Draft Conservation Values of the Wombat Forest / Macedon Landscape Zone

An assessment by The Wilderness Society and Wombat Forestcare

Prepared by Murray Ralph on behalf of Wombat Forestcare, The Wilderness Society and the Dara Foundation.

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1. Introduction and Overview

1.1 Victorian Context

Victoria is the most cleared state in Australia. Since European settlement 24 fauna and 51 flora species have become extinct. Currently 44 per cent of native plants and 30 per cent of native animals are listed as extinct or threatened in Victoria (Department of Sustainability and Environment 2009).

Nearly 80% of Victoria is considered fragmented. In fragmented areas there has been '*widespread removal and ongoing use of vegetation of native vegetation for economic development. Here the 'underlying stock' of native vegetation is generally considered to be declining or at risk of decline; degradation and the recovery from degradation are the dominant drivers*' (Victorian Environment Assessment Council 2010). Most of this clearing has occurred on private land, where due preferential clearing of more fertile areas, sixty per cent of the native vegetation types that remain on private land are classified as threatened (Commissioner for Environmental Sustainability Victoria 2008).

The most recent Catchment Condition Report concluded that the ecosystems underpinning Victoria's catchments and human livelihood are under continuing stress and decline, and the number of threatened species listed is still increasing (Victorian Catchment Management Council 2007). Victoria also has the highest proportion of sub-bioregions in Australia considered to be in poor landscape condition (CES 2008).

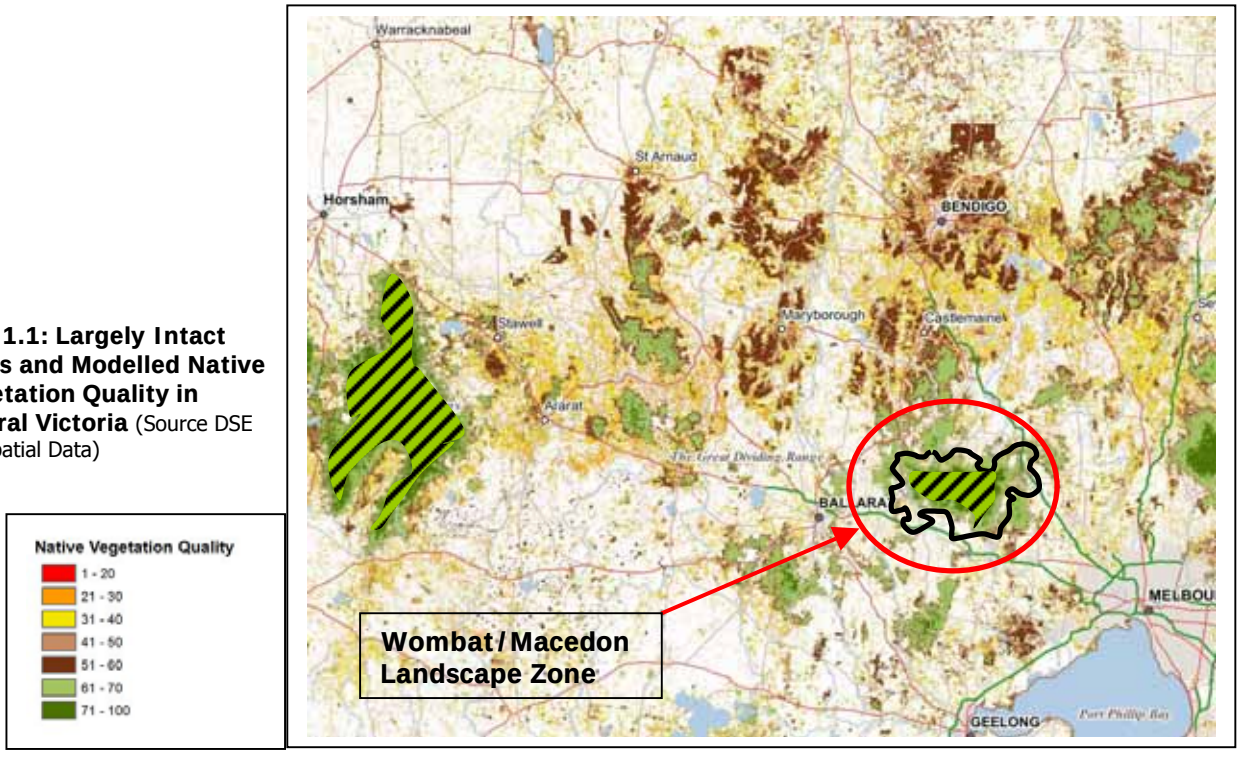
Despite this disturbing record native vegetation is still being cleared and what remains is declining in quality (DSE 2008). Evidence also suggests that the full impacts of past habitat loss and fragmentation have yet to occur, even from clearing that occurred many decades ago (Victorian Environment Assessment Council 2010).

All this combined with the looming threat of climate change means a very uncertain future for the health of Victoria's biodiversity. This is highlighted by recent research in northern Victoria that found a dramatic loss of woodland bird species over the last 15 years largely due to the impacts of climate change (McNally et al 2009).

1.2 Regional Context

Map 1.1 highlights the extensive clearance of vegetation that has occurred in the western and central parts of Victoria. It also highlights that 'largely intact' areas and areas of higher quality vegetation are now rare over much of the region. Largely intact areas are defined as those areas that maintain most of their ecological processes (DSE 2003).

The most recent Catchment Condition Report also highlights declining biodiversity, declining native vegetation condition and most catchments in poor health (VCMC 2007).



Map 1.1: Largely Intact Areas and Modelled Native Vegetation Quality in central Victoria (Source DSE Geospatial Data)

The Landscape Zone falls mostly within the Central Victorian Uplands bioregion (see Map 1.3). The recent Remnant Native Vegetation Investigation VEAC stated that '*..the Central Victorian Uplands protected areas system represents considerably less of its original native vegetation than the statewide average, despite having a moderate overall level of public land* and identified the Central Victorian Uplands bioregion as one of three priority areas for the creation of a comprehensive, adequate and representative system of protected areas (see Text Box below). It also identified the bioregion as being notable for the '*generally poor site condition of its remnant native vegetation relative to other moderately cleared bioregions*'.

VEAC Remnant Native Vegetation Investigation 2011 Recommendation Twelve
Government initiate investigations of public land use in the following bioregions, for amongst other things, assessment against the need to provide for the creation and preservation of a comprehensive, adequate and representative system of protected areas:
a) Wimmera, Dundas Tablelands and Glenelg Plain
b) Gippsland Plain and Strzelecki Ranges
c) Central Victorian Uplands

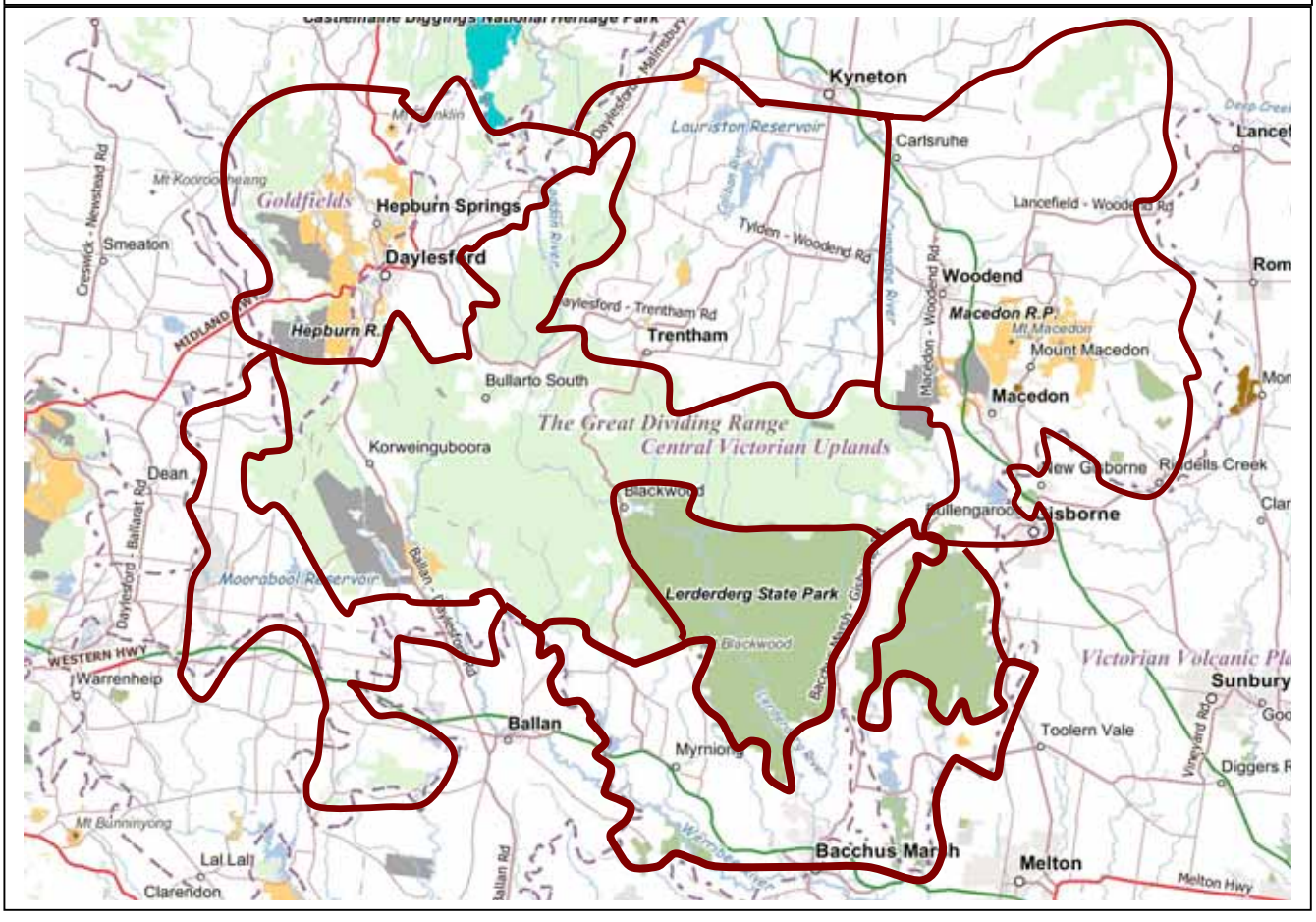
1.3 The Wombat Forest / Macedon Landscape Zone

The Wombat Forest/Macedon Landscape Zone is located in central Victoria and is shown on Map 1.2. The landscape zone is approximately 2,100 square kilometres (approximately 55km wide on the east-west axis and 50km long on the north-south axis). The rainfall is mostly between 600-900mm, with smaller areas above 1100mm on the Great Divide. Average daily mean temperature is 15-21˚C.

The natural environment of the Landscape Zone is very diverse and contains a range of landscape features. This includes the mountainous ranges of Great Divide, steep gorges along the Lerderderg and Werribee Rivers, the headwaters of numerous rivers, volcanic eruption points at Hanging Rock and other locations, and areas of volcanic plain.

The eastern, southern and western boundaries of the Landscape Zone are based upon changes in bioregion. The north-eastern boundary reflects changes from forest to woodland vegetation types. The north-western boundary reflects a change to drier forest types. The Landscape Zone has been divided into seven Local Areas.

Map 1.2: The Wombat Forest / Macedon Landscape Zone (Source: DSE Geospatial Data)



Dry, damp and wet forests, and to a lesser extent, woodlands dominate the Landscape Zone. Twenty-eight different vegetation types (Ecological Vegetation Classes) have been mapped in the area and over 900 plant species recorded. A diverse range of fauna is found in the Landscape Zone with over 290 species. Fifty-four fauna species and fifty flora species are considered rare or threatened. The damp and wet forests in the area are also renowned for their diversity of fungi.

The Wombat Forest/Macedon Landscape Zone contains the only remaining 'largely intact' area in central Victoria (see Map 1.1). Therefore the Landscape Zone plays a critical role in the regions' ecological processes and ecosystem resilience.

It also plays a key role in biodiversity conservation in the region. The Lerderderg-Wombat area was recognised by the Land Conservation Council in 1985 as being '*…the largest and most varied of a number of forest scattered through north-central Victoria, all of which are now isolated from each other by cleared land'* and considered the area to have a '..*high capability for nature conservation*' (LCC 1985).

A report by the Victorian National Parks Association has identified the Wombat State Forest as one of the highest priority conservation areas in central Victoria and called for the forest to become a State Park ((VNPA 2010). A recent VEAC discussion paper also noted that '*significant patches of remnant native vegetation of high quality and connectivity adjoin the largely intact landscape of the Wombat Forest (including, for example, in the Trentham- Daylesford area)* (VEAC 2010).

Vegetation on public land in the Wombat Forest/Macedon Landscape Zone (including Parks and State Forests) also tends to be of higher quality than other public land in the bioregion due to less intensive mining activities and lower levels of grazing on public land.

The biodiversity of the region attracts both residents and visitors, and underpins a local economy based largely on tourism and agriculture. It also provides a wide range of ecosystem services such as forested catchments, clean water and air, and natural pest control.

However, despite these very high conservation values the region is a low priority for funding under National, State and regional programs. The region was not included as a flagship or biolink area under the State governments Land and Biodiversity White Paper. This is partly due to limited overall funding for biodiversity conservation but the focus on 'assets' rather than overall ecological processes is also a factor.

Greater investment is required to protect the biodiversity of the area and secure the vital role the Landscape Zone plays in maintaining ecosystem processes and services across the region.

1.4 Objectives of the Report

The report is based on WildCountry Science principles, outlining key ecosystem processes and key biodiversity assets, and identifying threats to each. The overall objective of the report is to promote long term conservation in the Landscape Zone including the establishment of a network of protected areas. The report aims to:-

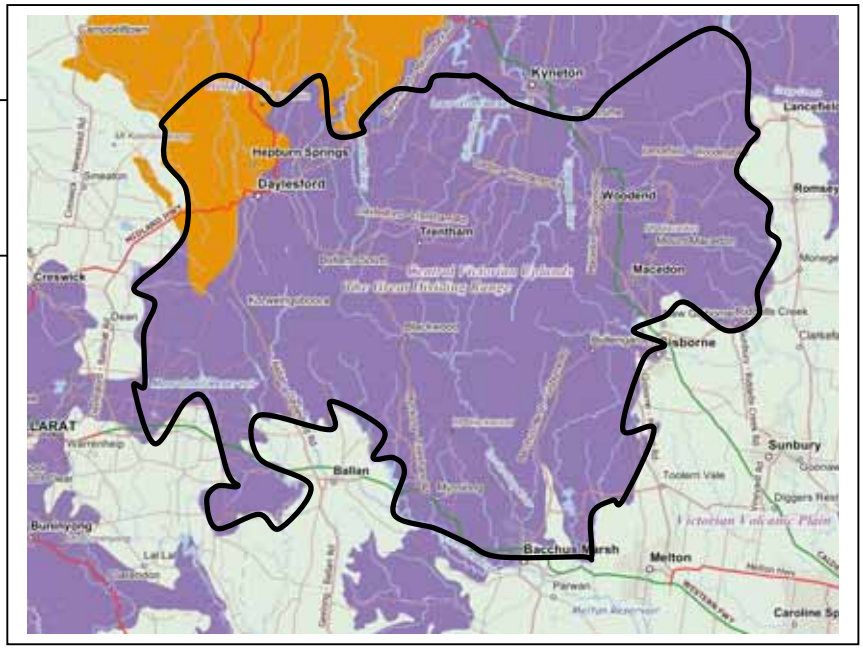
1. Document the extent and condition of natural values.
2. Identify key ecological processes operating in the Landscape Zone.
3. Identify key threatening processes.
4. Identify potential areas and actions to rebuild landscape connectivity.

1.5 Bioregions in the Landscape Zone

A Bioregion is an area with similar ecological, geographical and geological characteristics, and provides a natural boundary for regional scale biodiversity planning and management. Two bioregions occur in the Landscape Zone - the Central Victorian Uplands and Goldfields bioregions.

The Central Victorian Uplands bioregion dominates the Landscape Zone and is characterised by gently undulating terrain with occasional steeper slopes, ridges and peaks. The geology comprises Palaeozoic sediments transformed and extruded by igneous activity and raised by movements of the earth. Little geological activity has occurred since except erosion subduing the topography, exposing the granitic and associated metamorphic outcrops, and forming outwash fans of sediment (VEAC 2010). The Goldfields bioregion occurs in the north-western corner of the landscape zone and is characterised by a series of low hills and rolling plains, mainly sedimentary in origin. Metaphoric and old volcanic rocks form rugged slopes and ridges. The bioregion has relatively poor soils and relatively uncertain rainfall (VEAC 2010).

Map 1.3: Bioregions in the Landscape Zone (Source DSE Geospatial Data)



1.6 Past Land Use

As demonstrated by the current use of indigenous names for local areas, known archaeological sites and the usage of local species for food and tools, Aboriginal associations with the area date back many thousands of years. The land sustained a lifestyle that serviced basic needs and supported a rich cultural life. The Wombat Forest/Macedon Landscape Zone sits on the confluence of three aboriginal groups – the Dja Dja Wrung in the north, the Watha Wurrung in the south-west and the Wurundjeri in the south-east. Within this a larger number of clan groups occupied various parts of the Landscape Zone at various times of the year.

In the late 1830-1840's European settlers pastoralists and squatters took up land in the area. They quickly cleared the more fertile valleys and plains of native vegetation for the expanding pastoral industry. Areas less suitable for agriculture remained with the Crown. In these steeper and more infertile areas, timber harvesting increased dramatically during the 1850's when gold was discovered. Gold mining saw a wave of immigration and localised areas denuded of vegetation and stripped of topsoil, especially around Daylesford and Blackwood.

Over the ensuing decades the hardwood timber industry flourished and many areas were heavily logged. This included the Wombat State Forest where logging was so intense that a Royal Commission into over-harvesting was undertaken in 1899 and harvesting was ceased. Logging recommenced in the Wombat Forest and other areas in the 1940s and continued until recently when over harvesting has again led to the cessation of logging. Other major settlement periods included two waves of soldier settlers after each World War. Currently about 60 per cent of the Landscape Zone is private land. In the 1970-80s large areas of native vegetation was converted to exotic softwood timber plantation, particularly around Macedon and Daylesford.

1.7 Current Land Use

Over the last few decades land use in the Landscape Zone has changed dramatically. In many areas agricultural land has been subdivided into smaller lifestyle or amenity properties. This has resulted in a large change in the demographics of the regions landowners and broader mix of land uses in the area. Agricultural production is still the dominant land use in some areas. Sheep, cattle and potato farming are common activities, although intensive production of organic vegetables and other crops is increasing. An anticipated increase in Victoria's population to six million people by 2020 will further drive land use change (Commissioner for Environmental Sustainability Victoria 2008).

A key characteristic of the Landscape Zone is the relatively large number of public land areas, including Parks, Reserves and State Forests (see Section 6). Other public land in the study includes numerous smaller bushland reserves, roadsides and streamside reserves. Approximately 40 per cent of the Landscape Zone is public land.

2. Ecological Processes in the Landscape Zone

2.1 Ecological Processes

Ecological processes are the fundamental mechanisms that create and maintain natural ecosystems. They include climatic processes, hydrological cycles and interactions between species (Soule et al 2004, McGregor et al 2008). Maintaining these inter-related processes is essential for sustaining all life now and into the future.

Currently, ecosystem management in Victoria is focused on protecting and managing individual key biodiversity assets, such as threatened species and threatened vegetation types. However, '*actions that focus solely on particular species, vegetation communities, habitats or sites are unlikely to be effective unless the ecological processes that support these 'assets' are sustained'* (McGregor et al 2008).

It is therefore necessary to also focus on protecting and maintaining ecosystems, ecological processes and minimising the loss of overall biodiversity. Building ecosystem resilience will be vital to ensure that ecosystems have the best chance of adapting to climate change as it occurs (VEAC 2010).

Ecological processes that provide benefits to humans are referred to as 'ecosystem services'. These include a stable climate, clean air, pest control and pollination. In the USA the value of ecosystem services provided by insects alone, in the form of pollination, pest control and nutrient recycling, was valued at approximately US $57 billion per annum (Commissioner for Environmental Sustainability Victoria 2008).

A wide range of information points to many ecological processes being severely disrupted across Victoria (McGregor et al 2008). As mentioned previously, the most recent Catchment Condition Report highlights declining biodiversity, declining native vegetation condition and most catchments in poor health (VCMC 2007). The North Central CMA, which covers northern half of the Landscape Area, is in the poorest overall landscape condition of all CMAs within Victoria (Victorian Catchment Management Council 2007).

As the Wombat Forest/Macedon Landscape Zone contains one of the largest forested areas in Central Victoria it plays a vital role in the maintenance of ecological processes, landscape connectivity and ecosystem resilience within the wider region. A recent VEAC discussion paper noted that '*significant patches of remnant native vegetation of high quality and connectivity adjoin the largely intact landscape of the Wombat Forest (including, for example, in the Trentham- Daylesford area)'.* This connectivity provides a vital link from the foothill forests on the Great Divide, through the drier forest north of the Landscape Zone to the Box-Ironbark Woodlands in northern Victoria.

Key ecological process within the region and Landscape Zone are discussed below.

Climatic Processes are a major influence on the composition and geographic distribution of ecosystems. Climatic processes in Australia are very variable due the influences of the El Niño Southern Oscillation and the Indian Ocean Dipole.

Biodiversity has been identified as the global sector that is most vulnerable to climate change, with inevitable but uncertain effects (VEAC 2010). It is likely that the flora and fauna of the region are already suffering from the impacts of climate change. Crashes of woodland bird populations have occurred in northern Victoria over the last 15 years due to the reduced rainfall being experienced as a part of climate change (McNally et al 2009, Birds Australia 2009).

Future climate change will only exacerbate these trends, further disrupting natural rainfall patterns, causing more frequent and severe wildfires, and producing an even hotter climate (IPCC 2007). Temperatures in southern Australia are expected to increase a further 1-5^{o}C by 2070 depending on the level of emission reductions that are put in place (IPCC 2007).

Research undertaken by the North Central CMA on the impact of climate change points to major shifts in the ranges of ecosystems and species in the region (Parkes et al 2010). Species under greatest threat include those that have small geographical distributions, limited ability to disperse, low ecological tolerances, low genetic variation, long generation times and specialised requirements (DSE 2010, Victorian Environment Assessment Council 2010). This includes herbivorous possum species which are common in the Landscape Zone (Menkhorst 2009). The capacity of species to adapt to climate change is further limited by habitat fragmentation, pest species and inappropriate fire regimes (Mackey et al. 2007).

Given that the Landscape Zone has high levels of native vegetation extent, high connectivity, higher rainfall and higher elevations, it may possibly have greater inherent resilience to climate change than some other areas. It is also anticipated that the area will play a vital role as a 'climate change refuge' in the future and should be managed with this in mind. Areas such as the Wombat Forest, Lerderderg Forest and Macedon Ranges, will most likely act as refuges for species from northern Victoria that are forced to move south if the climate warms.

Hydrological Processes drive a range of key ecosystem functions, including the maintenance of riparian and wetland habitat, water tables and salinity, and groundwater systems that feed base river flows and springs in the area. The importance of native vegetation in maintaining hydrological processes is illustrated by the devastating impacts of rising water tables and salinity caused by widespread clearing. As mentioned previously the Landscape Zone is a very important catchment and riparian area with the headwaters of seven river systems and extensive riparian vegetation (see Section 3.4).

On public land in the Landscape Zone riparian vegetation is of a very high quality when compared to riparian vegetation further downstream. In the Landscape Zone, especially the Wombat State Forest a number of riparian areas are not streams in the conventional sense but more like swampy sediment flats. According to Dr Ian Rutherford, a fluvial geomorphologist from Melbourne University, these swampy sediment accumulation areas were once common in the Victorian landscape but have been systematically destroyed, and are now considered an endangered landform. These areas play a very important role in the overall hydrology of a region by acting as a vast natural water treatment plant before slowly releasing water downstream.

Sedgy Riparian Woodland in the Wombat State Forest south of Trentham.
(Picture to be included)

A number of large water storages are included in the Landscape Zone, including the Lauriston, Malmsbury and Rosslynne Reservoirs. However the negative impacts of these reservoirs on hydrological processes would mostly occur downstream of these areas and outside of the Landscape Zone.

With property sizes shrinking the number of farms dams within the area has dramatically increased. This has resulted in reductions of environmental water flows in the landscape. Research undertaken by Melbourne Water indicates two megalitres of environmental flows are lost for every 1 megalitre of water stored in a dam (MRSC 2009). More stringent regulations on the construction of dams on private land are required, especially those that are built for aesthetic or 'lifestyle' purposes. Over-extraction of groundwater is also causing problems.

Primary Productivity encompasses energy flows through ecosystems, including the formation of physical habitats, such as vegetation, tree hollows, flower and nectar production and leaf litter accumulation.

Productive parts of the landscape, such as fertile valleys, flat terrain with rich soil and river flats, have been disproportionately cleared or heavily modified for agriculture. For example, vegetation types (EVC groups) associated with fertile valleys and riparian areas have less than 20% original vegetation remaining, while EVC groups associated with slopes, escarpments or poor soils have more than 70-90% of original vegetation remaining (VEAC 2010). A high proportion of the native fauna that were characteristic of these productive parts of the landscape are also threatened (VEAC 2010).

These fertile agricultural landscapes were also the most productive for native plants and animals in terms of abundance and distribution. Research indicates that the loss of vital seasonal food resources from these fertile areas, such as winter and spring flowering species like Silver Banksia (*Banksia marginata*) have potentially had a major negative effect on plant pollination at a much wider ecological scale (Paton 2009). These plant species were also very prevalent in some parts of the Landscape Zone but are now almost absent.

Ecologically mature trees also play a very important role in foothill forest ecosystems (Environment Conservation Council 1997). Over sixty native fauna species in the Landscape Zone are dependent or partially dependant on tree hollows (Viridans 2009). These are most commonly found in large trees over 150 years old (McGibbon and Lindenmayer 2005). However due to widespread clearing on private and public land, large old trees now mostly only remain on roadsides or as isolated paddock trees. The loss of these key habitats and resources may have also severely disrupted a range of ecosystem processes in the Landscape Zone.

Interactions between Species play a crucial role in the function of ecosystems. Interactions include competition for resources, symbiotic relationships, predator/prey relationships, plant pollination and seed dispersal. Information on these complex interactions is lacking for many species and ecosystems in Victoria.

Although the Landscape Zone contains high levels of native vegetation, it is likely that species interactions have been disrupted by a range of threatening processes. For example, vegetation clearance and fragmentation on private land, altered fire regimes on public land, loss of hollow bearing trees on all land types and introduced species. The loss of top predator species, such as the Dingo and Spot–tailed Quolls, may have also led to imbalances in the numbers of other species. In areas with deeper, more fertile soils we have also seen the loss of small burrowing mammals, such as bandicoots, which played a role in maintaining soil health, nutrient recycling and natural regeneration.

Movements of Organisms including animals and the seeds of plants are also critically important for a range of ecosystem processes and functions within the Landscape Zone. These include genetic diversity within species, the dispersal of young and the colonisation of new territory (including in response to climate change).

Although research is lacking, it is likely that the movement patterns of a many species in the Landscape Zone have been disrupted by a range of threatening processes. For example, vegetation clearance and fragmentation on private land, altered fire regimes on public land, the loss of large old trees on all land types, water extraction from rivers, damming of streams and introduced species. Roads and a range of other infrastructure further contribute to the fragmentation of the landscape and hinder animal movement.

Evolutionary Processes, such as natural selection, the maintenance of genetic diversity and speciation (the development of new species) are ongoing processes that provide the potential for the development of life and the capacity for species to adapt to changing environmental conditions. Ecosystems have adapted to past changes in climate, volcanic activity and continental drift.

To allow evolutionary processes to continue, especially in the light of climate change, actions to maintain biodiversity should consider '*…the conditions necessary for continuing evolution, particularly the potential for adaptation to changing environmental conditions and for speciation.'* (Frankel and Soulé 1981). In the Landscape Zone disruptions to evolutionary processes are occurring through a range of threatening processes, including climate change, habitat loss and fragmentation, the loss of native species and altered fire regimes.

Although they play a very important role, refugia are only rarely considered in conservation assessment and planning (Mackey et al. 2007). Refugia are areas that enable species to maintain their presence in landscapes during periods of detrimental change in the surrounding landscape. Refugia will play a very important role for the maintenance of biodiversity during climate changes. With its high rainfall, high vegetation cover and wide topographic variation the Landscape Zone has high potential as a refuge area.

Refugia also occur in riparian areas and are very important for aquatic life. For example deep pools that remain in stream or creeks during periods of drought are critical refuge areas. These areas may be a very high priority for restoration in the Landscape Zone.

Natural Disturbance Regimes refer to the frequency and intensity of natural events that occur at local and regional scales e.g. fire and floods. They play a very important role in the composition and maintenance of ecosystems, influencing plant germination and the flows of water into ephemeral wetlands and floodplains. Key natural disturbances that operate in the Landscape Zone include wildfire, flooding and grazing by native animals. It is also possible that wind events and plant diseases such as *Armillaria* played a localised role.

Some natural disturbance regimes have been severely altered in the Landscape Zone, especially in smaller remnant patches. Social pressures are also leading to public land being burned too frequently. There is need to identify appropriate fire regimes (fire frequency, season, size and spatial arrangement in the landscape) that benefit the vast majority of native flora and fauna of the region, especially threatened species and ecosystems. There has been a range of research into the impacts of fire on native flora in Victoria, however much more research is required on the effect on native fauna (Clarke 2008).

2.2 Key Threats to Ecological Processes

Human use of the environment has resulted in a range of threats to ecological processes, ecosystems and many native species. These threats reduce the function and resilience of ecosystems. The key threats to ecological processes in Victoria are outlined in Table 2.1.

Table 2.1 Key Threats to Ecological Processes (Adapted from Bennett et al 2007)
▪ Climate change ▪ Loss, fragmentation and degradation of habitats ▪ Alterations to hydrological flows and reduction in aquatic connectivity ▪ Unsustainable harvesting of natural resources eg timber harvesting and firewood collection ▪ Pest plants and animals ▪ External inputs eg. fertiilisers and irrigation

2.3 Considering Ecological Processes in Conservation Planning and Restoration Programs

Although many ecological processes occur over a very wide scale there are a range of actions that could be carried out at a local or regional scale to improve ecological processes in an area. Some examples are provided below.

Climatic Processes

- the establishment of conservation reserves to further protect native ecosystems
- avoiding the clearing of native vegetation
- restoring areas of native vegetation to absorb greenhouse gas emissions

Hydrological processes

- improving environmental flows
- restoring riparian areas
- improving regulations regarding dams on private land

Primary productivity

- restore more fertile parts of the landscape
- restoring riparian areas
- combining revegetation with land degradation mitigation activities to gain multiple benefits

Interactions between species

- plant a wide diversity of indigenous species, including those with different fruit types (nectar-producing, fleshy fruits etc) or prickly species
- control pest animals
- maintain keystone habitat features eg large solitary trees, deep pools in streams, fallen logs, leaf litter

Evolutionary processes

- strategic development of biolinks
- wildlife corridors and biolinks
- encourage natural regeneration
- use indigenous plant species
- plant or build flora populations to minimums of 200 reproductive individuals
- establish populations of flora species strategically throughout landscape based on plant pollinator movement.

Movements of organisms

- strategic development of biolinks, wildlife corridors and biolinks.

Natural disturbance regimes

- implement ecological burning regimes.

2.4 Monitoring Ecological Processes and Ecosystem Health

Currently there is no monitoring of the overall health of ecosystems and ecological processes at a State, regional or local level. Catchment Condition Reports currently provide the most detailed assessment and are released every five years by the Victorian Catchment Management Council. However these reports do not specifically monitor the health of ecosystems or ecological processes, and it is noted in the most recent report that a lack of data is a key obstacle to managing natural resources (VCMC 2007).

At a local level a lack of monitoring also hampers management of biodiversity. Information on native vegetation requires refinement to improve accuracy. Much greater information on native fauna, including the distribution and health of local population is required.

Table 2.2 Indicators Used to Monitor Catchment Condition and Ecosystem Health

VCMA Catchment Condition Indicators	Other Types of Indicators
Biodiversity' • Extent Native Vegetation and changes • Condition of Native Vegetation • Extent and Condition of Forests • Extent and Condition of Parks **Soil** **Water** • Index of Stream Condition • Hydrology • Water Quality • Streamside Zone • Stream Fauna • Groundwater • Lakes and Wetlands • Coastal and Marine	• Waterwatch quality data • Regional Salinity Report • Environmental Flows • Bird Atlas • Frog Census • Fish Census • Rare and Threatened species • Plant and animal distribution • Land clearing/vegetation removal permits granted • Area of vegetation illegally cleared • Number and health Landcare, Friends of and other groups • Number and extent of Trust for Nature, Land for wildlife and BushTender properties

3. Native Vegetation and Flora in the Wombat Forest / Macedon Landscape Zone

This section provides a broad overview of the flora conservation values of the Wombat Forest/Macedon Landscape Zone. The Landscape Zone has been divided into seven Local Areas (sub zones) with maps and more specific information on conservation values being provided in the sections on each Local Area. Native flora lists for each Local Area are provided in Appendix One.

3.1 Pre 1750 Vegetation of the Wombat / Mount Macedon Region

Prior to European settlement the Wombat Forest/Macedon Landscape Zone contained a diverse range of forest and woodland vegetation types. Vegetation in Victoria has been classified into 'Ecological Vegetation Classes' (EVCs). Overall Twenty-eight EVCs have been mapped for the Landscape Zone (see Table 3.1).

These EVCs formed a mosaic across the landscape, depending on variations in rainfall, altitude, aspect, underlying geology, soil fertility, water holding capacity and topography. Former vegetation types and their current extent will be examined for each sub-zone within the Landscape Zone.

Foothill forests, such as shrubby foothill forest and herb-rich foothill forest, were common on the higher slopes of the Great Divide. Small patches of wet, damp and riparian forest were found in the gullies and along creeks and rivers of higher rainfall areas. Sedgy riparian woodland was common in other riparian areas. On the less fertile slopes in the north-west of the Landscape Zone heathy dry forest was common. Valley grassy and plains grassy woodland were found on the lower lying valleys and plains. A range of other EVCs also existed.

All EVC's are assigned a bioregional conservation status based on the current extent of that EVC remaining in each bioregion compared to its former extent. Table 3.1 outlines the EVCs in the Landscape Zone and their Bioregional Conservation Status.

Table 3.1 EVCs and their Bioregional Conservation Status in the Wombat Forest / Macedon Landscape Zone

EVC No	EVC	Bioregional Conservation Status	Extent in Landscape Zone
55	Plains Grassy Woodland	Endangered	Not widespread, mostly on private land, very widely cleared
851	Streambank Shrubland	Endangered	Along creeks mainly in north
132	Plains Grassland	Endangered	Very small pocket in the south near Bacchus Marsh
895	Escarpment Shrubland	Endangered	Occurs in Werribee Gorge
83	Swampy Riparian Woodland	Endangered	Occurs on Moorabool River and near Woodend
292	Red Gum Swamp	Endangered	Small area near Bacchus Marsh
803	Plains Woodland	Endangered	Formerly widespread in fertile areas now only small areas.
175	Grassy Woodland	Endangered	Formerly widespread in fertile areas now only small areas
894	Scoria Cone Woodland	Endangered	Scattered occurrences
29	Damp Forest	Vulnerable	Not formerly widespread
164	Creekline Herb-rich Woodland	Vulnerable	Formerly pretty widespread, heavily cleared
18	Riparian Forest	Vulnerable	Very small areas top of divide on public land
47	Valley Grassy Forest	Vulnerable	Small areas remain, needs further protection
61	Box-Ironbark Forest	Vulnerable	Small areas remain
128	Grassy Forest	Vulnerable	Scattered in smaller patches
64	Rocky Chenopod Woodland	Vulnerable	Long Forest area
178	Herb-rich Foothill Forest/ Shrubby Foothill Forest Complex	Depleted	Common west part Wombat State and adjacent areas
198	Sedgy Riparian Woodland	Depleted	Some riparian areas, common in Wombat Forest.
53	Swamp Scrub	Depleted	Limited occurrences on several rivers and creeks.
22	Grassy Dry Forest	Depleted	Formerly very widespread, now common esp. on public land
23	Herb-rich Foothill Forest	Depleted	Common foothills, especially on public land
48	Heathy Woodland	Depleted	Formerly small pockets on ridges through area
21	Shrubby Dry forest	Depleted	Isolated occurrences
20	Heathy Dry Forest	Least concern	Formerly very widespread, still common esp. on public land
45	Shrubby Foothill Forest	Least concern	Very common esp. in Wombat Forest
30	Wet Forest	Least Concern	Very small areas top of Mt Macedon on public land
16	Lowland Forest	Least Concern	Mount Charlie area
37	Montane Grassy Woodland/Rocky Outcrop Complex	Least Concern	Limited occurrences on Mt Macedon.

(Source Commonwealth of Australia 2000 and Environment Conservation Council 2001)

3.2 Current Extent and Quality of Native Vegetation (EVCs)

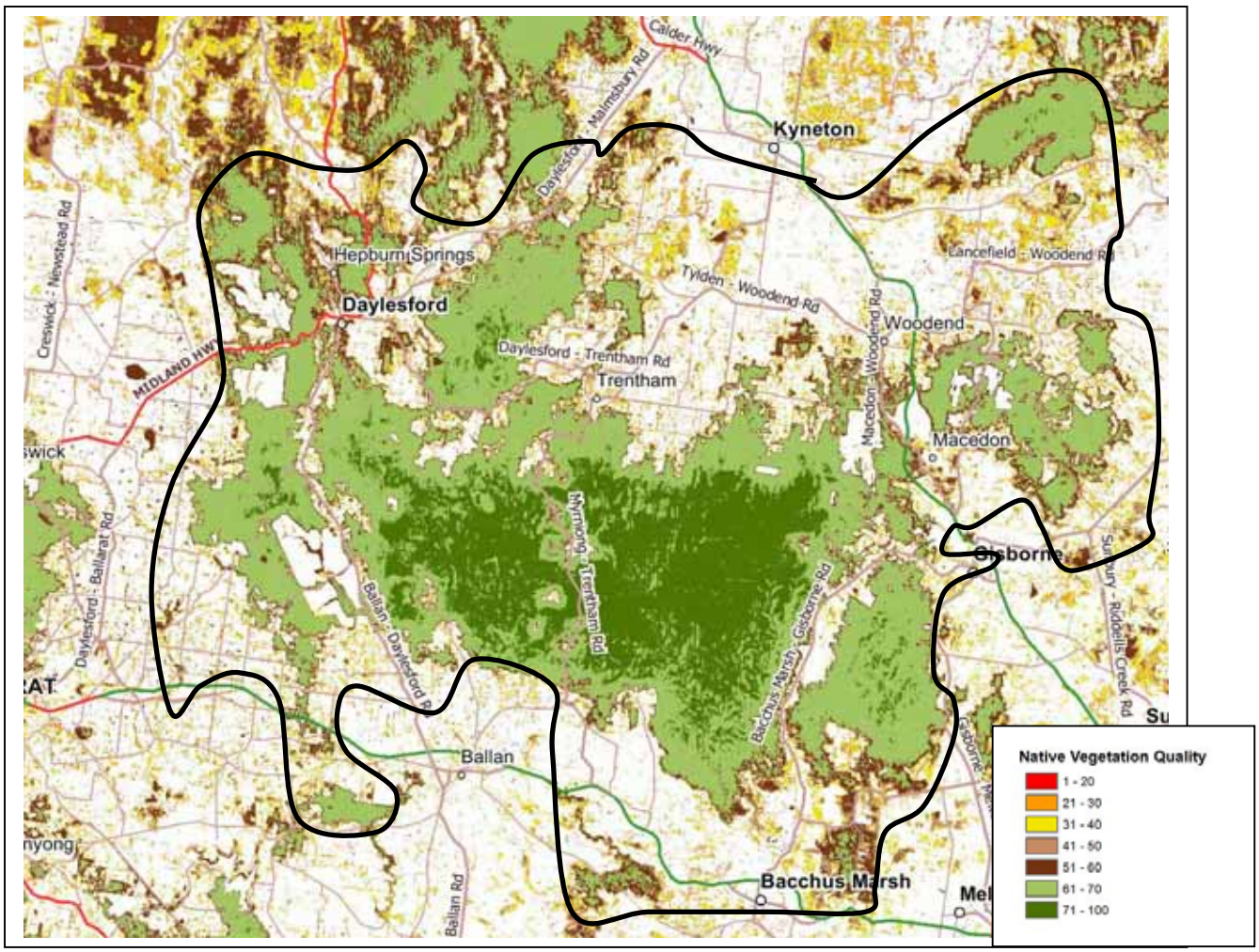
Many studies indicate that the extent of native vegetation cover in the landscape and the quality of that vegetation are two of the most important factors in relation to overall native species diversity in an area (Bennett & Radford 2004). As the foothills of the Divide have retained high vegetation cover, mostly on public land and in larger blocks, the Landscape Zone has relatively highs levels of native vegetation extent. However, the more fertile valleys and flatter areas on private land in the Landscape Zone have been widely cleared and

remnants tend to be small, fragmented and in decline. These areas are in need of restoration to restore landscape connectivity and ecological function.

Unlike most areas in the west of the state, the Wombat Forest/Macedon Landscape Zone also contains large areas of high to very high quality native vegetation (see Map 3.1). The quality of vegetation on public land is mostly high (61-70), with core areas of very high quality (71-100).

The quality of vegetation on private land is lower, ranging from the poor to good quality range (31-60 score). 'Better' quality vegetation on private land is typically smaller patches of bush in a mostly cleared landscape, with reduced tree cover and tree recruitment, few if any old trees, reduced understorey diversity and increased cover of weeds. Poorer quality sites (21-30 category) on private land tend to only have relict larger trees present, very little understorey diversity and a high cover of weeds and exist in areas of the Landscape Zone with greatly reduced vegetation cover.

Map 3.1: Modelled Native Vegetation Quality (Source: DSE Geospatial Data)



3.3 Flora

Over 900 indigenous plant species have been recorded in the Wombat Forest/Macedon Landscape Zone. Two species are endemic to the Landscape Zone - the endangered Wombat Leaf-less Bossiaea (*Bossiaea vombata*) which is only found in the Wombat State Forest and the rare Wombat Bush-pea (*Pultenaea reflexifolia)* which is found in the Wombat Forest area.

Open Eucalypt forests dominate the landscape with Messmate *(Eucalyptus obliqua)* and Narrow Leaf-Peppermint *(Eucalyptus radiata)* co-dominant in many areas. Manna Gum *(Eucalyptus viminalis)*, Candlebark *(Eucalyptus rubida)* and Mountain Gum *(Eucalyptus dalrympleana)* are also common and can be dominant at some sites. Broad-leaf Peppermint *(Eucalyptus dives)*, Red Stringybark *(Eucalyptus macrorhyncha)*, Long-leaf Box *(Eucalyptus goniocalyx)* and Yellow Box *(Eucalyptus melliodora)* were common in drier area in the north west of the Landscape Zone. On Mount Macedon there are restricted occurrences of Mountain Ash *(Eucalyptus regnans)* and Snow Gum *(Eucalyptus pauciflora)*. Snow Gum is also found in frost hollows near Woodend, Tylden and Trentham.

Understorey vegetation in the Landscape Zone varies widely depending on the vegetation type. Some areas have dense or open shrub layers or a heathy understorey, while in wetter areas sedges or ferns may dominate. In some drier forests and woodlands the understorey is open, grassy and herb-rich. High numbers of orchids have been recorded in some areas, such as the Macedon Local Area.

3.4 Threatened Flora

Fifty-four flora species are listed as threatened at a state or national level. This represents a significant proportion of the total flora that is listed as threatened within the Central Victorian Uplands bioregion.

Monocotyledon			
	r	*Austrostipa breviglumis*	Cane Spear-grass
	r	*Austrostipa exilis*	Heath Spear-grass
	E e	*Dianella amoena*	Matted Flax-lily
	r	*Dipodium pardalinum*	Spotted Hyacinth-orchid
	k	*Entolasia stricta*	Upright Panic
	r	*Gahnia microstachya*	Slender Saw-sedge
	k	*Lemna trisulca*	Ivy-leaf Duckweed
	r	*Poa amplexicaulis*	Red-sheath Tussock-grass
f	E e	*Prasophyllum frenchii*	Maroon Leek-orchid
f	e	*Pterostylis truncata*	Brittle Greenhood
Dicotyledons			
	r	*Acacia aspera subsp. parviceps*	Rough Wattle
	r	*Acacia nano-dealbata*	Dwarf Silver Wattle
f		*Allocasuarina luehmannii*	Buloke
f	E e	*Ballantinia antipoda*	Southern Shepherd's Purse
	r	*Bossiaea cordigera*	Wiry Bossiaea
	r	*Bossiaea riparia*	River Leafless Bossiaea
	v	*Brachyscome debilis*	Weak Daisy
	v	*Cardamine lilacina*	Lilac Bitter-cress
	k	*Cardamine tenuifolia*	Slender Bitter-cress
	k	*Desmodium varians*	Slender Tick-trefoil
f	e	*Eucalyptus aggregata*	Black Gum
	r	*Eucalyptus brookeriana*	Brooker's Gum
	v	*Eucalyptus leucoxylon subsp. connata*	Melbourne Yellow-gum
	r	*Eucalyptus yarraensis*	Yarra Gum
	r	*Goodia medicaginea*	Western Golden-tip
	r	*Grevillea obtecta*	Fryerstown Grevillea
	r	*Grevillea repens*	Creeping Grevillea
	r	*Grevillea steiglitziana*	Brisbane Range Grevillea
	v	*Helichrysum aff. rutidolepis (Lowland Swamps)*	Pale Swamp Everlasting
	r	*Hovea asperifolia subsp. spinosissima*	Rough Hovea
f	E e	*Lepidium hyssopifolium*	Basalt Peppercress
	r	*Leucopogon microphyllus var. pilibundus*	Hairy Beard-heath
	v	*Microseris sp. 1*	Plains Yam-daisy
	r	*Nicotiana suaveolens*	Austral Tobacco
	r	*Nematolepis squamea*	Satinwood
	k	*Olearia speciosa*	Netted Daisy-bush
	r	*Pimelea hewardiana*	Forked Rice-flower
f	C e	*Pimelea spinescens*	Spiny Rice-flower
	C e	*Pimelea spinescens subsp. spinescens*	Spiny Rice-flower
	r	*Poranthera corymbosa*	Clustered Poranthera
	r	*Prostanthera decussata*	Dense Mint-bush
	r	*Prostanthera nivea var. nivea*	Snowy Mint-bush
	r	*Prostanthera saxicola var. bracteolata*	Slender Mint-bush
	r	*Pseudanthus orbicularis*	Tangled Pseudanthus
f	v	*Pultenaea graveolens*	Scented Bush-pea
	r	*Pultenaea gunnii subsp. tuberculata*	Golden Bush-pea
	r	*Pultenaea reflexifolia*	Wombat Bush-pea
	r	*Pultenaea weindorferi*	Swamp Bush-pea
	r	*Rhagodia parabolica*	Fragrant Saltbush
	k	*Sclerolaena muricata var. muricata*	Black Roly-poly
	V v	*Senecio psilocarpus*	Swamp Fireweed
	r	*Tetratheca stenocarpa*	Long Pink-bells
f	V v	*Xerochrysum palustre*	Swamp Everlasting
	r	*Westringia glabra*	Violet Westringia

Listed under national EPBC Act (C = critically endangered, E = endangered, V = vulnerable, R = rare). Victorian Rare or Threatened (VROT) c = critically endangered, e = endangered, v = vulnerable, n = near threatened, k = poorly known. Listed under Flora and Fauna Guarantee Act = FFG. Data From: Flora Information System, Viridans - 2009 - © Viridans Biological Databases

3.5 Regionally Significant Flora

A number of flora species within the region are considered regionally significant. This is due to the Landscape Zone being at the western end of the Great Dividing Range, and the therefore at the edge of the biogeographic range of a number of species.

Acrothamnus hookeri	Mountain Beard-heath	western most limit of their range
Carex polyantha	Sedge	edge of range, disjunct occurrence
Comesperma ericinum	Heath Milkwort	disjunct occurrence
Dampiera stricta	Blue Dampiera	disjunct occurrence
Deyeuxia monticola	Mountain Bent-grass	edge of range, disjunct occurrence
Dillwynia ramosissima	Bushy Parrot-pea	edge of range, disjunct occurrence
Drymophila cyanocarpa	Turquoise Berry	disjunct occurrence
Epilobium gunnianum	Gunn's Willow-herb	edge of range, disjunct occurrence
Eucalyptus delegatensis	Alpine Ash	western most limit of their range
Eucalyptus muellerana	Yellow Stringybark	edge of range, disjunct occurrence
Festuca asperula	Graceful Fescue	edge of range, disjunct occurrence
Hovea rosmarinifolia	Mountain Beauty	disjunct occurrence
Lepidosperma tortuosum	Tortuous Rapier-sedge	edge of range, disjunct occurrence
Leptinella filicula	Mountain Cotula	edge of range, disjunct occurrence
Leptospermum grandifolium	Mountain Tea-tree	western most limit of their range
Leucopogon fraseri	Sharp Beard-heath	western most limit of their range
Lycopidium dueterodensum	Bushy Clubmoss	disjunct occurrence
Persoonia chamaepeuce	Dwarf Geebung	disjunct occurrence

Source: (Commonwealth of Australia 2000, Leversha 2004, Francis 2011)

3.6 Serious Weed Species

Weeds pose a serious threat to native ecosystems. Over 150 serious weed species are recorded for the Landscape Zone (a full list is provided in Appendix One). Many of these species have become invasive in parts of the Landscape Zone. Weeds that pose the biggest threat to native vegetation in the Landscape Zone include Blackberry, various Brooms, Bridal Creeper, Cape Weed, Gorse, Spanish Heath and Willows.

The Macedon Ranges Shire council developed a Weed Strategy in 2005. Hepburn and Moorabool Shires have yet to develop strategies for weed control. Further resources are required for weed control on all types of public land. Greater enforcement of legal requirements for weed control on private land is also required.

4. Native Fauna in the Wombat Forest / Macedon Landscape Zone

A large diversity of indigenous vertebrate fauna species occur in the Landscape Zone with over 290 species formally recorded. Native fauna lists for each Local Area are provided in Appendix One.

Thirty-six mammal species are recorded for the Landscape Zone. This includes arboreal mammals such as gliders, possums and twelve species of bat. A range of ground dwelling mammals also occurs. Seven mammal species are listed as threatened. Mammals have suffered the greatest declines of all native fauna since the arrival of Europeans (Tzaros 2006). This is mainly due to clearing of vegetation, introduced predators, competition with rabbits and stock, loss of tree hollows and hunting by European settlers. Other species, such as the Eastern Quoll and Dingo may have become regionally extinct.

Even once common species such as the Koala are in decline. Koala populations in the Macedon Ranges have been monitored since the 1970's. During this period Koala populations have steeply declined due to loss of habitat, being hit by vehicles, predation by dogs or death from the effects of wildfire. Koalas are now rare and may become locally extinct in some parts of that shire (MRSC 2009).

Bird species in the Landscape Zone are rich and varied with 213 species recorded. Forty bird species are listed as threatened, by far the largest group of fauna in the threatened category. Woodland bird species have shown a marked decline in population sizes over the last fifteen years, however no comparative studies have been undertaken with forest bird species (Bennett et al 2009). The research did indicate that Australian birds are less resilient to climate change than previously thought.

Twenty-seven species of reptile including seven types of snake, thirteen types of skink and three types of dragon occur in the Landscape Zone. Two reptile species are listed as threatened including the Bearded Dragon and Lace Goanna. Fourteen species of frog occur in the Landscape Zone with three being rare – Brown's Toadlet, Southern Toadlet and Growling Grass Frog. Both reptiles and amphibians have suffered from widespread clearing and modification of the ground layer e.g. fallen timber removal and grazing (Environment Conservation Council 1997).

Invertebrate fauna of the area is poorly known and studied.

4.1 Fauna Distribution across the Landscape Zone

A number of species occur across the entire Landscape Zone; these include mammals such as the Common Brush-tail Possum, Eastern Grey Kangaroo, Sugar Glider, Lesser Long-eared Bat, Short-beaked Echidna and Swamp Wallaby.

Examples of bird species that are common across the zone include Willie Wagtail, Australian Magpie, Grey Shrike-thrush, Rufous Whistler, Southern Boobook, Brown Goshawk, Australian Raven, Superb Fairy-wren, and Brown-headed Honeyeater. Amphibious species that are common across the Landscape Zone include the Common Froglet.

The central and eastern part of the Landscape Zone contains species that occur in the higher rainfall foothill forests. Mammals include the Koala, Common Ringtail Possum, Feathertail Glider, Mountain Brushtail Possum and the Common Wombat. Birds include Crimson Rosella, Scarlet Robin, Red-browed Finch, White-Browed Scrub-wren, Striated Thornbill and Eastern Spinebill. Bats include Large Forest Bat, Goulds Wattled Bat and Chocolate Wattled Bat. Reptiles include the Eastern Brown Snake and Red-bellied Snake, and many Skink species.

Species that are mostly found in the relatively drier regions in the north of the Landscape Zone include the Brush-tailed Phascogale.

4.2 Home Ranges and Fauna Movement in the Landscape Zone

Home ranges and the movement of native fauna within the Landscape Zone vary from species to species. Bird species tend to be the most mobile. A range of nectar feeding birds move seasonally from the damper foothill forests of the Great Dividing Range to the Box Ironbark Forests in the north, to exploit nectar from winter flowering Eucalypts, such as Grey Box, Red Ironbark and Yellow Gum (MacNally and McGoldrick 1997).

This includes the White-naped Honeyeater, Yellow-faced Honeyeater and Eastern Spinebill. Some small insect feeders, such as the Golden Whistler, Spotted Pardalote and Grey Fantail, also move into Box-Ironbark forest over the winter. The Flame Robin, Pink Robin, Yellow-tailed Black Cockatoo, Crimson Rosella, Powerful Owl and Pied Currawong also move from wetter forests to the milder north over winter (Environment Conservation Council 1997, Tzaros 2006). However not all bird species are highly mobile with many species having smaller home ranges. Home ranges of mammal species also vary considerably. The home range of Brush-tailed Phascogales is greater than 100 hectares while Sugar Gliders have a home range of six hectares.

4.3 Threatened and Regionally Significant Fauna

Fifty-two invertebrate fauna species in the Landscape Zone are listed as threatened (see Table 5.1). This represents a significant proportion of threaten fauna with the Central Victorian Uplands bioregion. Threatened species in the Landscape Zone tend to be hollow dependant, highly mobile species or ground dwelling species. Regionally significant species include the Greater Glider which is at the western edge of its range.

Table 4.1 Threatened Fauna in the Landscape Zone

FFG	EPBC	VROT		
			Mammals	
		n	*Eastern Pygmy-possum*	Cercartetus nanus
f		*v*	*Brush-tailed Phascogale*	Phascogale tapoatafa
		v	*Common Dunnart*	Sminthopsis murina
f	*E*	*e*	*Spot-tailed Quoll*	Dasyurus maculatus
f	*E*	*c*	*Eastern Barred Bandicoot*	Perameles gunnii
f	*V*	*v*	*Grey-headed Flying-fox*	Pteropus poliocephalus
f			*Common Bent-wing Bat*	Miniopterus schreibersii (group)
			Birds	
f		*v*	*Grey Goshawk*	Accipiter novaehollandiae
		n	*Spotted Harrier*	Circus assimilis
f		*v*	*Square-tailed Kite*	Lophoictinia isura
f		*v*	*White-bellied Sea-Eagle*	Haliaeetus leucogaster
		n	*Azure Kingfisher*	Alcedo azurea
		v	*Australasian Shoveler*	Anas rhynchotis
f		*e*	*Blue-billed Duck*	Oxyura australis
f		*e*	*Freckled Duck*	Stictonetta naevosa
		v	*Hardhead*	Aythya australis
		v	*Musk Duck*	Biziura lobata
f		*e*	*Australasian Bittern*	Botaurus poiciloptilus
f		*v*	*Eastern Great Egret*	Ardea modesta
f		*c*	*Intermediate Egret*	Ardea intermedia
		n	*Nankeen Night Heron*	Nycticorax caledonicus
		n	*Spotted Quail-thrush*	Cinclosoma punctatum
		n	*Brown Treecreeper (south-eastern ssp.)*	Climacteris picumnus victoriae
		n	*Black-eared Cuckoo*	Chrysococcyx osculans
		v	*Black Falcon*	Falco subniger
f		*n*	*Caspian Tern*	Hydroprogne caspia
f		*e*	*Gull-billed Tern*	Gelochelidon nilotica
		n	*Whiskered Tern*	Chlidonias hybridus
		n	*Black-chinned Honeyeater*	Melithreptus gularis
f		*v*	*Painted Honeyeater*	Grantiella picta
f	*E*	*c*	*Regent Honeyeater*	Anthochaera phrygia
f		*n*	*Crested Bellbird*	Oreoica gutturalis
f		*v*	*Chestnut-rumped Heathwren*	Calamanthus pyrrhopygius
f		*v*	*Speckled Warbler*	Pyrrholaemus sagittatus
f		*v*	*Diamond Firetail*	Stagonopleura guttata
f		*n*	*Hooded Robin*	Melanodryas cucullata
		n	*Pied Cormorant*	Phalacrocorax varius
		n	*Brown Quail*	Coturnix ypsilophora
f		*e*	*King Quail*	Coturnix chinensis
f	*E*	*e*	*Swift Parrot*	Lathamus discolor
f		*v*	*Baillon's Crake*	Porzana pusilla
		n	*Latham's Snipe*	Gallinago hardwickii
f		*e*	*Barking Owl*	Ninox connivens
f		*v*	*Powerful Owl*	Ninox strenua
		n	*Glossy Ibis*	Plegadis falcinellus
		v	*Royal Spoonbill*	Platalea regia
f		*e*	*Masked Owl*	Tyto novaehollandiae
			Reptiles	
		d	*Bearded Dragon*	Pogona barbata
		v	*Lace Goanna*	Varanus varius
			Frogs	
f	*V*	*e*	*Growling Grass Frog*	Litoria raniformis
f		*e*	*Brown Toadlet*	Pseudophryne bibronii
		v	*Southern Toadlet*	Pseudophryne semimarmorata

Listed under national EPBC Act (C = critically endangered, E = endangered, V = vulnerable, R = rare). Victorian Rare or Threatened (VROT) c = critically endangered, e = endangered, v = vulnerable, n = near threatened, k = poorly known. Listed under Flora and Fauna Guarantee Act = f. Data From: Flora Information System, Viridans - 2009 - © Viridans Biological Databases

4.4 Flagship Species

Flagship species are native animals or plants that can be used to convey the biodiversity conservation message to the broader community. Flagship species are usually rare in an area or iconic in some regard. The Brush-tailed Phascogale and the Golden Sun Moth have been identified as flagship species for the Central Victorian Uplands (DSE 2003). The Greater Glider has been identified as a flagship species for the foothill forests of the Landscape Zone.

Brush-tailed Phascogale or Tuan (Phascogale tapoatafa)

Tuans are small arboreal (tree dwelling) mammals that have a black 'bottle-brush' tail. They are a member of the Dasyuridae family which includes Quolls, Dunnarts, Antichinuses, Planigales and the Tasmanian Devil.

Preferred habitat is dry, open forest but Tuans also live in a variety of other forest or woodland habitats, including wetter areas. Sites usually need to have large, hollow bearing trees to act as dens, plus a range of foraging habitats and potential food sources. Diet consists mainly of large insects, spiders and centipedes, but Tuans also eat small vertebrate species or the occasional meal of domestic poultry.

Trees used as breeding dens tend to be large and old. Research in Western Australia found that the average age of trees used as dens were estimated to be 125-300 years.

For an animal of its size the Tuan forages over a very large home range and only small populations can exist in relatively large areas of habitat. Females occupy largely non-overlapping home ranges of 30-60 hectares. The home range for males is over 100 hectares and overlap extensively with females and other males. During the mating season males can travel over ten kilometres to seek out females.

Tuans are listed as threatened at both a State and National level. It is estimated that distribution of the Tuan has declined by at least 40% since European settlement and may still be decreasing. The main threats to the Tuan are widespread clearing of preferred habitat, loss of tree hollows due to logging and firewood harvesting, predation by foxes and cats, prescribed burns and unplanned fire, and drought and climate change.

Tuans occur across the Landscape Zone although greater information on their distribution and abundance in the area is required.

Greater Glider (*Petauroides volans*)

The Greater Glider (*Petauroides volans*) is an arboreal (tree dwelling) mammal that was once widespread in the Landscape Zone.

Greater Gliders have a long furry tail, large ears and a head and body length about 350-450mm long. They are strictly nocturnal, essentially solitary and feed entirely on eucalypt leaves. To move around the forest they glide from tree to tree, often covering up to 100m in one glide.

Greater Gliders only live in mature forest with hollow bearing trees. Due to clearing and logging, habitat for Greater Gliders in the Landscape Zone has been severely reduced.

Currently the largest population of Greater Gliders in the region occurs in the Wombat Forest. However, logging has dramtically reduced habitat and fuel reduction further threatens these populations.

There is evidence to suggest that a fuel reduction burn in the Hanging Rock Recreation Reserve may have lead to the loss of Greater Gliders from that reserve. No sightings of Greater gliders have occurred since the burn.

Key threats to Greater Gliders include clearing, logging, fuel reduction burning and firewood collection.

5. Other High Conservation Value 'Assets' in the Wombat Forest / Macedon Landscape Zone

A number of other high quality conservation assets have been identified in the Landscape Zone. Although all areas of vegetation and habitat are important, key assets require particular attention and are priority areas for action.

5.1 Very Large Areas of Vegetation on Public Land

The large network of public land in the Landscape Zone provides the backbone to many ecological processes and the foundations for ecosystem resilience in the region. Improving habitat quality and controlling threatening possesses in these areas is recognised as key way to enhance ecosystem resilience and function, enhance local and regional connectivity protect ecosystems from the impacts of climate change and maintain the provision of ecosystem services (CES 2008). Key threats and actions are outlined in Section Six.

5.2 Riparian Vegetation

With its location on the Great Divide, higher rainfall and hilly terrain the Landscape Zone contains a high proportion of riparian vegetation. The headwaters of seven major river systems originate in the Landscape Zone. The Moorabool, Werribee, Lerderderg and Maribrynong Rivers flow to the south, and the Loddon, Coliban and Campaspe Rivers flow to the north. The Lerderderg River is a Heritage River.

The area also contains a large number of creeks and smaller tributaries of these rivers. In the west Dry Creek comes out of Cobaw Ranges and joins Deep Creek. Riddles Creek arises near Macedon to join Jacksons Creek. Jackson's Creek joins with Deep Creek to become the Maribyrnong River. In the east Jim Crow Creek, Sailors Creek, Kangaroo Creek and Lietch's Creek all join the Loddon River.

Riparian areas are very productive parts of the landscape as they reliably provide resources, such as nectar and bark, for most of the year (Palmer 2009). Riparian areas have also been found to provide refuge areas during drought and climate change (Bennett et al 2009). The linear nature of riparian areas also facilitates dispersal of native fauna. Protection and restoration of riparian areas form an integral part of rebuilding landscape connectivity in the Landscape zone, especially in more cleared areas.

Riparian vegetation on public land in the Landscape Zone is generally of very high quality when compared to riparian vegetation lower in the catchment. The Lerderderg River is considered to be one of four rivers in the Central Victorian Uplands bioregion that is ecologically healthy (DSE 2003).

Management of stock is considered to be the key management issue for riparian vegetation on private land. Financial assistance through CMA's is available to appropriately manage these areas i.e. fencing to protect from stock, weed control, pest animal control and enhancement plantings. However, funding should be dramatically increased.

In some cases landowners are reluctant to fence these areas. Legislative changes at a state level are required to effectively deal with this issue, and ensure that waterways on private land are protected.

Table 5.1 Key Potentially Threatening Processes to Rivers and Streams in Victoria
(Source: Victorian Flora and Fauna Guarantee Act 1998)

- Alteration to the Natural Flow Regimes of Rivers and Streams
- Alteration to the Natural Temperature of Rivers and Streams
- Degradation of native riparian vegetation along Victorian rivers and streams
- Increase in Sediment Input to Rivers and Streams Due to Human Activities'
- Input of toxic substances into Victorian rivers and stream
- Introduction of Live Fish into Waters Outside their Natural Range
- Removal of Woody Debris from Victorian Streams
- Prevention of Passage of Aquatic Biota as a Result of the Presence of Instream Structures
- Wetland loss and degradation as a result of changes of water regime, dredging, draining, filling and draining

5.3 Large Old Trees

Large old trees play a very important role in maintaining habitat connectivity and providing habitat in fragmented landscapes (VEAC 2010). On public land large old trees are very rare due to past logging. The large old trees that remain tend to occur on private land and roadsides, often as isolated trees.

However, due to a lack of recruitment over many decades as a result of grazing, these trees are not being replaced by younger trees. Unless action is taken there will be a gradual loss of these old trees from the landscape over time, with dire consequences for hollow dependant fauna.

Research indicates that for a range of native fauna species closely spaced (less than 100m apart) large old paddock trees appear to be as good as continuous corridors for facilitating movement between habitat patches (Doerr 2009). Large old trees could be strategically identified for fencing, sources of natural regeneration and enhancement plantings to improve the important role these play as stepping stones.

5.4 Road Reserve Vegetation

The importance of roadside vegetation has been highlighted in the most recent VEAC Remnant Vegetation Investigation (VEAC 2011). Roadside vegetation is discussed in more detail in Section Seven.

5.5 Larger Remnants on Private Land

The size of a remnant is a major influence on types of native species present, species richness and the size of populations. For example, in northern Victoria remnants greater than 40ha had an average of 25.7 species compared to 7.8 species in roadsides remnants (Bennett et al 2005). Larger remnants have greater availability of habitat and less of an 'edge effect' (edges of remnants tend to have reduced habitat value, with larger remnants having a lower edge:area ratio). Remnants of at least 10 hectares, and preferably larger than 30 hectares, are required for many bird species that are a priority for conservation in the Central Victorian Uplands (DSE 2003).

Remnants greater than 100ha are required for some fauna species to present in an area, such as the Brush-tailed Phascogale and White-browed Babbler. Remnant patches that are close to other remnant patches will tend to provide more habitat than similar sized isolated remnants. Where larger remnants are not common, clusters of smaller higher quality remnants will provide the best areas to focus management actions.

5.6 High Vegetation / Habitat Quality

Higher quality vegetation tends to support more native flora and fauna species than lower quality areas. This is largely due to the greater availability of habitat resources at a site, for example tree hollows and woody debris. DSE modeling indicates that across Victoria the average quality of native vegetation is less than 50% of its original quality (VEAC 2010).

Although high quality vegetation is common in many area of the Landscape Zone some key habitat elements that are critical to a wide range of forest species may be lacking in many areas. This includes tree hollows, dead standing trees, logs on the ground and shrubby thickets or tussock grasses.

5.7 Fungi

As many areas of the Landscape Zone have relatively high rainfall there is a very high diversity of fungal species found in forest areas. Fungi are a vital contributor to healthy ecosystem functioning. They are major recyclers of organic matter and play an important role in maintenance of soil structure. A majority of green plants form symbiotic relationships with mycorrhizal fungi on which they rely for their continuing survival and wellbeing. Fungi are included in the diet of many mammals as well as many invertebrates.

The Wombat Forest and Macedon Ranges have especially diverse range of fungal species. Over 200 species of macro fungi have been recorded in the Wombat Forest region, however further surveys would most likely substantially increase this figure. In a recent excursion the Bendigo Field Naturalist Club found at least 60 species of fungi along one 100 metre section of forest track in the Wombat Forest at Bullarto.

Increased research and field surveys are required. Recently a fungus species belong to the *Sarcodon* genus was found in the Wombat State Forest. Only two *Sarcodon* species have been recorded in Victoria and only 14 in Australia. Blackwood is also the only known location in Victoria for the Ear-pick Fungus (*Auriscalpium* sp). It is possible this location is the only known site in Australia.

6. Management of Parks, Reserves and State Forests in the Wombat Forest / Macedon Landscape Zone

A key characteristic of the Landscape Zone is the relatively large number of public land areas, including Parks, Reserves and State Forests (see Map 6.1 below). Approximately 73,000 hectares or 35 per cent of the Landscape Zone is a Park, other type of conservation reserve or State Forest.

The network of public land in the Landscape Zone with its largely intact landscapes provides the backbone to many ecological processes and the foundations for ecosystem resilience in the region. These areas also provide vital habitat for large number of native species, including many threatened species.

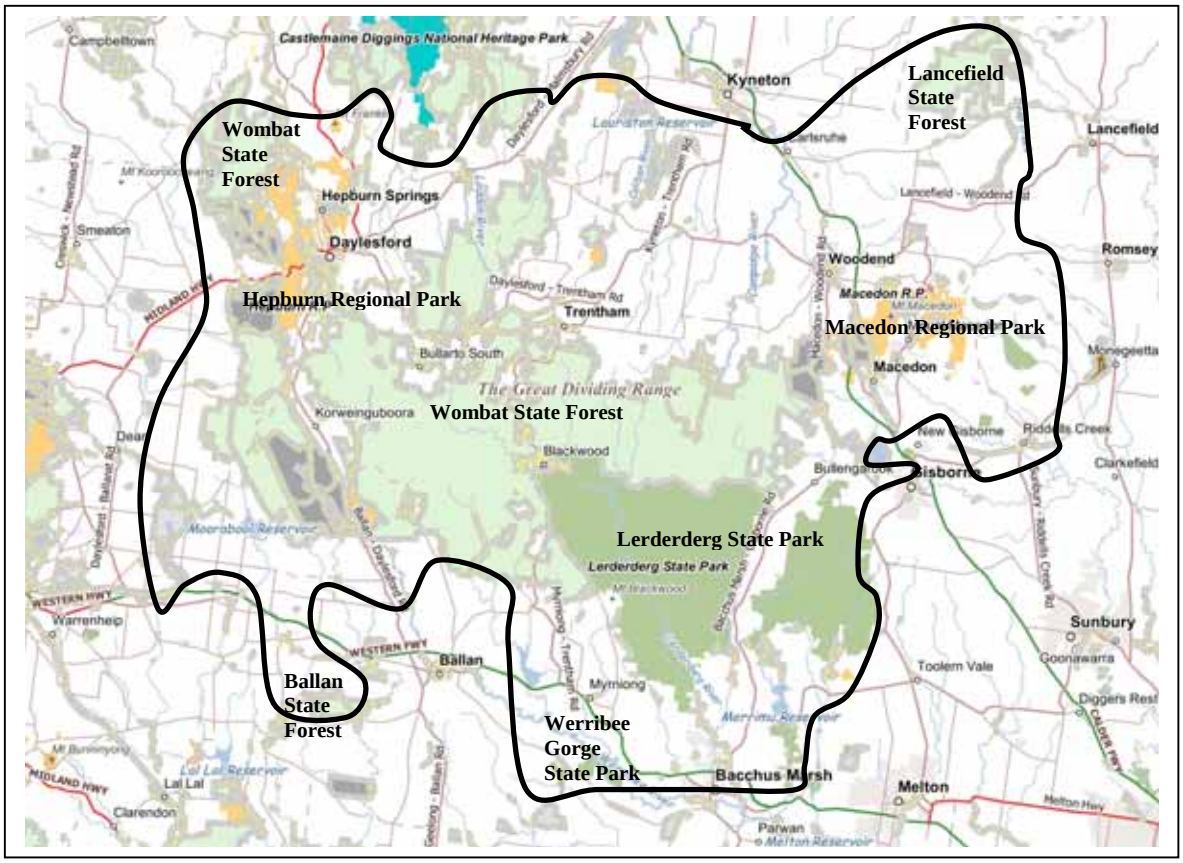
Improving habitat quality and controlling threatening processes in these core areas is recognised as key way to enhance ecosystem resilience and function, enhance local and regional connectivity protect ecosystems from the impacts of climate change and maintain the provision of ecosystem services (CES 2008). Co-operation between the various land managers is very important to maintain the ecological processes that still function in these core areas (DSE 2003).

Parks and reserves are managed by Parks Victoria with the main land use being conservation and recreation. State Forests are managed by the Department of Sustainability and Environment (DSE) with the main land uses being apiculture, recreation and forestry. Of public land in the Landscape Zone approximately one third (26,705 hectares) is devoted to conservation purposes and two thirds (47,776 hectares) is State Forests.

Table 6.1 Parks, Reserves and State Forests in the Wombat Forest / Macedon Landscape Zone

State Forests	Size (ha.)	Parks and Reserves	Size (ha.)
Wombat State Forest	45,100	Lerderderg State Park	20,184
Cobaw State Forest	2,220	Macedon Regional Park	2,165
Ballan State Forest	456	Hepburn Regional Park	2,820
		Werribee Gorge State Park	575
		Long Forest Flora and Fauna Reserve	491
		Mt Charlie Flora Reserve	322
		Lauriston Nature Conservation Reserve	148
Total	**47,776**		**26,705**

Map 6.1 Public Land in the Landscape Zone (Source: DSE Geospatial Data))



6.2 Conservation Management on Public Land

Victoria's Land and Biodiversity White Paper (2009) stressed the need for public land to be managed as the core of resilient ecosystems, with an emphasis on natural values and ecosystem processes. This includes addressing wider landscape connectivity, expanding the reserve system and the impacts of climate change.

However, a recent report by the Victorian National Parks Association found that current management of public land in central Victoria is uncoordinated and lacks the necessary resources to ensure management of conservation values, especially in State Forests (VNPA 2010). The most recent Victorian State of the Environment report also highlighted a significant lack of resources for biodiversity conservation on public land within Victoria (Commissioner for Environmental Sustainability 2008).

A significant increase in resources is required to adequately deliver clearly defined nature conservation outcomes in both Parks and State Forests in the Landscape Zone, including addressing threatening processes, threatened species protection and research and monitoring (VNPA 2010). The need to address threatening processes on public land has also been identified in a range of recent scientific papers (McNally et al, Bennett).

6.3 Key Potentially Threatening Processes on All Public Land

Potentially threatening processes are actions, activities or processes that threaten or may threaten the survival, abundance or evolutionary development of a species, native vegetation, ecosystem or ecological process. A range of potentially threatening processes has been identified at a national, statewide and regional level.

Inappropriate fire management is currently listed as a threatening process in a wide range of literature, strategies and legislation. However, large increases in fuel reduction burning will occur on public land in the Landscape Zone and across the State due to recommendations arising from the Black Saturday Royal Commission. The lack of scientific information on the impacts of fuel reduction burning on native fauna has been highlighted by Clarke (2008). There is also a far greater need to consider the impacts of undertaking large fuel reduction burning programs on broader ecological processes, such climatic, hydrological and primary productivity processes (see Section Two).

There is evidence to suggest that a fuel reduction burn in the Hanging Rock Recreation Reserve may have lead to loss of Greater Gliders from that reserve. No sightings of Greater Gliders have occurred since the burn (MRSC 2009). The largest population of Greater Gliders in the Wombat State Forest is also under threat from fuel reduction burns.

Fuel reduction burns not only effect species but entire habitats. Extensive areas of riparian EVCs on public land in the Landscape Zone are scheduled to be burnt on a regular basis. These riparian areas play a critical role in maintaining water quality (see section 2.1).

Any such increases should only be undertaken following greater research and monitoring to determine the impacts of repeated fuel reduction burning on native flora, fauna and ecosystem function. A dramatic increase in fuel reduction burning will also significantly add to the risk of these burns escaping their boundaries and burning far larger areas.

Pest plants and animals are a significant problem on public land. The foremost problem pest animal species include Foxes, feral Cats, Pigs and Rabbits. Control of a variety of environmental weeds, such as Blackberry, Broom and Gorse is also required on public land, especially along tracks and in riparian areas. A significant increase in investment is required to develop integrated management and controls programmes for pest plant and animals species in all Parks and State Forests in the region.

Recreational activities also cause a range of management issues for Parks and State Forests in the Landscape Zone. For example, trail bike riding and 4 wheel driving can lead to localised erosion, disturbance of riparian areas and sedimentation of waterways. In the medium term a Management Plan addressing these issues should be developed for public land in the area. In the short term increased surveillance is required to monitor compliance with existing regulations, including the illegal access to tracks that are closed during winter. Permanent closure of tracks should also be considered as part of any management plan.

A high degree of interface between public and private land occurs in the landscape area. This places greater pressure on public land management in terms of fire management, impacts of adjacent land use and threats posed by some domestic animals e.g. cats and dogs.

6.4 Additional Threatening Processes in State Forests

Both logging and firewood harvesting have been identified as threatening processes to forest ecosystems. Three State Forests are located within the Landscape Zone – the Wombat, Lancefield (Cobaw) and Ballan State Forests. Firewood harvesting only currently occurs in the Wombat State Forest (see below). Logging is not currently undertaken in either forest but could be re-introduced in the Wombat State Forest at any time in the future.

Logging negatively affects vegetation structure and species composition, and does not mimic fire (Commissioner for Environmental Sustainability Victoria 2008). Following logging, changes to the composition of faunal assemblages can have a marked influence on forest biodiversity (Gibbons and Lindenmeyer 2002).

Firewood removal from native forests is also a major threatening process, resulting in a loss of species diversity and ecosystem function through the loss of hollows, loss of dead standing trees and removal of logs on the ground (Environment Conservation Council 2001, RFA 1994).

A review of firewood harvesting in Box-Ironbark areas in 2001 found issues with long-term sustainability, illegal collection, difficulty in supervising domestic collection and poor attitudes of commercial harvesters (Environment Conservation Council 2001). It was concluded that the best economic and social interest of rural communities is to establish firewood plantations on private land. The recent VEAC River Red Gum Forests Investigation also recommended that firewood plantations be established on cleared private and public land (VEAC 2008).

Many of these issues are very relevant to firewood collection in the Wombat Forest, especially illegal collection of firewood, poor supervision of domestic firewood areas, impacts on other habitat e.g. the removal of dead standing trees and soil compaction from vehicles and machinery. Currently less than 6000 cubic metres of firewood are harvested annually from the Wombat Forest (see Table below). This could be supplied from 350-400 hectares of firewood plantations on private land (DPI 2009). Using firewood grown in coppiced plantations on cleared land actually results in a net carbon sequestration (DPI 2009).

One of the main disincentives to firewood plantations on private land is the low royalties paid for wood products from public forests, making it virtually impossible for private plantations to compete. It should also be pointed out that it costs far more to produce the Wood Utilisations Plans, mark firewood coupes and supervise collection than is currently paid in royalties. In effect commercial firewood harvesters are being subsidised to harvest firewood on public land.

Table 6.2 Timber and Firewood Harvesting in Wombat State Forest (3 years schedule from 2011 to 2014)

	Saw Logs	Commercial Firewood	Domestic Firewood	Minor Forest Products
Total	0	10716	6947	360

6.5 Apiary in State Forests in the Wombat Forest / Macedon Landscape Zone

Apiary is the largest industry conducted in State Forests in the Landscape Zone, with the Wombat State Forest a key area for honey production. A lack of research and technical obstacles has constrained assessment of the impacts of honey bees on Australian ecosystems (ECC 2001). However, some studies indicate that introduced bees may adversely affect native ecosystems (Paton 1993), and apiary and feral bees are noted as threatening processes to biodiversity in some literature (Commonwealth of Australia 2000).

6.6 Expanding the Conservation Reserve System in the Landscape Zone and Region

National and State governments have committed to the development of a comprehensive, adequate and representative (CAR) national reserve system that conserves biodiversity across Australia. Building the reserve system is one of six national priorities under the Australian Government's Caring for our Country initiative.

According to the Australian Biodiversity Strategy (2009) '*A well planned and managed …reserve system is the most effective and immediate way to build landscape reliance in a changing climate'*, and '*…to secure critical habitats of vulnerable species*'. As part of this the Federal government has committed to add 25 million hectares to the National reserve system by 2013 (ref Possingham 2011).

The State government has also committed to protect at least 80% of all bioregional ecosystems in each interim Biogeographic Region by 2015. In the Central Victorian Uplands and Goldfields bioregions only 12% of ecosystems (EVCs) meet these reservation targets. The EVCs outlined in Table 6.3 occur in the Landscape Zone and require extensive additions to meet bioregional reserve targets.

Table 6.3 EVCs in Wombat and Cobaw State Forests that are under-represented in Reserve System in Goldfield and CVU Bioregions

	Central Victorian Uplands	Bioregional Conservation Status	Goldfields	Bioregional Conservation Status
	164 Creekline Herb-rich Woodland	Vulnerable	851 Streambank Shrubland	Endangered
	147 Valley Grassy Forest	Vulnerable	147 Valley Grassy Forest	Vulnerable
	23 Herb-rich Foothill Forest	Depleted		
	22 Grassy Dry Forest	Depleted		
	178 Herb-rich Foothill Forest/Shrubby Foothill Forest Complex	Depleted		

An adequacy index analysis undertaken by DSE in 2003 for EVCs in Central Victorian Uplands indicated that only 31% of EVCs were adequately protected in conservation reserves. This would increase to 54% if all public land in the Central Victorian Uplands was placed into conservation reserves. To achieve 100 % adequacy would require the inclusion of vegetation on private land.

In its recent Native Vegetation Investigation the Central Victorian Uplands (CVU) bioregion was specifically identified by VEAC as requiring further additions to the reserve system with only 4.4% contained in conservation reserves. It was recommended that the State government initiate an investigation of the CVU bioregion to determine a more comprehensive, adequate and representative reserve system (VEAC 2011).

The addition of the Wombat and Cobaw State Forests to the reserve system would both increase the extent of parks and reserves in the Central Victorian Uplands and to meet bioregional ecosystem reserve targets. The creation of a new National Park containing the Lerderderg State Park and Macedon Ranges Regional Park has been promoted by some sections of the community and is supported by the Macedon Ranges Shire Council.

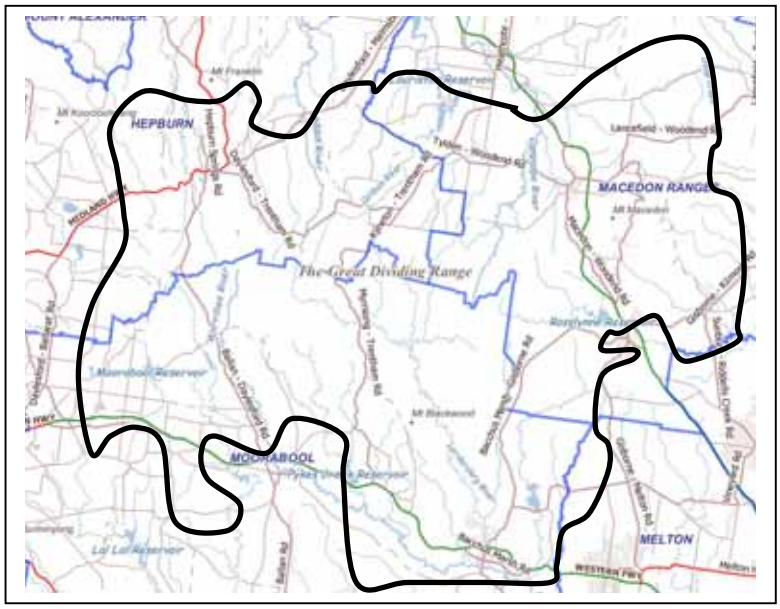
6.7 Key Recommendations for Parks, Reserves and State Forests

Expand the Conservation Reserve System
• The State government initiate an investigation of the Central Victorian Uplands bioregion to determine a more comprehensive, adequate and representative reserve system as recommended by VEAC. • As part of this investigation VEAC should consider the addition of the Wombat, Cobaw and Ballan State Forests to the conservation reserve system as a key way to develop a more comprehensive reserve system for the Central Victorian Uplands bioregion and meet bioregional ecosystem reserve targets.
Resourcing and Management
• Significantly increase resources for management of conservation values and ecological processes on public land, including funding for research and monitoring. • Manage larger core areas to sustain ecological processes, especially in relation to controlling threatening processes such as fire regimes, resource extraction, invasive species and inappropriate recreation. • Develop management plans for all public land. • Achieve a net gain in the condition of native vegetation on public land.
Timber and Firewood Harvesting
• Logging should permanently cease in the Wombat State Forest • In the shorter term domestic and commercial firewood collection should only occur as part or as a byproduct of management activities based on scientifically informed ecological management plans. In the medium term commercial and domestic harvesting should be phased out and the establishment of firewood plantations on private land encouraged with appropriate incentives and pricing reform. • Regulation of domestic and commercial firewood collection should be improved.
Timber and Firewood Harvesting
• Logging should permanently cease in the Wombat State Forest • Domestic and commercial firewood collection should only occur as a byproduct of scientifically based ecological thinning. • Regulation of domestic firewood collection should be improved. ▪ Commercial and domestic harvesting be progressively phased out and the establishment c firewood plantations on private land encouraged and subsidised.
Fire Management
• Long term research and monitoring should be increased to determine the impacts of fuel reduction burning on biodiversity, especially native fauna. • Specific prescriptions outlining temporal and spatial burning mosaics should be developed for each EVC based on expertise from all relevant ecological, biological and zoological disciplines. • Defined long term objectives and clear prescriptions for each Ecological Management Zone (Fire Operations Plan Zone Three).
Apiary
• An advisory body (including stakeholder participation) be established to monitor and research the impacts of introduced bees and apiary on native flora and fauna on public land. • Provide funding to establish Eucalypt 'honey' species plantations on private land. • Existing apiary licenses continue in any new State Parks subject to the outcomes of the above recommendations.

7. Conservation Management of Other Public Land in the Wombat Forest / Macedon Landscape Zone

7.1 Public Land Managed by Local Government

Local government manages a range of public that contains native vegetation, including road reserves and some bushland reserves. The Landscape Zone falls within the boundaries of three Local Government Areas. The Hepburn Shire in the north-west, the Macedon Ranges Shire in the east and the Moorabool Shire in the south (see Map 7.1).



Map 7.1: Local government areas in the Wombat Forest / Macedon Landscape Zone (Source DSE Geospatial Data)

Roadside reserves often contain vegetation types that have otherwise been heavily cleared in the surrounding landscape. Most road reserves in the Landscape Zone are managed by local councils. Vicroads manages major roads and highways.

One of the key findings of the current VEAC Remnant Vegetation investigation was the importance of roadside vegetation in maintaining landscape connectivity and providing habitat in fragmented parts of the landscape (VEAC 2010). This is particularly the case in the Goldfield and Central Victorian Uplands bioregions where a significant portion of native vegetation on public land is found on roadsides (VEAC 2011).

Unused road reserves in particular have high potential to restore landscape connectivity as they have no public safety issues, no road kill issues, less stakeholders involved, they are less prone to disturbance and have no utilities issues. It is estimated that there are 122,000 hectares of unused road reserves in Victoria. Most are currently licensed for grazing.

Roadside vegetation management strategies have been developed by Moorabool and Macedon Ranges Shire Councils but require upgrading. Hepburn Shire Council is soon to release its Roadside Management Strategy. All roadsides in the Landscape Zone have also been assessed for their conservation values by CMA's and Councils.

However, roadside vegetation continues to decline in quantity and quality. Poor management and inadequate training of staff by some Councils contribute to this as well as a lack of understanding within the community regarding the importance of native vegetation on roadsides, including fallen timber. Key threats to roadside vegetation in the Landscape Zone include weeds and pest animals, road works and maintenance, fire prevention activities by adjoining landowners, firewood collection, works related to utilities and fencing. Roadside vegetation with high conservation values has not been identified as part of this project due to the scale of mapping. Roadsides with native vegetation that are contained in the Biolink Areas outlined in Map 11.1 will have high connectivity value.

A number of Bushland Reserves are also managed by local government, especially in the Macedon Ranges Shire. These reserves are outlined in the relevant section on each Local Area.

7.2 Conservation Management of Crown Land Water Frontages

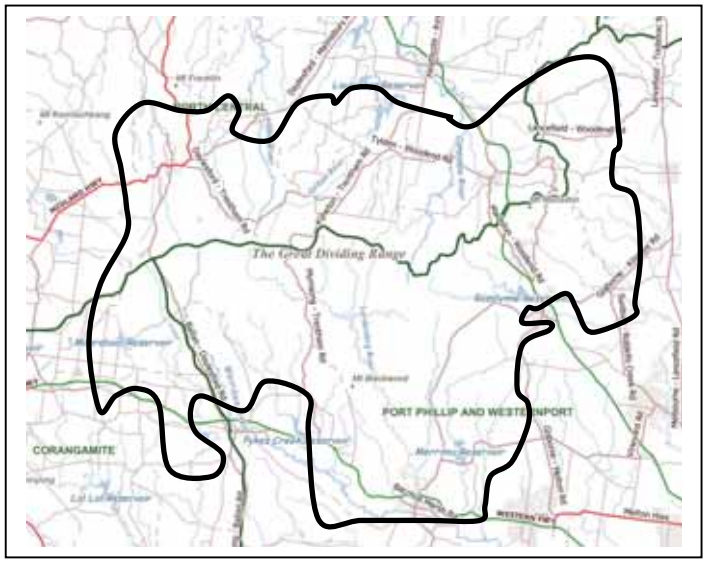
Over 25,000 kilometres of water frontages of permanent streams in Victoria are public land. This represents about 20% of stream frontages in Victoria with the remainder generally being private land. Crown Land Water Frontages are generally 20-30 metres wide. They often contain riparian vegetation and have been identified by

VEAC as critical areas for providing high quality habitat and maintaining landscape connectivity in fragmented landscapes (VEAC 2010). Most Crown Land Water Frontages are currently grazed under license by adjacent landowners. These licenses were recently renewed for five years despite opposition from environment groups and warnings from the health department regarding water quality. However, as most streams in Victoria are moderately to highly degraded, the future conversion of these areas to conservation zones is imperative.

The extent of Crown Land Water Frontages in the Landscape Zone could not be determined for this report but requires further investigation, as these stream frontages could play a role in rebuilding landscape connectivity.

7.3 Catchment Management Authorities in the Wombat Forest / Macedon Landscape Zone

Catchment Management Authorities play a role in the management of native vegetation and riparian areas within Victoria. Activities undertaken include the development of Native Vegetation Plans, Catchment Plans and Weed Strategies. The Wombat Forest/Macedon Landscape Zone falls within the boundaries of three Catchment Management Authorities (CMAs). The North Central CMA in the north, the Port Phillip CMA in the south and smaller proportion in the Corrangamite CMA in the south-west (see Map 7.2). Although the various plans and strategies apply to public land to various degrees the CMAs do not play a role in the management of public land.



Map 7.2: Catchment Management Authorities in the Wombat Forest / Macedon Landscape Zone (Source DSE Geospatial Data)

7.4 Pine Plantations on Public Land

In some areas of the Landscape Zone, especially around Daylesford and Macedon, large areas of pine plantations have been established on public land (in fact native forests were cleared to establish these plantations). These areas are currently leased to Hancocks Pty Ltd. The lack of riparian buffers on waterways and excessive use of herbicides are some of issues in relation to these plantations. The greater use of wildlife corridors in these plantations should also be considered. As part of improving landscape connectivity in the areas where these plantations occur there is a need to research ways to reduce the impacts of these plantations and increase habitat linkages within them.

7.5 Key Recommendations for Other Public Land

Council Managed Public Land, including Roadside Vegetation
• Local councils and Vicroads should provide improved management and greater resources for management of native habitat and vegetation on roadsides and bushland reserves they manage. • Where appropriate roadside vegetation should be enhanced to improve landscape connectivity. • Planning regulations and by-laws relating to roadsides conservation should be policed and enforced. • Councils should ensure that any actions outlined in relevant plans and strategies are undertaken.
Crown Land Water Frontages
• Domestic stock should be excluded from all Crown water frontages as recommended in the 2008 SoE report • High conservation value and key linkage areas of Crown Stream Frontage should be identified and added to the reserve system and managed by Parks Victoria. • Identify moderate quality Crown Land Water Frontages for conversion to Conservation Licences when licenses are due for renewal. Funding for fencing to exclude stock and undertake habitat restoration should be provided to license holders. • Natural regeneration should be encouraged and revegetation undertaken where necessary to enhance these valuable and productive riparian areas.
Pine Plantations
• Where appropriate riparian buffers on waterways and wildlife corridors should be established in plantations.

8. Conservation Management on Private Land in the Wombat Forest/Macedon Landscape Zone

Approximately sixty per cent of the Landscape Zone is private land. Much of the native vegetation on private land in the Landscape Zone has been cleared, however, many properties still contain some remnant vegetation. The vegetation that remains, including pockets of natural bushland and large solitary trees in paddocks, is a critical component of our natural ecosystems, often forming the last strongholds of otherwise depleted local plants and animals.

Many of these vegetation types are classified as endangered or vulnerable. A number of threatened native species occur on private land in the Landscape Zone, including the endangered Growling Grass Frog and the rare Yarra Gum. Off-reserve protection and management of natural areas are now recognised as one of the most important conservation needs in Australia (MRSC 2011)

Due to the large amount and configuration of public land in the Landscape Zone, the public-private land interface in very high. This places additional pressure and threats on public land (see Section 6.3). In many cases private land adjacent to large areas of public also contains vegetation that is contiguous with that on public land. The requirement for sympathetic landuse on private land close to public land has been recognised by the Macedon Ranges Shire Council as an important land management issue.

Better mapping of high conservation value areas, native flora and fauna are also required to ensure these areas are protected and managed. Information on the distribution and health of native fauna in the Landscape Zone is very limited, especially on private land.

8.1 Key Potentially Threatening Processes on Private Land

Key threatening processes to biodiversity on private land in the Landscape Zone include

- Habitat fragmentation
- Vegetation clearing for subdivisions, housing and fire prevention
- Firewood collection including loss of logs on the ground
- Grazing by stock - understorey and regeneration
- Pest plants and animals, including some domestic pets
- Altered fire regimes.

Despite historical levels of clearing abating, the incremental losses of native vegetation in the Landscape Zone still occurs for housing, subdivision of rural properties, upgrading of roads, fire protection, agricultural activities and fencing. Approximately 4600 hectares of native vegetation are still being cleared annually in Victoria. This incremental loss of small patches of native vegetation and single paddock trees further undermines the functioning and resilience of ecosystems. Retention of existing vegetation has been identified as the primary and most cost effective way to minimise biodiversity loss (VEAC 2010).

Statewide modelling undertaken by DSE also indicates a chronic loss of vegetation quality that has occurred over a long period (VEAC 2010). According to DSE these losses in quality are still occurring and have become the main driver in vegetation loss in the State (DSE 2009).

8.2 Threatened Vegetation Types on Private Land

Many threatened EVCs mainly occur on private land in the more fertile parts of the landscape. Threatened EVCs on private land in the Wombat Forest/Macedon Landscape Zone are listed below.

Endangered	Vulnerable	Depleted
Plains Grassy Woodland Plains Grassland Plains Woodland Grassy Woodland Scoria Cone Woodland	Creekline Herb-rich Woodland Valley Grassy Forest Grassy Forest	Herb-rich Foothill Forest Herb-rich Foothill Forest/ Shrubby Foothill Forest Complex

8.3 Threatened Species on Private Land

A range of threatened species occurs predominantly on private land. This includes flora species such as Matted Flax-lily *(Dianella amoena),* Buloke (*Allocasuarina luehmannii*) and Black Gum (*Eucalyptus aggregata*), and

fauna species such as Brush-tailed Phascogale, Common Dunnart and Growling Grass Frog. Sites containing such species are priority areas for protection and enhancement.

8.4 Trust for Nature & Land for Wildlife Properties

Changing demographics and land use in the area has also resulted in an increasing number of voluntary or legal conservation agreements to protect native vegetation on private land, for example, through the Bush Heritage, Trust for Nature and Land for Wildlife programs. These programs are a very effective way to protect native vegetation on private land, and expand the 'private' reserve system.

Financial incentives for land owners to protect and manage higher conservation value native vegetation on private land should also be significantly increased through programs such as BushTender and Bushbroker (Commissioner for Environmental Sustainability Victoria 2008). However, this will require increased public funding, as well as potential market-based mechanisms. The Macedon Ranges Shire Council provides 100% per cent rate relief for Trust for Nature' properties. This should be considered by Hepburn and Moorabool Shires.

The Landscape Zone contains a large number of Trust for Nature and Land for Wildlife properties. As of 2003 the Macedon Ranges Shire had the third highest number of Land for Wildlife Properties with 134 properties, while Moorabool Shire had 79 properties and Hepburn 70 properties. These properties should be identified as part of a conservation action plan for the Landscape Zone.

8.5 Role of Local Government

Local government plays a critical role in biodiversity conservation on private land through its administration of planning related to private land. This includes making planning decisions in relation to clearing native vegetation on private land and enforcement of a range of regulations relating to native vegetation and local ecosystems. Determining environmental overlays on private land, such as Vegetation Protection Overlays (VPOs), are also the province of local government.

Funding for biodiversity conservation and natural resource management is usually a low priority for local government. The Macedon Ranges Shire Council (MRSC) is relatively proactive in relation to protecting biodiversity on private land. For example, the MRSC has developed a Cobaw Biolink Policy Areas between the Macedon Ranges and Cobaw State Forest in an attempt to reduce further habitat fragmentation in the area. However, the Council is lagging behind in the implementation of some its policies and projects, such as incentives to protect remnant vegetation on private land. At the other end of the scale the Hepburn Shire Council is yet to develop adequate policies to protect natural ecosystems and more resources are required.

Further mapping of high conservation areas and surveying of native fauna is required to ensure that the best available information can inform planning decisions. This should include identifying areas of remnant vegetation on private land that has high conservation values. Improved planning controls are also required in some high conservation value areas.

8.6 Key Recommendations for Private Land

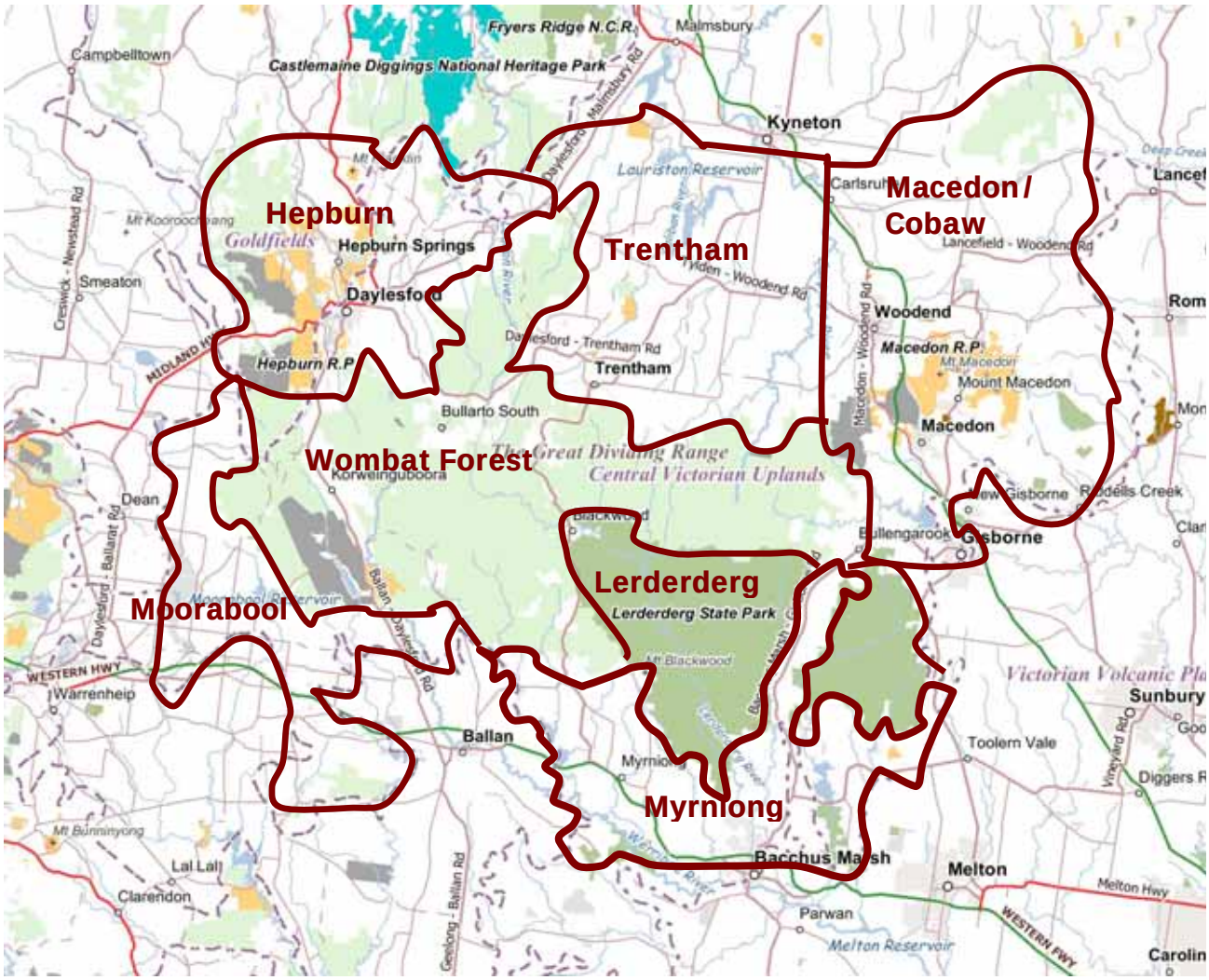
Recommendations

- DSE and local Councils should enforce existing Native Vegetation Retention regulations, including placing a greater emphasis on avoiding the loss of existing native vegetation.
- Investment in natural resource management should be significantly increased by Councils.
- All shires should employ a biodiversity officer to train staff, assist with planning decisions regarding native vegetation and biodiversity, and to develop and implement relevant policies and strategies to halt the loss of native vegetation on private land.
- DSE, CMA's and Councils should identify key biodiversity assets on private land e.g. threatened EVCs, threatened species, high quality remnants, vegetation with high connectivity and riparian vegetation for protection and enhancement.
- The State government should implement legislative changes to protect riparian areas on private property.
- The State government, CMA's and Councils should provide incentives for improved stewardship of riparian land on private property.
- The State government, CMA's and Councils should increase the level of financial assistance provided to land owners to ensure remnant vegetation on private land is protected and managed appropriately i.e. fencing to protect from stock, weed control, pest animal control and enhancement plantings.
- Encourage the protection of large old trees, including incentives to landowners.
- Voluntary protection agreements e.g. Trust for Nature and Land for Wildlife, should be encouraged, including through rate relief.
- Undertake education programmes regarding biodiversity conservation on private land.
- Preferentially restore more fertile parts of the landscape.

9. Local Areas in the Wombat Forest / Macedon Landscape Zone

Native flora and fauna lists for each Local Area are provided in Appendix One.

Map 9.1: The Wombat Forest / Macedon Landscape Zone (Source: DSE Geospatial Data)



Note. Some of the maps provided may not be totally accurate due to mapping scale or incorrect data.

9.1 Wombat Forest Local Area

Located within the Central Victorian Uplands bioregion the Wombat Forest Local Area consists primarily of the Wombat State Forest but also contains smaller areas of private land that are interspersed within the forest on more fertile soils. A list of native flora and fauna in the Wombat Forest Local Area is provided in Appendix One.

The Wombat Forest Local Area at a Glance

Flora

- 366 indigenous plants have been recorded
- 21 threatened flora species
- 49 serious weeds listed

EVCs

16 EVC's including 12 Threatened EVCs

Fungi

The area has a very high diversity of fungi.

Fauna

- 176 fauna species
- 14 threatened fauna species
- 125 bird species
- 27 mammals, including seven bats
- 14 species reptile, including 8 species skink
- 10 frog species

Pre-1750 Vegetation

Shrubby Foothill Forest and Herb-rich Foothill Forest were the most common EVCs. Wet and Damp Forest occurred in very high rainfall areas and gullies. Heathy Dry Woodland was found on dry ridgetops, while Shrubby Dry Forest and Heathy Dry Forest were found on drier sites. Shrubby Foothill Forest/Herb-rich Foothill Forest Complex was widespread in the west of the Wombat Forest. Riparian Forest and Sedgy Riparian Woodland occurred along waterways.

Current Vegetation

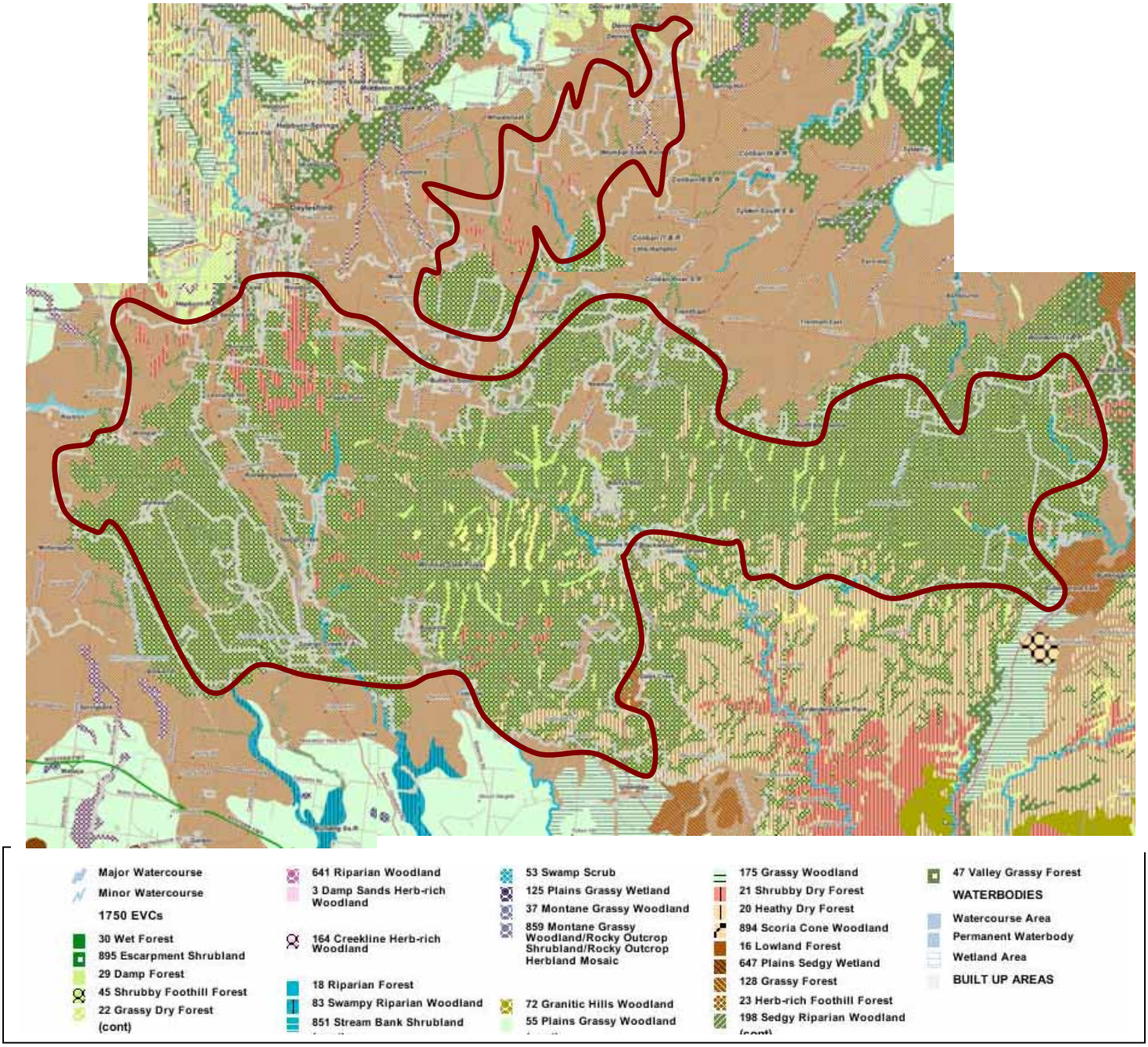
Clearing of native vegetation has only occurred on private land on the Local Area. Herb-rich Foothill Forest occurred on these more fertile areas and has been widely cleared.

Threatened EVCS

Twelve of the Sixteen EVCs in the Wombat Forest Local Area are listed as endangered, vulnerable of depleted.

Endangered	Vulnerable	Depleted
Swampy Riparian Woodland	Damp Forest Riparian Forest Valley Grassy Forest Creekline Herb-rich Woodland Grassy Woodland Grassy Forest Shrubby Dry Forest	Sedgy Riparian Woodland Heathy Woodland Grassy Dry Forest Herb-rich Foothill Forest Herb-rich Foothill Forest/ Shrubby Foothill Forest Complex

Map 9.1.1: Pre-1750 Vegetation (EVCs) of the Wombat Forest Local Area (Source: DSE Geospatial Data)



Regionally Significant Flora

A number of flora species within the region are considered regionally significant. This is due to the Landscape Zone being at the western end of the Great Dividing Range, and the therefore at the edge of the biogeographic range of a number of species. (Source Commonwealth of Australia 2000)

Carex polyantha	Sedge	edge of range, disjunct occurrence
Comesperma ericinum	Heath Milkwort	disjunct occurrence
Dampiera stricta	Blue Dampiera	disjunct occurrence
Deyeuxia monticola	Mountain Bent-grass	edge of range, disjunct occurrence
Dillwynia ramosissima	Bushy Parrot-pea	edge of range, disjunct occurrence
Drymophila cyanocarpa	Turquoise Berry	disjunct occurrence
Epilobium gunnianum	Gunn's Willow-herb	edge of range, disjunct occurrence
Eucalyptus muellerana	Yellow Stringybark	edge of range, disjunct occurrence
Festuca asperula	Graceful Fescue	edge of range, disjunct occurrence
Hovea rosmarinifolia	Mountain Beauty	disjunct occurrence
Lepidosperma tortuosum	Tortuous Rapier-sedge	edge of range, disjunct occurrence
Leptinella filicula	Mountain Cotula	edge of range, disjunct occurrence
Lycopidium dueterodensum	Bushy Clubmoss	disjunct occurrence
Persoonia chamaepeuce	Dwarf Geebung	disjunct occurrence

Threatened Flora

Twenty-one flora species in the Local Area are listed as rare, vulnerable or threatened at a State or National level. Two species are endemic to the region.

Monocotyledons			
	r	*Gahnia microstachya*	Slender Saw-sedge
	k	*Lemna trisulca*	Ivy-leaf Duckweed
	r	*Dipodium pardalinum*	Spotted Hyacinth-orchid
	k	*Entolasia stricta*	Upright Panic
Dicotyledons			
	r	*Acacia nano-dealbata*	Dwarf Silver Wattle
	r	*Bossiaea cordigera*	Wiry Bossiaea
	e	*Bossiaea vombata*	Wombat Leafless Bossiaea
	r	*Eucalyptus brookeriana*	Brooker's Gum
	r	*Eucalyptus yarraensis*	Yarra Gum
	r	*Grevillea obtecta*	Elphinstone Grevillea
	r	*Grevillea repens*	Creeping Grevillea
	r	*Leucopogon microphyllus var. pilibundus*	Hairy Beard-heath
	k	*Olearia speciosa*	Netted Daisy-bush
	r	*Nematolepis squamea*	Satinwood
	r	*Nicotiana suaveolens*	Austral Tobacco
	r	*Prosthanthera decussata*	Dense Mint Bush
	e	*Pterostylis lustra*	Small Sickle Greenhood
FFG	v	*Pultenaea graveolens*	Scented Bush Pea
	r	*Pultenaea gunnii subsp. tuberculata*	Golden Bush-pea
	r	*Pultenaea reflexifolia*	Wombat Bush-pea
	r	*Pultenaea weindorferi*	Swamp Bush-pea

Listed under national EPBC Act (C = critically endangered, E = endangered, V = vulnerable, R = rare). Victorian Rare or Threatened (VROT) c = critically endangered, e = endangered, v = vulnerable, n = near threatened, k = poorly known. Listed under Flora and Fauna Guarantee Act = FFG. Data From: Flora Information System, Viridans - 2009 - © Viridans Biological Databases

Threatened Fauna

Fourteen fauna species in the Landscape Zone are listed as rare, vulnerable or threatened at a State or National level.

Mammals			
	n	Eastern Pygmy-possum	*Cercartetus nanus*
f	*v*	Brush-tailed Phascogale	*Phascogale tapoatafa*
f	*E*	*e* Spot-tailed Quoll	*Dasyurus maculatus*
Birds			
f	*v*	Grey Goshawk	*Accipiter novaehollandiae*
f	*v*	Square-tailed Kite	*Lophoictinia isura*
	n	Spotted Quail-thrush	*Cinclosoma punctatum*
	n	Brown Treecreeper (south-eastern ssp.)	*Climacteris picumnus victoriae*
	n	Black-chinned Honeyeater	*Melithreptus gularis*
f	v	Painted Honeyeater	*Grantiella picta*
	n	Brown Quail	*Coturnix ypsilophora*
f	v	Powerful Owl	*Ninox strenua*
f	e	Masked Owl	*Tyto novaehollandiae*
Frogs			
f	V	e Growling Grass Frog	*Litoria raniformis*
f	e	Brown Toadlet	*Pseudophryne bibronii*

Listed under national EPBC Act (C = critically endangered, E = endangered, V = vulnerable, R = rare). Victorian Rare or Threatened (VROT) c = critically endangered, e = endangered, v = vulnerable, n = near threatened, k = poorly known. Listed under Flora and Fauna Guarantee Act = f. Data From: Flora Information System, Viridans - 2009 - © Viridans Biological Databases

Key Threats on Public Land

Key threats to biodiversity in the Wombat State Forest include:

- Inappropriate fuel reduction burning, fire breaks and other fire management practices
- Firewood collection including illegal firewood removal
- Pest plants and animals
- Fragmentation by roads and tracks
- Potential re-introduction of logging
- Recreational activities e.g. recreational vehicles, car rallies

Clearing of native vegetation on roadsides, especially for fire management is also a threat.

Key Threats on Private Land

- Clearing of native vegetation
- Pest plants and animals
- Firewood collection
- Fuel reduction activities, such as clearing vegetation and removal of fallen logs

Key Areas

The Wombat State Forest (45,100 hectares)

As one of the largest forested areas in Central Victoria the Wombat Forest plays a vital role in biodiversity conservation and the maintenance of ecological processes, landscape connectivity and ecosystem resilience within the region. As a part of this the Wombat Forest provides a vital link between the foothill forest on the Great Divide to the Box-Ironbark forests and woodlands in northern Victoria. Due to these linkages it is anticipated that the Wombat Forest would play a vital role as a 'climate change refuge' if global temperatures rise significantly.

A report by the Victorian National Parks Association highlighted the Wombat State Forest as one of the highest priority conservation areas in central Victoria and called for the forest to become a State Park (VNPA 2010).

In its recent Native Vegetation Investigation VEAC specifically identified the Central Victorian Uplands (CVU) bioregion as requiring further additions to the reserve system. Only 4.4% of the CVU bioregion is contained in conservation reserves (VEAC 2011).

The Wombat State Forest is comprised of four main forest blocks. The Hepburn or north-west forest block is located within the Hepburn Local Area and covered within that section.

Main Forest Block (31,488 ha.) – Contiguous with Lerderderg State Park. Contains 'largely intact' landscape and therefore has very high biodiversity values. Also contains significant areas of Sedgy Riparian Woodland and other riparian EVCs. Very important habitat for many species of native flora and fauna, including many threatened species.

Glenlyon Forest Block (5,747 ha.) – Some 70% of EVCs in this block are under-reserved within the Central Victorian Uplands bioregion. Contains Loddon River and various creeks. Important in connecting Wombat Forest to forest in Upper Loddon area to the north. Contains a number of threatened flora and fauna species.

Barkstead Forest Block (5,085 ha.) – Seventy five percent of EVCs are under-represented in the Central Victorian Uplands bioregion. Also includes a range of threatened species. Has large areas of riparian vegetation in the south west. Large areas of pine plantations occur on leased public land adjacent to the State Forest.

Landscape Connectivity

Very High – The Wombat Forest Local Area contains one of the largest forested areas in Central Victoria. The area plays a vital role in the maintenance of ecological processes, landscape connectivity and ecosystem resilience within the wider region. A recent VEAC discussion paper noted that '*significant patches of remnant native vegetation of high quality and connectivity adjoin the largely intact landscape of the Wombat Forest (including, for example, in the Trentham- Daylesford area).* This connectivity provides a vital link from the foothill forests on the Great Divide, through the drier forest north of the Landscape Zone to the Box-Ironbark Woodlands in northern Victoria.

Key Recommendations

- The State government initiate an investigation of the Central Victorian Uplands bioregion to determine a more comprehensive, adequate and representative reserve system as recommended by VEAC. As part of this investigation VEAC should consider the addition of the Wombat State Forest to the conservation reserve system as a key way to develop a more comprehensive reserve system for the Central Victorian Uplands bioregion and meet bioregional ecosystem reserve targets.
- Resources for conservation management of public land including managing key threats should be increased

9.2 Hepburn Local Area

The Hepburn Local Area occurs within in the Goldfields and Central Victorian Uplands bioregions. The Local Area contains relatively high levels of native vegetation due to larger areas of public land such as the Wombat State Forest and Hepburn Regional Park. A list of native flora and fauna in the Hepburn Local Area is provided in Appendix One.

The Hepburn Local Area at a Glance

Flora	Fauna
• 310 indigenous plants have been recorded • 14 threatened flora species • 71 serious weeds listed **EVCs** 12 EVC's including 9 Threatened EVCs	• 142 fauna species • 12 threatened fauna species • 119 bird species • 18 mammal species • 1 species of reptile • 4 frog species

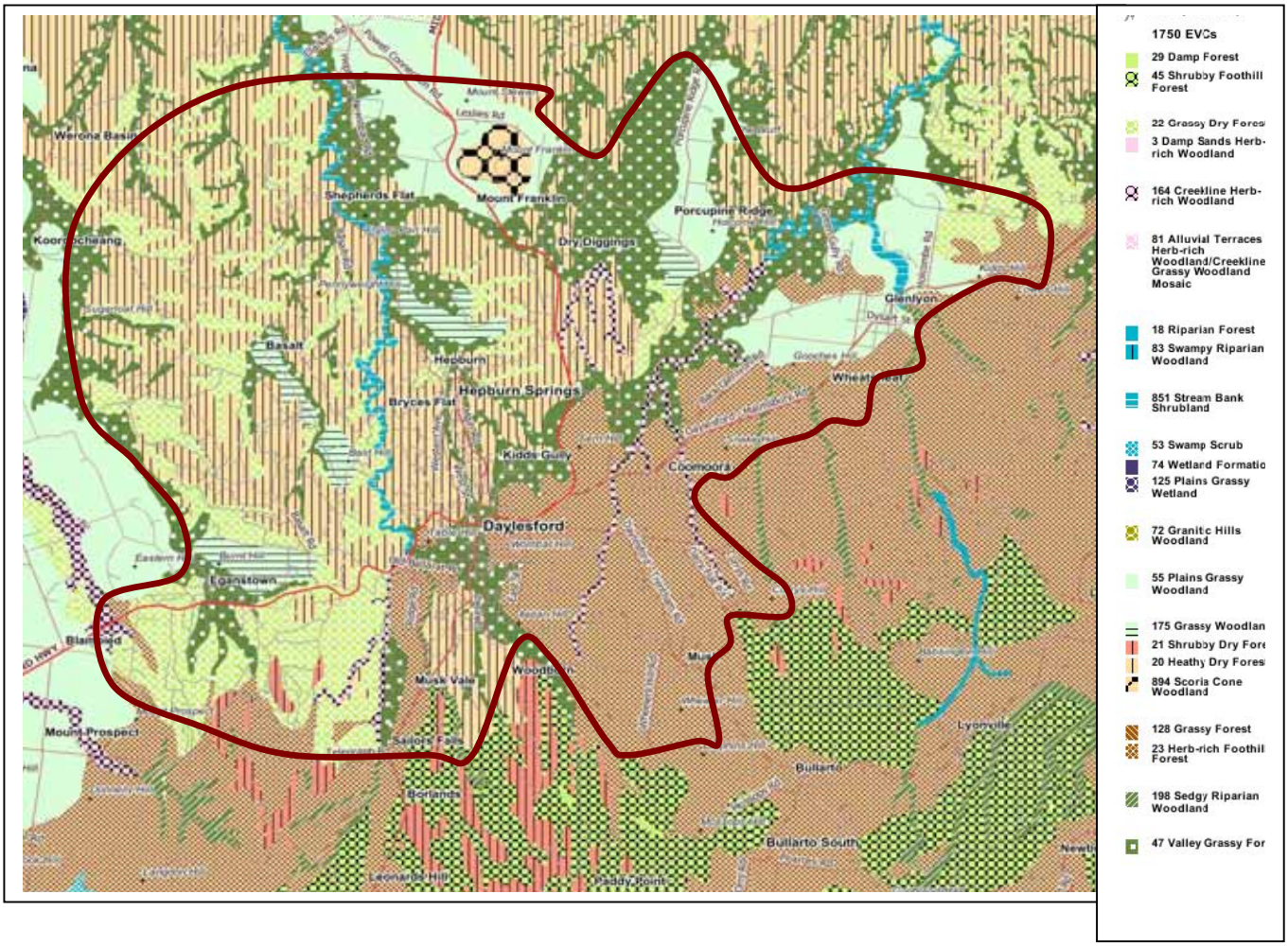
Pre-1750 Vegetation

Heathy Dry Forest dominated the higher slopes and ridges of northern section of the Local Area. Valley Grassy Forest occurred in more sheltered valleys, creek flats and valley heads. Grassy Dry Forest was found on lower slopes and Grassy Woodland in more fertile areas. Streambank Shrubland occurred in very narrow strips along the major waterways. In the south west Herb-rich Foothill Forest occurred in the more fertile and higher rainfall areas.

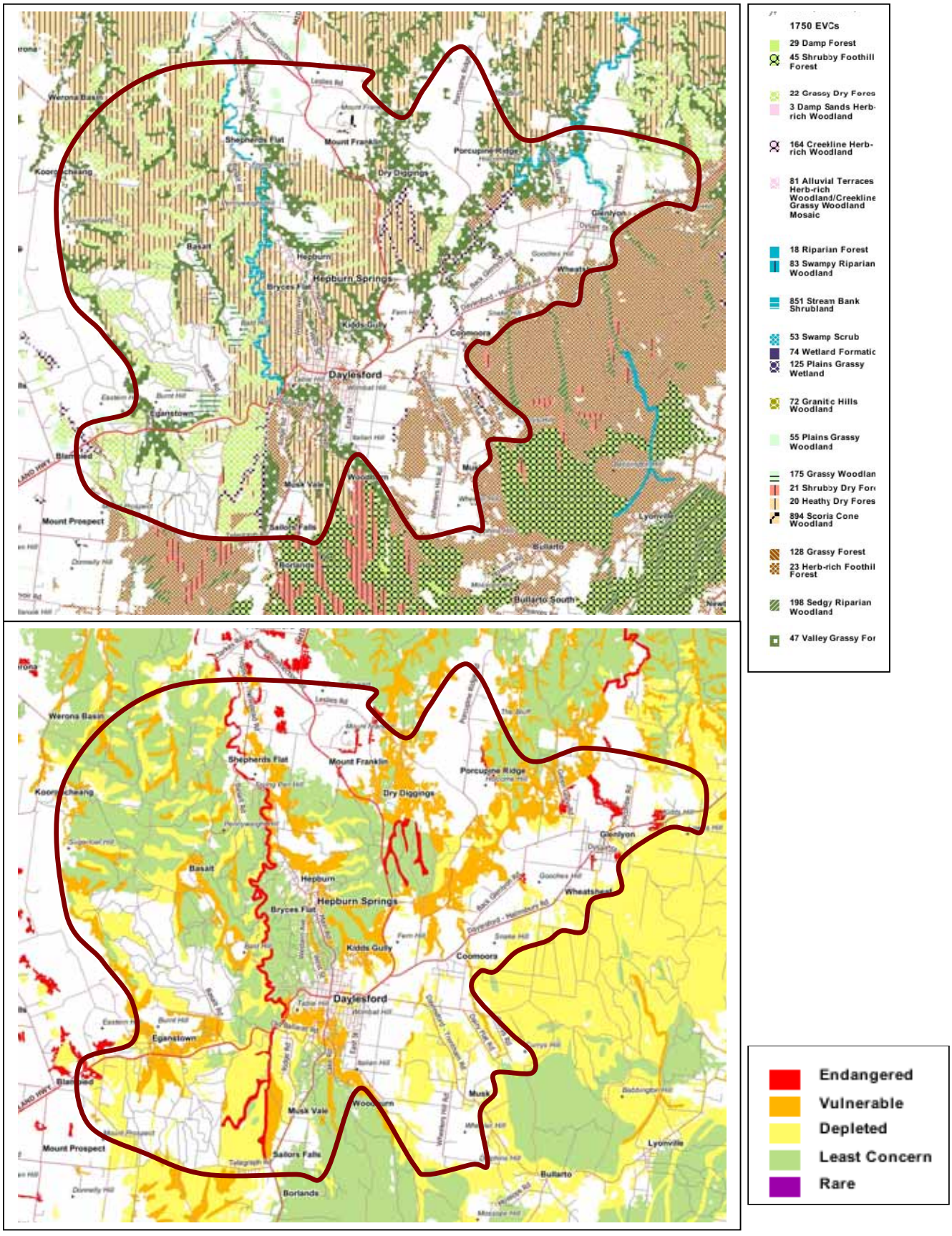
Current Vegetation

Clearing of native vegetation has occurred on private land in the Local Area. Widely cleared EVCs include Herb-rich Foothill Forest, Valley Grassy Forest, Plains Grassy Woodland, Grassy Woodland and Creekline Herb-rich Woodland

Map 9.2.1: Pre-1750 Vegetation (EVCs) of the Hepburn Local Area (Source: DSE Geospatial Data)



Map 9.2.2 : Current EVCs (top map) and their Bioregional Conservation Status (lower map) in the Hepburn Local Area (Source: DSE Geospatial Data)



Threatened EVCs

Nine EVCs in the Hepburn Local Area have a bioregional conservation status of endangered, vulnerable or depleted.

Endangered	Vulnerable	Depleted
Streambank Shrubland	Riparian Forest	Sedgy Riparian Woodland
Plains Grassy Woodland	Valley Grassy Forest	Grassy Dry Forest
Grassy Woodland	Creekline Herb-rich Woodland	Herb-rich Foothill Forest

Threatened Flora

13 flora species in the Hepburn Local Area are listed as rare, vulnerable or threatened at a State or National level.

Monocotyledons				
E		e	*Dianella amoena*	Matted Flax-lily
		v	*Caladenia clavescens*	Midlands Spider-orchid
		r	*Dipodium pardalinum*	Spotted Hyacinth-orchid
E	FFG	e	*Prasophyllum frenchii*	Maroon Leek-orchid
Dicotyledons				
		r	*Acacia nano-dealbata*	Dwarf Silver Wattle
		r	*Bossiaea riparia*	River Leafless Bossiaea
		v	*Cardamine lilacina*	Lilac Bitter-cress
		r	*Eucalyptus yarraensis*	Yarra Gum
		r	*Grevillea obtecta*	Fryerstown Grevillea
		r	*Grevillea repens*	Creeping Grevillea
		r	*Hovea asperifolia subsp. spinosissima*	Rough Hovea
	FFG	v	*Pultenaea graveolens*	Scented Bush-pea
		r	*Swainsona behriana*	Southern Swainson-pea

Listed under national EPBC Act (C = critically endangered, E = endangered, V = vulnerable, R = rare). Victorian Rare or Threatened (VROT) c = critically endangered, e = endangered, v = vulnerable, n = near threatened, k = poorly known. Listed under Flora and Fauna Guarantee Act = f. Data From: Flora Information System, Viridans - 2009 - © Viridans Biological Databases

Threatened Fauna

12 fauna species in the Local Area are listed as rare, vulnerable or threatened at a State level.

Mammals			
f	v	Brush-tailed Phascogale	*Phascogale tapoatafa*
f		Common Bent-wing Bat	*Miniopterus schreibersii* (group)
Birds			
	v	Australasian Shoveler	*Anas rhynchotis*
	n	Brown Treecreeper (south-eastern ssp.)	*Climacteris picumnus victoriae*
f	v	Grey Goshawk	*Accipiter novaehollandiae*
	v	Musk Duck	*Biziura lobata*
	n	Pied Cormorant	*Phalacrocorax varius*
f	v	Powerful Owl	*Ninox strenua*
f	v	Square-tailed Kite	*Lophoictinia isura*
	n	Spotted Quail-thrush	*Cinclosoma punctatum*
f	v	Speckled Warbler	*Pyrrholaemus sagittatus*
Frogs			
f	e	Brown Toadlet	Pseudophryne bibronii

Listed under national EPBC Act (C = critically endangered, E = endangered, V = vulnerable, R = rare). Victorian Rare or Threatened (VROT) c = critically endangered, e = endangered, v = vulnerable, n = near threatened, k = poorly known. Listed under Flora and Fauna Guarantee Act = f. Data From: Flora Information System, Viridans - 2009 - © Viridans Biological Databases

Key Threats

- Clearing and fragmentation of habitat
- Pest plants and animals
- Fuel reduction activities on private and public land
- Rural subdivision
- Grazing
- Firewood collection on private and public land
- The high degree of Public/Private Land interface is an issue in areas close to the Wombat State Forest.

Key Areas

Hepburn Regional Park (2,820 hectares)

Located in the Goldfields bioregion. Provides significant habitat for the Brush-tailed Phascogale. Main EVCs in the Park include Heathy Dry Forest, Grassy Dry Forest and Valley Grassy Forest.

Wombat State Forest – Hepburn Forest Block (3,085 hectares)

Located within the Central Victorian Uplands and Goldfields bioregions. Contains numerous threatened species.

Landscape Connectivity

Very High - The Local Area contains several large blocks of public land. Vegetation on private land is high in some areas although the understorey is often modified. Has good linkages to the north and south. The Dry Diggings NFR is a 12.16 hectare linear reserve that could be expanded to build connectivity in that area. Large areas of pine plantations occur on leased public land adjacent to the State Forest.

Key Recommendations

- The State government initiate an investigation of the Central Victorian Uplands bioregion to determine a more comprehensive, adequate and representative reserve system as recommended by VEAC. As part of this investigation VEAC should consider the addition of the Wombat State Forest to the conservation reserve system
- Resources for conservation management of public land including managing key threats should be increased.
- Ensure further native vegetation loss and degradation on private land is minimised.
- Enhance vegetation on roadsides and riparian areas.
- Protect and enhance threatened vegetation types. See Bioregional Conservation Significance Map on page 36 with red and orange coloured areas the highest priority.

9.3 Trentham Local Area

Due to the fertile soils and higher rainfall most native vegetation in the Trentham Local Area has been cleared. Some areas of higher conservation value vegetation remain in the area both on public and private land. A list of native flora and fauna in the Trentham Local Area is provided in Appendix One.

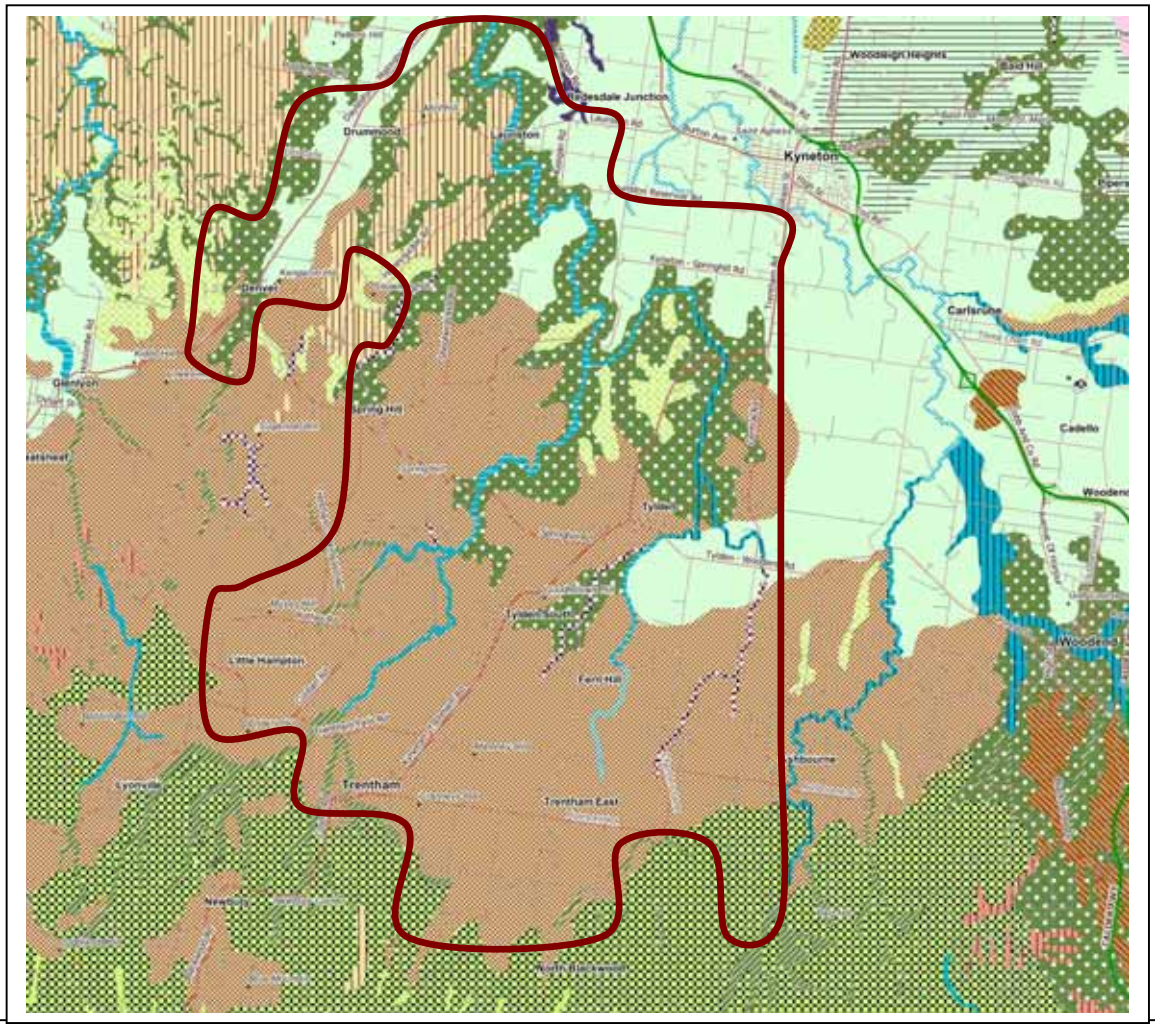
The Trentham Local Area at a Glance

Flora	Fauna
• 292 indigenous plants have been recorded • 10 threatened flora species • 49 serious weeds listed **EVCs** 12 EVC's including 10 Threatened EVCs	• 154 fauna species • 11 threatened fauna species • 110 bird species • 15 mammals • 11 reptile species • 9 frog species

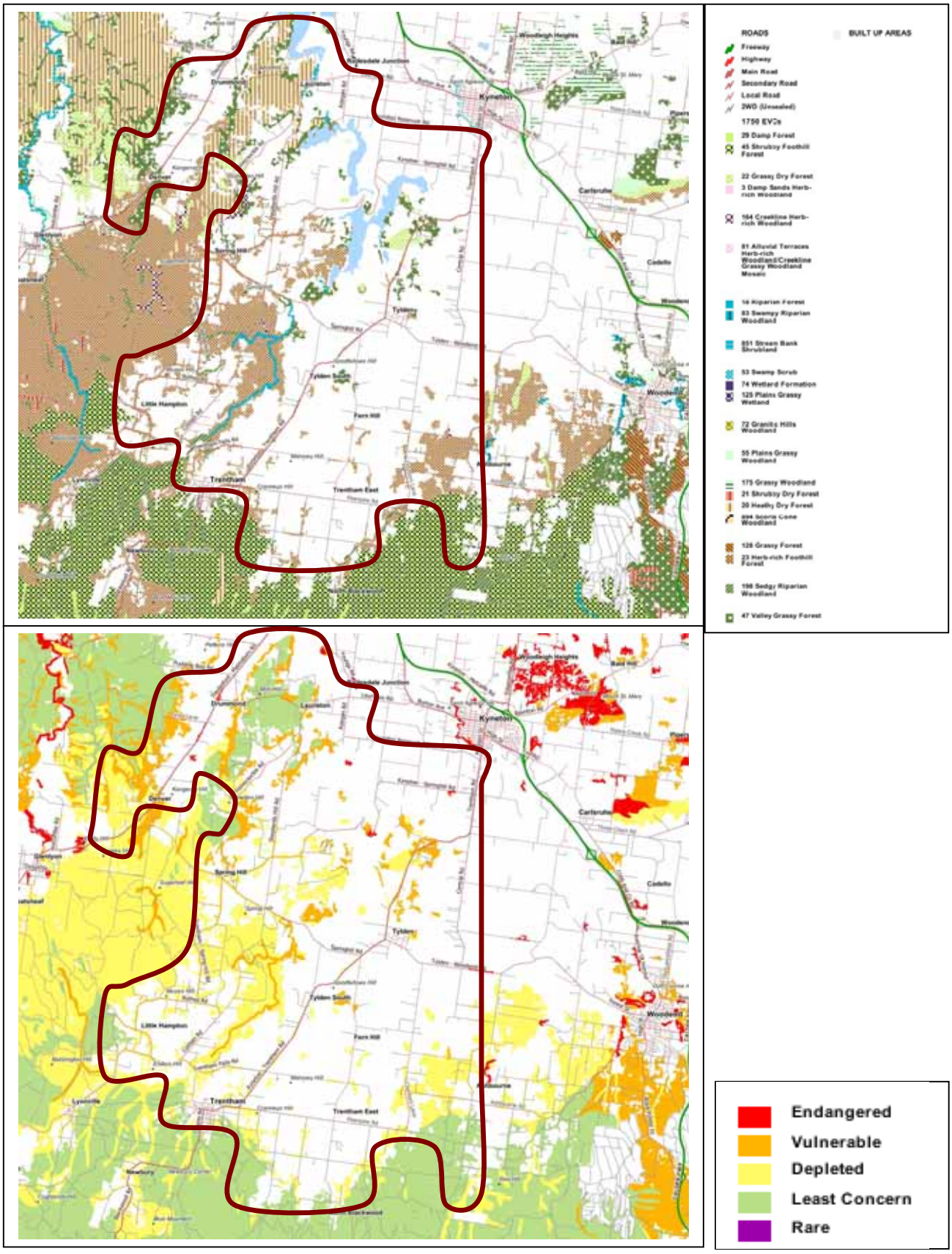
Pre-1750 Vegetation

Herb-rich foothill Forest was the most common EVC occurring on the more fertile soils. Shrubby Foothill Forest occurred on less fertile sites mostly in the south. In the north pockets of Valley Grassy Forest, Grassy Dry Forest, Plains Grassy Woodland and Heathy Dry Forest were found. Sedgy Riparian Woodland, Riparian Forest, Streambank Shrubland, Swamp Scrub, Swampy Riparian Woodland and Creekline Herb-rich Woodland occurred along watercourses.

Map 9.3.1: Pre-1750 Vegetation (EVCs) of the Trentham Local Area (Source: DSE Geospatial Data)



Map C.2: Current EVCs (top map) and their Bioregional Conservation Status (lower map) in the Trentham Local Area (Source: DSE Geospatial Data)



Current Vegetation

Clearing of native vegetation has occurred on private land in the Local Area. Widely cleared EVCs include Herb-rich Foothill Forest, Valley Grassy Forest, Plains Grassy Woodland and Grassy Dry Forest. Most riparian EVCs have been heavily cleared or modified.

Threatened EVCs

Ten of the twelve EVCs in the Trentham Local Area have a bioregional conservation status of endangered, vulnerable or depleted (Shrubby Foothill Forest and Heathy Dry Forest are least concern).

Endangered	Vulnerable	Depleted
Plains Grassy Woodland	Riparian Forest	Swamp Scrub
Streambank Shrubland	Valley Grassy Forest	Sedgy Riparian Woodland
Swampy Riparian Woodland	Creekline Herb-rich Woodland	Grassy Dry Forest
		Herb-rich Foothill Forest

Threatened Flora

Ten flora species in the Landscape Zone are listed as rare, vulnerable or threatened at a State or National level. Species in red have been recorded in the Local Area but are not formally recorded.

Monocotyledons					
		r	*Calochilus imberbis*	Naked Beard-orchid	Lauriston NCR
E		e	*Dianella amoena*	Matted Flax-lily	Denver area
Dicotyledons					
		r	*Bossiaea cordigera*	Wiry Bossiaea	
	FFG	e	*Eucalyptus aggregata*	Black Gum	
		r	*Eucalyptus brookeriana*	Brooker's Gum	
		r	*Geranium solanderi* var. *solanderi*	Austral Crane's-bill	Denver area
		r	*Grevillea repens*	Creeping Grevillea	Lauriston NCR
E	FFG	e	*Lepidium hyssopifolium*	Basalt Peppercress	
		r	*Platylobium alternifolium*	Victorian Flat-pea	Denver area
		r	*Pultenaea reflexifolia*	Wombat Bush-pea	

Threatened Fauna

Ten fauna species in the Landscape Zone are listed as rare, vulnerable or threatened at a State or National level.

Mammals				
	f	v	Brush-tailed Phascogale	*Phascogale tapoatafa*
Birds				
		v	Australasian Shoveler	*Anas rhynchotis*
		n	Brown Treecreeper (south-eastern ssp.)	*Climacteris picumnus victoriae*
	f	v	Grey Goshawk	*Accipiter novaehollandiae*
		v	Hardhead	*Aythya australis*
		v	Musk Duck	*Biziura lobata*
		n	Nankeen Night Heron	*Nycticorax caledonicus*
		n	Pied Cormorant	*Phalacrocorax varius*
Frogs				
	f	e	Brown Toadlet	*Pseudophryne bibronii* Lauriston area
	f V	e	Growling Grass Frog	*Litoria raniformis*

Listed under national EPBC Act (C = critically endangered, E = endangered, V = vulnerable, R = rare). Victorian Rare or Threatened (VROT) c = critically endangered, e = endangered, v = vulnerable, n = near threatened, k = poorly known. Listed under Flora and Fauna Guarantee Act = f. Data From: Flora Information System, Viridans - 2009 - © Viridans Biological Databases

Key Threats

- Clearing of native vegetation on private land
- Fragmentation of habitat
- Pest plants and animals
- Fuel reduction activities on private and public land
- Rural subdivision
- Grazing
- Firewood collection on private and public land

Key Areas

Lauriston Nature Conservation Reserve (148 hectares)

A substantial population (300 plus) of *Grevillea repens* occurs in this reserve which is outside of the recognised distribution range for this species. The rare *Calochilus imberbis* (Naked Beard-orchid) has also been observed. Neither of these species is formally recorded in the region. Fourteen orchid species occur in the reserve.

An area of forested Crown land adjacent to the reserve is currently licensed for grazing. This license should be revoked and the area incorporated into the Lauriston Nature Conservation Reserve. Alternatively a partnership management approach could be established between Parks Victoria and the Macedon Ranges Shire Council. Some community interest exists and the council is currently undertaking some weed control on the site with DSE funding.

Wombat State Forest – Lauriston block (109 hectares)
The area is entirely comprised of threatened EVCs. Abuts Coliban River therefore forms part of an important riparian corridor.

Tylden South Education Area (120 hectares)
This reserve is mainly comprised of Valley Grassy Forest which is an EVC that has been widely cleared in the area. Abuts Coliban River so forms part of important riparian corridor.

Trentham Falls Reserve (30 hectares)
Occurring on fertile volcanic, soils the Trentham Falls Reserve provides a relatively intact example of Herb-rich Foothill Forest. This EVC has been widely cleared in the region, especially the form that existed on deep red soils. Over 100 plant species have been recorded in the reserve.

A significant Aboriginal heritage site also occurs in the Upper Coliban Reservoir. The site was visited by aboriginals to collect a particular type of stone used for making flaked tools. The area contains very large numbers of discarded flakes but is currently under water due to the high levels of the reservoir.

Landscape Connectivity

Low to Very High – Highly cleared areas, especially in the north and north-east of the Trentham Local Area has low connectivity. In the west and south of the Local Area connectivity is moderate to high. There are opportunities to build connectivity through the Denver area and along the Campaspe River.

Key Recommendations

- The Lauriston block of the Wombat State Forest should be re-classified and become part of the Lauriston Nature Conservation Reserve.
- The current license on the crown land adjacent to the Lauriston Nature Conservation Reserve should be revoked and appropriate management arrangements implemented to ensure the biodiversity values of the site are protected.
- Ensure further native vegetation loss and degradation on private land is minimised.
- Enhance vegetation on roadsides and riparian areas.
- Protect and enhance threatened vegetation types. See Bioregional Conservation Significance Map on page 40 with red and orange coloured areas the highest priority.

9.4 Macedon/Cobaw Local Area

The Macedon/Cobaw Local Area has very high conservation values. The area is moderately cleared. The Macedon Ranges in particular has a very diverse range of vegetation types due to its varied topography. A list of native flora and fauna in the Macedon/Cobaw Local Area is provided in Appendix One.

The Macedon/Cobaw Local Area at a Glance

Flora

- 563 indigenous plants have been recorded, including 48 orchid species
- 20 threatened flora species
- 106 serious weeds listed

EVCs

18 EVC's including 14 Threatened EVCs

Fauna

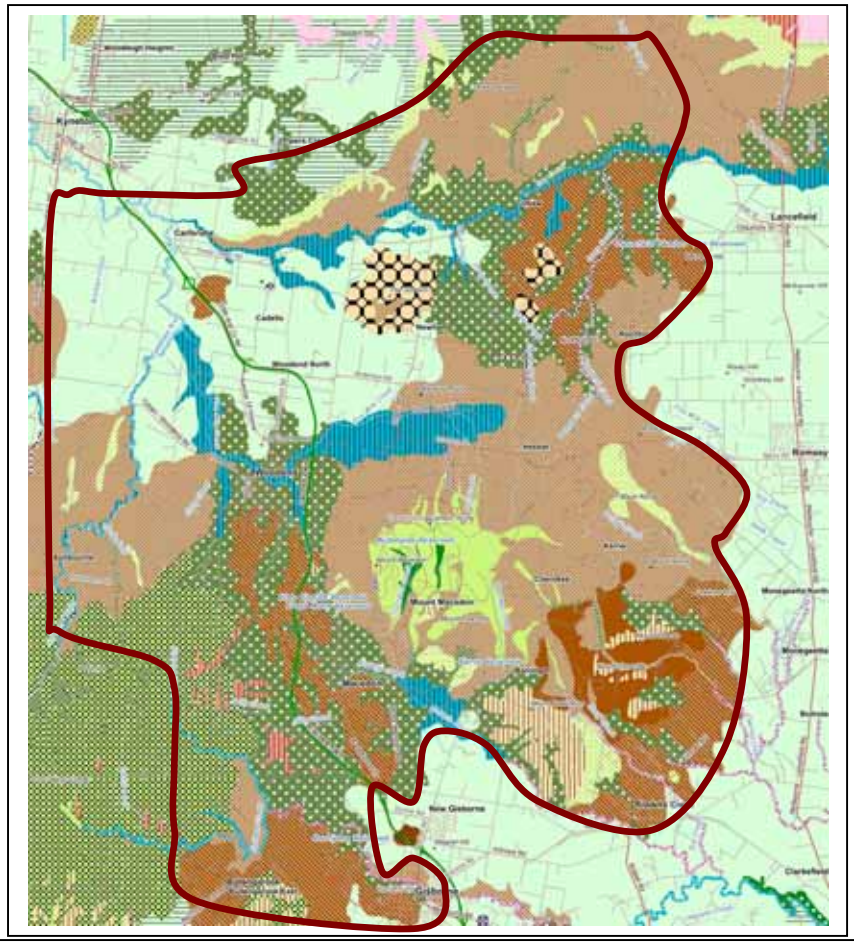
- 219 fauna species
- 26 threatened vertebrate fauna species
- 2 threatened invertebrate species
- 164 bird species
- 32 mammals, including 9 bat species
- 14 reptile species, including nine skink species
- 9 frog species

Pre-1750 Vegetation

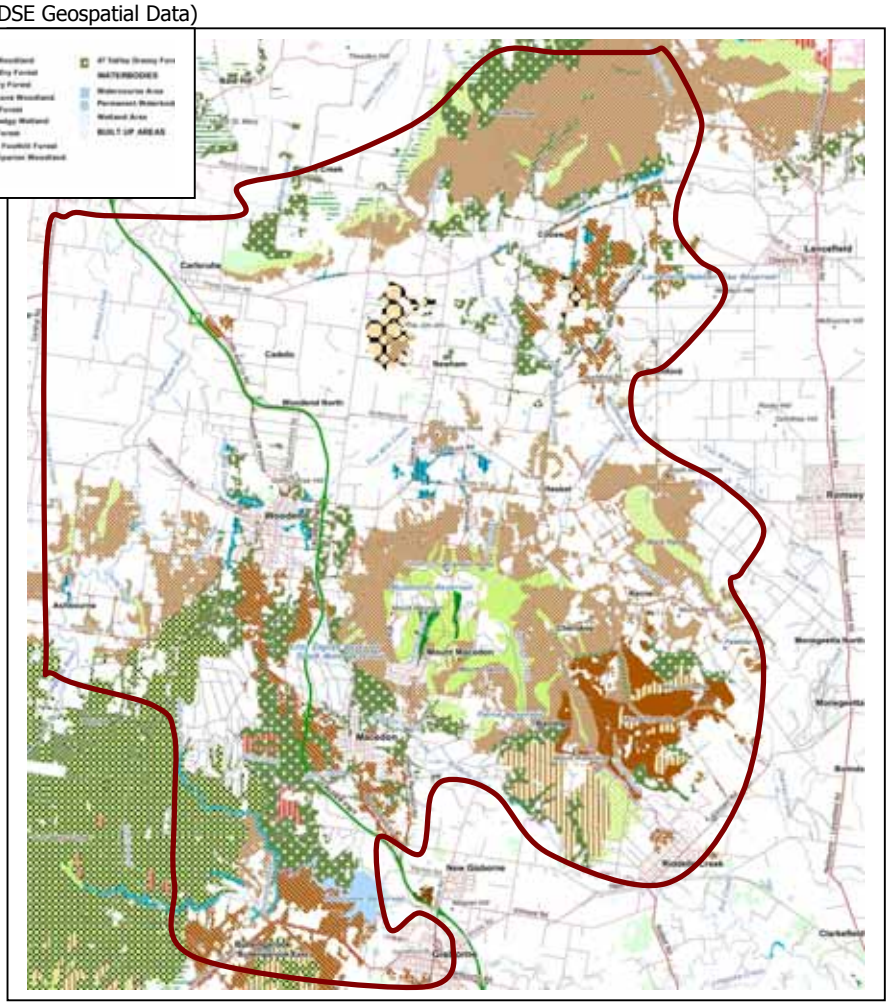
Herb-rich foothill Forest was the most common EVC in the area and mostly occurred on flatter areas with more fertile soils and better water availability. Valley Grassy Forest was also common in valleys around Macedon, Woodend and Newham. Both EVCs were mostly open forest with grassy or herb-rich understorey. On Mount Macedon Damp Forest was dominant at higher altitudes and on sheltered eastern slopes. Wet forest occurred in the south facing gullies. Montane Grassy Woodland/Rocky Outcrop Complex occurred on Camels Hump and near Major Mitchell Lookout.

Swampy Riparian Woodland occurred along creeks and low lying areas, especially around Woodend. Smaller patches of Lowland Forest occurred near Mount Charlie, Shrubby Dry Forest around Macedon, Scoria Cone Woodland north-west of Newham and Grassy Forest around Cobaw and Macedon. Plains Grassy Woodland was common around Woodend North and Cadello.

Map 9.4.1: Pre-1750 Vegetation (EVCs) of the Macedon/Cobaw Local Area (Source: DSE Geospatial Data)



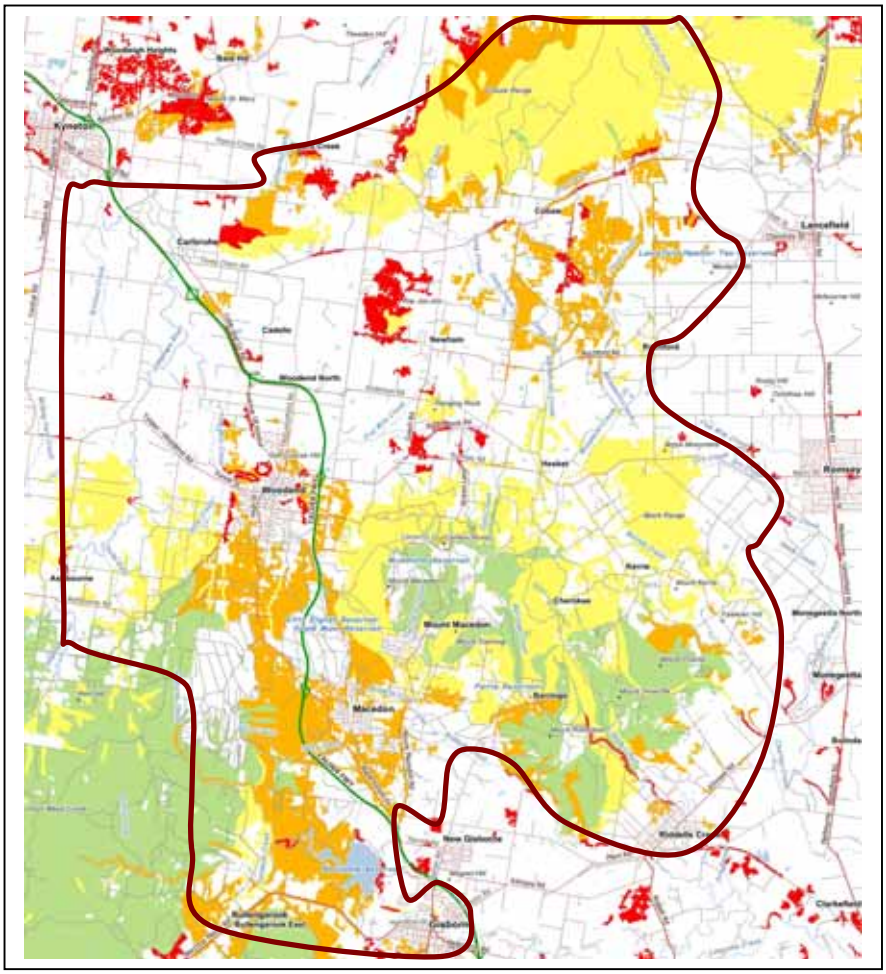
Map 9.4.2: Current EVCs (top map) and their Bioregional Conservation Status (lower map) in the Macedon/Cobaw Local Area (Source: DSE Geospatial Data)

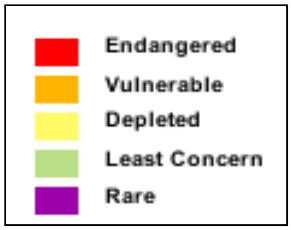


Threatened EVCs

Fourteen of the eighteen EVCs in the Macedon/Cobaw Local Area have a bioregional conservation status of endangered, vulnerable or depleted.

Endangered
Streambank Shrubland
Swampy Riparian Woodland
Scoria Cone Woodland
Plains Grassy Woodland
Grassy Woodland
Vulnerable
Riparian Forest
Valley Grassy Forest
Creekline Herb-rich Woodland
Grassy Forest
Montane Grassy Woodland
Montane Grassy Woodland/ Rocky Outcrop Shrubland/ Rocky Outcrop Herbland Mosaic
Depleted
Sedgy Riparian Woodland
Grassy Dry Forest
Herb-rich Foothill Forest
Sedgy Riparian Woodland





Current Vegetation

The foothills of the Great Divide retain relatively high levels of native vegetation, including on some areas of private land. On flatter and more gently undulating areas clearing of native vegetation has been more extensive. Widely cleared EVCs include Herb-rich Foothill Forest, Valley Grassy Forest, Grassy Woodland and Swampy Riparian Woodland. In the Macedon Ranges Shire 90% of endangered and vulnerable EVCs occur on private land.

Threatened Flora

Twenty flora species in the Landscape Zone are listed as rare, vulnerable or threatened at a State or National level.

Monocotyledons				
E		e	*Dianella amoena*	Matted Flax-lily
	FFG	v	*Diuris punctata var. punctata*	Purple Diuris
Dicotyledons				
		r	*Acacia nano-dealbata*	Dwarf Silver Wattle
		v	*Brachyscome debilis*	Weak Daisy
		v	*Cardamine lilacina*	Lilac Bitter-cress
		k	*Cardamine tenuifolia*	Slender Bitter-cress
	FFG	e	*Eucalyptus aggregata*	Black Gum
		r	*Eucalyptus brookeriana*	Brooker's Gum
		r	*Eucalyptus yarraensis*	Yarra Gum
		r	*Euphrasia collina subsp. trichocalycina*	Purple Eyebright
		v	*Gernium solanderi var. solanderi*	Austral Crane's-bill
		e	*Geranium sp. 1*	Large-flower Crane's-bill
		r	*Geranium sp. 3*	Pale-flower Crane's-bill
		v	*Helichrysum aff. rutidolepis (Lowland Swamps)*	Pale Swamp Everlasting
		v	*Microseris sp. 1*	Plains Yam-daisy
		r	*Rhagodia parabolica*	Fragrant Saltbush
		r	*Senecio cunninghamii var. cunninghamii*	Branching Groundsel
V		v	*Senecio psilocarpus*	Swamp Fireweed
	FFG	c	*Stylidium armeria subsp. pilosifolium*	Hairy-leaf Triggerplant
V	FFG	v	*Xerochrysum palustre*	Swamp Everlasting

Listed under national EPBC Act (C = critically endangered, E = endangered, V = vulnerable, R = rare). Victorian Rare or Threatened (VROT) c = critically endangered, e = endangered, v = vulnerable, n = near threatened, k = poorly known. Listed under Flora and Fauna Guarantee Act = FFG. Data From: Flora Information System, Viridans - 2009 - © Viridans Biological Databases except for data in red which has been provided by Russell Best and David Francis of Riddells Creek Landcare <http://www.riddellscreeklandcare.org.au/>

Threatened Fauna

Twenty-six vertebrate and two invertebrate fauna species in the Landscape Zone are listed as threatened at a State or National level.

Mammals				
	f	*v*	*Brush-tailed Phascogale*	Phascogale tapoatafa
		v	*Common Dunnart*	Sminthopsis murina
		n	*Eastern Pygmy-possum*	Cercartetus nanus
	f	*E e*	*Spot-tailed Quoll*	Dasyurus maculatus
Birds				
	f	*e*	*Australasian Bittern*	Botaurus poiciloptilus
		v	*Australasian Shoveler*	Anas rhynchotis
	f	*v*	*Baillon's Crake*	Porzana pusilla
	f	*e*	*Barking Owl*	Ninox connivens
	f	*e*	*Blue-billed Duck*	Oxyura australis
		v	*Black Falcon*	Falco subniger
		n	*Brown Treecreeper (south-eastern ssp.)*	Climacteris picumnus victoriae
	f	*v*	*Eastern Great Egret*	Ardea modesta
		v	*Hardhead*	Aythya australis
	f	*n*	*Hooded Robin*	Melanodryas cucullata
	f	*c*	*Intermediate Egret*	Ardea intermedia
		n	*Latham's Snipe*	Gallinago hardwickii
	f	*e*	*Masked Owl*	Tyto novaehollandiae
		v	*Musk Duck*	Biziura lobata
		n	*Nankeen Night Heron*	Nycticorax caledonicus
	f	*v*	*Powerful Owl*	Ninox strenua
	f	*E c*	*Regent Honeyeater*	Anthochaera phrygia
		v	*Royal Spoonbill*	Platalea regia
		n	*Spotted Quail-thrush*	Cinclosoma punctatum
		n	*Whiskered Tern*	Chlidonias hybridus

Frogs

f	*e*	*Brown Toadlet*	Pseudophryne bibronii
f	*Ve*	*Growling Grass Frog*	Litoria raniformis

Invertebrates

Insects

f	*Yellow Ochre Butterfly*	Trapezites lutea lutea
f	*Amethyst Hairstreak Butterfly*	Jalmenus icilius

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Key Threats to Biodiversity

- Clearing
- Fragmentation of habitat
- Pest plants
- Feral and domestic animals
- Fuel reduction activities on private and public land
- Recreational activities e.g. recreational vehicles
- Rural subdivision
- Grazing
- Firewood collection

The Macedon Ranges Shire Council has developed 'Landscape Units' to improve land and biodiversity management. Each land unit contains common environmental assets, threats and issues.

Key Areas on Public Land

Macedon Regional Park (2,165 hectares)

Contains a very diverse range of vegetation types. Snow Gums are found on the higher peaks. The flora of the Macedon Ranges has some affinity with the eastern highlands. A number of species are found at the western most limit of their range, for example, Alpine Ash (*Eucalyptus delegatensis*), Mountain Beard-heath (*Acrothamnus hookeri*), Sharp Beard-heath (*Leucopogon fraseri*) and Mountain Tea-tree (*Leptospermum grandifolium*) (Francis 2011).

Lancefield (Cobaw) State Forest (2.220 hectares)

Largely comprised of threatened EVCs. The depleted Herb-rich Foothill Forest is widespread. The vulnerable Valley Grassy Forest is also common.

Hanging Rock Recreation Reserve (88 hectares)

Managed by MRSC. Hanging Rock formed 6 million years ago and is a unique rock type found nowhere else in Australia (siliqua rich soda trachyte). It plays an important role in landscape connectivity being a relatively large remnant between two larger core areas of bush – the Macedon Ranges and Cobaw Ranges. A Management Plan was developed in 1993. Three distinct woodland vegetation types – including a Snow Gum and Candlebark Woodland on the peak and a high quality area of native grassland. Fauna includes Greater Gliders, Sugar Gliders and a range of bird species. The MRSC, Friends of Hanging Rock and local Landcare groups undertake conservation work on the reserve.

Woodend Racecourse Reserve (9 hectares)

Very high conservation values. Only intact example of native grasslands that dominated the plains to the north and south of Woodend. Kangaroo and Wallaby Grass dominate with 70 flora species. Managed by MRSC. A management plan was developed in 2000. Ecological burns have been undertaken and the area has been fenced to protect from trail bikes. Weed invasion is an ongoing issue.

Mount Charlie Flora Reserve (319 ha)

Contains a large area of Lowland Forest which is listed as least concern but is regionally significant as it is not common in the region.

Cobaw Bushland Reserve (57 hectares)

A remnant of the Endangered Grassy Woodland occurs in the reserve and adjoining private land.

Conglomerate Gully Flora Reserve (85 hectares)

Contains area of the vulnerable EVC Valley Grassy Forest and Heathy Dry Forest.

T-Hill Flora Reserve (50 hectares)

Contains Lowland Forest, Heathy Dry Forest and Valley Grassy Forest.

Barringo Bushland and Recreation Reserve (20 hectares)
Managed by MRSC. Contains Heathy Dry Forest and the vulnerable Valley Grassy Forest. The Recreation Reserve contains the Grass Tree Conservation Area. Connects to Mount Robertson and provides a link from Conglomerate Gully to the Macedon Regional Park.

Key Areas on Private Land

Mount Teneriffe Trust for Nature Sanctuary (65 hectares)
Contains Heathy Dry Forest and Lowland Forest.

Mount Robertson (60 hectares)
Contains Heathy Dry Forest. Links Conglomerate Gully and Barrm Birrm to Barringo and the Macedon Regional Park.

Barrm Birrm, Riddells Creek (120 hectares),
Private land being considered for purchase as a nature reserve. Contains Heathy Dry Forest and Grassy Dry Forest. Widely recognised for high conservation values. Contains 208 plant species, including an entirely new plant variety, Hairy-leaved Trigger Plant *(Stylidium armeria* var. nov. Riddells Creek) that has been recently found on site. Noted for the quality of the vegetation. Connects with Conglomerate Gully Flora Reserve.

Black Gum Remnants and Isolated Trees
Black Gum is endangered at a state level. In Victoria it only occurs in the Macedon Ranges and is limited to the Five Mile Creek floodplain, Slatey Creek and a tributary of the Campaspe. The Slatey Creek population has very high conservation values as it is in a relatively undisturbed area. Along Five Mile Creek Black Gum often remain as isolated trees. Identified by MRSC as a key species and protected in a Vegetation Overlay. Revegetation works have been undertaken.

The creation of a new National Park containing the Lerderderg State Park and Macedon Ranges Regional Park has been promoted by some sections of the community and is supported by the Macedon Ranges Shire Council.

Landscape Connectivity

Moderate to Very High - The Local Area has very high connectivity in the south but is fragmented in the north. A number of biolink projects have been implemented in the area.

Riddells Creek Wildlife Corridor
The Riddells Creek Landcare is also in the planning stage of establishing two smaller wildlife corridors.

1. Conglomerate Gully Reserve to Macedon State Park via Barringo Reserve, including Mt Robertson. This involves four private properties to the north and NW of Conglomerate Gully Reserve.
2. Conglomerate Gully Reserve to the southern-most tip of the Macedon Range, ending at the Riddells Creek water body. This involves four private properties. Barrm Birrm would adjoin this wildlife corridor and become a significant addition to it. Trust for Nature covenants would be placed on some of the properties.

Cobaw-Macedon Ranges Biolink
The Cobaw Range contains a large area of native vegetation but is relatively isolated. Strengthening connectivity between the Cobaw and Macedon Ranges is a high priority. A Cobaw Biolink Policy Area has been created under the MRSC Planning Scheme. In the policy area, a range of planning measures have been implemented to reduce further fragmentation of habitat. Sympathetic subdivision can occur providing existing native vegetation is protected and revegetation that contributes to biolink is undertaken. Areas of public land that could be enhanced as part of the biolink include the:

- Hanging Rock Recreation Reserve
- The Twin Bridges Bushland Reserve (8.25 ha.) and public land water frontage (30 ha.) along Deep Creek is as a linear riparian corridor.
- Various smaller parcel of public land occur along the Coliban River including the Coliban River Scenic Reserve (25 ha) and the three small Coliban River Bushland Reserves that range from 1.5-3ha.

EVCs on private land that could be enhanced as part of the biolink include:
- Scoria Cone Woodland on the 'Jim Jim' north-west of Newham
- Plains Grassy Woodland very small area north east of Brock Monument
- Plains Grassy Woodland and Grassy Woodland around Pipers Creek and north-west of the Cobaw Ranges

Map 9.4.3: Macedon Ranges Shire Council Cobaw Biolink Policy Area

Key Recommendations

- The State government initiate an investigation of the Central Victorian Uplands bioregion to determine a more comprehensive, adequate and representative reserve system as recommended by VEAC. As part of this investigation VEAC should consider the addition of the Lancefield (Cobaw) State Forest to the conservation reserve system and the creation of a National Park that includes the current Lerderderg State Park, Macedon Regional Park and other public land.
- Parks Victoria invest greater resources to manage the Macedon Ranges Regional Park and other reserves.
- DSE, CMA's and Councils should ensure that further native vegetation loss and degradation on private land is minimised.
- Native vegetation on roadsides and riparian areas should be protected and where appropriate enhanced.
- Threatened vegetation types should be protected and enhanced. See Bioregional Conservation Significance Map on page 44 (red and orange coloured areas are the highest priority).
- The State government should provide funding for the purchase of Barrm Birrm in Riddells Creek so the area can be managed as a conservation reserve.
- The Macedon Ranges Shire Council should significantly increase investment in natural resource management.

9.5 Lerderderg Local Area.

Located in the Central Victorian Uplands. The Lerderderg Local Area is composed entirely of the Lerderderg State Park. The park has two separate sections - the western Lerderderg section and the eastern Pyrete section. The area has very high conservation values as reflected by its state park status. The park is 20,184 hectares. A list of native flora and fauna in the Lerderderg Local Area is provided in Appendix One.

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The Lerderderg State Park Local Area at a Glance

Flora	Fauna
• 448 indigenous plants have been recorded, including 31 species of native orchids • 21 threatened flora species • 85 serious weeds listed **EVCs** 9 EVC's including 4 Threatened EVCs	• 176 fauna species • 19 threatened fauna species (4 mammals, 11 birds, 2 reptiles and 2 frogs) • 163 bird species • 29 mammals, including 10 bat species • 23 reptile species, including 6 snakes, 11 skinks, 3 dragons and Lace Goanna • 9 frog species

Pre 1750 and Current Vegetation

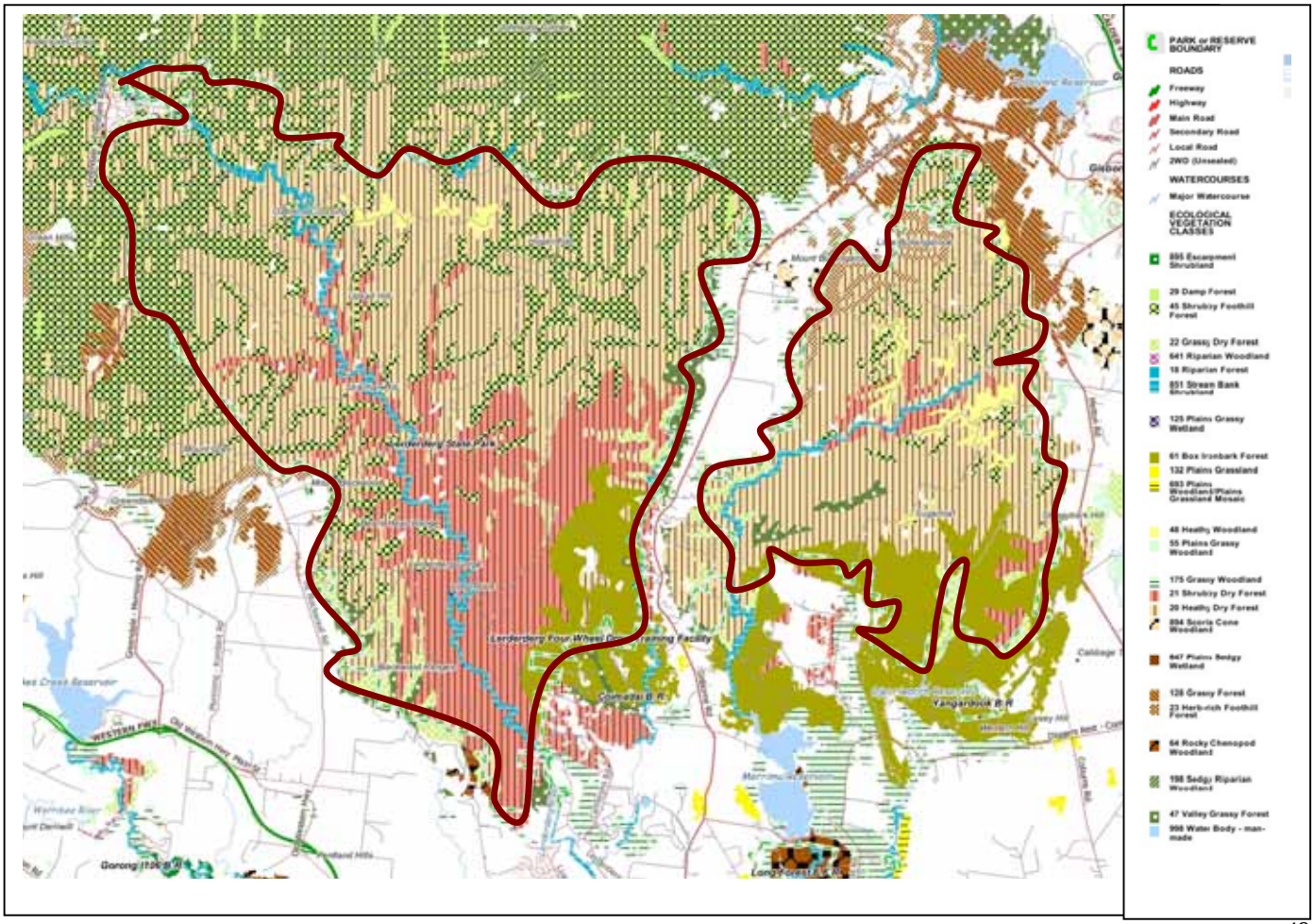
Heathy Dry Forest was the dominant EVC in the north with Shrubby Foothill Forest occurring on more sheltered sites. Scrubby Dry Forest was dominant in south with areas of Box-Ironbark Forest in the south-west. Scattered areas of Heathy Dry Woodland and Valley Grassy Forest also occur. Riparian EVC's included Riparian Forest in the north changing to Streambank Shrubland in the south.

Threatened EVCs

Four of the nine EVCs in the Lerderderg Local Area have a bioregional conservation status of endangered, vulnerable or depleted (Shrubby Foothill Forest and Heathy Dry Forest are least concern).

Endangered	Vulnerable	Depleted
Streambank Shrubland	Riparian Forest Valley Grassy Forest	Heathy Woodland

Map 9.5.1: Current Vegetation (EVCs) of the Lerderderg Local Area (Source: DSE Geospatial Data)



Threatened Flora and Fauna

Twenty-one flora species in the Lerderderg Local Area are listed as rare, vulnerable or threatened at a State or National level.

Monocotyledons

	r	*Austrostipa breviglumis*	Cane Spear-grass	Lerderderg State Park
	r	*Austrostipa exilis*	Heath Spear-grass	Lerderderg State Park
	r	*Gahnia microstachya*	Slender Saw-sedge	Lerderderg State Park
FFG	e	*Pterostylis truncata*	Brittle Greenhood	Private Land

Dicotyledons

	r	*Acacia aspera subsp. parviceps*	Rough Wattle	Various
FFG	f	*Allocasuarina luehmannii*	Buloke	Various
	r	*Bossiaea cordigera*	Wiry Bossiaea	Lerderderg State Park
	k	*Desmodium varians*	Slender Tick-trefoil	
	r	*Grevillea repens*	Creeping Grevillea	Lerderderg State Park
	r	*Leucopogon microphyllus var. pilibundus*	Hairy Beard-heath	Lerderderg State Park
	r	*Nicotiana suaveolens*	Austral Tobacco	Various
	r	*Poranthera corymbosa*	Clustered Poranthera	Lerderderg State Park
	r	*Prostanthera decussata*	Dense Mint-bush	Lerderderg State Park
	r	*Prostanthera nivea var. nivea*	Snowy Mint-bush	
	r	*Prostanthera saxicola var. bracteolata*	Slender Mint-bush	Lerderderg State Park
	r	*Pseudanthus orbicularis*	Tangled Pseudanthus	
	r	*Pultenaea reflexifolia*	Wombat Bush-pea	Lerderderg State Park
	r	*Pultenaea weindorferi*	Swamp Bush-pea	Lerderderg State Park
	r	*Rhagodia parabolica*	Fragrant Saltbush	Various
	r	*Tetratheca stenocarpa*	Long Pink-bells	Lerderderg State Park
	r	*Westringia glabra*	Violet Westringia	

Nineteen fauna species in the Lerderderg Local Area are listed as rare, vulnerable or threatened at a State or National level.

Mammals				
	f	v	*Brush-tailed Phascogale*	Phascogale tapoatafa
	f		*Common Bent-wing Bat*	Miniopterus schreibersii (group)
		v	*Common Dunnart*	Sminthopsis murina
		n	*Eastern Pygmy-possum*	Cercartetus nanus
Birds				
		n	*Azure Kingfisher*	Alcedo azurea
	f	e	*Barking Owl*	Ninox connivens
		n	*Black-eared Cuckoo*	Chrysococcyx osculans
		n	*Black-chinned Honeyeater*	Melithreptus gularis
		n	*Brown Treecreeper (south-eastern ssp.)*	Climacteris picumnus victoriae
	f	v	*Chestnut-rumped Heathwren*	Calamanthus pyrrhopygius
	f	v	*Diamond Firetail*	Stagonopleura guttata
	f	n	*Hooded Robin*	Melanodryas cucullata
	f	v	*Powerful Owl*	Ninox strenua
		n	*Spotted Quail-thrush*	Cinclosoma punctatum
	f	v	*Square-tailed Kite*	Lophoictinia isura
Reptiles				
		d	*Bearded Dragon*	Pogona barbata
		v	*Lace Goanna*	Varanus varius
Frogs				
	f	e	*Brown Toadlet*	Pseudophryne bibronii
	f	V e	*Growling Grass Frog*	Litoria raniformis

Listed under national EPBC Act (C = critically endangered, E = endangered, V = vulnerable, R = rare). Victorian Rare or Threatened (VROT) c = critically endangered, e = endangered, v = vulnerable, n = near threatened, k = poorly known. Listed under Flora and Fauna Guarantee Act = f. Data From: Flora Information System, Viridans - 2009 - © Viridans Biological Databases

Key Potentially Threatening Processes

- Fuel reduction burning
- Pest plants and animals
- Recreation

Landscape Connectivity

Very High - The Lerderderg Local Area is a large core area of native vegetation that is contiguous with the larger Wombat State Forest in the north and west. In the north west the area has good connectivity with the Macedon Ranges Regional Park. To the south good connectivity occurs with Long Forest Flora and Fauna Reserve. Connectivity to the south west is poorer with largely cleared private land between the Lerderderg State Park and smaller Werribee Gorge State Park. The need and practicality of building linkages to the relatively isolated Werribee Gorge State Park should be investigated. Building greater linkages between the two main sections of the Park should also be investigated, although the traffic volumes on the Gisborne Road present a barrier.

Key Recommendations

- Parks Victoria invest greater resources to manage threatening processes in the State Park.

9.6 Myrniong Local Area.

The Myrniong Local Area is largely cleared. However very significant areas of native vegetation remain, especially the Werribee Gorge State Park, Long Forest Flora and Fauna Reserve and abutting the Djerriwarrah and Merrimu Reservoirs. A list of native flora and fauna in the Myrniong Local Area is provided in Appendix One.

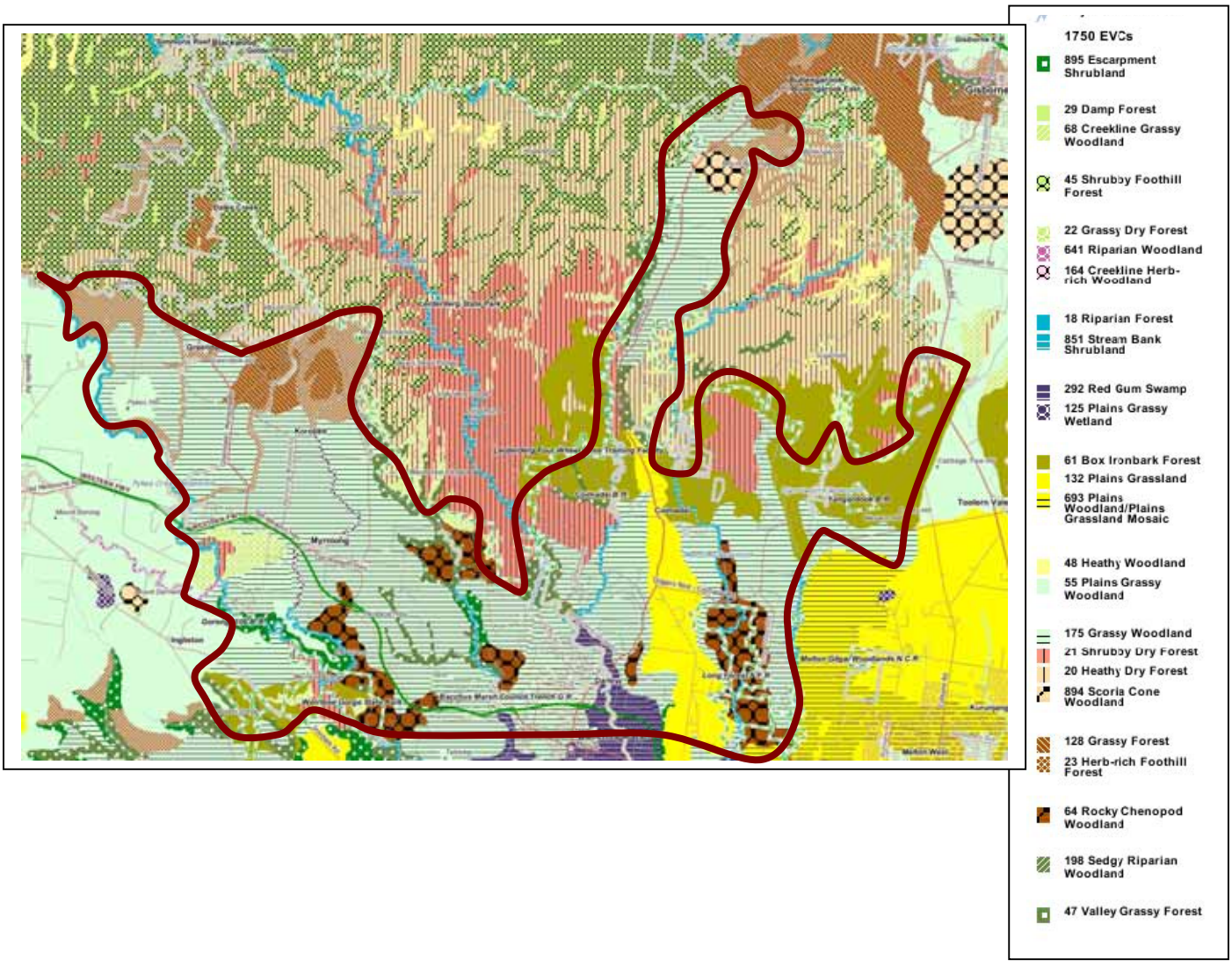
The Myrniong Local Area at a Glance

Flora	Fauna
• 300 indigenous plants have been recorded, including 18 species of chenopod associated with Mallee vegetation in Long Forest • 17 threatened flora species • 98 serious weeds listed **EVCs** 15 EVC's including 12 Threatened EVCs	• 251 fauna species • 37 threatened fauna species (5 mammals, 27 birds, 2 reptiles and 3 frogs) • 163 bird species • 28 mammals, including 10 bat species • 20 reptile species, including 2 dragons, 6 snakes and 9 species of skink and Lace Goanna

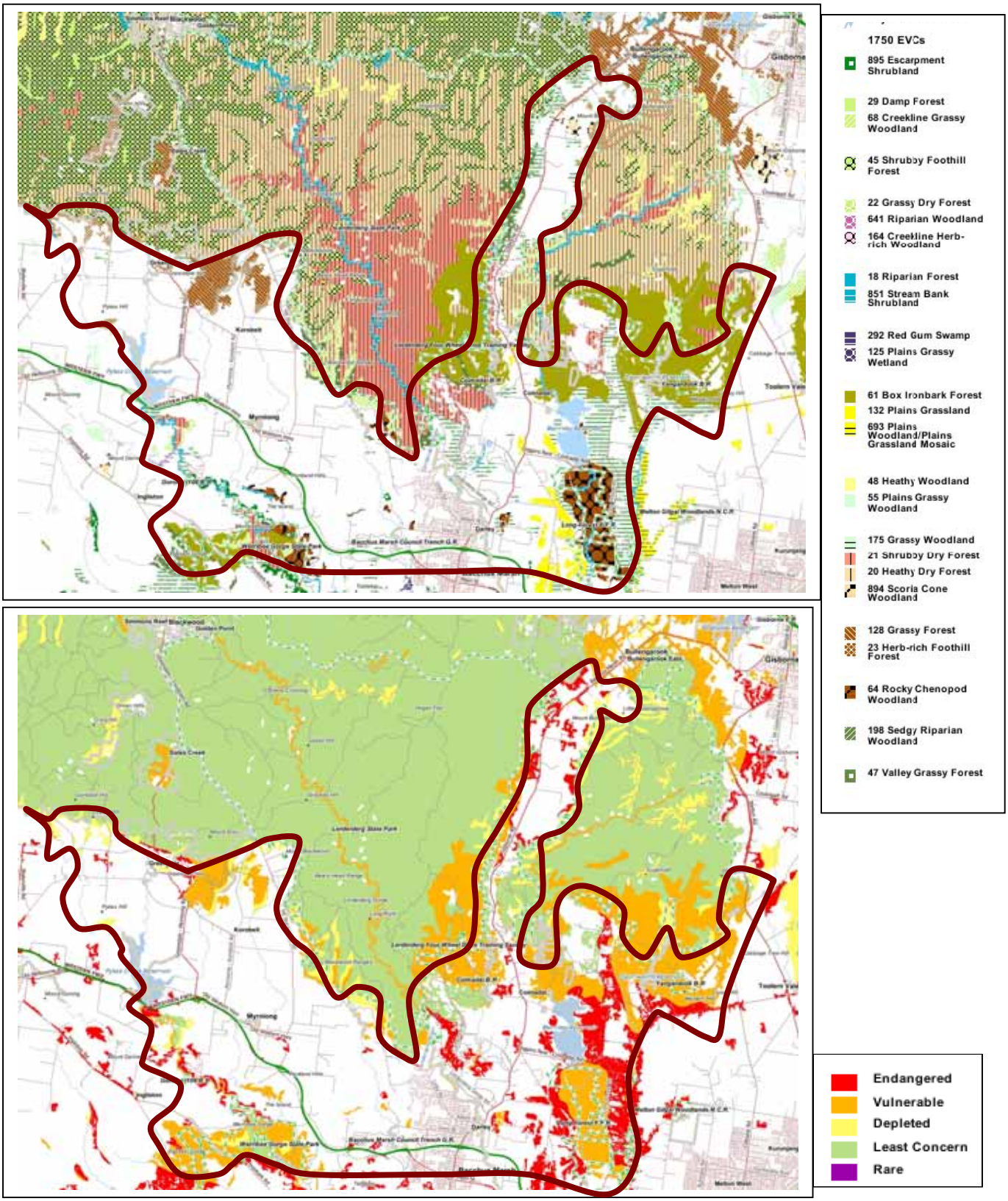
Pre 1750 Vegetation

Grassy Woodland was the most common EVC and occurred on flatter areas and lower valleys. Plains Grassland also occurred west of Bacchus Marsh. A range of other EVCs are associated with the Werribee Gorge. These include Rocky Chenopod Woodland, Escarpment Shrubland and Box-Ironbark Forest. Streambank Shrubland and Red Gum Swamp occurred along creeks and wetlands areas. Rocky Chenopod Woodland was found in the Long Forest area, and Box-Ironbark Forest and Shrubby Dry Forest were found in the drier, less fertile areas in the east of the Local Area. Small areas of Grassy Forest, Herb-rich Foothill Forest and Valley Grassy Forest occurred south-west of the Lerderderg State Park.

Map 9.6.1: Pre-1750 Vegetation (EVCs) of the Myrniong Local Area (Source: DSE Geospatial Data)



Map 9.6.2: Current EVCs (top map) and their Bioregional Conservation Status (lower map) in the Myrniong Local Area (Source: DSE Geospatial Data)



Current Vegetation

Clearing of native vegetation has occurred on private land in the Local Area. Grassy Woodland was the most common but has been extensively cleared and very little remains. Plains Grassland also occurred west of Bacchus Marsh and has also been extensively cleared. Other widely cleared EVCs include Herb-rich Foothill Forest, Valley Grassy Forest, Plains Grassy Woodland, Grassy Woodland and Creekline Herb-rich Woodland.

Threatened EVCs

Twelve EVCs in the Myrniong Local Area have a bioregional conservation status of endangered, vulnerable or depleted.

Endangered	Vulnerable	Depleted
Grassy Woodland	Valley Grassy Forest	Grassy Dry Forest
Plains Grassland	Rocky Chenopod Woodland	Herb-rich Foothill Forest
Plains Grassy Woodland	Box-Ironbark Forest	Grassy Forest
Escarpment Shrubland		
Streambank Shrubland		
Red Gum Swamp		

Threatened Flora

Sixteen flora species in the Landscape Zone are listed as rare, vulnerable or threatened at a State or National level.

Monocotyledons

	FFG	e	*Pterostylis truncata*	Brittle Greenhood
		r	*Austrostipa breviglumis*	Cane Spear-grass
		r	*Austrostipa exilis*	Heath Spear-grass
		r	*Poa amplexicaulis*	Red-sheath Tussock-grass

Dicotyledons

	FFG	r	*Allocasuarina luehmannii*	Buloke
		r	*Rhagodia parabolica*	Fragrant Saltbush
		k	*Sclerolaena muricata var. muricata*	Black Roly-poly
		r	*Goodia medicaginea*	Western Golden-tip
		r	*Acacia aspera subsp. parviceps*	Rough Wattle
		v	*Eucalyptus leucoxylon subsp. connata*	Melbourne Yellow-gum
		r	*Eucalyptus yarraensis*	Yarra Gum
		r	*Grevillea steiglitziana*	Brisbane Range Grevillea
		r	*Nicotiana suaveolens*	Austral Tobacco
		r	*Pimelea hewardiana*	Forked Rice-flower
C	FFG	e	*Pimelea spinescens*	Spiny Rice-flower
C		e	*Pimelea spinescens subsp. spinescens*	Spiny Rice-flower

Listed under national EPBC Act (C = critically endangered, E = endangered, V = vulnerable, R = rare). Victorian Rare or Threatened (VROT) c = critically endangered, e = endangered, v = vulnerable, n = near threatened, k = poorly known. Listed under Flora and Fauna Guarantee Act = FFG. Data From: Flora Information System, Viridans - 2009 - © Viridans Biological Databases

Threatened Fauna

Thirty-seven fauna species in the Landscape Zone are listed as rare, vulnerable or threatened at a State or National level.

Birds

	n	*Spotted Harrier*	Circus assimilis
f	*v*	*White-bellied Sea-Eagle*	Haliaeetus leucogaster
	v	*Australasian Shoveler*	Anas rhynchotis
f	*e*	*Blue-billed Duck*	Oxyura australis
f	*e*	*Freckled Duck*	Stictonetta naevosa
	v	*Hardhead*	Aythya australis
	v	*Musk Duck*	Biziura lobata
f	*v*	*Eastern Great Egret*	Ardea modesta
	n	*Nankeen Night Heron*	Nycticorax caledonicus
	n	*Brown Treecreeper (south-eastern ssp.)*	Climacteris picumnus victoriae
	n	*Black-eared Cuckoo*	Chrysococcyx osculans
	v	*Black Falcon*	Falco subniger
f	*n*	*Caspian Tern*	Hydroprogne caspia
f	*e*	*Gull-billed Tern*	Gelochelidon nilotica
	n	*Black-chinned Honeyeater*	Melithreptus gularis
f	*n*	*Crested Bellbird*	Oreoica gutturalis
f	*v*	*Chestnut-rumped Heathwren*	Calamanthus pyrrhopygius
f	*v*	*Speckled Warbler*	Pyrrholaemus sagittatus
f	*v*	*Diamond Firetail*	Stagonopleura guttata
f	*n*	*Hooded Robin*	Melanodryas cucullata
	n	*Pied Cormorant*	Phalacrocorax varius
f	*E e*	*Swift Parrot*	Lathamus discolor
	n	*Latham's Snipe*	Gallinago hardwickii
f	*e*	*Barking Owl*	Ninox connivens
f	*v*	*Powerful Owl*	Ninox strenua
	n	*Glossy Ibis*	Plegadis falcinellus
	v	*Royal Spoonbill*	Platalea regia

Mammals			
		Eastern Pygmy-possum	Cercartetus nanus
	f	*Brush-tailed Phascogale*	Phascogale tapoatafa
		Common Dunnart	Sminthopsis murina
	f E c	*Eastern Barred Bandicoot*	Perameles gunnii
	f V v	*Grey-headed Flying-fox*	Pteropus poliocephalus
Reptiles			
		Bearded Dragon	Pogona barbata
		Lace Goanna	Varanus varius
Frogs			
	f V e	*Growling Grass Frog*	Litoria raniformis
	f	*Brown Toadlet*	Pseudophryne bibronii
		Southern Toadlet	Pseudophryne semimarmorata

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Key Potentially Threatening Processes

- Clearing
- Fragmentation of habitat
- Fuel reduction burning
- Pest plants and animals
- Recreation
- Rural Subdivision
- Grazing
- Firewood Collection

Key Areas

Werribee Gorge State Park (575 hectares)
Contains a range of threatened flora, fauna and EVCs.

Long Forest Flora and Fauna Reserve (491 hectares)
Contains a disjunct occurrence of Rocky Chenopod Woodland a vegetation type more associated with the Mallee. The high degree of public/private land interface creates additional management problems in the reserve. Weed control is urgently required in many areas of the reserve.

Landscape Connectivity

High – Despite being heavily cleared the Myrniong Local Area has high connectivity. It is adjacent to large core areas of native vegetation in the Lerderderg State Park and Wombat State Forest. Extensive areas of vegetation in the east of the Local area also provide good connectivity through the Long Forest Flora and Fauna Reserve, Djerriwarrah Reservoir and Merrimu Reservoir. Linkages between the Werribee Gorge and Lerderderg State Park and Wombat State Forest could be enhanced by restoration and enhancement of native vegetation on private land, riparian areas and roadside vegetation. Connectivity to the south is poorer with largely cleared private land between the Local Area and the Brisbane Ranges.

Building greater linkages between the two main sections of the Lerderderg State Park should also be investigated, although traffic volumes on the Gisborne Road do present a barrier.

A community group Grow West has already commenced habitat links between the Wombat State Forest, Werribee Gorge State Park and Brisbane National Park. The group has undertaken large-scale revegetation projects in the Myrniong and Ingliston area, and is also engaged in reducing erosion and sediment discharge into waterways and reservoirs.

Key Recommendations

- Parks Victoria invest greater resources to manage threatening processes in the Werribee Gorge State Park, Long Forest Flora and Fauna Reserve and other reserves they manage.
- Ensure further native vegetation loss and degradation on private land is minimised.
- Protect and enhance vegetation on roadsides and riparian areas.
- Protect and enhance threatened vegetation types. See Bioregional Conservation Significance Map on page 52 with red and orange coloured areas the highest priority.

9.7 Moorabool Local Area

The Moorabool Local Area is mostly private land. The predominant land use is agriculture. The area has been largely cleared area. Native vegetation is highly fragmented except on the western boundary with the Wombat State Forest and to south of the Wombat State where vegetation cover is higher on private land. A list of native flora and fauna in the Moorabool Local Area is provided in Appendix One.

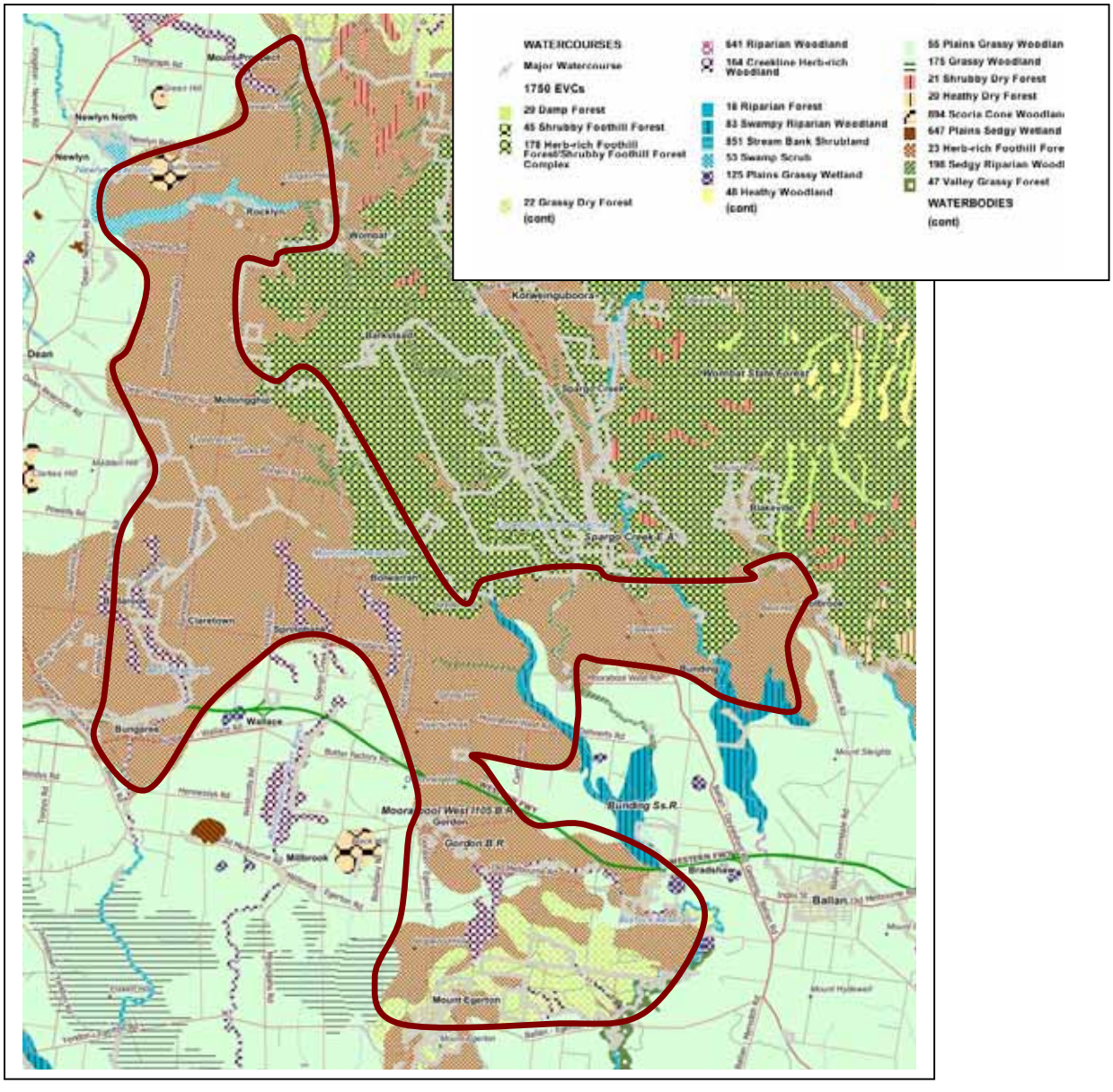
The Moorabool Local Area at a Glance

Flora	Fauna
• 228 indigenous plants recorded • 3 threatened flora species • 77 serious weeds listed **EVCs** 9 EVC's all of which are Threatened EVCs	• 136 fauna species • 16 threatened fauna species (1 mammal, 15 birds) • 114 bird species • 14 mammals • 3 reptiles • 5 frogs

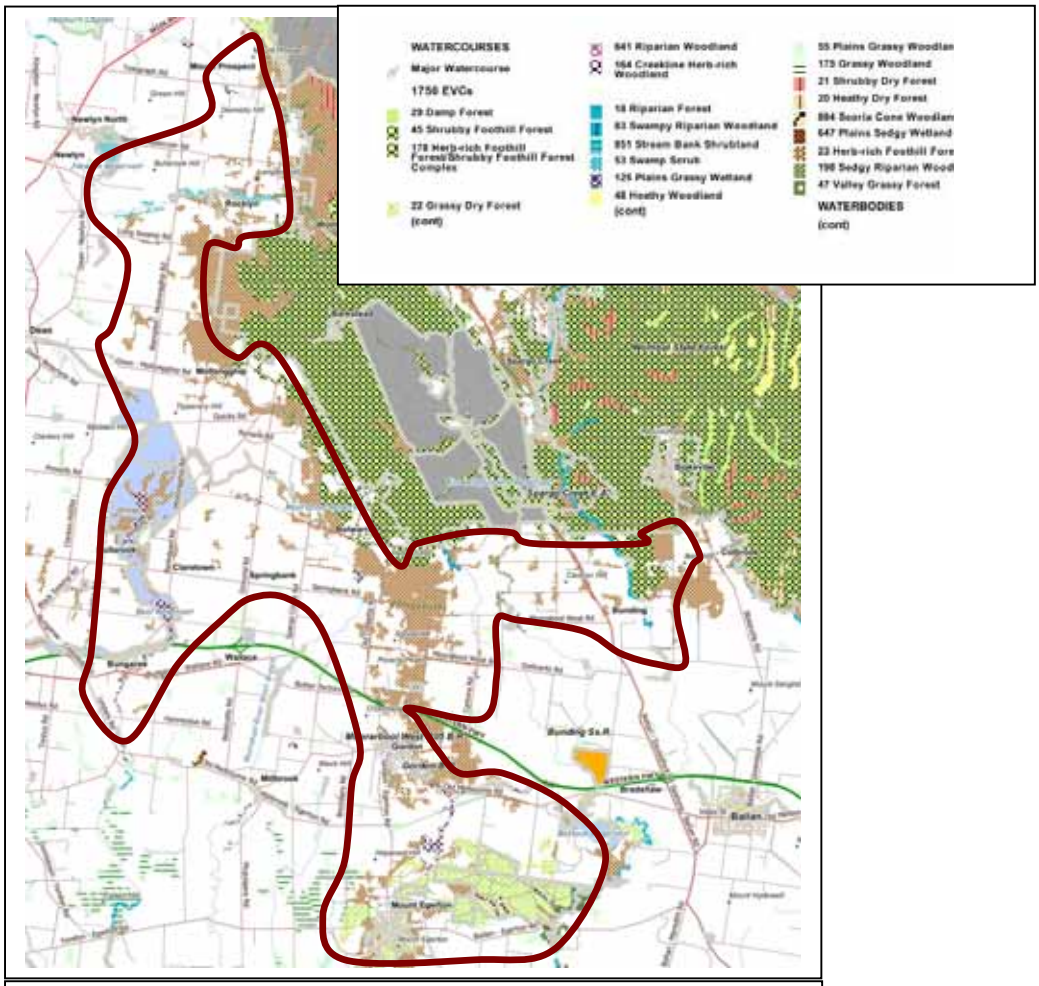
Pre 1750 Vegetation

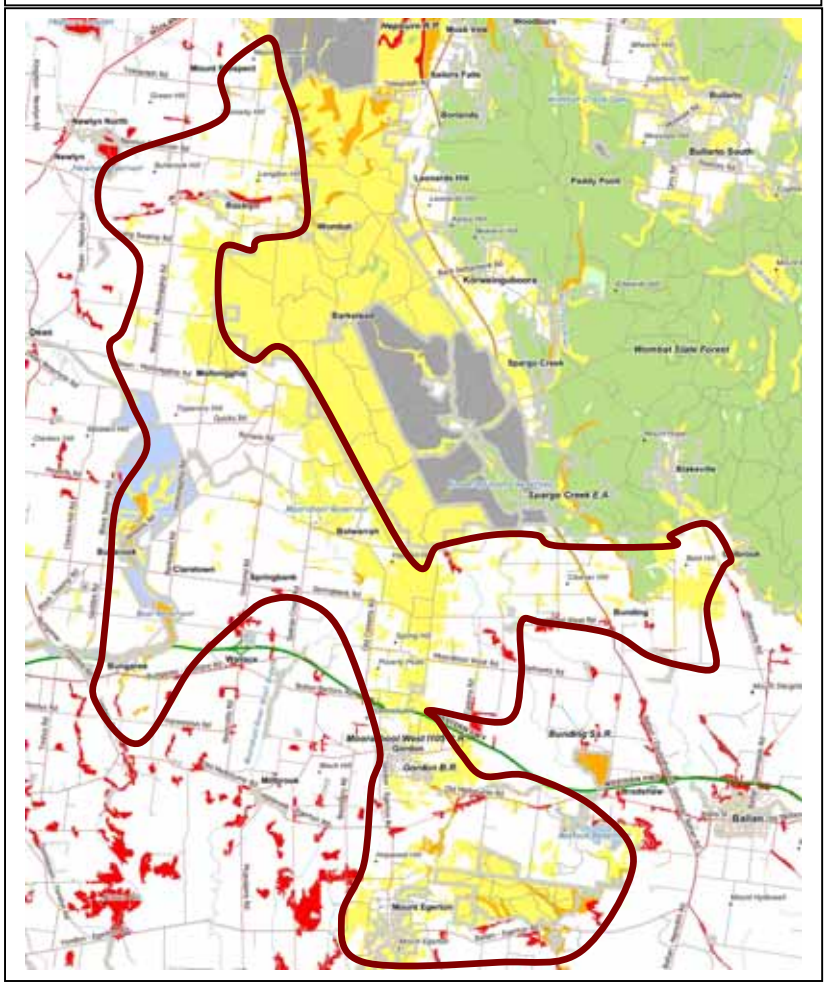
Nine EVCs occurred in the Moorabool Local Area. Herb-rich Foothill Forest was very widespread but has been extensively cleared and very little remains. It occurred on the fertile plains and lower valleys. Herb-rich Foothill Forest/Shrubby Foothill Forest Complex was found in the west of the area. Grassy Dry Forest and Valley Grassy Forest was found in the Mt Edgerton area. A small area of Scoria Cone Woodland occurred on Bullarook Hill. Creekline Herb-rich Woodland, Sedgy Riparian Woodland, Swampy Riparian Woodland and Swamp Scrub occurred in riparian areas.

Map 9.7.1: Pre-1750 Vegetation (EVCs) of the Moorabool Local Area (Source: DSE Geospatial Data)



Map 9.7.2: Current EVCs (top map) and their Bioregional Conservation Status (lower map) in the Moorabool Local Area (Source: DSE Geospatial Data)





Current Vegetation

Clearing of native vegetation has occurred very extensively on private land in the Local Area. The formerly extensive Herb-rich Foothill Forest was very widely cleared. Plains Grassy Woodland and Creekline Herb-rich Woodland have also been heavily cleared.

Threatened EVCs

All EVCs in the Moorabool Local area are threatened.

Endangered	Vulnerable	Depleted
Swampy Riparian Woodland Scoria Cone Woodland Swamp Scrub	Herb-rich Foothill Forest/Shrubby Foothill Forest Complex Valley Grassy Forest Creekline Herb-rich Woodland	Sedgy Riparian Woodland Grassy Dry Forest Herb-rich Foothill Forest

Threatened Flora and Fauna

Three flora species are listed as rare, vulnerable or threatened at a State or National level.

		k	*Cardamine tenuifolia*	Slender Bitter-cress
E	FFG	e	*Lepidium hyssopifolium*	Basalt Peppercress
		k	*Desmodium varians*	Slender Tick-trefoil

Sixteen fauna species are listed as rare, vulnerable or threatened at a State or National level.

Mammals				
	f	v	*Brush-tailed Phascogale*	Phascogale tapoatafa
Birds				
		n	*Azure Kingfisher*	Alcedo azurea
		v	*Australasian Shoveler*	Anas rhynchotis
	f	e	*Blue-billed Duck*	Oxyura australis
	f	e	*Freckled Duck*	Stictonetta naevosa
		v	*Hardhead*	Aythya australis
		v	*Musk Duck*	Biziura lobata
		n	*Brown Treecreeper (south-eastern ssp.)*	Climacteris picumnus victoriae
		n	*Black-chinned Honeyeater*	Melithreptus gularis
	f	v	*Diamond Firetail*	Stagonopleura guttata
	f	e	*King Quail*	Coturnix chinensis
	f	E e	*Swift Parrot*	Lathamus discolor
	f	e	*Barking Owl*	Ninox connivens
	f	v	*Powerful Owl*	Ninox strenua
		v	*Royal Spoonbill*	Platalea regia
	f	e	*Masked Owl*	Tyto novaehollandiae

Listed under national EPBC Act (C = critically endangered, E = endangered, V = vulnerable, R = rare). Victorian Rare or Threatened (VROT) c = critically endangered, e = endangered, v = vulnerable, n = near threatened, k = poorly known. Listed under Flora and Fauna Guarantee Act = f. Data From: Flora Information System, Viridans - 2009 - © Viridans Biological Databases

Key Areas

Ballan State Forest (456 hectares) is largely comprised of the depleted EVC Grassy Dry Forest with linear strips of the vulnerable EVC Creekline Herb-rich Woodland.

Key Potentially Threatening Processes

- Clearing
- Fragmentation of habitat
- Pest plants and animals e.g. foxes, cats and rabbits.
- Grazing
- Firewood Collection

Low to Moderate - The majority of the Moorabool Local Area has low connectivity, especially in heavily cleared parts. Areas close to the Wombat Forest and in the area between the Wombat Forest and the Ballan Forest have moderate connectivity.

Key Recommendations

- Ballan State Forest should become a Nature Conservation Reserve and resources devoted to ensure key threats and conservation values are managed appropriately. Connections to the Wombat State Forest have the potential to be enhanced.
- Ensure further native vegetation loss and degradation on private land is minimised.
- Protect and enhance vegetation on roadsides and riparian areas.
- Protect and enhance threatened vegetation types. See Bioregional Conservation Significance Map on page 56 with red and orange coloured areas the highest priority.

10. Rebuilding Landscape Connectivity and Ecosystem Resilience

The Wombat Forest/Macedon Landscape Zone has very high conservation values.

The area contains a high proportion of the remaining 'largely intact' areas in the west of the state and contributes greatly to ecological processes in the region. Over 900 indigenous plants and 290 indigenous vertebrate fauna species have been recorded in the Landscape Zone. That includes 54 flora species and 52 fauna species that are listed as threatened at a State or National level. A large number of fungi species also occur in the Landscape Zone.

Of the twenty-eight EVCs in the Landscape Zone, nine have a bioregional conservation status of endangered, seven are vulnerable, seven are depleted and four least concern.

To stem the decline and loss of biodiversity within the region, especially in the face of climate change, will involve a wide range actions at multiple geographic scales, including the rebuilding of larger-scale ecological processes. The current levels of habitat protection and revegetation are entirely insufficient to halt regional species losses, and that '*The urgency and magnitude of remedial action required is many fold greater than current practice*' (Radford et al 2005).

Where possible these actions should seek to achieve multiple benefits e.g. greenhouse abatement, river health or the provision of ecosystem services (Radford et al 2007).

10.1 Key Priorities

1. Protection

- Reservation of State Forests in conservation areas e.g. Parks and other conservation reserves.
- Statutory planning e.g. conservation-related overlays, native vegetation retention regulations.
- Covenants and management agreements for private property.
- Fencing to protect native vegetation from grazing.

2. Enhancement

- Restore habitat quality in larger forests blocks.
- Control threats e.g. altered fire regimes, grazing, weeds and pest animals.
- Promote natural regeneration via fencing and weed control.
- Undertake enhancement planting in remnants e.g. understorey.
- Revegetation to buffer and increase the size of existing remnants.

3. Restoration

- Improve landscape connectivity by the strategic development of mmultiple pathways for movement of native species.
- Preferential restoration in more fertile areas of the landscape, including riparian area.

4. Research and Monitoring

- Increase research and monitoring to understand the ecological processes that influence viability of populations and ecosystems.
- Develop long-term monitoring programs to track responses to management initiatives and provide information on changes to biodiversity over time.
- Carry out more surveys for species in the Landscape Zone for which there is little data, e.g. invertebrates and reptiles.
-

10.2 High Ecological Value 'Assets' in the Landscape Zone

- Very large areas of vegetation on public land
- Threatened vegetation types
- Riparian vegetation
- Threatened species
- Larger remnants on private land
- Areas of high vegetation/habitat quality
- Large old indigenous trees

10.3 Key Recommendations and Actions

Parks, Reserves and State Forests

Expand the Conservation Reserve System

- As recommended by VEAC the State government initiate an investigation of the Central Victorian Uplands bioregion to determine a more comprehensive, adequate and representative reserve system.
- As part of this investigation VEAC should consider the addition of the Wombat, Cobaw and Ballan State Forests to the conservation reserve system as a key way to develop a more comprehensive reserve system for the Central Victorian Uplands bioregion and meet bioregional ecosystem reserve targets.

Resourcing and Management

- Significantly increase resources for management of conservation values and ecological processes on public land, including funding for research and monitoring.
- Manage larger core areas to sustain ecological processes, especially in relation to controlling threatening processes such as fire regimes, resource extraction, invasive species and inappropriate recreation.
- Develop management plans for all public land.
- Achieve a net gain in the condition of native vegetation on public land.

Timber and Firewood Harvesting

- Logging should permanently cease in the Wombat State Forest
- In the shorter term domestic and commercial firewood collection should only occur as part or as a byproduct of management activities based on scientifically informed ecological management plans. In the medium term commercial and domestic harvesting should be phased out and the establishment of firewood plantations on private land encouraged with appropriate incentives and pricing reform.
- Regulation of domestic and commercial firewood collection should be improved.

Fire Management

- Long term research and monitoring should be increased to determine the impacts of fuel reduction burning on biodiversity, especially native fauna.
- Specific prescriptions outlining temporal and spatial burning mosaics should be developed for each EVC based on expertise from all relevant ecological, biological and zoological disciplines.
- Defined long term objectives and clear prescriptions for each Ecological Management Zone (Fire Operations Plan Zone Three).

Apiary

- An advisory body (including stakeholder participation) be established to monitor and research the impacts of introduced bees and apiary on native flora and fauna on public land.
- Provide funding to establish Eucalypt 'honey' species plantations on private land.
- Existing apiary licenses continue in any new State Parks subject to the outcomes of the above recommendations.

Other Public Land

Council Managed Public Land, including Roadside Vegetation

- Local councils and Vicroads should provide improved management and greater resources for management of native habitat and vegetation on roadsides and bushland reserves they manage.
- Where appropriate roadside vegetation should be enhanced to improve landscape connectivity.
- Planning regulations and by-laws relating to roadsides conservation should be policed and enforced.

Crown Land Water Frontages

- Domestic stock should be excluded from all Crown water frontages as recommended in the 2008 SoE report
- High conservation value and key linkage areas of Crown Stream Frontage should be identified and added to the reserve system and managed by Parks Victoria.
- Identify moderate quality Crown Land Water Frontages for conversion to Conservation Licences when licenses are due for renewal. Funding for fencing to exclude stock and undertake habitat restoration should be provided to license holders.
- Natural regeneration should be encouraged and revegetation undertaken where necessary to enhance these valuable and productive riparian areas.

Pine Plantations

- Where appropriate riparian buffers on waterways and wildlife corridors should be established in plantations

Private Land

General

- DSE and local Councils should enforce existing Native Vegetation Retention regulations, including placing a greater emphasis on avoiding the loss of existing native vegetation.
- All shires should employ a biodiversity officer to train staff, assist with planning decisions regarding native vegetation and biodiversity, and to develop and implement relevant policies and strategies to halt the loss of native vegetation on private land.
- DSE, CMA's and Councils should identify key biodiversity assets on private land e.g. threatened EVCs, threatened species, high quality remnants, vegetation with high connectivity and riparian vegetation for protection and enhancement.
- The State government should implement legislative changes to protect riparian areas on private property.
- The State government, CMA's and Councils should provide incentives for improved stewardship of riparian land on private property.
- The State government, CMA's and Councils should increase the level of financial assistance provided to land owners to ensure remnant vegetation on private land is protected and managed appropriately i.e. fencing to protect from stock, weed control, pest animal control and enhancement plantings.
- Encourage the protection of large old trees, including incentives to landowners.
- Voluntary protection agreements e.g. Trust for Nature and Land for Wildlife, should be encouraged, including through rate relief.
- Undertake education programmes regarding biodiversity conservation on private land.
- Preferentially restore more fertile parts of the landscape.

All Land Tenures

Develop a Conservation Action Plan

The development of a Conservation Action Plan by environmental groups, local councils and CMAs, would help to outline a clear vision for the Landscape Zone. The Plan should be based on informed goals that are specific, achievable and measurable, and identify a range of actions to achieve these goals and vision. Actions include outlining specific areas and priorities for on-ground actions, such as weed or pest control, fencing, enhancement planting or wildlife corridors, priority remnants for protection on private land and priority areas of public land for further protection and enhancement.

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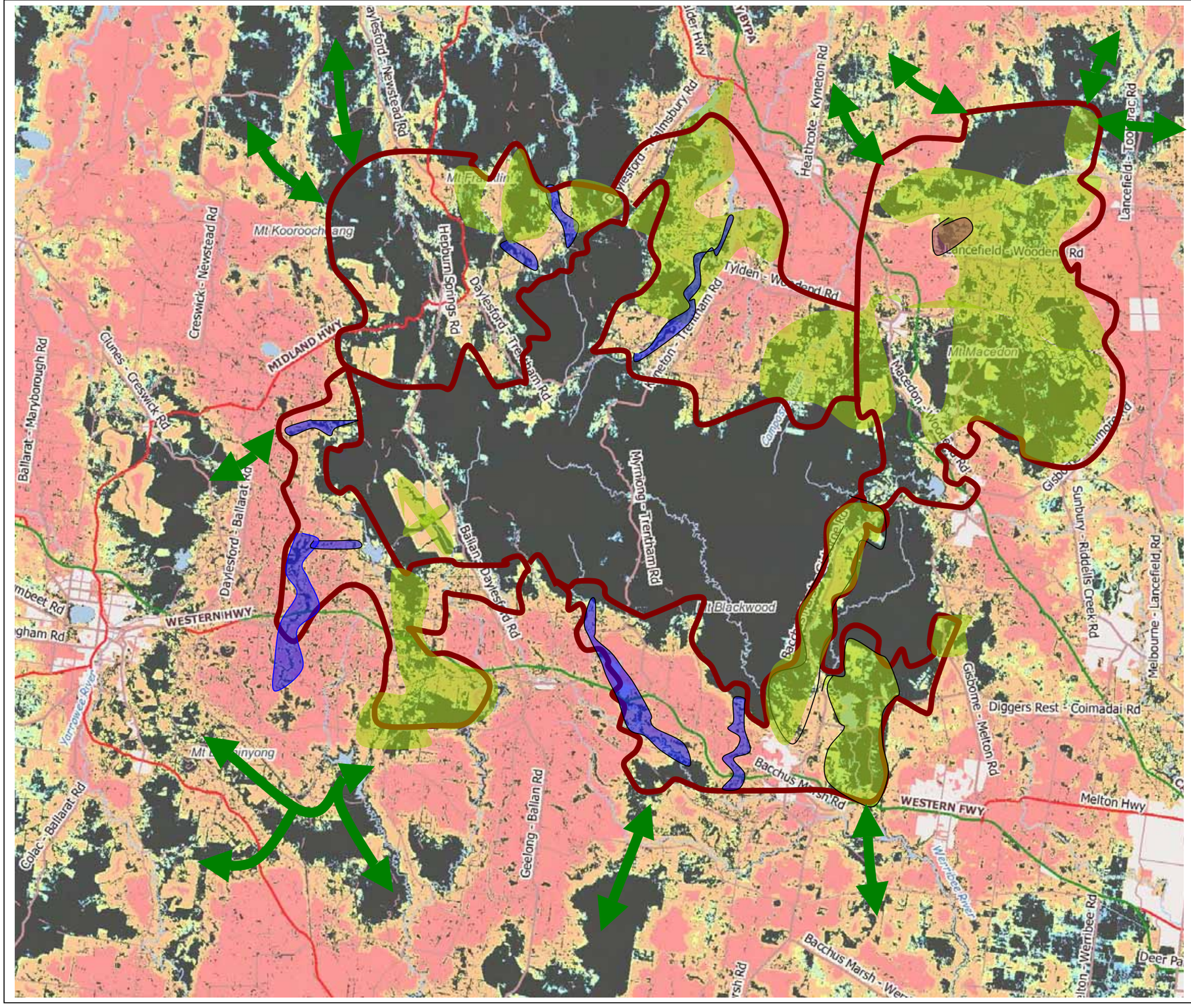
Appendix One. Serious Weed Species Recorded in the Landscape Zone

CONIFERS	
Pinaceae	
* ***Pinus radiata***	Radiata Pine
MONOCOTYLEDONS	
Alliaceae	
* ***Agapanthus praecox subsp. orientalis***	Agapanthus
Aponogetonaceae	
* ***Aponogeton distachyos***	Cape Pond-lily
Asparagaceae	
* ***Asparagus asparagoides***	Bridal Creeper
Asphodelaceae	
* ***Asphodelus fistulosus***	Onion Weed
Cyperaceae	
* ***Cyperus eragrostis***	Drain Flat-sedge
Iridaceae	
* ***Freesia alba x Freesia leichtlinii***	Freesia
* ***Romulea rosea***	Onion Grass
Juncaceae	
* ***Juncus articulatus***	Jointed Rush
* ***Juncus bulbosus***	Bulbous Rush
* ***Juncus microcephalus***	Tiny-headed Rush
Poaceae	
* ***Agrostis capillaris***	Brown-top Bent
* ***Agrostis stolonifera***	Creeping Bent
* ***Aira caryophyllea***	Silvery Hair-grass
* ***Alopecurus geniculatus***	Marsh Fox-tail
* ***Anthoxanthum odoratum***	Sweet Vernal-grass
* ***Avena fatua***	Wild Oat
* ***Briza maxima***	Large Quaking-grass
* ***Bromus catharticus***	Prairie Grass
* ***Bromus diandrus***	Great Brome
* ***Bromus rubens***	Red Brome
* ***Cortaderia selloana***	Pampas Grass
Cynodon dactylon	Couch
* ***Cynosurus echinatus***	Rough Dog's-tail
* ***Dactylis glomerata***	Cocksfoot
* ***Ehrharta calycina***	Perennial Veldt-grass
* ***Ehrharta erecta var. erecta***	Panic Veldt-grass
* ***Ehrharta longiflora***	Annual Veldt-grass
* ***Eragrostis curvula***	African Love-grass
* ***Festuca arundinacea***	Tall Fescue
* ***Holcus lanatus***	Yorkshire Fog
* ***Hordeum marinum***	Sea Barley-grass
* ***Lagurus ovatus***	Hare's-tail Grass
* ***Lolium perenne***	Perennial Rye-grass
* ***Lolium rigidum***	Wimmera Rye-grass
* ***Nassella hyalina***	Cane Needle-grass
* ***Nassella neesiana***	Chilean Needle-grass
* ***Nassella trichotoma***	Serrated Tussock
* ***Paspalum dilatatum***	Paspalum
* ***Paspalum distichum***	Water Couch
* ***Pennisetum clandestinum***	Kikuyu
* ***Pentaschistis airoides subsp. airoides***	False Hair-grass
* ***Phalaris aquatica***	Toowoomba Canary-grass
* ***Phalaris minor***	Lesser Canary-grass
* ***Phleum pratense***	Timothy Grass
* ***Poa pratensis***	Kentucky Blue-grass
* ***Polypogon monspeliensis***	Annual Beard-grass
* ***Vulpia bromoides***	Squirrel-tail Fescue
* ***Vulpia myuros***	Rat's-tail Fescue
DICOTYLEDONS	
Aceraceae	
* ***Acer pseudoplatanus***	Sycamore Maple
Aizoaceae	
* ***Galenia pubescens var. pubescens***	Galenia
Apiaceae	
* ***Conium maculatum***	Hemlock
* ***Foeniculum vulgare***	Fennel
Apocynaceae	
* ***Vinca major***	Blue Periwinkle
Aquifoliaceae	
* ***Ilex aquifolium***	English Holly
Araliaceae	
* ***Hedera helix***	English Ivy
Asteraceae	
* ***Arctotheca calendula***	Cape Weed
* ***Aster subulatus***	Aster-weed
* ***Carduus pycnocephalus***	Slender Thistle
* ***Chrysanthemoides monilifera***	Boneseed
* ***Cirsium vulgare***	Spear Thistle
* ***Conyza sumatrensis***	Tall Fleabane
* ***Cotula coronopifolia***	Water Buttons
* ***Crepis capillaris***	Smooth Hawksbeard
* ***Cynara cardunculus***	Artichoke Thistle
* ***Helminthotheca echioides***	Ox-tongue
* ***Hypochoeris glabra***	Smooth Cat's-ear
* ***Hypochoeris radicata***	Flatweed
* ***Leontodon taraxacoides subsp. taraxacoides***	Hairy Hawkbit
* ***Silybum marianum***	Variegated Thistle
* ***Sonchus asper***	Rough Sow-thistle
* ***Sonchus oleraceus***	Common Sow-thistle
* ***Vellereophyton dealbatum***	White Cudweed
Boraginaceae	
* ***Echium plantagineum***	Paterson's Curse
* ***Myosotis sylvatica***	Wood Forget-me-not
Brassicaceae	
* ***Nasturtium officinale***	Watercress
Caryophyllaceae	
* ***Stellaria media***	Chickweed
Clusiaceae	
* ***Hypericum perforatum subsp. veronense***	St John's Wort

Convolvulaceae	
**** Ipomoea indica***	Blue Morning-glory
Ericaceae	
**** Erica lusitanica***	Spanish Heath
Euphorbiaceae	
**** Euphorbia lathyris***	Caper Spurge
Fabaceae	
**** Chamaecytisus palmensis***	Tree Lucerne
**** Cytisus scoparius***	English Broom
**** Genista linifolia***	Flax-leaf Broom
**** Genista monspessulana***	Montpellier Broom
**** Lotus corniculatus***	Bird's-foot Trefoil
**** Lotus uliginosus***	Greater Bird's-foot Trefoil
**** Medicago polymorpha***	Burr Medic
**** Trifolium angustifolium var. angustifolium***	Narrow-leaf Clover
**** Trifolium arvense var. arvense***	Hare's-foot Clover
**** Trifolium campestre var. campestre***	Hop Clover
**** Trifolium dubium***	Suckling Clover
**** Trifolium glomeratum***	Cluster Clover
**** Trifolium repens var. repens***	White Clover
**** Trifolium striatum***	Knotted Clover
**** Trifolium subterraneum***	Subterranean Clover
**** Ulex europaeus***	Gorse
Gentianaceae	
**** Centaurium erythraea***	Common Centaury
**** Centaurium tenuiflorum***	Slender Centaury
Geraniaceae	
**** Erodium botrys***	Big Heron's-bill
**** Erodium cicutarium***	Common Heron's-bill
Lamiaceae	
**** Marrubium vulgare***	Horehound
**** Melissa officinalis***	Lemon Balm
**** Mentha pulegium***	Pennyroyal
**** Mentha spicata***	Spearmint
**** Salvia verbenaca***	Wild Sage
Mimosaceae	
**** Acacia baileyana***	Cootamundra Wattle
**** Acacia decurrens***	Early Black-wattle
# Acacia longifolia subsp. longifolia	Sallow Wattle
# Acacia retinodes	Wirilda
**** Paraserianthes lophantha subsp. lophantha***	Cape Wattle
Myrtaceae	
# Eucalyptus botryoides	Southern Mahogany
**** Eucalyptus cladocalyx***	Sugar Gum
Oxalidaceae	
**** Oxalis incarnata***	Pale Wood-sorrel
**** Oxalis pes-caprae***	Soursob
**** Oxalis purpurea***	Large-flower Wood-sorrel
Pittosporaceae	
**** Billardiera heterophylla***	Bluebell Creeper
# Pittosporum undulatum	Sweet Pittosporum
Polygonaceae	
**** Acetosa sagittata***	Rambling Dock
**** Acetosella vulgaris***	Sheep Sorrel
**** Rumex conglomeratus***	Clustered Dock
**** Rumex crispus***	Curled Dock
Primulaceae	
**** Anagallis arvensis***	Pimpernel
Ranunculaceae	
**** Ranunculus repens***	Creeping Buttercup
Rosaceae	
**** Cotoneaster simonsii***	Himalayan Cotoneaster
**** Crataegus monogyna***	Hawthorn
**** Prunus cerasifera***	Cherry Plum
**** Prunus laurocerasus***	Cherry Laurel
**** Rosa rubiginosa***	Sweet Briar
**** Rubus anglocandicans***	Blackberry
**** Rubus laciniatus***	Cut-leaf Bramble
**** Rubus polyanthemus***	Blackberry
**** Rubus ulmifolius***	Blackberry
Rubiaceae	
**** Galium aparine***	Cleavers
Salicaceae	
**** Salix alba***	White Willow
**** Salix cinerea***	Grey Sallow
**** Salix X rubens***	Basket Willow
Scrophulariaceae	
**** Verbascum thapsus subsp. thapsus***	Great Mullein
**** Verbascum virgatum***	Twiggy Mullein
Solanaceae	
**** Datura stramonium***	Common Thorn-apple
**** Lycium ferocissimum***	African Box-thorn
**** Solanum linnaeanum***	Apple of Sodom
**** Solanum nigrum***	Black Nightshade
**** Solanum pseudocapsicum***	Madeira Winter-cherry
Veronicaceae	
**** Plantago coronopus***	Buck's-horn Plantain
**** Plantago lanceolata***	Ribwort

Map 8.1: Potential areas to rebuild habitat connectivity in the Landscape Zone (Map Source: DSE Geospatial Data)



Legend

High Connectivity (Core) Areas
- Protect and enhance natural values and ecosystem processes
- Control or manage key threats
- Protect and enhance habitat of threatened species

Moderate Connectivity Areas
- Protect and enhance habitat of threatened species
- Protect and enhance larger remnants (greater 5ha)
- Protect large old trees
- Expand and enhance riparian vegetation

Low Connectivity Areas
- Protect and enhance habitat of threatened species
- Protect and enhance larger remnants (greater 1ha)
- Protect large old trees
- Expand and enhance riparian vegetation

Very Low Connectivity Areas
- Protect and enhance habitat of threatened species
- Protect and enhance larger remnants (greater 1ha)
- Protect large old trees
- Expand and enhance riparian vegetation

Key Biolink Areas
- Control or manage key threats
- Fencing of Remnants and Individual Trees
- Expand and enhance existing remnants
- Expand and enhance riparian vegetation
- Strategically link existing remnants
- Replace key habitat elements in remnants and strategically throughout landscape

Riparian Corridor
- Expand and enhance riparian vegetation
- Control or manage key threats

Threatened EVCs

Biolinks Outside Landscape Zone