SHW. When inundated these sites are attractive, and loud with frog calls.
- Selected Stony Knoll Shrubland. Some stony rises stand out due to their native species diversity, and their substantial and visually impressive rocky platforms.
- Themeda Grasslands.

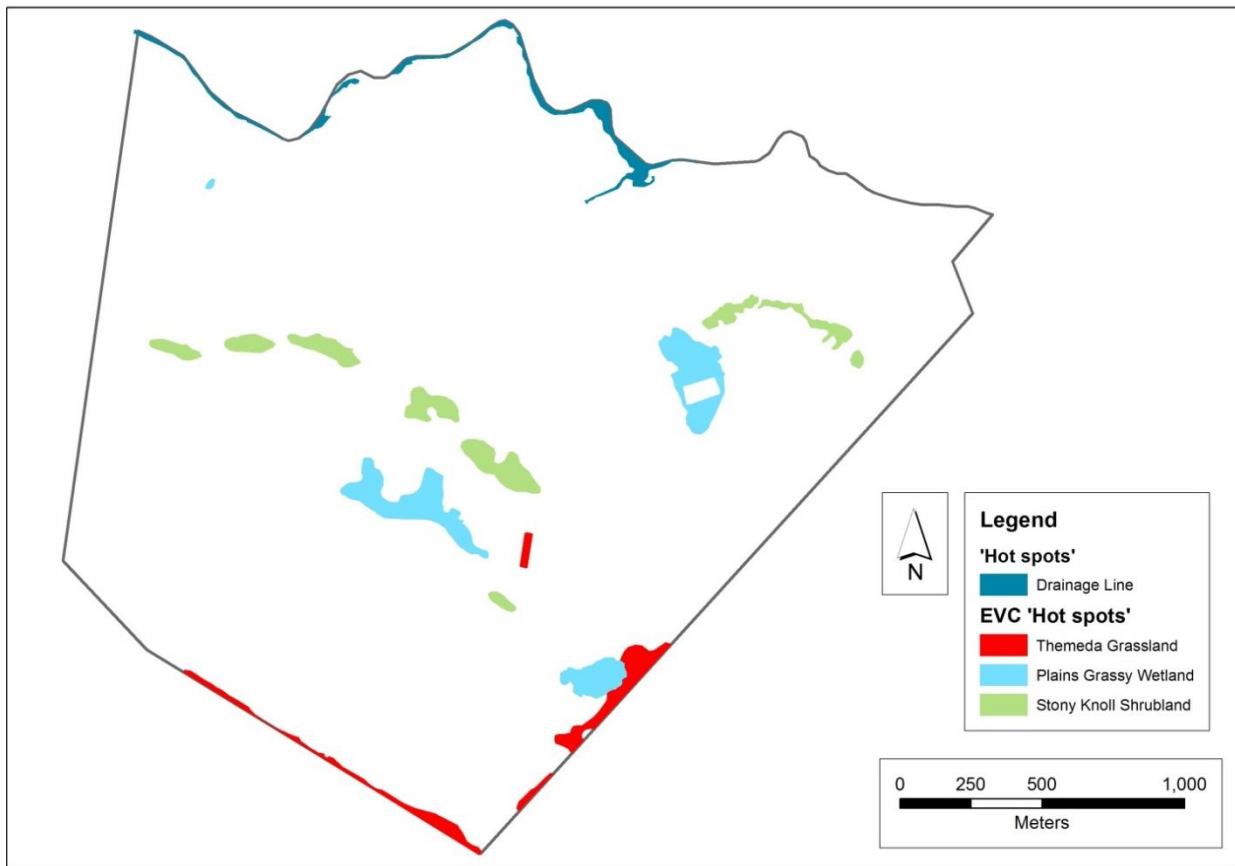


Figure 20. 'Hot spots', subjectively defined on the subject land.



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## Appendix 1: List of vascular plants identified

The list below records all vascular plant species recorded, by habitat (community / EVC). The habitats are abbreviated as follows:

- NTG (C3G) (Natural Temperate Grassland / Plains Grassland in state 'C3 grassland')
- NTG (TG) (Natural Temperate Grassland / Plains Grassland in state 'Themeda grassland')
- NTG (C3G – EDLGW) (Natural Temperate Grassland in state 'C3 grassland' that is referable to EVC 'Ephemeral Drainage Line Grassy Wetland')
- SHW (Seasonal Herbaceous Wetlands / Plains Grassy Wetland)
- CTG (Creekline Tussock Grassland including 'Lava Plain Ephemeral Wetland')
- SKS (Stony Knoll Shrubland)
- RW (Riparian Woodland)

The significance of each species is rated using the following categories:

- EPBC: EPBC listed (see main text for discussion of species in this category)
- e VROT: Endangered in Victoria.
- v: VROT: Vulnerable in Victoria.
- r: VROT: Rare in Victoria.
- k: VROT: Poorly known in Victoria.
- SP: CaLP listed: State Prohibited weed.
- RP: CaLP listed: Regionally Prohibited weed.
- RC: CaLP listed: Regionally Controlled weed.
- Res: CaLP listed: Restricted weed.

The following categories taken from Mueller-Dombois & Ellenberg (1974), describe the observed abundance / distribution of each species in each vegetation type *in the survey area*. They make no reference to the status of the species outside the study area (see Assignment of conservation status and significance, above):

- r Solitary (or at least exceedingly rare)
- + Few individuals, <5% cover
- 1 Numerous or scattered, <5% cover
- 2 5-25% cover
- 3 25-50% cover
- 4 50-75% cover
- 5 >75% cover

The direct observations above are modified by the following categories which represent the author's (S Sinclair) opinion about the former abundance of each taxon before Agricultural land use (pre-1835). The combination of both abundance estimates represents some local measure of depletion:

- A: Abundant. Once numerous, and probably once contributed >5% cover within the vegetation type.
- C: Common. Once numerous, but probably did not contribute >5% cover within the vegetation type.

- O: Occasional. Always rare or incidental within the vegetation type. This includes 'freak' occurrences which are observable 'in' a vegetation type, but are not 'of' it.

Species marked with a ? are doubtful. The location of the ? denotes the level of uncertainty. Species with a ? before their generic names are of doubtful occurrence; often because they have been reported by other observers without supporting specimens or photographs. Species marked with a ? before their specific or subspecific names are of doubtful identity, usually because mature material could not be obtained that displayed all of the characters required for positive identification.

Species marked # are restricted to the (currently unfenced) drainage line that defines the northern boundary of the property. It is possible that they do not actually occur within the property as fenced for management.

	Species name	Status / Significance	NTG (C3G)	NTG (TG)	NTG (C3G – EDLDW)	stock camps / crop / non-native	NTG (former)	SHW	SHW (former)	CTG	CTG (former)	SKS	SKS (former)	ES	ES (former)	RW	RW (former)
NATIVE																	
MONCOTS																	
Alismataceae	<i>Damasonium minus</i>							r	c								
Cyperaceae	<i>Bolboschoenus caldwellii</i> #								?							r	o
	<i>Carex breviculmis</i>							r	o		?						o
	<i>Carex inversa</i>		1	1	1		c	1	c	1	c			+	o		o
	<i>Carex tereticaulis</i> #								?							r	o
	<i>Cyperus lhotskyanus</i> #									1	c					+	o
	<i>Eleocharis acuta</i>							2	a	1	c					1	o
	<i>Eleocharis macbarronii</i>	k						r	o								
	<i>Eleocharis pallens</i>	k						+	c								
	<i>Eleocharis pusilla</i>							1	c	+	c						
	<i>Isolepis hookeriana</i>						?	+									
	<i>Isolepis marginata</i>		+				?	+									
	<i>Schoenoplectus tabernaemontani</i> #															1	o
	<i>Schoenus apogon</i>		+	1	1		c		o		o	+	o				o
Hydrocharitaceae	<i>Ottelia ovalifolia</i> subsp. <i>ovalifolia</i>							r	c								o
Juncaceae	<i>Juncus amabilis</i>							1	c		?						o
	<i>Juncus australis</i>							1	c		?						o
	<i>Juncus bufonius</i>		1					1	?	+	?						?
	<i>Juncus flavidus</i>		r					1	c	1	?						o



		Status / Significance	NTG (C3G)	NTG (TG)	NTG (C3G – EDLDW)	stock camps / crop / non-native	NTG (former)	SHW	SHW (former)	CTG	CTG (former)	SKS	SKS (former)	ES	ES (former)	RW	RW (former)
	<b>Species name</b>																
	<i>Juncus homalocaulis</i>									r	o			r	o		o
	<i>Juncus pallidus</i> #								o		o					+	o
	<i>Juncus radula</i>		+				o	+		+							
	<i>Juncus subsecundus</i>		1	+	1		o	1	c	1	c	+	o	1	o	+	o
Juncaginaceae	<i>Triglochin striata</i>								o		o					r	o
Lemnaceae	<i>Lemna disperma</i>							r	o								o
Liliaceae	<i>Arthropodium minus</i>		+				c					+	c		o		
	<i>Dianella</i> sp. aff. <i>longifolia</i> (Benambra)	v					c					r	c		o		
	<i>Hypoxis glabella</i> var. <i>glabella</i>		+			+	c		c	r	c			+	o		
	<i>Tricoryne elatior</i>						o				?		o	+	o		o
Poaceae C3	<i>Amphibromus macrorhinus</i>							r	o								
	<i>Amphibromus nervosus</i>							1	c	+	o						o
	<i>Austrostipa bigeniculata</i>		3	3	1	1	c	+	o	1	c	2	c	1	c		o
	<i>Austrostipa curticoma</i>		1				c		?		?		o		o		o
	<i>Austrostipa gibbosa</i>		+	+			c		o		o			r	o		o
	<i>Austrostipa nodosa</i>							r	?								
	<i>Austrostipa scabra</i>		+				o					1	c	1	c		
	<i>Austrostipa setacea</i>		+	1	+		c						?				
	<i>Lachnagrostis filiformis</i> (var. unknown)		+				o	1	c	1	c	r	o			+	o
	<i>Microlaena stipoides</i> var. <i>stipoides</i>		+				o		?	+	o	1	c	1	c	+	o
	<i>Poa labillardierei</i> var. <i>labillardierei</i>								?	+	o					+	c
	<i>Poa labillardierei</i> var. (Volcanic Plains)	k					?		?							r	o
	<i>Poa sieberiana</i> var. <i>sieberiana</i>		+	+			a						o		o		
	<i>Rytidosperma bipartitum</i> s.l.						?	+	?					r	?		

		Status / Significance	NTG (C3G)	NTG (TG)	NTG (C3G – EDLDW)	stock camps / crop / non-native	NTG (former)	SHW	SHW (former)	CTG	CTG (former)	SKS	SKS (former)	ES	ES (former)	RW	RW (former)
	<b>Species name</b>																
	<i>Rytidosperma caespitosum</i>		2	1	1		a	+	o	+	o	1	c	1	c		o
	<i>Rytidosperma carphoides</i>						o	r	o		o						
	<i>Rytidosperma duttonianum</i>		2	1	2	+	a	2	a	+	o	+	o				o
	<i>Rytidosperma erianthum</i>		1				o					1	c		c		
	<i>Rytidosperma racemosum</i> var. <i>racemosum</i>		1	+			c					1	c		c	+	o
	<i>Rytidosperma setaceum</i>		1	+			c	+	o		o		o		o		o
Poaceae C4	<i>Bothriochloa macra</i>		1		+	+	c	+	?	1	c	1	c	1	c	+	o
	<i>Chloris truncata</i>		2	1	1	1	c	+	?	1	c	1	c	1	c		
	<i>Enneapogon nigricans</i>						o						o	1	c		
	<i>Panicum effusum</i>						o	r	c	r	c			r	o		
	<i>Paspalidium constrictum</i>													1	c		
	<i>Phragmites australis</i> #															1	c
	<i>Themeda triandra</i>		+	3			a		o	+	o	+	c	+	c		c
	<i>Tripogon loliiformis</i>	r					o						c	r	c		
	<i>Walwhalleya proluta</i>		+				c	+	o								
Potamogetonaceae	<i>Potamogeton cheesmanii</i>							r	o								o
Typhaceae	<i>Typha domingensis</i> #															1	o
Xanthorrhoeaceae	<i>Lomandra filiformis</i>						o			r	o		o	r	o		o
<b>FERNS</b>																	
Adiantaceae	<i>Pellaea falcata</i> s.s.													r	o		
Aspleniaceae	<i>Asplenium flabellifolium</i>													r	o		
	<i>Pleurosorus rutifolius</i> s.l.													+	o		
Isoetaceae	<i>Isoetes drummondii</i>						o	+	c		o						
Marseliaceae	<i>Marsilea costulifera</i>							+	o	+							

		Status / Significance	NTG (C3G)	NTG (TG)	NTG (C3G – EDLDW)	stock camps / crop / non-native	NTG (former)	SHW	SHW (former)	CTG	CTG (former)	SKS	SKS (former)	ES	ES (former)	RW	RW (former)
	<b>Species name</b>																
	<i>Marsilea drummondii</i>							1	a	+	o						o
	<i>Marsilea hirsuta</i>							+	o		o						o
	<i>Pilularia novae-hollandiae</i>							+	c		o						
Pteridaceae	<i>Cheilanthes distans</i>											r	o	1	o		
	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>											1	c		c		
<b>DICOTS</b>																	
Amaranthaceae	<i>Alternanthera denticulata</i> s.l.							r	o	1	o					1	o
	<i>Alternanthera</i> sp. 1 (Plains)	k	+				c	+	c		o						
Apiaceae	<i>Eryngium ovinum</i>			1			c										
	<i>Hydrocotyle sibthorpioides</i> #								o	r	o						o
Asteraceae	<i>Brachyscome basaltica</i> var. <i>gracilis</i>							r	c								
	<i>Calocephalus citreus</i>			r			c		c								
	<i>Cassinia arcuata</i>		+				o					r	o	+	o		
	<i>Cassinia complanata</i>		r				?		?				?		?		
	<i>Centipeda cunninghamii</i>							r	c								
	<i>Chrysocephalum</i> sp. 1			r			c						o				
	<i>Cotula australis</i>		+				?		?					+	?		?
	<i>Cotula coronopifolia</i>						?		?						?	1	?
	<i>Euchiton japonicus</i> s.s.		+				c		o		o						o
	<i>Euchiton involucratus</i>							r	o							r	o
	<i>Euchiton sphaericus</i>		1				c	+	o	+	o			1			o
	<i>Helichrysum luteoalbum</i>		1	1			o		o	+	o	+	o	+	o		o
	<i>Senecio glomeratus</i>						o	r	o								o
	<i>Senecio hispidulus</i> s.s.		r				o										

	Species name	Status / Significance	NTG (C3G)	NTG (TG)	NTG (C3G – EDLDW)	stock camps / crop / non-native	NTG (former)	SHW	SHW (former)	CTG	CTG (former)	SKS	SKS (former)	ES	ES (former)	RW	RW (former)
	<i>Senecio quadridentatus</i>		1	1			o	+	o		o	?	o	1	o		o
	<i>Vittadinia gracilis</i>						c						?	r	o		
Brassicaceae	<i>Lepidium ?pseudotasmanicum</i>		r				?						?		o		
Campanulaceae	<i>Lobelia anceps</i> #								?							1	c
	<i>Lobelia pratioides</i>							r	c								
	<i>Wahlenbergia communis</i>						o							r	o		
	<i>Wahlenbergia gracilis</i>		+	+			c	r	?		?		?		?		
	<i>Wahlenbergia luteola</i>						o					+	c	+	c		
	<i>Wahlenbergia multicaulis</i>		+	+			c					+		r			
	<i>Wahlenbergia victoriensis</i>		r				c						?				
Caryophyllaceae	<i>Spergularia brevifolia</i>		r				?		?								
Casuarinaceae	<i>Allocasuarina luehmannii</i>	FFG	+			+	o										
Chenopodiaceae	<i>Atriplex semibaccata</i>		1	1	1	1	c	1	o	1	o	+	o	1	o	+	o
	<i>Dysphania pumilio</i>		+				o	r	?	+	o	1	o	+	o		o
	<i>Einadia nutans</i> subsp. <i>nutans</i>		+				o				o		o	1	o		o
	<i>Enchylaena tomentosa</i> subsp. <i>tomentosa</i> (prostrate form)		+	1			c	+	o	+	o	+	o				
	<i>Enchylaena tomentosa</i> (white form)													1	c		
	<i>Maireana decalvans</i>		1	1	1	+	c	+	o								
	<i>Maireana enchylaenoides</i>		+	1			c					r	o		o		
	<i>Rhagodia parabolica</i>	r												1	a	+	o
	<i>Scerolaena muricata</i> var. <i>villosa</i>		r				o	+	o		o						
Clusiaceae	<i>Hypericum gramineum</i>						c	r	o		o		o		o		o
Convolvulaceae	<i>Convolvulus angustissimus</i> subsp.		+				o	r	o		o	1	c	1	c		

	Species name	Status / Significance	NTG (C3G)	NTG (TG)	NTG (C3G – EDLDW)	stock camps / crop / non-native	NTG (former)	SHW	SHW (former)	CTG	CTG (former)	SKS	SKS (former)	ES	ES (former)	RW	RW (former)
	<i>angustissimus</i>																
	<i>Convolvulus angustissimus</i> subsp. <i>omnigracilis</i>	k	1	1	1	+	c	+	o	+	o		o	+	o		o
	<i>Dichondra repens</i>		r	+	+		c	1	c	1	c	1	c	1	c	1	c
	<i>Dichondra</i> ?sp. 1						?			r	?						
Crassulaceae	<i>Crassula decumbens</i> var. <i>decumbens</i>		+				o	r	o	+	o		o		o		o
	<i>Crassula sieberiana</i> s.l.		1	1	1	+	c	+	o	+	o	1	c	1	c		o
Elatinaceae	<i>Elatine gratioloides</i>							r	c								
Euphorbiaceae	<i>Euphorbia drummondii</i>		1	+	1		c	+	o	+	o	+	o		o		
Fabaceae	<i>Glycine tabacina</i>						o					+	c	+	c		
Geraniaceae	<i>Erodium crinitum</i>		+				o					1	c	+	o		
	<i>Geranium gardneri</i> #						c									r	o
	<i>Geranium retrorsum</i> s.s.						c			+	o		o	r	o		o
	<i>Pelargonium australe</i>													+	c		
Goodeniaceae	<i>Goodenia gracilis</i>							+	c								
	<i>Goodenia heteromera</i>							r	o								
Haloragaceae	<i>Haloragis aspera</i>				1		o	1	a	1	c						
	<i>Myriophyllum simulans</i>							1	a								o
Lythraceae	<i>Lythrum hyssopifolia</i>		+	+	+		o	1	c	1	c		o		o		o
Mimosaceae	<i>Acacia implexa</i>													+	c		
	<i>Acacia mearnsii</i>													+	c	r	o
	<i>Acacia melanoxylon</i>														o	1	a
	<i>Acacia paradoxa</i>											r	?		?		
	<i>Acacia provincialis</i>													+	c	1	c

		Status / Significance	NTG (C3G)	NTG (TG)	NTG (C3G – EDLDW)	stock camps / crop / non-native	NTG (former)	SHW	SHW (former)	CTG	CTG (former)	SKS	SKS (former)	ES	ES (former)	RW	RW (former)
	<b>Species name</b>																
Myrtaceae	<i>Callistemon sieberi</i> #															1	a
	<i>Eucalyptus baueriana</i> subsp. <i>thalassina</i>	v												+	c	1	c
	<i>Eucalyptus camaldulensis</i>															2	a
	<i>Leptospermum lanigerum</i> #															1	a
Onagraceae	<i>Epilobium billardierianum</i> subsp. <i>billardierianum</i>		r					r	o	+	o				o	1	o
	<i>Epilobium billardierianum</i> subsp. <i>cinereum</i>						o		?		?	+	o		?		?
	<i>Epilobium hirtigerum</i>		1		+		o	1	c	+	o	r	o	1	o		o
Oxalidaceae	<i>Oxalis exilis</i>						?		?		?			+	?		?
	<i>Oxalis perennans</i>		1	1	1	+	c	1	c	+	c	1	c	+	c	+	c
	<i>Oxalis radicata</i>												o	r	o		
Pittosporaceae	<i>Bursaria spinosa</i>													r	c		o
Plantaginaceae	<i>Veronica gracilis</i>			r			c		o		o						o
Polygonaceae	<i>Duma florulenta</i>							r	?		o						o
	<i>Persicaria prostrata</i>								o	1	c						o
	<i>Rumex brownii</i>		1	+	1	+	o	1	o	1	o	1	o	1	o	1	o
	<i>Rumex dumosus</i>		1	+			o		o	r	o	+	o				
	<i>Rumex tenax</i>							+	o								
Portulacaceae	<i>Calandrinia eremaea</i>		r				o							+	c		
	<i>Portulaca olearcea</i>											r	?		?		
Ranunculaceae	<i>Clematis microphylla</i> s.l.	k												1	c		o
Rosaceae	<i>Acaena echinata</i>		r	r			c				o	r	o		o	r	o
	<i>Acaena novae-zelandiae</i>								o					r	o	r	c
Rubiaceae	<i>Asperula conferta</i>		+				o	1	a	+	c						o

	Species name	Status / Significance	NTG (C3G)	NTG (TG)	NTG (C3G – EDLDW)	stock camps / crop / non-native	NTG (former)	SHW	SHW (former)	CTG	CTG (former)	SKS	SKS (former)	ES	ES (former)	RW	RW (former)
	<i>Galium leptogonium</i>		r				o						o	+	o		
Sapindaceae	<i>Dodonaea viscosa</i> subsp. <i>cuneata</i>													1	c		
Scrophulariaceae	<i>Glossostigma elatinoides</i>				o			+	o	+	o						
	<i>Gratiola pumilio</i>	r						+	o								
	<i>Limosella australis</i>				o			r	o								
Urticaceae	<i>Urtica incisa</i>													r	o	1	c
Verbenaceae	<i>Verbena officinalis</i> var. <i>gaudichaudii</i>	k												r	o	r	o
Violaceae	<i>Melicytus dentatus</i> s.s.		+				o					r	o	1	c	1	c
	<i>Melicytus</i> sp. aff. <i>dentatus</i> (Volcanic Plain variant)		+				o					r	o		o		
<b>INTRODCUED</b>																	
<b>MONOCOTS</b>																	
Cyperaceae	<i>Cyperus eragrostis</i>							+		1				+		1	
Iridaceae	<i>Romulea minutiflora</i>		+							+		+		+		+	
	<i>Romulea rosea</i> var. <i>australis</i>		1	1	1	1		1		1		1		1		1	
Juncaceae	<i>Juncus acutus</i> subsp. <i>acutus</i> #															1	
Poaceae C3	<i>Festuca</i> sp.															r	
	<i>Avena barbata</i>		1	1	1	1		+		+		+		1		1	
	<i>Aira elegantissima</i>		1	1	1	1		+		+		1		1			
	<i>Briza maxima</i>			+													
	<i>Bromus</i> (?) unknown sp. #1							r								+	
	<i>Bromus</i> (?) unknown sp. #2		+														
	<i>Bromus catharticus</i>							r									
	<i>Bromus hordeaceus</i> subsp. <i>hordeaceus</i>		2	+	1	1		1		+		+		+		+	

		Status / Significance	NTG (C3G)	NTG (TG)	NTG (C3G – EDLDW)	stock camps / crop / non-native	NTG (former)	SHW	SHW (former)	CTG	CTG (former)	SKS	SKS (former)	ES	ES (former)	RW	RW (former)
	<b>Species name</b>																
	<i>Bromus rubens</i>													+			
	<i>Cynodon dactylon</i>		+					+		+				+		1	
	<i>Dactylis glomerata</i>		+		+							+		+		+	
	<i>Holcus lanatus</i>															+	
	<i>Hordeum</i> sp.		+			2		+									
	<i>Lolium rigidum</i>		2	+	2	3		1		1		1		1		1	
	<i>Nassella hyalina</i>		+		+			+									
	<i>Nassella neesiana</i>		+					+				+					
	<i>Nassella trichotoma</i>		2	+	1	1		1		1		1		1		+	
	<i>Pentamerisairoides</i> subsp. <i>airoides</i>		+									1					
	<i>Phalaris aquatica</i>		+					+								1	
	<i>Polypogon</i> (?) sp.													+		+	
	<i>Vulpia</i> (?) spp.		1	1	1	1		+		+		1		1			
Poaceae C4	<i>Eleusine tristachya</i>		+		+							+					
	<i>Paspalum dilatatum</i>				+			+									
	<i>Paspalum distichum</i>							+								1	
Primulaceae	<i>Anagalis arvensis</i>		+											+		1	
<b>DICOTS</b>																	
Aizoaceae	<i>Galenaia pubescens</i> var. <i>pubescens</i>		1	+	1	3		1		1		1		5		1	
Anarcardiaceae	<i>Schinus molle</i>													r		+	
Apiaceae	<i>Foeniculum vulgare</i>									r				+			
Asteraceae	<i>Arctotheca calendula</i>		+							+		+					
	<i>Aster subulatus</i>							+									
	<i>Carthamus lanatus</i>		+									+		+			



		Status / Significance	NTG (C3G)	NTG (TG)	NTG (C3G – EDLDW)	stock camps / crop / non-native	NTG (former)	SHW	SHW (former)	CTG	CTG (former)	SKS	SKS (former)	ES	ES (former)	RW	RW (former)
	<b>Species name</b>																
	<i>Cirsium vulgare</i>		1	1	1	1		1		1		+		1		1	
	<i>Conyza bonariensis</i>		1	+	1	1		1		+		+		1		+	
	<i>Cynara cardunculus</i> subsp. <i>flavescens</i>		1	+	1	1		1		1		1		1		1	
	<i>Gazania linearis</i>		r														
	<i>Gamochaeta purpurea</i>		+		+									+			
	<i>Helminthotheca echioides</i>		+		+			1								1	
	<i>Hypochaeris radicata</i>		1	1	1	1		+		+		+		+		1	
	<i>Lactuca saligna</i>													r			
	<i>Lactuca serriola</i>											r		r			
	<i>Leontodon taraxacoides</i> subsp. <i>taraxacoides</i>		1	1						+							
	<i>Onopordum acaulon</i>		r														
	<i>Scolymus hispanicus</i>											+		r			
	<i>Scorzonera laciniata</i> var. <i>calcitrapifolia</i>									r							
	<i>Silybum marianum</i>							r									
	<i>Sonchus asper</i>		1		+	+				+				+		+	
	<i>Sonchus oleraceus</i>		1	+	1	1		+		+		+		1		1	
	<i>Xanthium spinosum</i>		+		+			+		+							
Boraginaceae	<i>Heliotropium europaeum</i>					1											
Brassicaceae	Unknown Brassicaceae															1	
	<i>Capsella bursa-pastoris</i>		+			+						+					
	<i>Lepidium africanum</i>		1		+	+		r				r					
	<i>Lepidium draba</i>					+											
Cactaceae	<i>Opuntia ficus-indica</i>													1		1	

		Status / Significance	NTG (C3G)	NTG (TG)	NTG (C3G – EDLDW)	stock camps / crop / non-native	NTG (former)	SHW	SHW (former)	CTG	CTG (former)	SKS	SKS (former)	ES	ES (former)	RW	RW (former)
	<b>Species name</b>																
Caryophyllaceae	<i>Cerastium</i> sp.		+														
	<i>Polycarpon tetraphyllum</i>											+		+		+	
	<i>Silene</i> sp.													1			
	<i>Spergularia media</i> s.s.							+		+							
Chenopodiaceae	<i>Chenopodium</i> sp.					+										+	
	<i>Chenopodium album</i>					1				+							
Dipsacaceae	<i>Dipsacus fullonum</i> subsp. <i>fullonum</i> #															r	
Fabaceae	<i>Melilotus</i> sp.															r	
	<i>Medicago polymorpha</i>		+		+	+		+				r				+	
	<i>Trifolium</i> unknown sp. #1		1		+	+		r									
	<i>Trifolium</i> unknown sp. #2		1		+	+				+		+		1			
	<i>Trifolium arvense</i> var. <i>arvense</i>		+	+	+	+								+			
	<i>Ulex europaeus</i>													r		+	
Fumariaceae	<i>Fumaria</i> sp.															+	
Gentianaceae	<i>Centaurium erythraea</i>		1		+	+		+						+			
Geraniaceae	<i>Erodium moschatum</i>					+											
	<i>Erodium botrys</i>		2	+	1	1		1		1		1		+		+	
Lamiaceae	<i>Echium vulgare</i>		+		+	1		+						+		+	
	<i>Marrubium vulgare</i>					1								1		1	
	<i>Salvia verbenaca</i>		1	+	+	1		+				1		1			
Malvaceae	<i>Malva</i> sp.					+											
	<i>Modiola caroliniana</i>		+			1		+				r		+		+	
Plantaginaceae	<i>Plantago coronopus</i> subsp. <i>coronopus</i>		1	1	1	1		1		1		1		+		1	
	<i>Plantago lanceolata</i>		1	+	1	1		1		1		+		+		1	

		Status / Significance	NTG (C3G)	NTG (TG)	NTG (C3G – EDLDW)	stock camps / crop / non-native	NTG (former)	SHW	SHW (former)	CTG	CTG (former)	SKS	SKS (former)	ES	ES (former)	RW	RW (former)
	<b>Species name</b>																
	<i>Plantago major</i>															r	
Polygonaceae	<i>Polygonum aviculare</i>		1		1	2		1		1						1	
	<i>Rumex conglomeratus</i>							+									
	<i>Rumex crispus</i>							+									
	<i>Rumex pulcher</i> subsp. <i>pulcher</i>													r		+	
Rosaceae	<i>Rosa rubiginosa</i>											r		+		+	
Salaceae	<i>Salix</i> sp.															r	
Scrophulariaceae	<i>Verbascum thapsus</i> subsp. <i>thapsus</i>		+									r		+			
Solanaceae	<i>Lycium ferocissimum</i>		1	+	+	2		r				+		2		2	
	<i>Nicotiana glauca</i>															r	
	<i>Solanum linnaeanum</i>		+		+			r				+					
	<i>Solanum nigrum</i> s.l.		+		+	1				r				1		+	
	<i>Solanum pseudocapsicum</i> #															1	

## Appendix 2: Notes on plant identification

Some plants displayed characteristics or variations worthy of note. These include plants that were difficult to assign to a species, plants which occurred in several apparently distinct but unrecognized forms and plants which could be assigned to a sub-specific rank not formally recognized, but commonly noted and/or listed on the curation version of the VBA database:

- *Dichondra* sp. 1. This species is recorded doubtfully. The specimen examined had the short, recurved pedicels and the short calyx of *D.* sp. 1. The leaf indumentum was intermediate between the two species, but fitted *D. repens* more closely. The specimen was collected among rocks in a drainage line.
- *Enchylaena tomentosa*. This species occurs locally in two distinct forms:
  - A very distinctive, woody upright form to ~1m high with whitish foliage and red-pink fruits occurs on dry rocky slopes, only within Escarpment Shrubland (Cover illustration).
  - A grey-green sub-erect to sprawling form occurs in grassland and in nutrient-enriched places under trees. Its mature fruit colour was not clearly observed, but is apparently greenish-orange-red.
- *Haloragis aspera*. Most specimens keyed equally well to *H. aspera* or *H. heterophylla*. It was not felt that two distinct entities were really present, and the name *H. aspera* was chosen for all material.
- *Lepidium ?pseudotasmanicum*. This taxon is recorded with doubt. A single specimen examined closely had conspicuously papillose stems (excluding the very-common *L. africanum*), and pedicels with hairs on one side only (excluding *L. hyssopifolium*). The plant keyed to *L. pseudotasmanicum* (Entwisle 1996) but did not have the usual divided basal leaves of that species, and the plants in the field did not occur in particularly rocky places where this species is usually found.
- *Lolium temulentum* / *Lolium rigidum*. A few culms were noted bearing lemmas with long (>5mm) fine awns, referable to *Lolium temulentum*. These all occurred within vast stands of *L. rigidum*, and were not considered worthy of separate note.
- *Lomandra filiformis* subsp. *filiformis*. This taxon includes a great deal of variation across its range. All plants recorded on the property were rhizomatous, with khaki-coloured leaves appearing in tufts (not glaucous tussocks).
- *Juncus subsecundus*. A conservative view of this very variable species was taken. Numerous specimens were assigned to this species which approached a number of other species, based on variation in culm striations, inflorescence architecture and stature. Some approached species listed here in their own right (e.g. *Juncus flavidus*, *Juncus radula*), while other specimens approached *Juncus remotiflorus*, which was not recorded with clear enough features to warrant listing.
- *Medicago polymorpha*. Plants occurred with spinose or non-spinose pods.
- *Triglochin striata*. All plants noted were the 'terete leaved form' (with leaves up to 40cm) recognized informally by DELWP's VBA database.
- *Rytidosperma caespitosum*. This species occurs locally in two forms:
  - A form with large ovate panicles occurs occasionally in rocky grassland.
  - The widespread form with a lanceolate panicle is widespread.
- *Spergularia brevifolia*. Specimens examined conform in all particulars to *S. brevifolia*, except the seeds are prominently winged. No other species is a more likely candidate. The plants occur occasionally in open grassland, particularly in bare areas such as vehicle tracks.



- *Wahlenbergia luteola*. This species occurs in typical form on the escarpment. Other anomalous plants of very different appearance were collected from several stony rises, and are here assigned reluctantly to this taxon. Those plants key to *W. gymnoclada* in Walsh (1999), being strongly rhizomatous (>1m along rock fissures), usually having long naked stems beneath the flowers, and small hairy leaves with thickened margins. They display the yellow-backed flowers typical of *W. luteola* and also common in *W. gymnoclada*. Given *W. gymnoclada* occurs in a different habitat and geographic location, it was considered prudent to list only *W. luteola*.

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