

Vegetation Inventory Report: Western Grassland Reserve - One Tree East

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 the Environment
DEPI	The former Victorian Department of Environment and Primary Industries (now DELWP)
DSE	The former Victorian Department of Sustainability and Environment (now DELWP)
EPBC Act	The Federal Environment Protection and Biodiversity Conservation Act 1999
EVC	Ecological Vegetation Class, the units used to describe vegetation type in Victoria
FFG Act	The Victorian Flora and Fauna Guarantee Act 1988
MNES	Matters of National Environmental Significance, as listed under the EPBC-Act.
WGR	Western Grassland Reserve

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, 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).
- Describe 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 the One Tree East property, a triangular block of land on Ballan Rd, in the locality of Quandong (436 ha). The survey area is shown in Figure 1

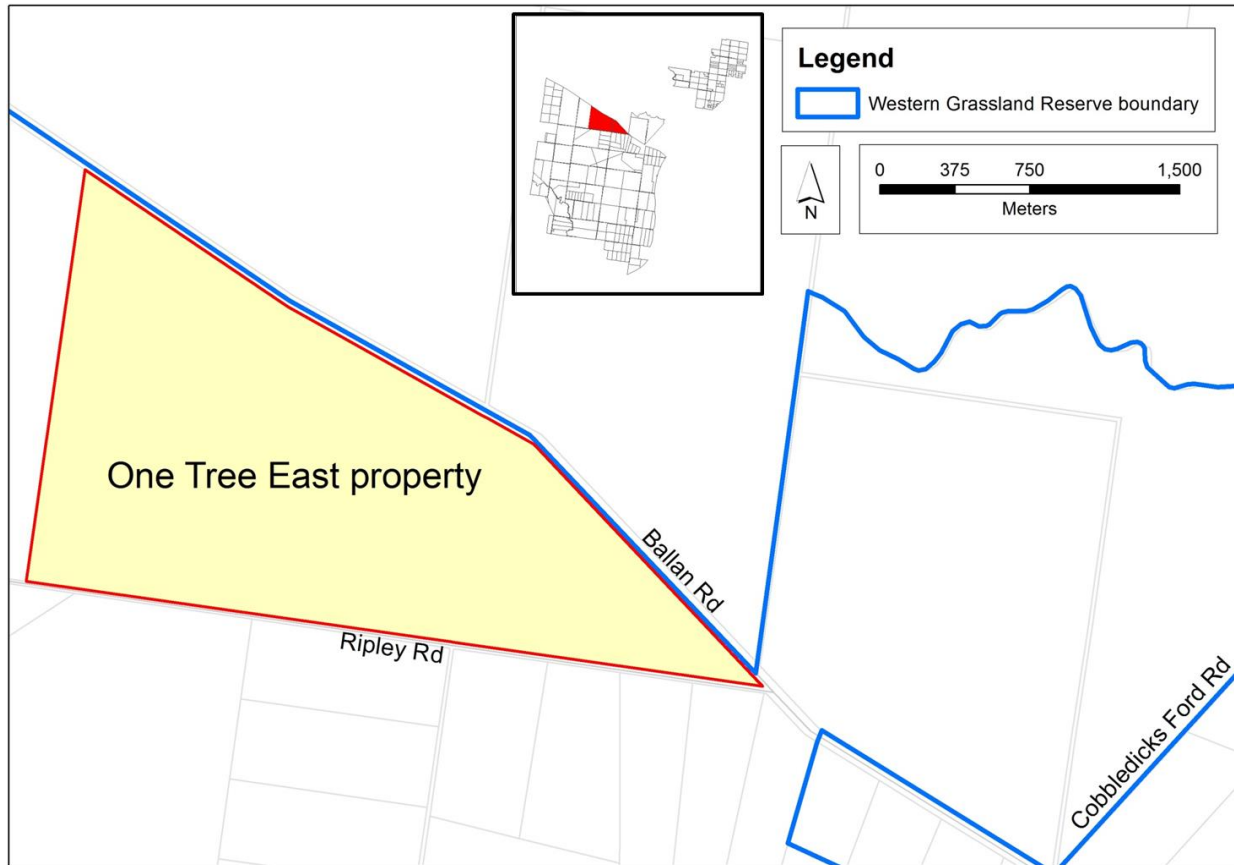


Figure 1. The location of the One Tree East property.

Previous survey information

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

- BushBroker field officers undertook Vegetation Quality Assessment (Habitat Hectare) surveys of the property in 2011.
- Australian Ecosystems were commissioned in 2011 by DELWP to survey and comment on targeted wetlands when they filled for the first time after approximately ten 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 (with the exception that one wetland polygon has been altered based on subsequent field visits).
- Biosis Research (2011) 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.

The property was within the area surveyed by Biosis Research for the Growth Areas Authority (GAA) as part of the Precinct Structure Planning process for Melbourne's growth areas. The One Tree East property was not, however, accessed by Biosis and no relevant data was included in the resultant report (GAA 2010).

Survey Methods

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

Coverage and intensity

The land was surveyed over 10 days between September and February in 2011, 2013, and 2014 as well as an additional 2 days in May and June 2013. These survey days include vegetation mapping, species searches and point-intercept quadrats for grassland monitoring (as described in DELWP 2015). The land was also visited briefly on other occasions between November 2010 and November 2014, 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.

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 Victorian *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 are known to occur naturally at One Tree East, both of which are ecological communities:

- 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).

NTG covers most of the surveyed land (409 ha, 94%).

An area of NTG on the property is shown in Figure 2. The distribution of the community on the property is shown in Figure 4.



Figure 2. NTG on One Tree East, in summer-time. The only species visible is *Austrostipa bigeniculata*.

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 EVC 'Plains Grassy Wetland' (see below).

The surveyed property supports 6.5 ha of SHW (1%). Under DELWP (2015a), patches larger than 3 ha will be monitored regularly. There is one relatively large patch (3.1 ha), known informally as 'One Tree Rise Wetland'. One additional wetland exceeding 3 ha was originally mapped in DEPI (2013b) (Upper Lollipop Wetland; 4.5 ha). The more detailed inventory mapping, however, revealed only a mosaic of small and marginal SHW patches. This wetland should not be monitored in future due to its size. Appendix 1 shows the relationship between the previous and recent mapping.

The EPBC-listed community has size thresholds (0.5 ha for isolated patches, 0.1 ha for patches embedded within Native vegetation (TSSC 2012)). These thresholds exclude numerous very small patches of vegetation that would be assignable to SHW on the basis of their composition, but which are too small to qualify for SHW (These sites are mapped as Plains Grassy Wetland, but not SHW, see below). SHW is shown in Figure 3. The distribution of SHW on the property is shown in Figure 4 (along with NTG).

At all SHW sites, the predominant native species are Common Spike-sedge (*Eleocharis acuta*), Nardoo (*Marsilea drummondii*), Rough Raspwort (*Haloragis aspera*), and Rushes (*Juncus* spp.). Figure 2 shows SHW on the surveyed land.

The listing advice (TSSC 2012) distinguishes examples of SHW that are of particularly high quality by their species composition. The property as a whole supports five of the indicator species for High quality SHW, and One Tree Rise Wetland is considered a 'high quality' site because it contains three of these species. These occur on the property as follows:

- *Asperula conferta* occasional, most patches
- *Isoetes drummondii* occasional in patches, (observed by AE and Cook et al. 2013)
- *Lobelia pratioides* occasional in 'One Tree Rise' wetland
- *Marsilea drummondii* common, subdominant in all patches
- *Pilularia novae-hollandiae* scattered, rare (observed by Cook et al. 2013)

Several other species not listed as 'high quality indicator species' also occur that are uncommon regionally (Bull and Stolfo, 2014); including Plains Joyweed (*Alternanthera* sp. 1) Pale Spike-sedge (*Eleocharis pallens*), Spreading Goodenia (*Goodenia heteromera*), Slender Goodenia (*Goodenia gracilis*) and Small-flowered Buttercup (*Ranunculus pumilio*).



Figure 3. SHW on the surveyed land (when last inundated, in 2012). This patch is dominated by *Eleocharis acuta*.

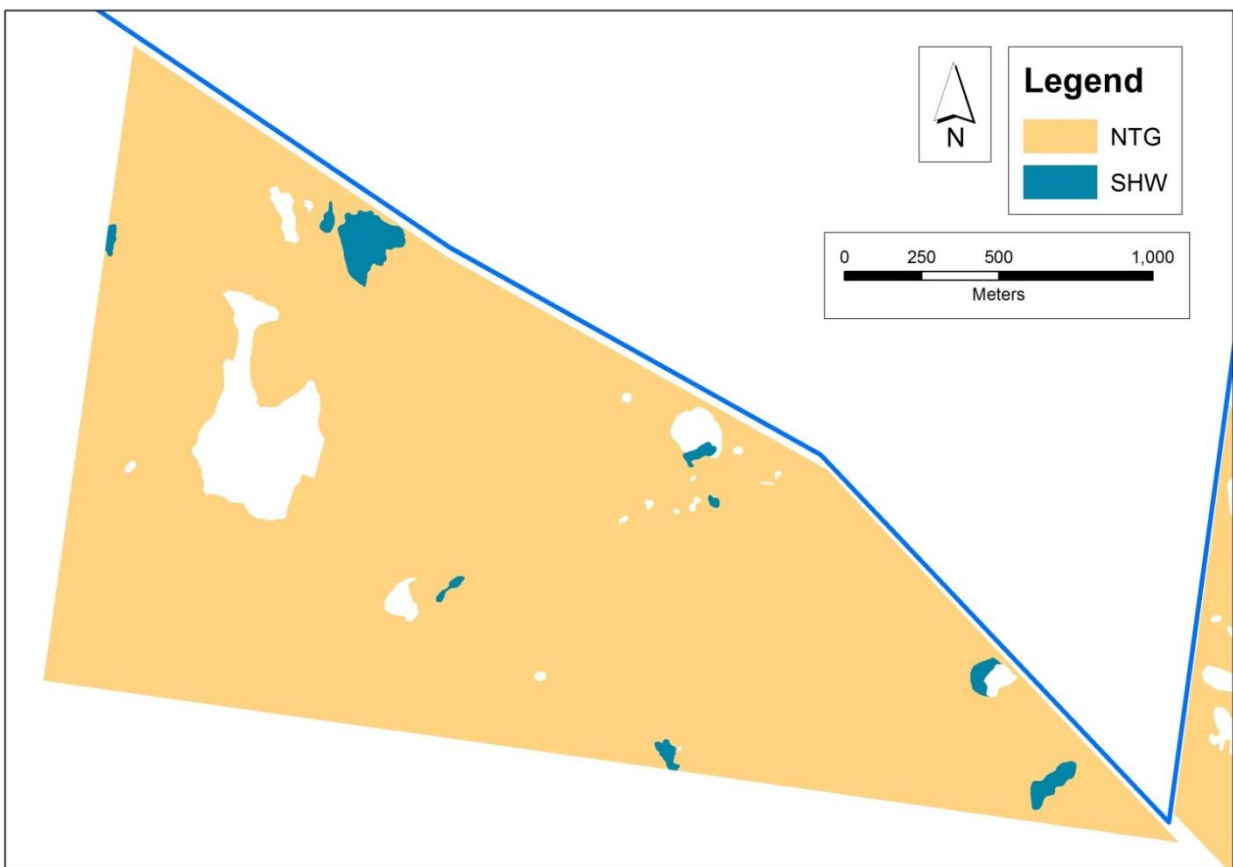


Figure 4. The distributions of Natural Temperate Grassland (NTG) and Seasonal Herbaceous Wetland (SHW) on the One Tree East property.

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. Although the structure of the MSA and the goals of the WGR do not directly relate to the FFG Act, FFG-listed assets provide a useful structure for considering the status of the values on the property.

- One FFG-listed community occurs: 'Western (Basalt) Plains Grassland Community', which corresponds directly (on this property) with NTG, discussed above.
- One FFG-listed species has been re-introduced: Large-fruit Groundsel, which is also EPBC listed, and is discussed above.

Native vegetation according to Ecological Vegetation Classes

The survey area contains 416 ha of native vegetation (95% of the property). The patterns of vegetation on the property can be described using five EVCs. The current distribution of EVCs is shown in Figure 5, below. The assumed distribution of EVCs before agricultural settlement ('pre-1750') is shown in Figure 6.

Plains Grassland (EVC 132)

This EVC corresponds entirely (on this property) to NTG, described above. DELWP recognizes several variants of Plains Grassland, with all in the surveyed area best 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'.

This EVC covers 387 ha of the One Tree East property (89%). Its coverage is slightly less than NTG, because some small areas of NTG are assignable 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 ferns to persist alongside plants otherwise characteristic of arid places. On the surveyed land, this EVC is dominated by Rough Spear-grass (*Austrostipa scabra*), Plains Spear-grass (*Austrostipa bigeniculata*) and Soft Spear-grass (*Austrostipa mollis*). It also supports a range of native species at low abundance which are absent from other parts of the property (e.g. Wattle Matt-rush (*Lomandra filiformis*), Small Vanilla Lily (*Arthropodium minus*) and Variable Glycine (*Glycine tabacina*)). On the property this EVC forms part of NTG.

This EVC covers 15 ha of the One Tree East property (3%).

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. When not inundated, this EVC often appears to be non-native vegetation (bare ground or high levels of ephemeral weeds).

This EVC covers 7 ha of the One Tree East property (2 %). 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 occurs along well-defined, low gradient drainage lines. On the One Tree property, it is characterised by the presence of Common Tussock-grass (*Poa labillardierei*; which may once have been the dominant species), along with a range of species tolerant of occasional flooding, many of which are shared with Plains Grassy Wetland (Rough Raspwort, Nardoo, Brown-back Wallaby-grass (*Rytidosperma duttonianum*) and Common Woodruff (*Asperula conferta*). This vegetation is heavily invaded by weeds.

This EVC covers 7 ha of the One Tree East property (2 %).

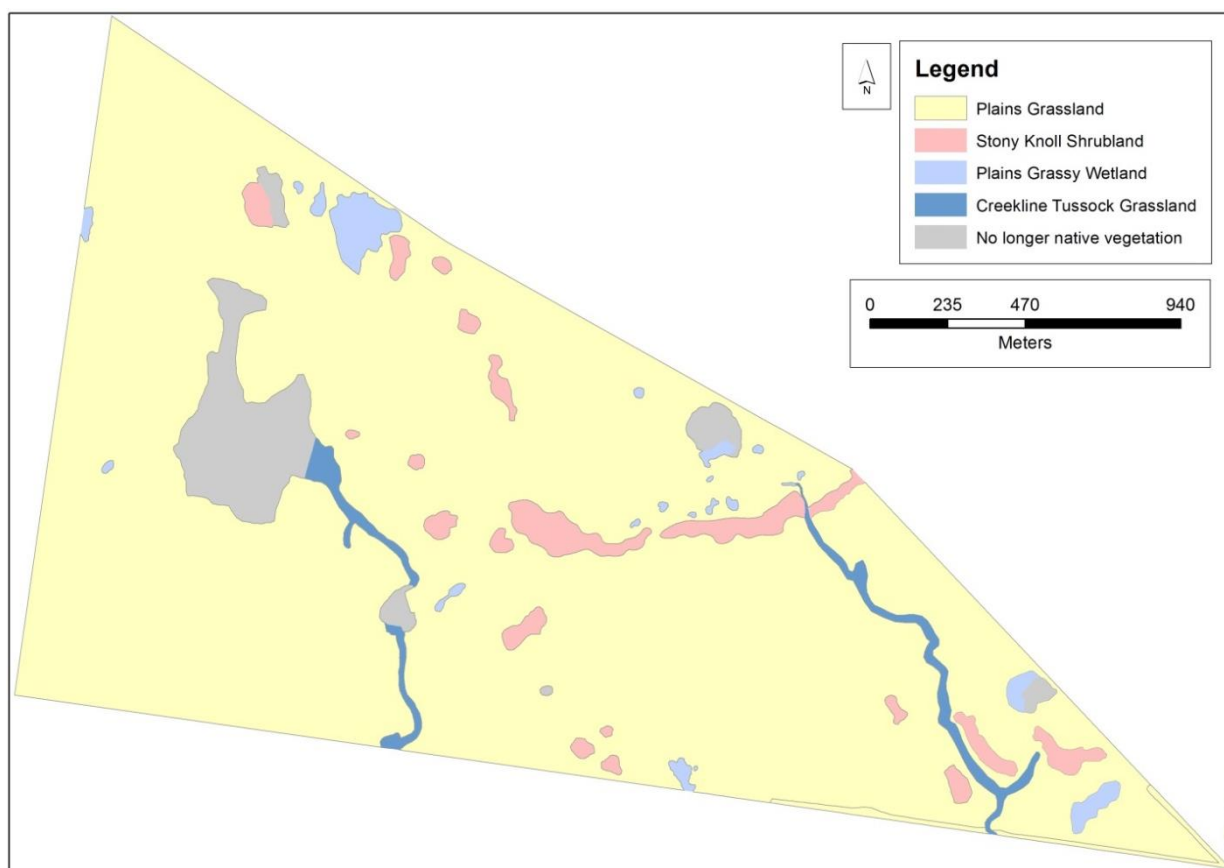


Figure 5. The current distribution of native vegetation classified according to EVC on the property.

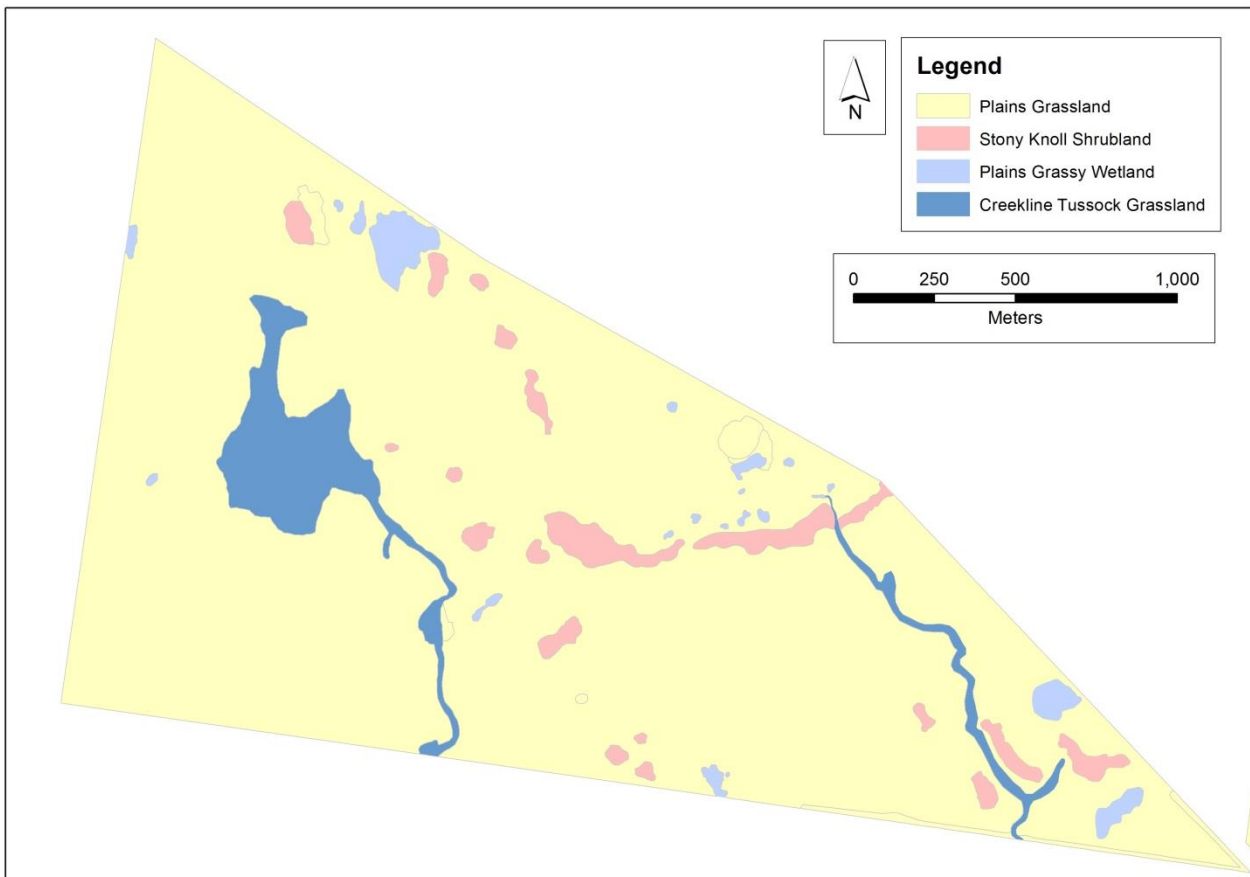


Figure 6. The likely pre-1750 distribution of native vegetation according to EVCs.

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. They are shown in Figure 7.

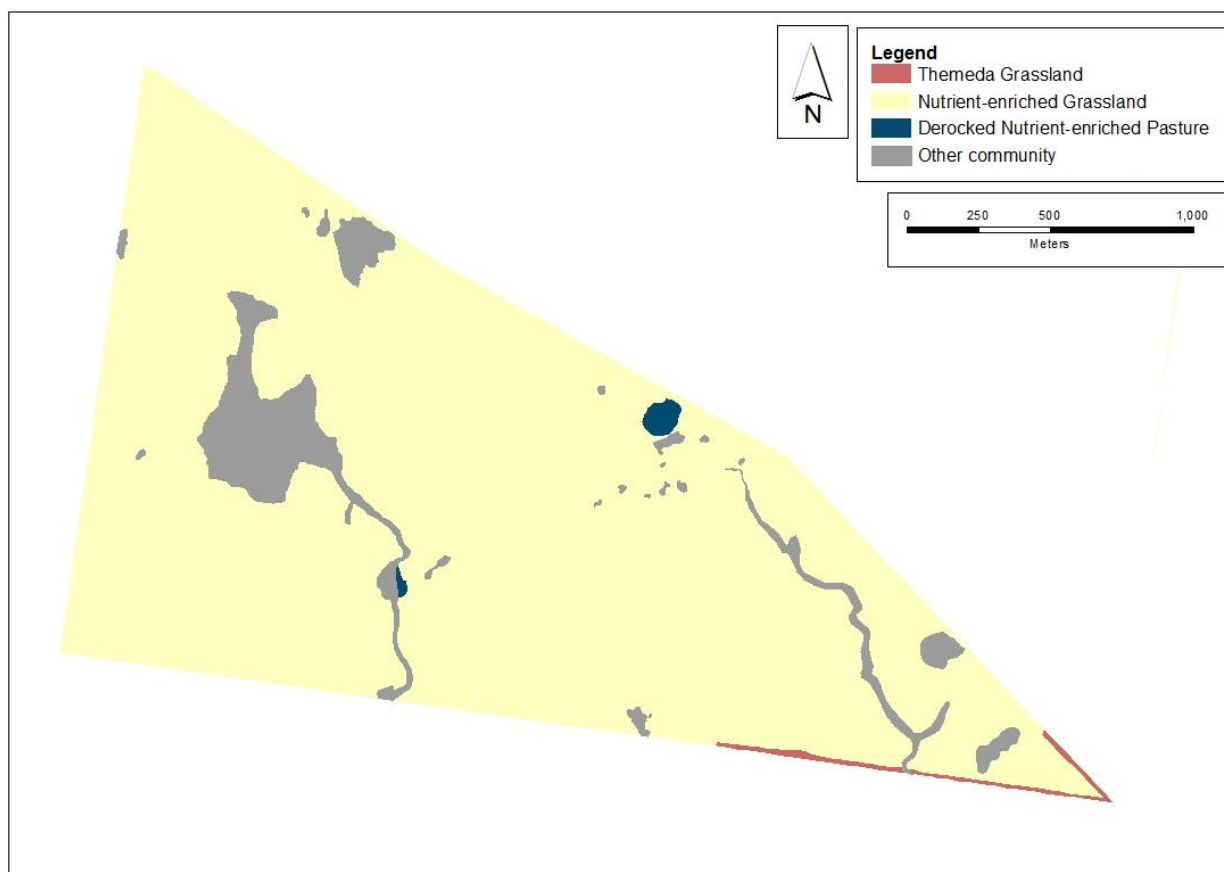


Figure 7. States within Natural Temperate Grassland on the One Tree East property.

***Themeda* grassland (TG)**

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 along the eastern edges of the property. This distribution may reflect the gradual re-colonisation of Kangaroo Grass into the paddocks during periods of lighter grazing, from the roadsides which have acted as a refuge for this species.

Themeda grassland covers 2.5 ha of the One Tree East property (<1 %).

Nutrient-enriched Grassland (NG)

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). The transition between these two states is gradual, as it involves the slow process of de-nutrition. 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), and very low numbers of species which are generally found in more intact states (e.g. Blue Devil (*Eryngium ovinum*), Sweet Hound's-tongue (*Cynoglossum suaveolens*). Figure 8 shows an example of Nutrient-enriched Grassland at One Tree East.

Nutrient-enriched Grassland covers 424 ha of the One Tree East Property (97%).

De-rocked nutrient-enriched pasture (DNP)

This state describes areas which have had their natural rocky layer removed, and have elevated nutrient levels as a result of grazing and fertilizer application. At One Tree East, this state is restricted to small areas used as farm dams. A few small piles of rocks in the north-western portion of the property indicate that some clearing of the surface rocks has occurred in the past, possibly by hand, but no sizeable area can be found that lacks embedded surface rocks, and no areas of DNP are mapped in that area.

De-rocked nutrient-enriched pasture covers 1.5 ha of the One Tree East property (<1%).



Figure 8. Nutrient-enriched Grassland at One Tree East. The visible vegetation is non-native and not referable to NTG. It is dominated by a range of introduced species.

Plant species

One hundred and thirty seven vascular plants were recorded as naturally occurring on the surveyed land. While this tally represents a high diversity, the abundance of the species was markedly uneven. A small number of species covered most of the property (the natives Kangaroo Grass and Spear-grass and the exotics Soft Brome and Wimmera Rye Grass). Most species were recorded in few places and in low abundance.

Eighty-eight (88) of the 137 species were native (64%).

Appendix 2 lists all of the vascular plant species recorded and describes their estimated abundance, according to vegetation types. This list is intended to be a useful reference guide for managers. Appendix 3 presents notes on plant identification, recording identification difficulties and the occurrence of notable forms that are not currently named.

Significant native species

No species were recorded as naturally occurring which are EPBC- or FFG-listed.

Three species were recorded that are listed as poorly known in Victoria (DEPI, 2014). Table 1 lists these species, with some brief notes about their local occurrence. Figure 9 shows the distribution on the surveyed land of one of these species. Some very abundant species are not shown on the map, for the sake of clarity (e.g. Slender Bindweed).

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

Species	EPBC	FFG	VROT	Observations
<i>Alternanthera</i> sp. 1 (Plains Joyweed)			k	Moderately common in SHW and NTG across the property
<i>Convolvulus angustissimus</i> subsp. <i>omnigracilis</i> (Slender Bindweed)			k	Very common everywhere (1000s of plants).
<i>Dianella</i> sp. aff. <i>longifolia</i> (Benambra) (Arching Flax-lily)			k	One individual reported by AE (2011), without an accurate location. Not re-located during current survey
<i>Poa labillardierei</i> var. (Volcanic Plains)			k	Twelve plants in similar location

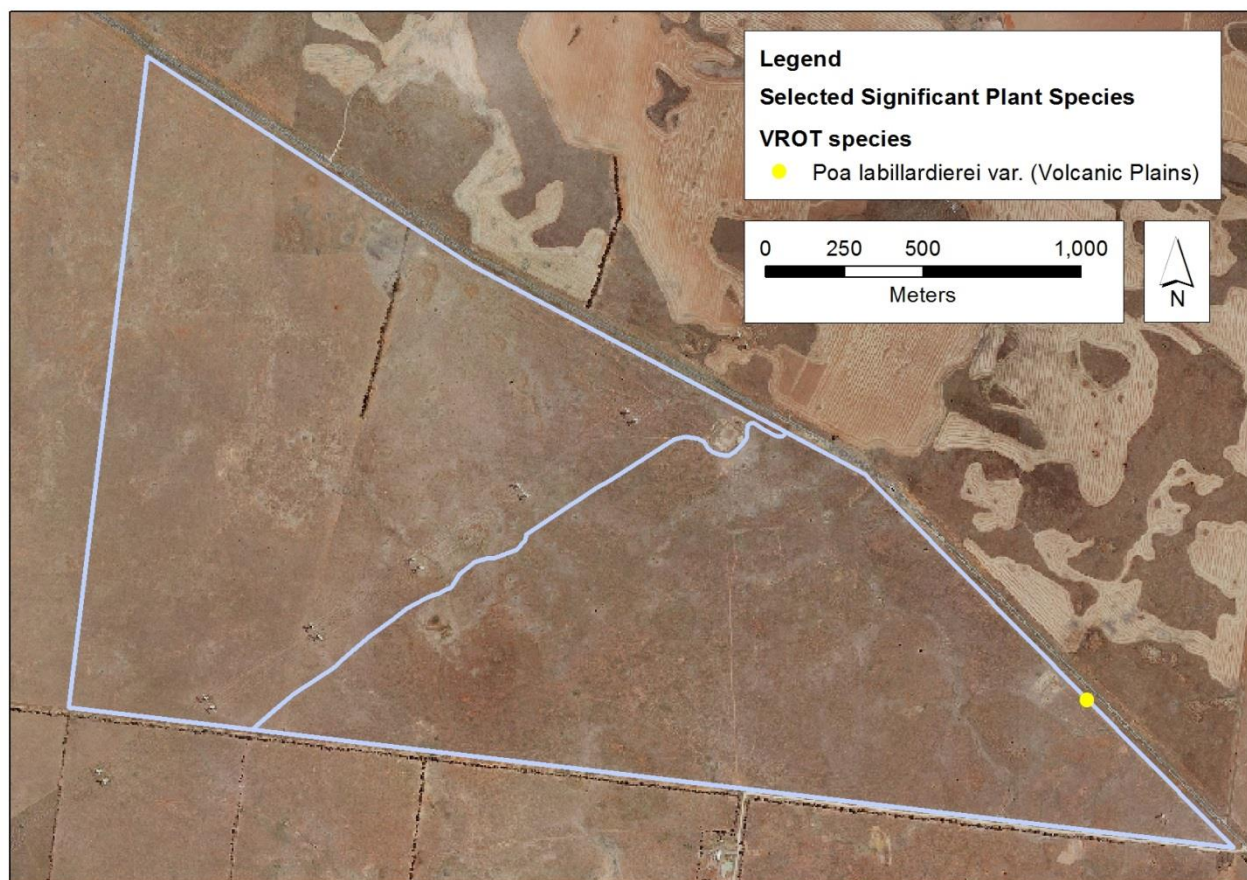


Figure 9. The locations of selected significant plant species. Selected species include EPBC-listed, VROT species and those considered locally significant. Species which are very widespread are not shown.

Weeds

Of the 137 species recorded, 49 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, and notes their category of listing in the Port Phillip region. Figure 10 shows the distribution on the surveyed land of some of these species. Some very abundant species are not shown on the map, for the sake of clarity (e.g. Serrated Tussock).

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

CaLP Act category	Weed species	Observations
State Prohibited	None	NA
Regionally Prohibited	None	NA
Regionally Controlled	<i>Cirsium vulgare</i> (Spear Thistle)	Widespread and abundant
	<i>Cynara cardunculus</i> (Artichoke Thistle)	Widespread and abundant
	<i>Lycium ferocissimum</i> (African Boxthorn)	Widely scattered
	<i>Nassella trichotoma</i> (Serrated Tussock)	Widespread and abundant
	<i>Physalis hederifolia</i> (formerly <i>viscosa</i>) (Prairie Ground-cherry)	Localised
	<i>Senecio pterophorus</i> (African Daisy)	Single mature individual noted. Removed during survey (including roots).
Restricted	<i>Nassella neesiana</i> (Chilean Needle Grass)	Localised patches, mostly along access track and on eastern edge.

In addition to these declared noxious weeds, DSE (2011) identified ten species that were considered to be the most seriously threatening in the WGR. Two of these species were noted, both of which are declared noxious (Chilean Needle Grass and Prairie Ground-cherry, above)

In addition to these species, several others are considered is considered high threat weeds in the context of the One Tree East property:

- *Galenia pubescens* (Blanket Weed, very widespread)
- *Carthamus lanatus* (Saffron Thistle, scattered, rare)

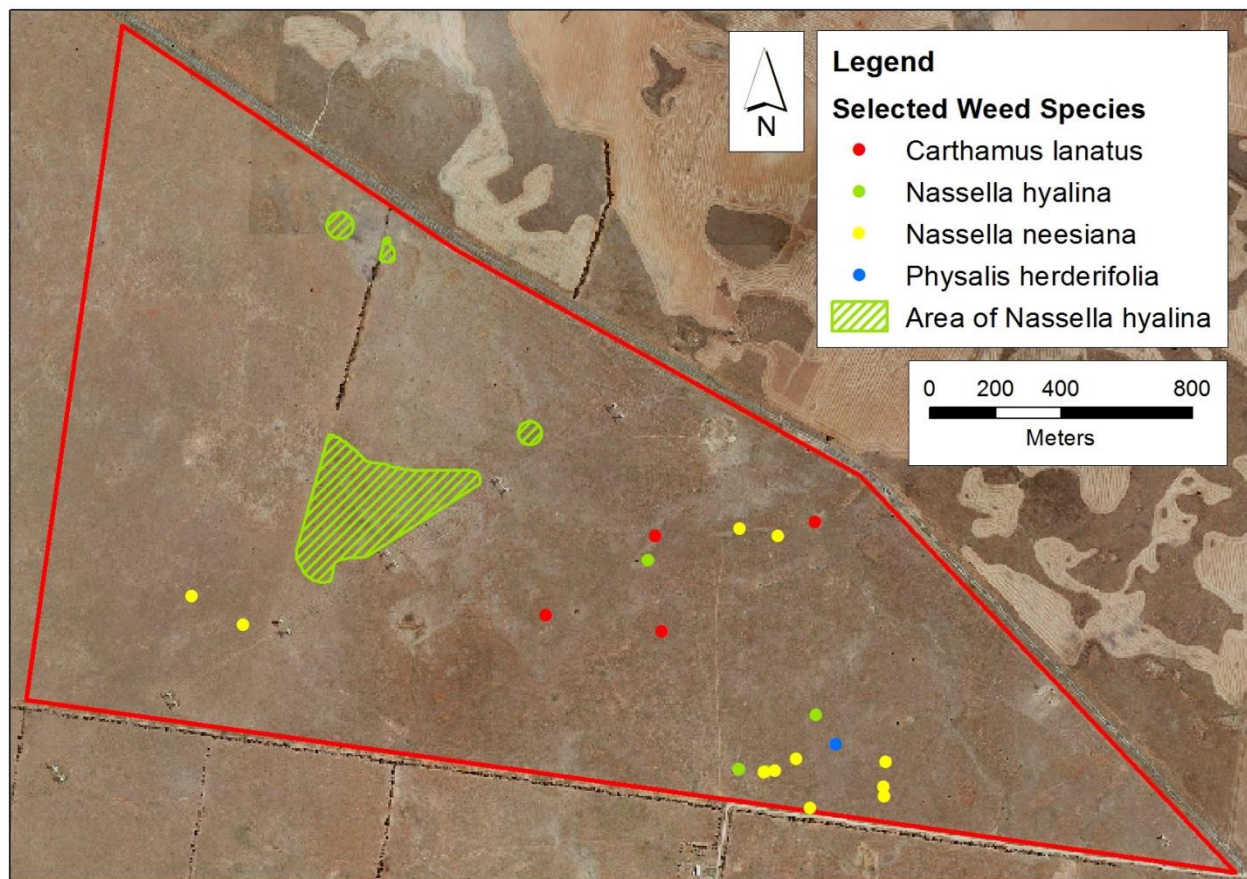


Figure 10. The locations of selected weed species. Those which are very widespread are not shown.

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 (and risks), called here “hot spots”. These are the places of particular interest on the property, and places where intensive or intricate management may be justified to protect the values of the site. 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, etc.

On the property, hotspots are identified in three contexts:

- Seasonal Herbaceous Wetlands.
- Stony Knolls with relatively intact and diverse vegetation
- A drainage line with patches of relatively intact and diverse Creekline Tussock Grassland.

These hot spots are shown on Figure 11.

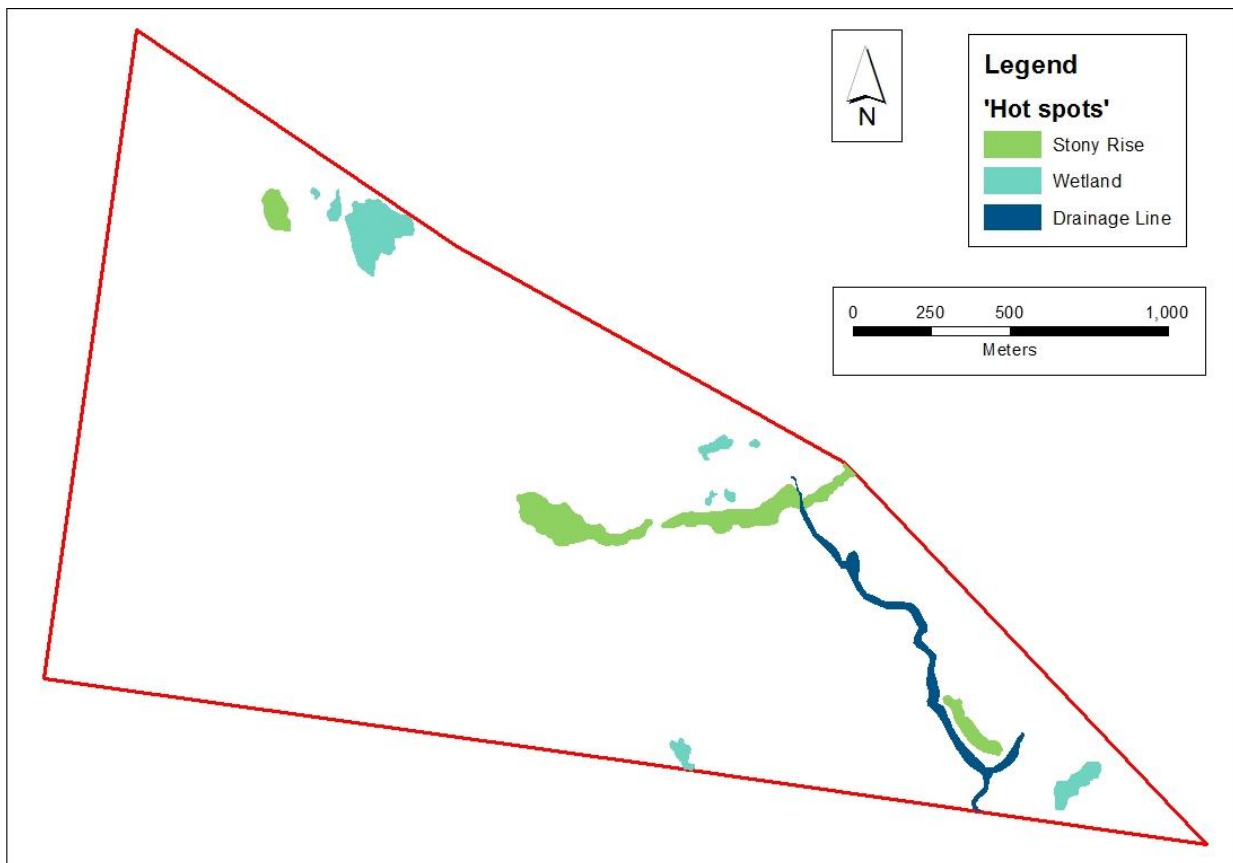
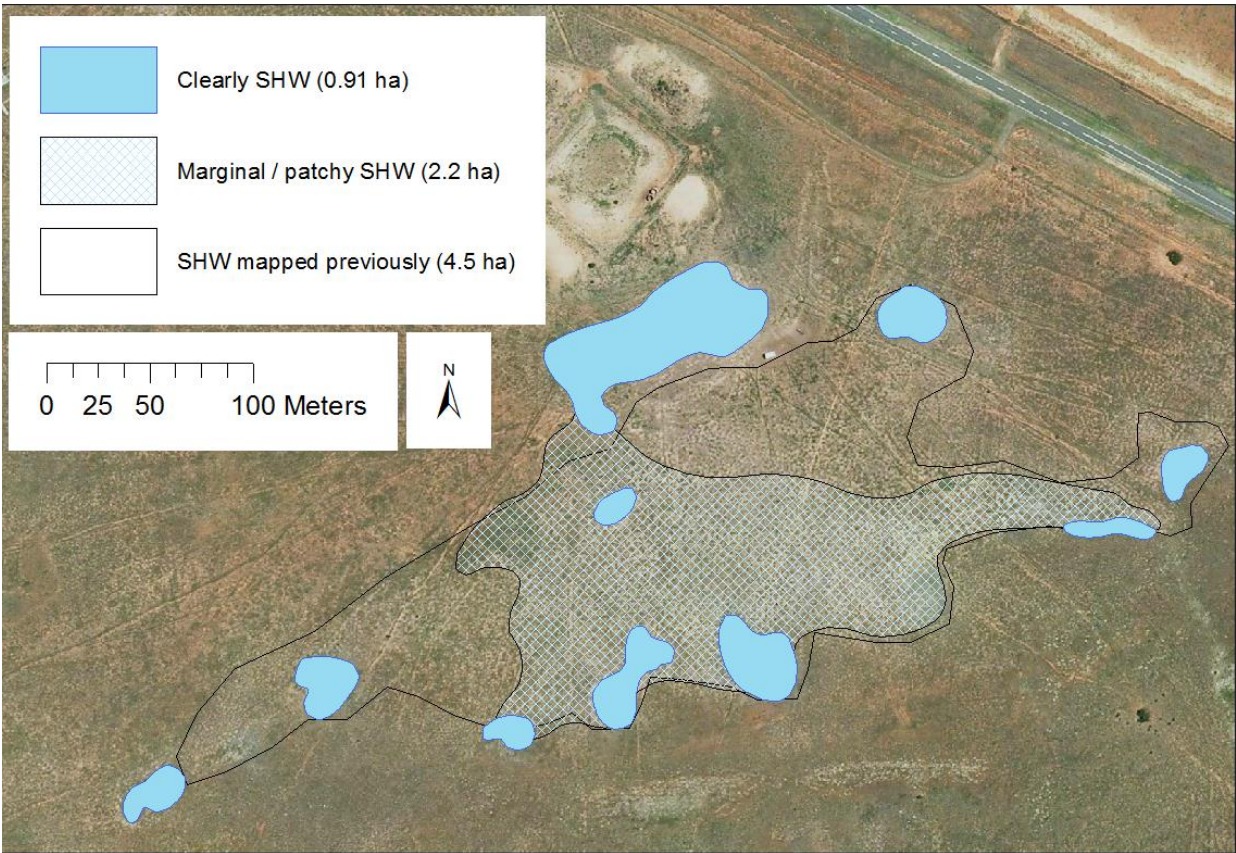


Figure 11. Distribution of 'Hot spots' at One Tree East.

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Appendix 1: Comparison of previous and recent mapping at Upper Lollipop Wetland.



Appendix 2: 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 (TG) Natural Temperate Grassland / Plains Grassland in the state *Themeda* Grassland.
- NTG (NG) Natural Temperate Grassland / Plains Grassland in the state Nutrient-enriched Grassland.
- PGW Plains Grassy Wetland

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. These are qualitative estimates that refer to the abundance of the species across the entire site, and may be assigned in retrospect after numerous site visits. The use of the categories makes 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 name	Status / Significance	NTG (NG)	NTG (TG)	stock camps / crop / non-native	NTG (former)	SHW	SHW (former)	SKS	SKS (former)	CTG	CTG (former)
NATIVE												
MONOCOTS												
Cyperaceae	<i>Carex inversa</i>		1	1		c	1	c			1	o
	<i>Eleocharis acuta</i>						2	a			1	o
	<i>Eleocharis pallens</i>	k					+	c				
	<i>Eleocharis pusilla</i>						+	c				
	<i>Schoenus apogon</i>		+	+		c	+	o		o		o
Juncaceae	<i>Juncus bufonius</i>						1	?			1	?
	<i>Juncus flavidus</i>						1	c			1	c
	<i>Juncus subsecundus</i>		1			c	1	c			1	c
Liliaceae	<i>Arthropodium minus</i>					c			+	c		
	<i>Dianella admixta</i>											
	<i>Dianella</i> sp. aff. <i>longifolia</i> (Benambra)	v				c				c	r	o
	<i>Tricoryne elatior</i>					o			r	o		
Poaceae C3	<i>Amphibromus nervosus</i>						1	c				
	<i>Austrostipa bigeniculata</i>		3	3	1	c	+	o	2	c	+	o
	<i>Austrostipa curticoma</i>		+			c		?		o		?
	<i>Austrostipa gibbosa</i>		+			c		o				
	<i>Austrostipa mollis</i>		+						+	a		
	<i>Austrostipa scabra</i>		+			o			1	a		o
	<i>Austrostipa setacea</i>		+			c				?		
	<i>Lachnagrostis filiformis</i>		+			o	1	c	r	o	+	c
	<i>Microlaena stipoides</i> var. <i>stipoides</i>		+			o		?	1	c	1	c
	<i>Poa labillardierei</i> var. <i>labillardierei</i>							?			1	a

		Status / Significance	NTG (NG)	NTG (TG)	stock camps / crop / non-native	NTG (former)	SHW	SHW (former)	SKS	SKS (former)	CTG	CTG (former)
	Species name											
	<i>Poa labillardierei</i> var. (Volcanic Plains)	k	+									
	<i>Poa sieberiana</i> var. <i>sieberiana</i>		1			a				o		o
	<i>Rytidosperma bipartitum</i> s.l.					?	r	?		?	r	?
	<i>Rytidosperma caespitosum</i>		2	1		a	+	o	2	c	?	o
	<i>Rytidosperma duttonianum</i>		2	1	+	a	2	a	+	o	1	a
	<i>Rytidosperma erianthum</i>		+			o			1	c		
	<i>Rytidosperma racemosum</i> var. <i>racemosum</i>		1	+		c			1	c		?
	<i>Rytidosperma setaceum</i>		1	+		c	+	o	+	o	+	o
Poaceae C4	<i>Bothriochloa macra</i>		1		+	c	+	?	1	c	1	c
	<i>Chloris truncata</i>		2	1	1	c	+	?	1	c	1	c
	<i>Enteropogon acicularis</i>		+									
	<i>Themeda triandra</i>		+	3		a		o	+	c	+	c
	<i>Walwhalleya proluta</i>		+			c	+	o				o
Xanthorrhoeaceae	<i>Lomandra filiformis</i>					o			r	o		o
FERNS												
Isoetaceae	<i>Isoetes drummondii</i>					o	+	c				o
	<i>Marsilea drummondii</i>						1	a			1	c
	<i>Pilularia novae-hollandiae</i>						+	c				?
Pteridaceae	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>								+	c		
DICOTS												
Amaranthaceae	<i>Alternanthera denticulata</i> s.l.						+	o			+	o
	<i>Alternanthera</i> sp. 1 (Plains)	k	1	+		c	1	c			?	o
Apiaceae	<i>Eryngium ovinum</i>		+	1		c						
Asteraceae	<i>Cassinia arcuata</i>		+			o				o		o

		Status / Significance	NTG (NG)	NTG (TG)	stock camps / crop / non-native	NTG (former)	SHW	SHW (former)	SKS	SKS (former)	CTG	CTG (former)
	Species name											
	<i>Centipeda cunninghamii</i>						r	c				
	<i>Chrysocephalum</i> sp. 1		+									
	<i>Cotula coronopifolia</i>					?	r	?				?
	<i>Euchiton sphaericus</i>		1	+	+	c	+	o	+	o	+	o
	<i>Helichrysum luteoalbum</i>		1	+	+	o	+	o	+	o	+	o
	<i>Senecio glomeratus</i>		r	r		o	r	o				
	<i>Senecio hispidulus</i>		r	r		o						
	<i>Senecio quadridentatus</i>		1	1	1	o	1	o	1	o	1	o
	<i>Senecio runcinifolius</i>		r			?		?				?
	<i>Vittadinia gracilis</i>		+			c				o		
Boraginaceae	<i>Cynoglossum suaveolens</i>		r			o				o		
Campanulaceae	<i>Wahlenbergia gracilis</i>		+			c		?		?		?
	<i>Wahlenbergia luteola</i>					o			+	c		
	<i>Wahlenbergia multicaulis</i>		+	+		c						
Chenopodiaceae	<i>Atriplex semibaccata</i>		1	1	1	c	1	o	1	o	1	o
	<i>Dysphania pumilio</i>		+			o		?	1	o		?
	<i>Einadia nutans</i> subsp. <i>nutans</i>		+			o			?	o		
	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i> (prostrate form)		+			c		o		o		
	<i>Maireana decalvans</i> s.s.		1			c	+	o				
	<i>Maireana enchylaenoides</i>		1			c			+	o		
	<i>Sclerolaena muricata</i> var. <i>villosa</i>											
Convolvulaceae	<i>Convolvulus angustissimus</i> subsp. <i>Angustissimus</i>		+			o		o	1	c	?	o

	Species name	Status / Significance	NTG (NG)	NTG (TG)	stock camps / crop / non-native	NTG (former)	SHW	SHW (former)	SKS	SKS (former)	CTG	CTG (former)
	<i>Convolvulus angustissimus</i> subsp. <i>Omnigracilis</i>	k	1	1	+	c	+	o	?	o	?	o
	<i>Dichondra repens</i>		+			c	1	c	+	c	1	c
Crassulaceae	<i>Crassula decumbens</i> var. <i>decumbens</i>		+			o	+	o		o		o
	<i>Crassula sieberiana</i> s.l.		1	?	?	c	?	o	?	c	?	o
Elatinaceae	<i>Elatine gratioloides</i>						r	c				o
Euphorbiaceae	<i>Euphorbia drummondii</i>		1			c	+	o	+	o	?	o
Fabaceae	<i>Glycine tabacina</i> s.l.								+	c		
Geraniaceae	<i>Erodium crinitum</i>		+			o			1	c		
	<i>Geranium retrorsum</i>		+									
Haloragaceae	<i>Haloragis aspera</i>		+			o	1	a			1	a
Goodeniaceae	<i>Goodenia gracilis</i>						+	o				
	<i>Goodenia heteromera</i>						+	o				
Lythraceae	<i>Lythrum hyssopifolia</i>		+		?	o	1	c		o	?	c
Mimosaceae	<i>Acacia paradoxa</i>								+			
Onagraceae	<i>Epilobium billardierianum</i> subsp. <i>billardierianum</i>						?	o			?	o
	<i>Epilobium hirtigerum</i>		1	?	?	o	1	c	?	o	?	o
Oxalidaceae	<i>Oxalis perennans</i>		1	1	?	c	1	c	1	c	1	c
	<i>Oxalis radicata</i>								r	o	r	
Plantaginaceae	<i>Plantago gaudichaudii</i>		+	r		c						
Polygonaceae	<i>Rumex brownii</i>		1	1	1	o	1	o	1	o	1	o
Ranunculaceae	<i>Ranunculus pumilio</i>						+	c			1	
Rosaceae	<i>Acaena ovina</i>		+			c		o		o		o

		Status / Significance	NTG (NG)	NTG (TG)	stock camps / crop / non-native	NTG (former)	SHW	SHW (former)	SKS	SKS (former)	CTG	CTG (former)
	Species name											
Rubiaceae	<i>Asperula conferta</i>		+			o	1	c			1	c
	<i>Galium leptogonium</i>								+	o		
Scrophulariaceae	<i>Limosella australis</i>						r	o			?	o
Violaceae	<i>Melicytus dentatus</i> s.s.					o			+	o		
INTRODUCED												
MONOCOTS												
Iridaceae	<i>Romulea rosea</i> var. <i>australis</i>		2	1	2		1		1		1	
Poaceae C3	<i>Avena barbata</i>		1	?	1		?		?		?	
	<i>Aira elegantissima</i>		1	1	1		1		1		1	
	<i>Bromus</i> spp.		?									
	<i>Bromus hordeaceus</i> subsp. <i>hordeaceus</i>		2	1	2		1		+		?	
	<i>Cynodon dactylon</i>		+		?		?		?		?	
	<i>Lolium rigidum</i>		2	1	3		1		1		1	
	<i>Nassella hyalina</i>		1	1	?		1		1		1	
	<i>Nassella neesiana</i>		+	1	?		?		?		?	
	<i>Nassella trichotoma</i>		2	2	2		1		2		2	
	<i>Phalaris aquatica</i>		1	+	?		?		1		1	
	<i>Vulpia bromoides</i>		1	1	1		1					
	<i>Eleusine tristachya</i>											
DICOTS												
Apiaceae	<i>Foeniculum vulgare</i>				+							
Aizoaceae	<i>Galenaia pubescens</i> var. <i>pubescens</i>		1	+	3		+		1		1	
Asteraceae	<i>Arctotheca calendula</i>		+						+			
	<i>Aster subulatus</i>						+					

		Status / Significance	NTG (NG)	NTG (TG)	stock camps / crop / non-native	NTG (former)	SHW	SHW (former)	SKS	SKS (former)	CTG	CTG (former)
	Species name											
	<i>Cirsium vulgare</i>		2	1	1		+		1		1	
	<i>Conyza bonariensis</i>		1	+	1		1		+		1	
	<i>Cynara cardunculus</i> subsp. <i>flavescens</i>		1	+	1		1		1		1	
	<i>Helminthotheca echioides</i>		+		+		1				?	
	<i>Hypochaeris radicata</i>		1	1	1		1		+		1	
	<i>Leontodon taraxacoides</i> subsp. <i>taraxacoides</i>		1	1	+		+		?		?	
	<i>Senecio pterophorus</i>											
	<i>Sonchus oleraceus</i>		1	+	1		+		+		+	
	<i>Scolymus hispanicus</i>		+						?			
	<i>Xanthium spinosum</i>		+				+					
Boraginaceae	<i>Echium plantagineum</i>		+		+							
Brassicaceae	Unknown Brassicaceae		+									
	<i>Lepidium africanum</i>		+		1		+		+		+	
Chenopodiaceae	<i>Chenopodium</i> spp.				+							
Fabaceae	<i>Medicago polymorpha</i>		+		+		?		?		?	
	<i>Trifolium</i> spp.		1		1		+		+		1	
	<i>Trifolium arvense</i> var. <i>arvense</i>		+	?	?		?		?		?	
Gentianaceae	<i>Centaurium erythraea</i>		+	?	+		?		?		?	
Geraniaceae	<i>Erodium ?cicutarium</i>						+					
	<i>Erodium botrys</i>		2	+	1		1		1		1	
Lamiaceae	<i>Salvia verbenaca</i>		1						1			
Malvaceae	<i>Malva</i> sp.				+							
Plantaginaceae	<i>Plantago coronopus</i> subsp. <i>coronopus</i>		1	1	1		1		1		1	

		Status / Significance	NTG (NG)	NTG (TG)	stock camps / crop / non-native	NTG (former)	SHW	SHW (former)	SKS	SKS (former)	CTG	CTG (former)
	Species name											
	<i>Plantago lanceolata</i>		+				+				+	
Polygonaceae	<i>Polygonum aviculare</i> s.l.		+		1		1					
	<i>Rumex crispus</i>						+					
	<i>Rumex pulcher</i> subsp. <i>pulcher</i>						+				+	
Primulaceae	<i>Anagalis arvensis</i>		+		?		?		?		?	
Solanaceae	<i>Lycium ferocissimum</i>		+		+				1			
	<i>Physalis hederifolia</i>		+									
	<i>Solanum linnaeanum</i>		+									
	<i>Solanum nigrum</i> s.l.		+		+		?		?			

Appendix 3: Notes on plant identification

Some plants displayed characteristics or variations worthy of note. These may 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 Victorian Biodiversity Atlas database:

- *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.

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