Conservation Values
of the Wombat Forest and Macedon Region

An assessment by Wombat Forestcare

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

This publication is intended to be of assistance to all people involved in biodiversity conservation in the region. The consultant and organisations involved in the publication of this report, do not guarantee that the publication is without flaw of any kind, or that it is wholly appropriate for the particular purposes of individuals, and therefore disclaim any liability for any error, loss or other consequence that may arise from reliance on any information in this publication.

Maps generated from the DELWP Biodiversity Interactive Maps (available at www. delwp.vic.gov.au) have been extensively used in this report. These maps outline data collected over many years by the Victorian government. As they are based partly on modelling, they are subject to limitations, and may contain some inaccuracies. Despite these limitations the maps provide a very valuable source of information, and are very widely used to inform conservation and land management decisions.

The boundaries of the Wombat Forest/Macedon region and some other information have been digitally overlaid on many of the maps used in this report. Flora and fauna records have been sourced from the Victorian Biodiversity Atlas and local naturalists. It should be noted that the databases will not cover all existing species in an area.

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Wombat Forestcare acknowledges and pays its respects to Victoria's Traditional Owners within the assessment area, and their cultural connection to Country.

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Report design by Angela Halpin

Front cover photography © Sandy Scheltema

Powerful Owl *(Ninox strenua)* with Common Ringtail Possum prey
Photography © Gayle Osborne

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Part One

1. Introduction and Overview

1.1 Victorian Context

Victoria is the most cleared state in Australia with approximately half of all native vegetation lost since European settlement, mostly on private land (CES 2013). The current extent and condition of native vegetation continues to decline, especially in fragmented landscapes due to chronic degradation of habitat condition (CCMR 2012, CES 2013). Nearly 80 per cent of native vegetation in Victoria is considered to be fragmented (VEAC 2010).

Fifteen native fauna species and 51 native plant species have become extinct in Victoria during the period of European settlement (CES 2013). Currently 50 per cent of native plants and 30 per cent of native animals in Victoria are listed as extinct, rare or threatened (DEPI 2013, DEPI 2014).

The most recent Victorian State of the Environment Report concluded that *'Despite the efforts of governments, non-government organisations, communities and individuals over many decades, the health of our species and ecosystems continues to decline'* (CES 2013). The report also indicated that between 2007 and 2013, the number of species listed as rare or threatened increased and populations of these species were still declining due to ongoing habitat loss and fragmentation (CES 2013).

Evidence also suggests that the full impacts of past habitat loss and fragmentation have yet to occur, including from clearing that occurred many decades ago (VEAC 2010).

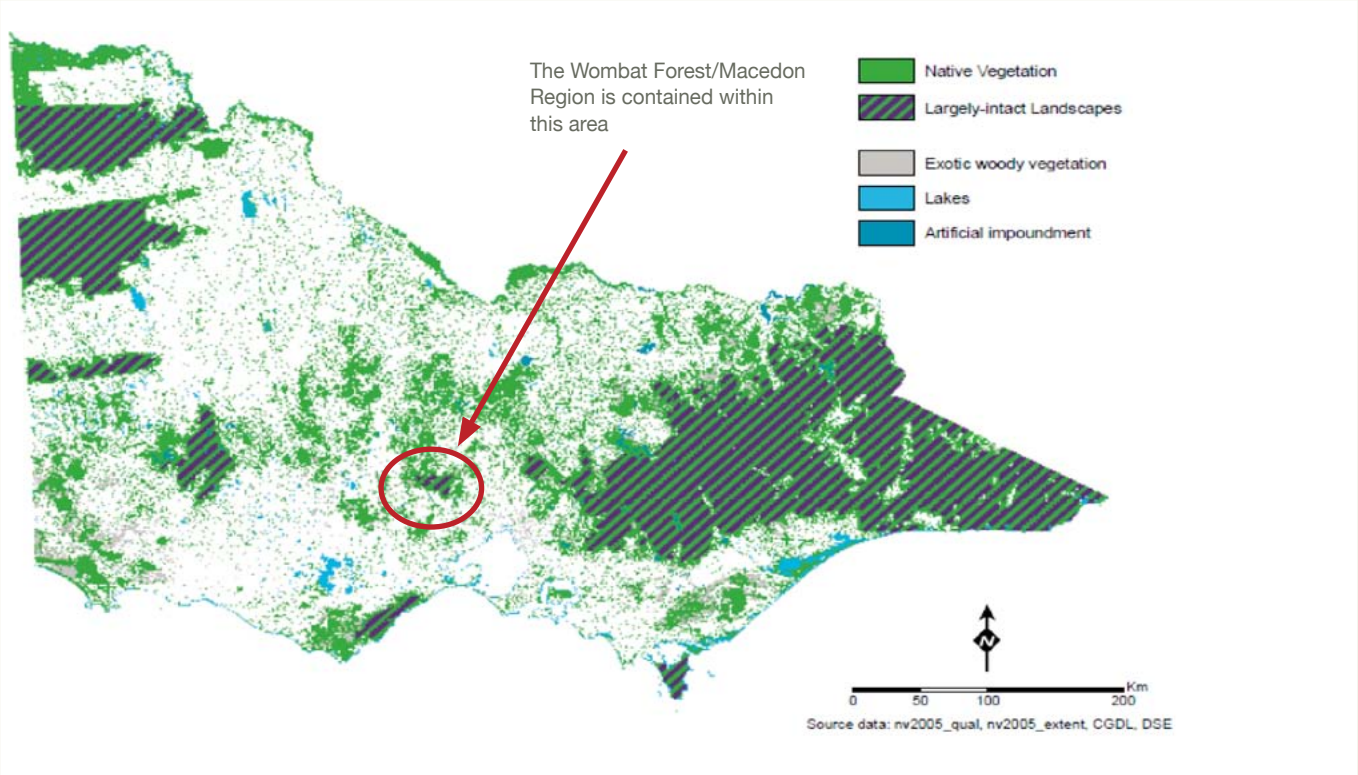
All the above combined with the looming threat of climate change means a very uncertain future for the health of Victoria's biodiversity. This is highlighted by recent research in northern Victoria that found a dramatic loss of woodland bird species over the last 15 years largely due to the impacts of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

1.2 Regional Context

Map 1.1 highlights the extensive clearance and fragmentation of native 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).

At a regional level, the most recent *Catchment Condition Management Report* also highlights declining native vegetation condition, mostly on private land, with the number of rare and threatened species increasing and existing populations declining, and river and streams in poor health (CCMR 2012). The 2012 Victorian *State of the Environment Report* also noted that significant areas of public land in the region are not currently included within the conservation reserve system (CES 2103).

Map 1.1 **Vegetation Extent and Largely Intact Areas in Victoria** (Source DSE 2008)



1.3 The Wombat Forest/Macedon Region

The Wombat Forest/Macedon Region is located in Central Victoria and is shown on Map 1.2. The region is approximately 2,100 square kilometres (approximately 55km wide on the east-west axis and 50km long on the north-south axis).

The boundaries of the Wombat Forest/Macedon Region have been selected to highlight an area of Central Victoria that has significant public land, an area of largely intact vegetation, high connectivity potential and an extensive riparian system with a number of important rivers emanating from the forested areas.

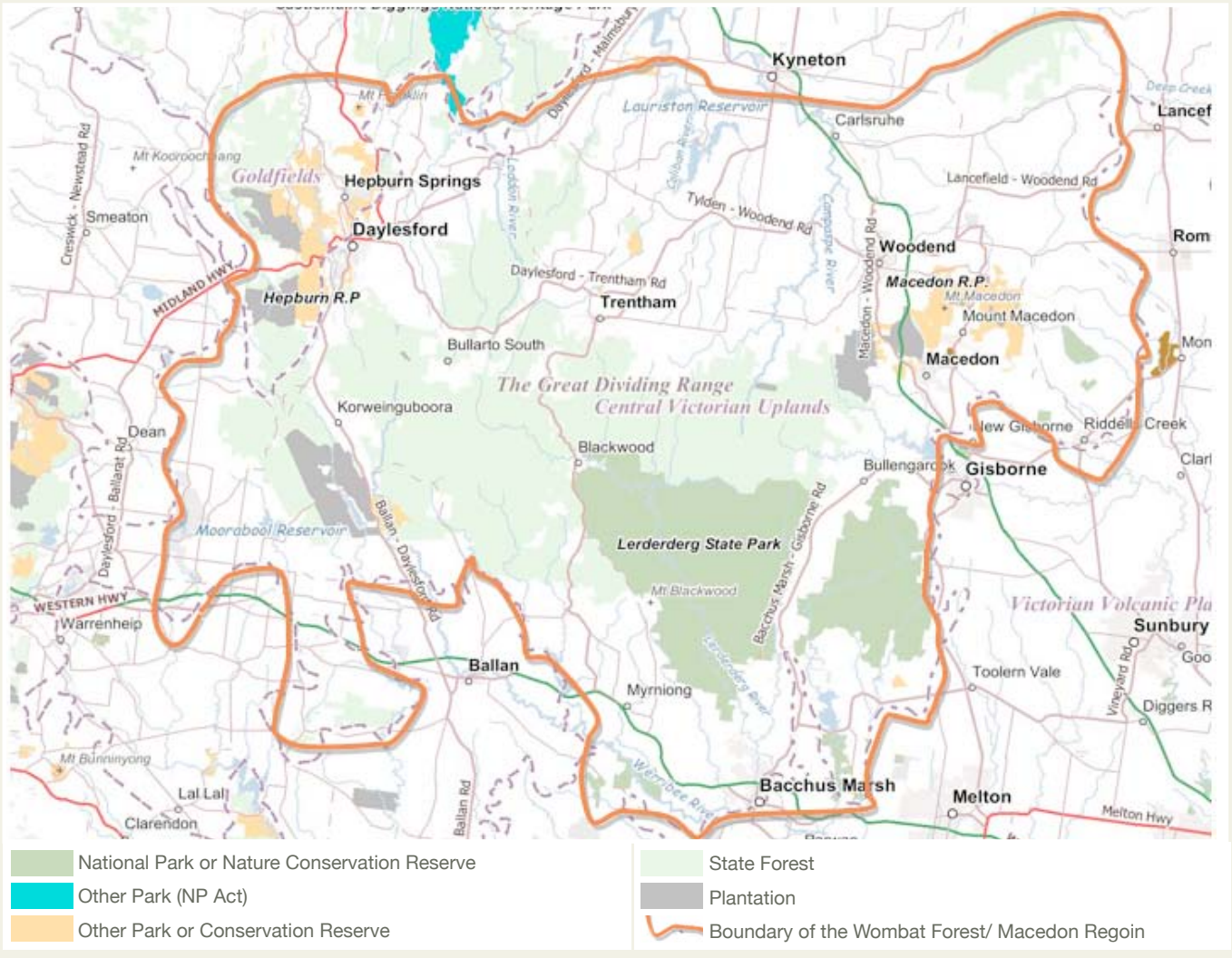
The natural environment of the region is very diverse and contains a range of landscape features. This includes the mountainous ranges of the Great Divide, steep gorges along the Lerderderg and Werribee Rivers, the headwaters of numerous rivers, volcanic eruption points at Hanging Rock and other locations, and areas of volcanic plain. Climate is temperate and annual rainfall is mostly between 600-900mm, with smaller areas above 1100mm on the Great Divide (Environment Conservation Council 1997).

The eastern, southern and western boundaries of the region reflect changes in bioregion. The north-eastern boundary reflects a change from forest to woodland vegetation types. The north-western boundary reflects a change to drier forest types. The region has been further divided into seven Local Areas (see Section 9).

The Wombat Forest/Macedon Region contains a relatively high level of native vegetation cover. This is mostly due to a high concentration of public land (approximately 35 per cent) and relatively high levels of native vegetation cover on some areas of private land, especially adjacent to public land.

The Wombat Forest/Macedon Region contains the only remaining 'largely intact' area in Central Victoria thereby playing a critical role in the maintenance of ecological processes and ecosystem resilience within the region (see Map 1.1). The Lerderderg-Wombat area was also 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'* (Land Conservation Council, Victoria 1985).

Map 1.2 **The Wombat Forest/Macedon Region** Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016



Twenty-eight different vegetation types (Ecological Vegetation Classes) have been mapped in the region. A range of dry, damp and wet forests are dominant, but areas of woodlands and small areas of grassland also occur (DSE 2011). Biological diversity is also very high with over 900 native flora and 290 native vertebrate fauna species recorded (VBA 2016). Fifty-four fauna species and fifty flora species are considered rare or threatened (VBA 2016). The damp and wet forests in the area are also renowned for their diversity of fungi (Bendigo Field Naturalists 2010).

The area also contains significant areas of public land that require greater protection in conservation reserves, most notably the Wombat State Forest. The Central Victorian Uplands bioregion in which the Wombat State Forest occurs was identified by VEAC as a priority area for additions to the conservation reserve system (VEAC 2011). A 2010 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).

A report by the VNPA has also 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).

The biodiversity of the region attracts both residents and visitors, and underpins a local economy based largely on tourism and agriculture (Macedon Ranges Shire Council 2009). It also provides a wide range of ecosystem services such as forested catchments, clean water and air, and natural pest control.

A significant increase in investment is required to protect biodiversity in the region and secure the vital role it plays in maintaining ecosystem processes and services across the region.

1.4 Objectives of the Report

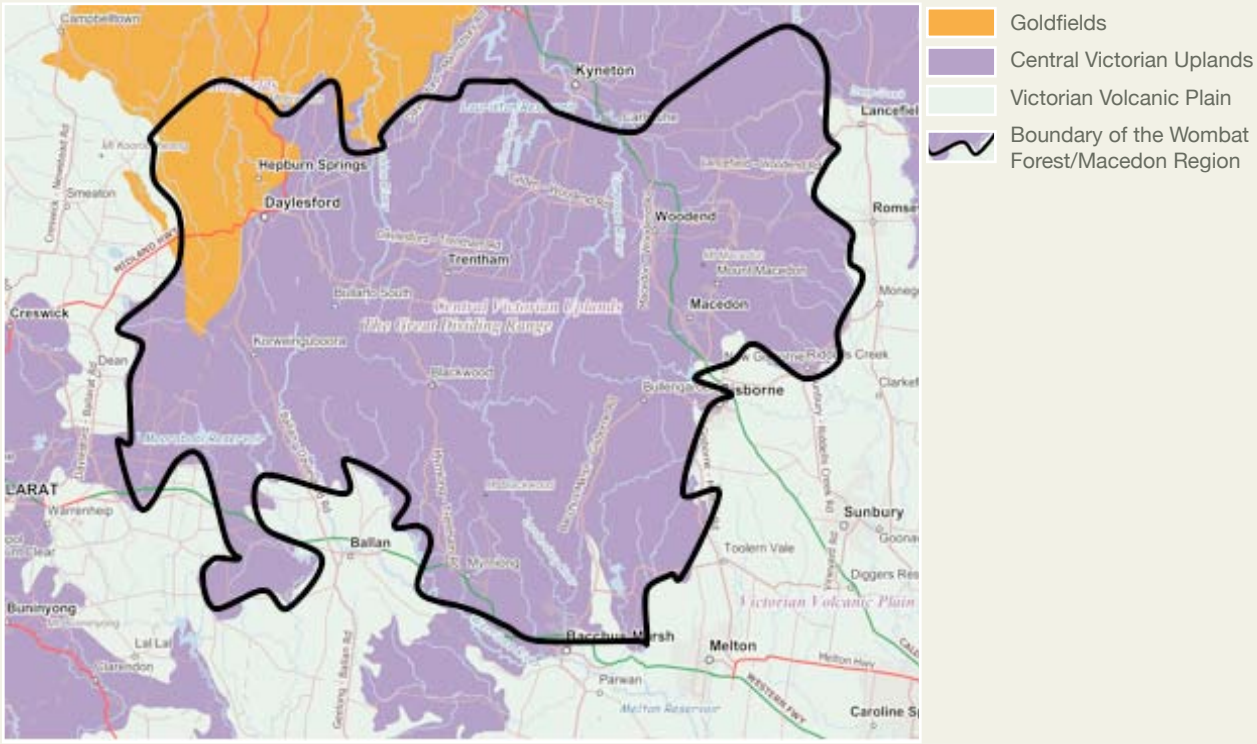
Conservation of biodiversity requires a landscape-wide approach or whole of landscape approach. *'The recognition that species rely on functioning ecosystems is particularly important as it demonstrates the need for integrated regional strategies that encompass protective conservation and natural resource management measures.'* (Australian Terrestrial Biodiversity Assessment 2002).

The report is based on the WildCountry Science principles, outlining key ecosystem processes and key biodiversity assets, and identifying threats to each (Koch 2009). The overall objective of the report is to highlight the significant conservation values of the Wombat Forest/Macedon area, and encourage greater protection and improved management of this important area. The report aims to: -

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

The report is presented in two parts, Part One is a conservation report and Part Two lists flora and fauna species for the region.

Map 1.3 **Bioregions in the Wombat Forest/Macedon Area**
(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016)



1.5 Bioregions in the Wombat Forest/Macedon Region

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

The Central Victorian Uplands bioregion dominates the region 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 region 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).

A very small area of the Victorian Volcanic Plain bioregion occurs in the south-east of the area and is characterised by flat or rolling plains, volcanic in origin. Due the fertile nature of these soils the Victorian Volcanic Plain bioregion is the most heavily cleared in Victoria (VEAC 2011).

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 (LCC 1985). The Wombat Forest/Macedon region 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 (ECC 1987). Within this a larger number of clan groups occupied various parts of the region at various times of the year (ECC 1987).

In the late 1830-1840s European settlers, pastoralists and squatters took up land in the area (LCC 1985). 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. Gold mining saw a wave of immigration and localised areas denuded of vegetation and stripped of topsoil, especially around Daylesford and Blackwood (Houghton 1980).

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 ceased (Houghton 1980). Selective logging began again in the Wombat Forest and other areas in the 1930s and continued until the mid-1970s (Department of Natural Resources and Environment, Victoria 1996). A modified type of clearfell logging (the Shelterwood System) was then introduced and continued until widespread over-harvesting again led to the cessation of logging in 2006.

Other major settlement periods included two waves of soldier settlers after each World War. Currently about 60 per cent of the region is private land. In the 1970-80s large areas of public land, comprising of native vegetation were converted to exotic softwood timber plantations, particularly around Macedon and Daylesford.

1.7 Current Land Use

Over the last few decades land use in the region has changed dramatically (MRSC 2009). 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 region's landowners and broader mix of land uses in the area (MRSC 2009).

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 8.3 million people by 2051 will further drive land use change (CES2012).

A key characteristic of the region 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 35 per cent of the Region is a Park, Reserve or State Forest.

Large remnant paddock tree
Photography © Gayle Osborne

2. Ecological Processes in the Region

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 (CES 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 oversees the northern half of the Landscape Area, is in the poorest overall landscape condition of all CMAs within Victoria (VCMC 2007).

As the Wombat Forest/Macedon Region contains one of the few 'largely intact' areas in Central Victoria it plays a vital role in the maintenance of ecological processes, landscape connectivity and ecosystem resilience within the wider region. This connectivity provides a vital link from the foothill forests on the Great Divide, through the drier forest north of the region to the Box-Ironbark Woodlands in northern Victoria.

2.2 Key Ecological Processes within the Region.

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).

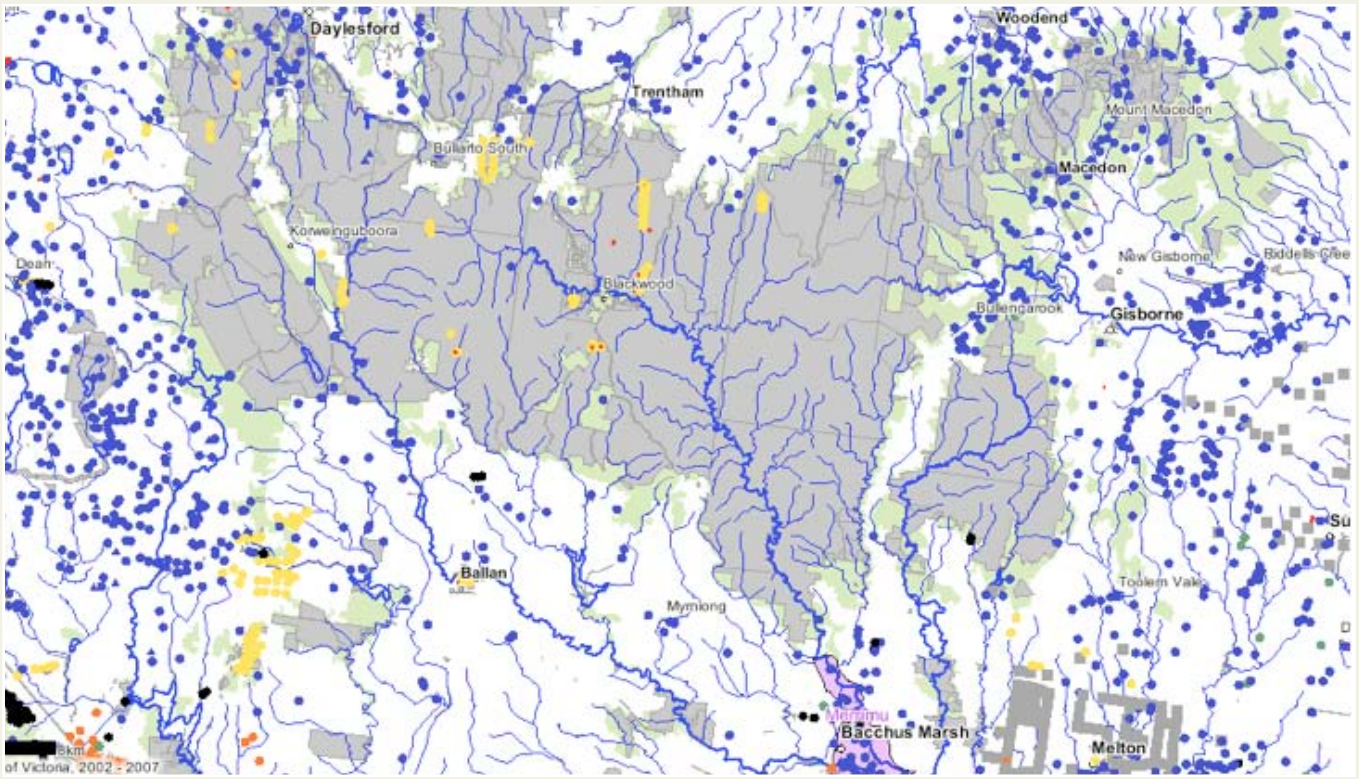
Future climate change will only exacerbate these trends, further disrupting natural rainfall patterns, causing more frequent and severe wildfires, and producing an even hotter climate (IPCC 2007). Temperatures in southern Australia are expected to increase a further 1-5°C by 2070 depending on the level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

Research on the impacts of climate change points to major shifts in the ranges of ecosystems and species in the region (NCCMA 2005). 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, VEAC 2010). This includes herbivorous possum species, which are common in the region (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 region 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' (Brereton et al 1995) in the future and should be managed with this in mind. For example, areas such as the Wombat Forest, Lerderderg Forest and Macedon Ranges, may act as refuges for species from northern Victoria that are forced to move south as the climate warms.

Golden Orb Spider

Map 2.1 **Hydrological Drainage Patterns in the Region**
(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016)



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 (McGregor et al 2008). 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 region is a very important catchment and riparian area with the headwaters of seven river systems and extensive riparian vegetation (see Map 2.1 and Section 3.4).

Riparian vegetation on public land in the area is of a very high quality when compared to riparian vegetation further downstream. In the region, especially the Wombat State Forest, a number of riparian areas are not streams in the conventional sense but resemble 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.

A number of large water storage areas occur in the area, including the Lauriston, Upper Coliban and Roslynne Reservoirs. However the negative impacts of these reservoirs on hydrological processes would most likely occur downstream of these areas and outside of the region. With property sizes shrinking the number of farms dams within the area has dramatically increased (MRSC 2009). 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 likely to be negatively impacting some hydrological processes.

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 (McGregor et al 2008, Koch 2009).

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 (Birds Australia 2009). Silver Banksia was also prevalent in some parts of the region but is now absent from those areas.

Ecologically mature trees also play a very important role in foothill forest ecosystems (ECC 1997). Over sixty native fauna species in the Region are dependent or partially dependent on tree hollows (Viridans Biological Database 2009). These are most commonly found in large trees over 150 years old (Lindenmayer and Burgman 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 region.

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 (Koch 2009).

Although the region contains high levels of native vegetation, it is likely that a range of threatening processes has disrupted species interactions. Examples of threatening processes include 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 (Koch 2009). 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 (Reynolds et al 2011).

Movements of Organisms including animals, the seeds of plants and the spore of fungi are also critically important for a range of ecosystem processes and functions within the region. 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 region have been disrupted by a range of threatening processes, such as 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. The Brown Treecreeper (south-eastern ssp.) (*Climacteris picumnus victoriae*), a bird species, which is listed as near threatened and is found in the region will not cross gaps between tree cover greater than 500m, unless scattered trees are present.

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 region 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.

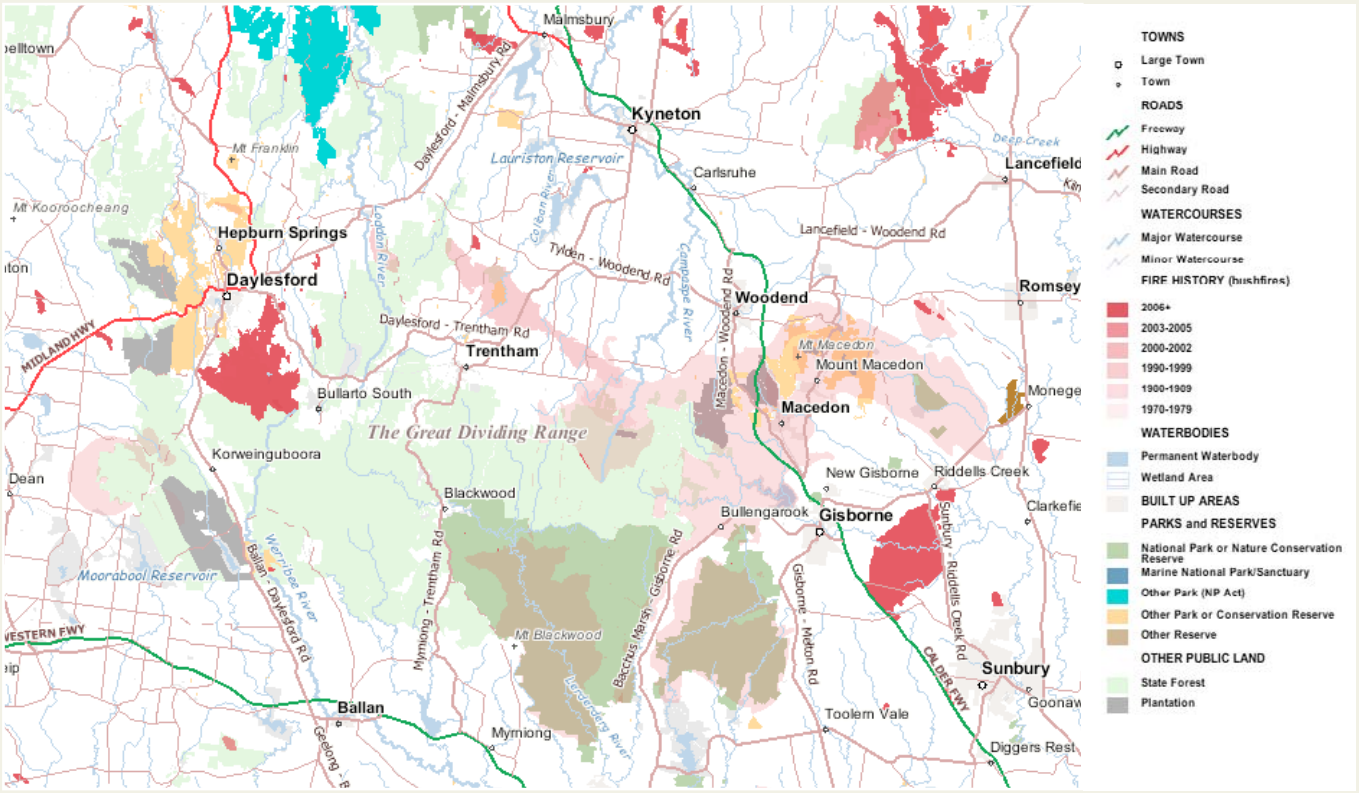
Although they play a very important role, refugia are only rarely considered in conservation assessment and planning (Mackey et al 2007). Refugia are areas that enable species to maintain their presence in landscapes during periods of detrimental change in the surrounding landscape. Refugia will play a very important role for the maintenance of biodiversity during climate changes (Koch 2009). With its high rainfall, high vegetation cover and wide topographic variation the region 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 streams or creeks during periods of drought are critical refuge areas (Bond 2007). These areas may be a very high priority for restoration in the region.

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 (Koch 2009). Key natural disturbances that operate in the region include wildfire, flooding and grazing by native animals. It is also possible that wind events and plant diseases such as *Armillaria luteobubalina* played a localised role.

Some natural disturbance regimes have been severely altered in the region, especially in smaller remnant patches. Social pressures are also leading to public land being subjected to overly frequent burns. 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).

Map 2.2 **Wildfire History in the Region** (Source: Forest Explorer 5 © The State of Victoria, DELWP 2017)



2.3 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 e.g. timber harvesting and firewood collection
- Pest plants and animals
- External inputs e.g. fertiilisers and irrigation

Commercial firewood harvesting in the Wombat State Forest
Photography © Gayle Osborne

2.4 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 (Source: McGregor et al 2008, Bennett et al 2000, Radford et al 2007, Lindenmayer et al 2008).

Climatic Processes

- establish conservation reserves to further protect native ecosystems
- avoid the clearing of native vegetation
- restore areas of biodiverse native vegetation to absorb greenhouse gas emissions
- avoid disturbances such as logging in native forest ecosystems

Hydrological processes

- improve environmental flows
- restore and protect riparian areas
- improve regulations regarding dams on private land
- exclude logging from water catchments

Primary productivity

- restore more fertile parts of the landscape and riparian areas
- combine revegetation with land degradation mitigation activities to gain multiple benefits
- enhance natural regeneration

Interactions between species

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

Evolutionary processes

- strategic development of biolinks, wildlife corridors and stepping stones
- encourage natural regeneration
- revegetate with indigenous plant species
- plant or build flora populations to minimums of 200 reproductive individuals

Movements of organisms

- protect existing vegetation
- strategic development of biolinks, wildlife corridors and stepping stones
- removal of barriers to animal and plant movement

Natural disturbance regimes

- implement ecological burning regimes
- reinstatement of adequate environmental flows

2.5 Monitoring Ecological Processes and Ecosystem Health

Currently, long-term monitoring of the overall health of ecosystems and ecological processes, at a State, regional or local level, is hindered by patchy or incomplete information, inconsistent methodologies and appropriate levels of coverage (CCMR 2012, CES 2013). The Victorian Catchment Condition Report and Victorian State of the Environment Report currently provide the most detailed assessments and are periodically released by the relevant authorities. It is noted, in both these reports, that a lack of data is a key obstacle to managing natural resources (CCMR 2012, CES 2013).

A lack of monitoring and detailed information on the distribution and health of local fauna populations hampers the management of biodiversity at a local level (Loos 2011). More accurate information on native vegetation types, former distribution and current extent is also required (Loos 2011).

Table 2.2 **Indicators Used to Monitor Catchment Condition and Ecosystem Health**

VCMC Catchment Condition Indicators

Biodiversity
- Extent of Native Vegetation and changes
- Condition of Native Vegetation
- Extent and Condition of Forests
- Extent and Condition of Parks

Water
- Index of Stream Condition
- Hydrology
- Water Quality
- Streamside Zone
- Stream Fauna
- Groundwater
- Lakes and Wetlands
- Coastal and Marine

Soil
- Extent of soil structure decline
- Extent of soil acidification

Other Types of Indicators

- Waterwatch quality data
- Regional Salinity Report
- Environmental Flows
- Bird Atlas
- Frog Census
- Fish Census
- Fungi Map
- Rare and Threatened species
- Plant and animal distribution
- Land clearing/vegetation removal permits granted
- Area of vegetation illegally cleared
- Number and health of Landcare, Friends of and other groups
- Number and extent of Trust for Nature, Land for Wildlife and BushTender properties

(Source VCMC 2007, CES 2008, MRSC 2009)

Community members install a motion-sensing camera for a research project
Photography © Gayle Osborne

Water Health Community Day
on the Loddon River
Photography © Gayle Osborne

Common Yabby (*Cherax destructor)*
Photography © Gayle Osborne

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

This section provides a broad overview of native flora and vegetation in the Wombat Forest/Macedon Region. The region has been divided into seven Local Areas (sub zones), with 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 Part Two, available from www.wombatforestcare.org.au

3.1 Pre-1750 Vegetation of the Wombat/Mount Macedon Region

Prior to European settlement, the Wombat Forest/Macedon Region 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 by DELWP for the Region (see Table 3.1). It should be noted that the current mapping of EVCs in the region does have its limitations and finer scale mapping is required to increase its accuracy.

These EVCs formed a complex mosaic across the landscape, depending on variations in rainfall, altitude, aspect, underlying geology, soil fertility, soil water holding capacity and topography. The pre -1750 and current extent of EVCs in the Region are examined in greater detail for each Local Area (see Section 9).

In the north-western section of the region, around Daylesford, Eganstown and Hepburn, Heathy Dry Forest dominated the higher slopes and ridges, while 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. West of Daylesford Herb-rich Foothill Forest occurred in the more fertile and higher rainfall areas.

On the higher slopes of the Great Divide in the Wombat Forest, foothill forests, such as Shrubby Foothill Forest and Herb-rich Foothill Forest, were common. Small patches of Wet and Damp Forest were found in very high rainfall areas and in gullies. Shrubby Foothill Forest/Herb-rich Foothill Forest Complex was widespread in the west of the Wombat Forest. Riparian Forest occurred along creeks and rivers of higher rainfall areas, while Sedgy Riparian Woodland was common in other riparian areas. Heathy Woodland, Shrubby Dry Forest and Grassy Dry Forest occurred in less fertile areas on the divide.

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.

In the Trentham, Springhill and Macedon area 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. North of Trentham 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. Valley Grassy Forest was also common in valleys around Macedon, Woodend and Newham.

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.

In the Lerderderg State Park, 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 of the Park with areas of Box-Ironbark Forest in the south-west. Scattered areas of Heathy Dry Woodland and Valley Grassy Forest also occur. Riparian EVCs included Riparian Forest in the north changing to Streambank Shrubland in the south.

In the Myrniong area, 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.

In the Rocklyn and Mollinghip 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. 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.

All EVCs 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 EVCs in the region, their Bioregional Conservation Status and provides some comment on former and current extent.

Table 3.1 **EVCs and their Bioregional Conservation Status in the Wombat Forest/Macedon Region**

EVC No	EVC	Bioregional Conservation Status	Extent in Region
55	Plains Grassy Woodland	Endangered	Not widespread, mostly on private land, very widely cleared
851	Streambank Shrubland	Endangered	Along creeks mainly in the 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 quite widespread, heavily cleared
18	Riparian Forest	Vulnerable	Very small areas top of the Great 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 in western part of the Wombat Forest and adjacent areas
198	Sedgy Riparian Woodland	Depleted	Some riparian areas, common in the Wombat Forest.
53	Swamp Scrub	Depleted	Limited occurrences on several rivers and creeks.
22	Grassy Dry Forest	Depleted	Formerly very widespread, now mostly only on public land
23	Herb-rich Foothill Forest	Depleted	Common in the foothill forests, 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 especially on public land
45	Shrubby Foothill Forest	Least concern	Very common especially in the Wombat Forest
30	Wet Forest	Least Concern	Very small areas on 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: Biodiversity Interactive Map © The State of Victoria, DELWP, 2016)

3.2 Current Extent and Quality of Native Vegetation (EVCs) in the Wombat/Mount Macedon Region

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 flora and fauna species diversity in an area (Bennett & Radford 2004, Radford et al 2007, Brooker et al 2004).

The foothills of the Divide have retained high vegetation cover, mostly on public land and in larger blocks. However, the more fertile valleys and flatter areas on private land in the region have been widely cleared and remnants tend to be small, fragmented and often in decline. These fertile areas are in need of restoration to reinstate landscape connectivity and ecological function.

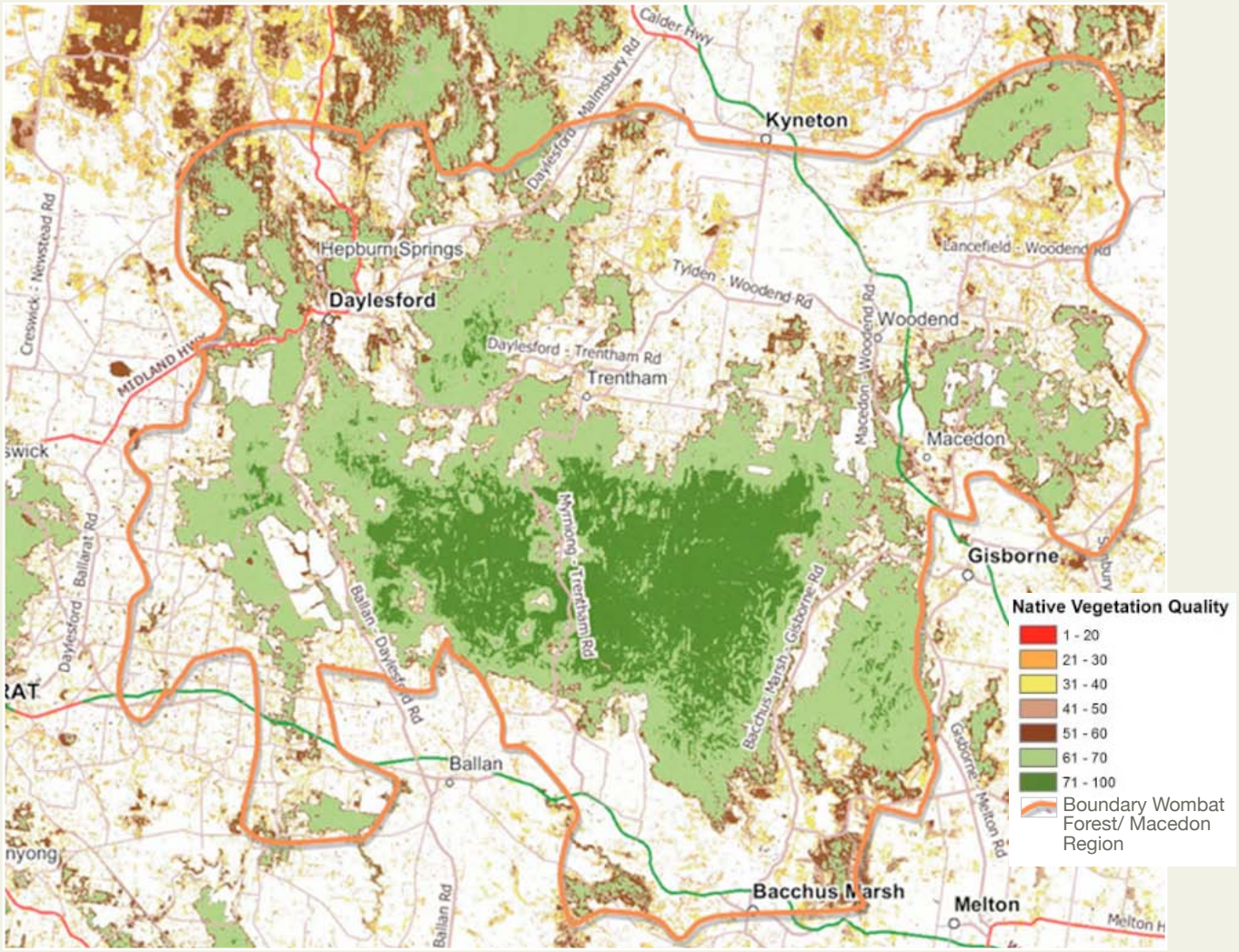
Unlike most areas in central Victoria, the Wombat Forest/ Macedon region also contains significant areas of high to very high quality native vegetation, especially on public land. This is reflected in modelling of native vegetation quality undertaken by DELWP (see Map 3.1) and other vegetation quality assessments undertaken in the Wombat State Forest (VNPA 2010). The modelled quality of vegetation on public land is mostly high (61-70), with core areas of very high quality (71-100).

However, it should be noted that due to extensive timber extraction in the late 1800's there is now virtually no old growth forest remaining on public land in the region (Commonwealth of Australia 1999). Extensive timber harvesting in the 1980-90s in the Wombat State Forest has also resulted in large areas of young regrowth forest being present in some areas (DSE 2000). Large, old hollow bearing trees now tend to very scarce, leading to a range of negative impacts on native fauna, especially those dependent on tree hollows.

The modelled quality of vegetation on private land in the region is lower than on public land, ranging from the poor to good quality range (31-60 score, see Map 3.1). Good quality vegetation on private land is typically found in smaller patches in a mostly cleared landscape. Tree cover and tree recruitment is reduced, there are 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 region with greatly reduced vegetation cover.

However, some areas of private land do contain areas of high quality vegetation, especially adjacent to public land such as the Wombat State Forest and Macedon Regional Park.

Map 3.1 **Modelled Native Vegetation Quality in the Wombat/Mount Macedon Region**
(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016)



3.3 Flora

Over 900 indigenous plant species have been recorded in the Wombat Forest/Macedon region (VBA 2016, Francis 2011). Two flora species are endemic to the region; the endangered Wombat Leafless 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. A new plant variety, Hairy-leaf Triggerplant *(Stylidium armeria* subsp. *pilosifolium)* was discovered by the Riddells Creek Landcare Group in an area known as Barrm Birrm in Riddells Creek.

Open Eucalypt forests dominate the landscape with Messmate *(Eucalyptus obliqua*) and Narrow-leaved 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-leaved Peppermint *(Eucalyptus dives)*, Red Stringybark *(Eucalyptus macrorhyncha)*, Long-leaved Box *(Eucalyptus goniocalyx)* and Yellow Box *(Eucalyptus melliodora)* were common in the drier area, in the north west of the region.

On Mount Macedon there are restricted occurrences of Mountain Ash *(Eucalyptus regnans)* and Snow Gum *(Eucalyptus pauciflora)*. Snow Gum is also found on Mount Macedon and in frost hollows near Woodend, Tylden and Trentham.

Understorey vegetation in the region varies widely depending on the vegetation type and past land management history. In some areas the understorey is dense, and in others, open or heathy, 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 (Francis 2011). It is also likely that logging and fuel reduction burning has lead to reduced understorey diversity in some areas on public land.

3.4 Threatened Flora

Fifty-seven flora species are listed as rare or 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 (DSE 2003).

Wombat Leafless Bossiaea *(Bossiaea vombata)*
Photography © Gayle Osborne

Drooping Mistletoe *(Amyema pendula)*
Photography © Gayle Osborne

Table 3.2 **Threatened Flora of the Wombat Forest/Macedon Region**

Monocotyledons		FFG	EPBC	VROTS
Austrostipa breviglumis	Cane Spear-grass			r
Austrostipa exilis	Heath Spear-grass			r
Dianella amoena	Matted Flax-lily		E	e
Dipodium pardalinum	Spotted Hyacinth-orchid			r
Entolasia stricta	Upright Panic			k
Gahnia microstachya	Slender Saw-sedge			r
Lemna trisulca	Ivy-leaf Duckweed			k
Poa amplexicaulis	Red-sheath Tussock-grass			r
Prasophyllum frenchii	Maroon Leek-orchid	FFG	E	e
Pterostylis truncata	Brittle Greenhood	FFG		e
Dicotyledons				
Acacia aspera subsp. *parviceps*	Rough Wattle			r
Acacia nano-dealbata	Dwarf Silver Wattle			r
Allocasuarina luehmannii	Buloke			e
Ballantinia antipoda	Southern Shepherd's Purse	FFG	E	e
Bossiaea cordigera	Wiry Bossiaea			r
Bossiaea riparia	River Leafless Bossiaea			r
Bossiaea vombata	Wombat Leafless Bossiaea	FFG		e
Brachyscome debilis	Weak Daisy			v
Cardamine lilacina	Lilac Bitter-cress			v
Cardamine tenuifolia	Slender Bitter-cress			k
Desmodium varians	Slender Tick-trefoil			k
Eucalyptus aggregata	Black Gum	FFG		e
Eucalyptus brookeriana	Brooker's Gum			r
Eucalyptus leucoxylon subsp. *connata*	Melbourne Yellow-gum			v
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			r
Helichrysum aff. *rutidolepis* (Lowland Swamps)	Pale Swamp Everlasting			v
Hovea asperifolia subsp. *spinosissima*	Rough Hovea			r
Lepidium hyssopifolium	Basalt Peppercress	FFG	E	e
Leucopogon microphyllus var. *pilibundus*	Hairy Beard-heath			r
Microseris sp. 1	Plains Yam-daisy			v
Nicotiana suaveolens	Austral Tobacco			r

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: Victorian Biodiversity Atlas.

Table 3.2 **Threatened Flora of the Wombat Forest/Macedon Region - continued**

Dicotyledons *continued*			FFG	EPBC	VROTS
	Nematolepis squamea	Satin Wood			r
	Olearia speciosa	Nettled Daisy-bush			k
	Pimelea hewardiana	Forked Rice-flower			r
	Pimelea spinescens	Spiny Fice-flower	FFG	C	e
	Pimelea spinescens subsp. *spinescens*	Spiny Rice-flower		C	e
	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			r
	Pultenaea graveolens	Scented Bush-pea	FFG		v
	Pultenaea gunnii subsp. *tuberculata*	Golden Bush-pea			r
	Pultenaea reflexifolia	Wombat Bush-pea			r
	Pultenaea weindorferi	Swamp Bush-pea			r
	Rhagodia parabolica	Fragrant Saltbush			r
	Sclerolaena muricata var. *muricata*	Black Roly-poly			k
	Senecio psilocarpus	Swamp Fireweed		V	v
	Stylidium armeria subsp. *pilosifolium*	Hairy-leaf Triggerplant	FFG		e
	Swainsona behriana	Southern Swainson-pea			r
	Tetratheca stenocarpa	Long Pink-bells			r
	Xerochrysum palustre	Swamp Everlasting	FFG	V	v
	Westringia glabra	Violet Westringia			r

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: Victorian Biodiversity Atlas.

Swamp Bush-pea (*Pultenaea weindorferi)*
Photography © Gayle Osborne

3.5 Regionally Significant Flora

A number of flora species within the region are considered regionally significant. As the region is at the western end of the Great Dividing Range it is at the edge of the biogeographic range of a number of native flora species. Other species listed may be significant due to the population being disjunct i.e. isolated from other populations of the species.

Table 3.3 **Regionally Significant Flora of the Wombat Forest/Macedon Region**

Acrothamnus hookeri	Mountain Beard-heath	western most limit of range
Carex polyantha	Sedge	edge of range, disjunct occurrence
Correa glabra	Rock Correa	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
Enneapogon nigricans	Pappus Grass	
Epilobium gunnianum	Gunn's Willow-herb	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
Leucopogon fraseri	Sharp Beard-heath	western most limit of their range
Lycopodium dueterodensum	Bushy Clubmoss	disjunct occurrence
Lysiana exocarpi	Harlequin Mistletoe	
Myosotis australis	Austral Forget-me-not	
Persoonia chamaepeuce	Dwarf Geebung	disjunct occurrence
Scutellaria humilis	Dwarf Skullcap	
Senecio odoratus	Scented Groundsel	
Solanum laciniatum	Kangaroo Apple	

(Source: Leversha 2004, Parks Victoria 1999, Francis 2011, Commonwealth of Australia 1999, LCC 1987)

3.6 Serious Weed Species

Over 150 serious weed species are recorded for the region, with a full list provided in Part Two (available from www.wombatforestcare.org.au). Many of these species have become invasive in parts of the region (MRSC 2009). Weeds that pose the biggest threat to native vegetation in the region include Blackberry, various Brooms, Bridal Creeper, Cape Weed, Gorse, Paterson's Curse, Radiata Pine, Spanish Heath, Willows and a range of exotic grasses including Chilean Needle Grass and Texas Needle Grass.

The Macedon Ranges Shire Council developed a Weed Management Strategy in 2009 and has undertaken considerable weed control on roadsides and in reserves (MRSC 2009). Hepburn and Moorabool Shires have yet to develop strategies for weed control, although weed mapping has been undertaken in Hepburn Shire. Hepburn Shire currently undertakes little weed control works, although this may change following weed mapping.

Catchment Management Authorities have also undertaken weed control in riparian areas within the region. Based on numerous visits to different parts of the Wombat State Forest, very little weed management is currently undertaken by DELWP. 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.

'New and Emerging Weeds' are usually the most cost effective weeds to manage, as they can often be eradicated, preventing large expensive infestations from becoming established (MRSC 2009). Black Knapweed and Texas Needle Grass have been identified in the Macedon Ranges Shire Council Weed Strategy (MRSC 2009). New and emerging weeds in other parts of the region should also be identified and controlled by relevant land managers.

Examples of Fungi of the Wombat Forest/Macedon Region

Emperor Cortinar *(Cortinarius archeri)*
Photography © Alison Pouliot

Crowned Coral Fungus
(Artomyces austropiperatus)
Photography © Alison Pouliot

Variable Oysterling *(Crepidotus variabilis)*
Photography © Alison Pouliot

Beefsteak Fungus *(Fistulina hepatica)*
Photography © Alison Pouliot

Green Elfcup *(Chlorociboria aeruginascen)*
Photography © Alison Pouliot

Coral Tooth *(Hericium coralloides)*
Photography © Alison Pouliot

Ruby Bonnet (*Cruentomycena viscidocruenta)*
Photography © Alison Pouliot

In 2011, a previously undiscovered fungi species belonging to the *Sarcodon* genus was found in the Wombat State Forest.
Photography © Gayle Osborne

4. Native Fauna in the Wombat Forest/Macedon Region

A large diversity of indigenous vertebrate fauna species occur in the region with over 290 species formally recorded (Victorian Biodiversity Atlas). Native fauna lists for each Local Area are provided in Part Two.
(available from www.wombatforestcare.org.au)

Thirty-six mammal species are recorded for the region (Victorian Biodiversity Atlas). This includes arboreal mammals such as gliders, possums and twelve species of bats. A range of ground dwelling mammals also occurs. Seven mammal species are listed as threatened. Mammals have suffered the greatest decline 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 Spotted-tail Quoll *(Dasyurus maculatus)* and the Eastern Barred Bandicoot *(Perameles gunnii)* 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 1970s. 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 region are rich and varied with 213 species recorded (Victorian Biodiversity Atlas). 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 (Bennett et al 2009). The research did indicate that Australian birds are less resilient to climate change than previously thought. Although no comparatively detailed studies have been undertaken with forest bird species in Victoria, data from the Atlas of Australian Birds demonstrate declining population for at least some species. For example, Red-browed Treecreeper and Gang-gang Cockatoo sightings have declined approximately fifty percent over recent years (Tanya Loos, personal communication 2011).

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

The invertebrate fauna of the area is poorly known and studied, despite their importance as pollinators and decomposers.

4.1 Fauna Distribution across the Region

A number of species occur across the entire region; these include mammals such as the Common Brushtail 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 region include the Common Froglet.

The central and eastern part of the region 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 Scrubwren, 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 Black Snake, and many Skink species.

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

4.2 Home Ranges and Fauna Movement in the Region

Home ranges and the movement of native fauna within the region 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).

These include 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 and Pied Currawong also move from wetter forests to the milder north over winter (ECC 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 (DSE 2003).

4.3 Threatened Fauna

Fifty-two invertebrate fauna species in the region are listed as threatened at a State or National level (see Table 4.1). This represents a significant proportion of threaten fauna with the Central Victorian Uplands bioregion (DSE 2003). Threatened species in the region tend to be hollow dependent species or highly mobile species or ground dwelling species.

Table 4.1 **Threatened Fauna in the Wombat Forest /Macedon Region**

Mammals			FFG	EPBC	VROT
	Brush-tailed Phascogale	*Phascogale tapoatafa*	FFG		v
	Common Bent-wing Bat	*Miniopterus schreibersii* (group)	FFG		
	Common Dunnart	*Sminthopsis murina*			v
	Eastern Barred Bandicoot	*Perameles gunnii*	FFG	E	c
	Eastern Pygmy-possum	*Cercartetus nanus*			n
	Greater Glider	*Petauroides volans*	FFG	V	v
	Grey-headed Flying-fox	*Pteropus poliocephalus*	FFG	V	v
	Spot-tailed Quoll	*Dasyurus maculatus*	FFG	E	e
	Brown Toadlet	*Pseudophryne bibronii*	FFG		e
	Southern Toadlet	*Pseudophryne semimarmorata*			v
Birds					
	Australasian Shoveler	*Anas rhynchotis*			v
	Azure Kingfisher	*Alcedo azurea*			n
	Blue-billed Duck	*Oxyura australis*	FFG		e
	Grey Goshawk	*Accipiter novaehollandiae*	FFG		v
	Spotted Harrier	*Circus assimilis*			n
	Square-tailed Kite	*Lophoictinia isura*	FFG		v
	Freckled Duck	*Stictonetta naevosa*	FFG		e
	Hardhead	*Aythya australis*			v
	Musk Duck	*Biziura lobata*			v
	Australasian Bittern	*Botaurus poiciloptilus*	FFG		e
	Eastern Great Egret	*Ardea modesta*	FFG		v
	Intermediate Egret	*Ardea intermedia*	FFG		c
	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*			n
	Black Falcon	*Falco subniger*			v
	Caspian Tern	*Hydroprogne caspia*	FFG		n
	Gull-billed Tern	*Gelochelidon nilotica*	FFG		e
	Whiskered Tern	*Chlidonias hybridus*			n
	Black-chinned Honeyeater	*Melithreptus gularis*			n
	Painted Honeyeater	*Grantiella picta*	FFG		v
	Regent Honeyeater	*Anthochaera phrygia*	FFG	E	c
	Crested Bellbird	*Oreoica gutturalis*	FFG		n
	Chestnut-rumped Heathwren	*Calamanthus pyrrhopygius*	FFG		v
	Speckled Warbler	*Pyrrholaemus sagittatus*	FFG		v
	Diamond Firetail	*Stagonopleura guttata*	FFG		v
	Hooded Robin	*Melanodryas cucullata*	FFG		n

continued next page -

Table 4.1 **Threatened Fauna in the Wombat Forest /Macedon Region -** continued

Birds continued			FFG	EPBC	VROT
	Pied Cormorant	*Phalacrocorax varius*			n
	Brown Quail	*Coturnix ypsilophora*			n
	King Quail	*Coturnix chinensis*	FFG		e
	Swift Parrot	*Lathamus discolor*	FFG	E	e
	Baillon's Crake	*Porzana pusilla*	FFG		v
	Latham's Snipe	*Gallinago hardwickii*			n
	Barking Owl	*Ninox connivens*	FFG		e
	Powerful Owl	*Ninox strenua*	FFG		v
	Glossy Ibis	*Plegadis falcinellus*			n
	Royal Spoonbill	*Platalea regia*			v
	White-bellied Sea-Eagle	*Haliaeetus leucogaster*	FFG		v
	Masked Owl	*Tyto novaehollandiae*	FFG		e
Reptiles					
	Bearded Dragon	*Pogona barbata*			v
	Lace Goanna	*Varanus varius*			v
Frogs					
	Growling Grass Frog	*Litoria raniformis*	FFG	V	e
	Brown Toadlet	*Pseudophryne bibronii*	FFG		e
	Southern Toadlet	*Pseudophryne semimarmorata*			v

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: Victorian Biodiversity Atlas, State of Victoria 2016.

4.4 Regionally Significant Fauna

Regionally significant mammal species include the Greater Glider (see following page), which is at the western edge of its range and the Mountain Brushtail Possum, which is close to the edge of its range. The Red-browed Treecreeper is also at the westerly edge of its range and has declined in the region. The local population may have become isolated as records of sightings demonstrate that there is a gap between the population in this area and those in the Broadford/ Seymour area. The species has also been identified as possible indicator species for climate change (Tanya Loos, personal communication 2014).

4.5 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 region. It is assumed that the protection and revegetation of habit for flagship species will also assist in the conservation of many other species.

Juvenile Nankeen Night Heron *(Nycticorax caledonicus)*
Photography © Gayle Osborne

Brush-tailed Phascogale or Tuan
Phascogale tapoatafa

Photography © Jess Lawton

Tuans are small arboreal (tree dwelling) mammals with a distinctive black 'bottle-brush' tail. They are a member of the Dasyuridae family, which includes Quolls, Dunnarts 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.

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 a State 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 region although greater information on their distribution and abundance in the area is required.

Greater Glider
Petauroides volans

Photography © Gayle Osborne

The Greater Glider is an arboreal (tree dwelling) mammal that was once widespread in the region. Recently it was listed as vulnerable at a State and National level.

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 almost 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 region has been severely reduced.

Currently the largest population of Greater Gliders in the region occurs in the Wombat Forest, which is the western edge of their range. However, logging has dramatically reduced their habitat and fuel reduction further threatens these populations.

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

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

A number of other high conservation assets have been identified in the region. 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 region 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 large core areas is recognised as a 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 2013, McNally et al 2009). Key threats and actions are outlined in Section 6.

5.2 Riparian Vegetation

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 (VEAC 2011). Protection and restoration of riparian areas form an integral part of rebuilding landscape connectivity in the region, especially in more cleared areas.

With its location on the Great Divide, higher rainfall and hilly terrain the region contains a high proportion of riparian vegetation (see Map 2.1). The headwaters of seven major river systems originate in the region. 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 east Dry Creek rises in the Cobaw Ranges and joins Deep Creek. Riddells Creek arises near Macedon to join Jacksons Creek. Jacksons Creek joins with Deep Creek to become the Maribyrnong River. In the west Jim Crow Creek, Sailors Creek, Kangaroo Creek and Leitches Creek all join the Loddon River.

Relatively intact riparian vegetation is considered of high conservation significance (NCCMA 2005). Riparian vegetation in public land in the region is generally of high quality, especially 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 CMAs 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.

See also Hydrological Processes in Section 2.2.

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 into rivers and streams due to human activities
- Input of toxic substances into Victorian rivers and streams
- 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 and filling

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, younger trees are not replacing these 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 dependent fauna.

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

5.4 Road Reserve Vegetation

The importance of roadside vegetation has been highlighted in the 2011 VEAC Remnant Vegetation Investigation (VEAC 2011). Roadside vegetation is discussed in more detail in Section 7.

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 40 hectares 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 100 hectares are required for some fauna species to be 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 (VEAC 2010). 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 areas of the region 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 region 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 an 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 an 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. In 2011, a previously undiscovered fungi species belonging to the *Sarcodon* genus was found in the Wombat State Forest. 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.

Lichens (formed from a partnership between fungi and algae) are also little studied but are important for the extraction and recycling of nutrients and the formation of soil from rocks. They provide important habitat for invertebrates.

More detailed research of fungi (including lichens) would greatly assist in the understanding of ecological processes.

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

A key characteristic of the region 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 region is a Park, other type of conservation reserve or State Forest.

The network of public land in the region 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 2013). 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 primary land use being conservation and recreation. State Forests are managed by the Department of Environment, Land, Water and Planning, with the main land uses being apiculture, recreation and forestry. Of public land in the region approximately one third (26,705 hectares) is devoted to conservation purposes and two thirds (47,776 hectares) are State Forests.

Map 6.1 **Public Land in the Region** (Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016)

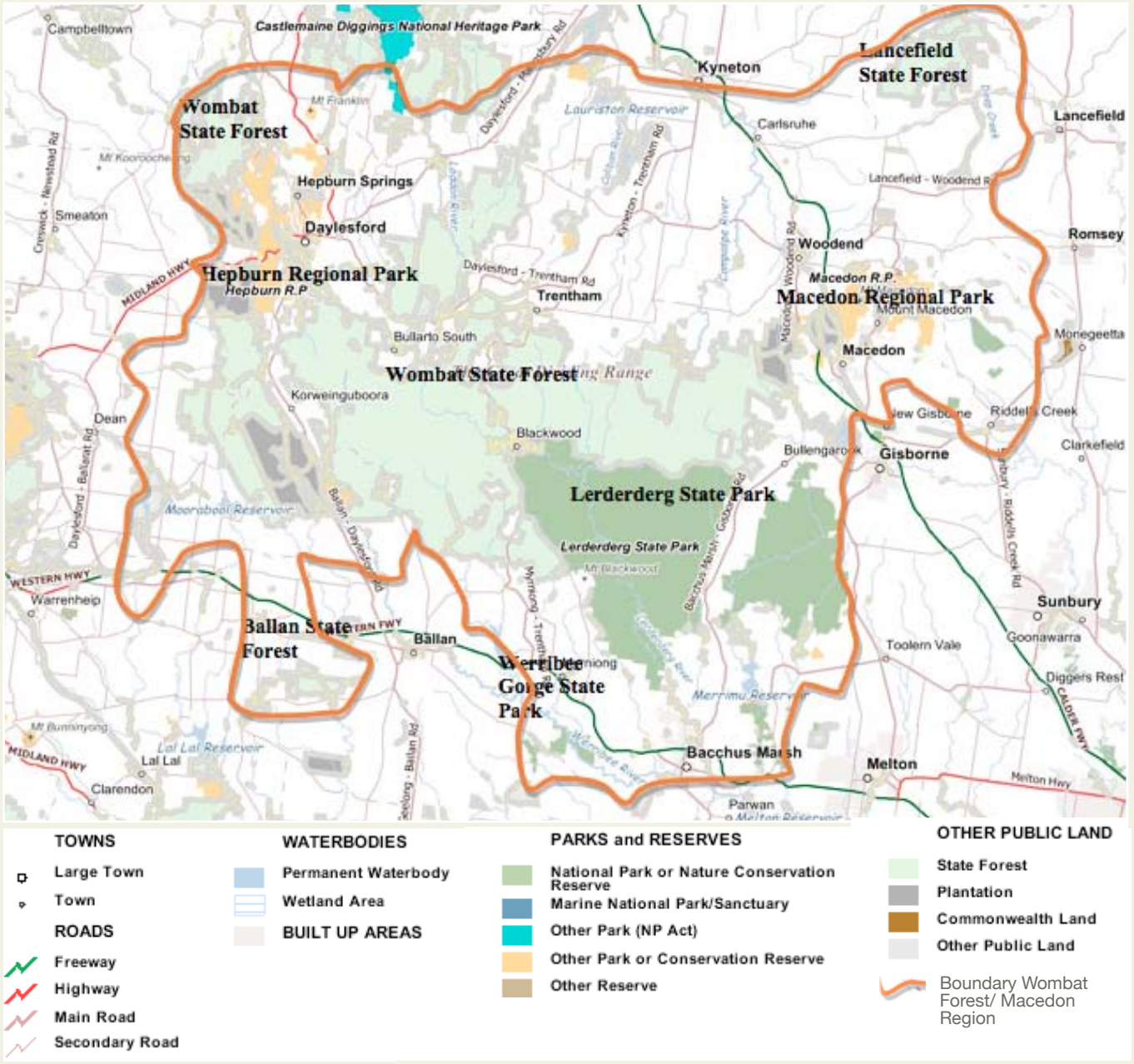


Table 6.1 **Parks, Reserves and State Forests in the Wombat Forest/Macedon Region**

State Forests	Size (ha.)	Parks and Reserves	Size (ha.)
Wombat State Forest	45,100	Lerderderg State Park	20,184
Lancefield (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**

6.1 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 stated that *'…the management of Victoria's relatively intact public land remains a significant problem'* and highlighted a significant lack of resources for biodiversity conservation on public land within Victoria (CES 2013).

A significant increase in resources is required to adequately deliver clearly defined nature conservation outcomes in both Parks and State Forests in the region, 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 2009, Bennett and Radford 2004).

Decisions relating to fuel reduction plans and wood utilisation plans are made relying, in part, on flora and fauna records, which are often inadequate. For example, in the Hepburn Local Area (see 9.2), only one species of reptile is recorded. Resources are not available to carry out surveys or on ground assessments prior to carrying out these programs.

Rare and endangered flora and fauna are at risk of being destroyed in management operations due to a lack of resources and their protection being a low management priority.

6.2 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. Although the State Government replaced the target of burning 5% of public land in the state with a risk-based approach, similar percentages of the public land in the region will be subjected to fuel reduction burns. The lack of scientific information regarding 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 as climatic, hydrological and primary productivity processes (see Section 2).

Smoke inhalation from fuel reduction burns has the potential to lead to mortality in arboreal mammals, including Koalas and Greater Gliders.

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

Increased research and monitoring to determine the impacts of repeated fuel reduction burning on native flora, fauna and ecosystem function is required. The planned amount of 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 programs 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 region. 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).

The detrimental consequences of some recreational activities

6.3 Additional Threatening Processes in State Forests

Both logging and firewood harvesting have been identified as threatening processes to forest ecosystems (Commonwealth of Australia 1999, Gibbons and Lindenmeyer 2002, NCCMA 2005). Three State Forests are located within the region – 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 these State Forests 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 (CES 2008). Following logging, changes to the composition of faunal assemblages can have a marked influence on forest biodiversity (Gibbons and Lindenmeyer 2002).

Logging also negatively affects water yields, with research from the Mountain Ash forests of the Central Highlands of Victoria showing that, although logged forests initially contribute to higher stream flows, the vigorous regrowth causes a substantial decline in yield which can take 150 years to return to pre-logged flows (Kuczera 1985).

The practice of logging of native forests should also be reconsidered in light of recent findings that undisturbed forests are more efficient in carbon sequestration than harvested or disturbed forests (CES 2008). Production of timber products from Victoria's maturing plantation estate should be encouraged.

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 (ECC 2001, Commonwealth of Australia 1999, NCCMA 2005).

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 (ECC 2001). It was concluded that the establishment of firewood plantations on private land would best serve the economic and social interests of rural communities. The 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 relevant to firewood collection in the Wombat Forest, especially illegal collection, poor supervision of domestic firewood areas, impacts on habitat such as the removal of dead standing trees and soil compaction by vehicles and machinery.

Currently, approximately 5000 cubic metres of firewood are harvested annually from the Wombat Forest. There are relatively large costs involved in managing this firewood collection including producing Wood Utilisations Plans, marking firewood coupes and supervising collection. These costs would be far greater than is currently paid in royalties (domestic collection is now free), and possibly even more than the commercial value of the firewood.

In effect commercial firewood harvesters are being subsidised to harvest firewood on public land. Disturbed or harvested forests are less efficient in carbon sequestration than undisturbed forests (CES 2008), while using firewood grown in coppiced plantations on cleared land actually results in a net carbon sequestration (DPI 2009). The volume

of firewood currently harvested from the Wombat Forest could be supplied from 350-400 hectares of firewood plantations on private land. This would not only contribute to a reduction in greenhouse gases (DPI 2009) but would also provide a sustainable local firewood industry into the future.

For the 2015/16 financial year, the Wombat State Forest produced approximately 3,000 cubic metres of commercial firewood and 1,000 lineal metres of wood chop logs. No recent figures were available on domestic firewood but in the 2011-14 period approximately 2300 cubic metres per annum were being removed from the forest.

Mining is permitted in State Forests in Victoria under a license arrangement. Mining results in the clearing of native vegetation and loss of habitat for native fauna. Mining can also result in the sedimentation of waterways and cause toxic chemicals, such as naturally occurring arsenic and historic mercury, to be released into the environment.

In many instances, the bonds paid by mining companies are totally inadequate to cover remediation of mining sites, and the rehabilitation of sites is not undertaken. Under current legislation, community consultation regarding mining operations and their work plans is also totally inadequate.

In 2012, eleven mining leases were held in the Wombat State Forest and covered 430 hectares. Mining exploration leases or applications for mineral exploration licences in 2012 covered approximately 15,000 hectares of the Wombat State Forest.

The inadequacy of environmental protections was evident when in 2007, a mining licence (MIN5349) was granted for a 5 hectare area in the headwaters of the Lerderderg River (a proclaimed Heritage River). A work plan was approved in 2012 that allowed for 5,000 tonnes to be removed from the site. Ultimately, Melbourne Water determined that a waterway was present on the site and the licensee would need to apply for a 'works on waterway permit', at which stage the venture did not proceed.

6.4 Apiary in State Forests in the Region

Apiary is conducted in some State Forests in the region, including the Wombat State Forest. 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 1999).

6.5 Expanding the Conservation Reserve System in the 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 (CES 2013). Building the reserve system is one of six national priorities under the Australian Government's Caring for 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'*. In support, the Federal government has committed to add 25 million hectares to the National Reserve System by 2013 (Possingham 2011). The establishment of new protected areas is also *'...one of the most cost effective, reliable, secure and timely options for conserving biodiversity'* (VEAC 2011).

The region is mostly comprised of the Central Victorian Uplands bioregion, although areas of the Goldfields bioregion and very small areas of the Victorian Volcanic Plain bioregion are also present (see Map 1.3).

The VEAC Remnant Native Vegetation Investigation concluded 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 further investigation (VEAC 2011). The 2008 Victorian State of the Environment Report also identified the Central Victorian Uplands as having significant areas of public land not protected in the conservation reserve system (CES 2008).

The State government has also committed to meet targets for the protection of all bioregional ecosystems (15% of the pre-European extent of 'least concern' EVCs, 60% of the current extent for 'vulnerable' EVCs and 100% of the current extent for 'rare' and 'endangered' EVCs) in each bioregion by 2015 (CES 2008).

Approximately six per cent of EVCs in the Central Victorian Uplands bioregion, eight per cent of EVCs in the Goldfields bioregions and one per cent of EVCs in the Victorian Volcanic Plain meet these reservation targets (CES 2008). The EVCs outlined in Table 6.3 require extensive additions to meet bioregional reserve targets, and occur in State Forests in the region. EVCs for the Victorian Volcanic Plain bioregion are not included as appropriate areas of public land are not present in the region.

The Wombat and Cobaw State Forests represent significant areas of public land that could be added to the conservation reserve system. This would increase the extent of parks and reserves in the Central Victorian Uplands and Goldfields bioregions addressing concerns raised by VEAC and in the 2013 Victorian State of the Environment Report (VEAC 2011, CES 2013).

The addition of these State Forests to the reserve system would also assist with meeting bioregional EVC reservation targets for the Central Victorian Uplands and Goldfields bioregions.

Table 6.3 **EVCs in the Wombat and Cobaw State Forests that are under-represented in the Reserve System in the Goldfields and Central Victorian Uplands 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		

Valley Grassy Forest
Photography © Gayle Osborne

6.6 Key Recommendations for Parks, Reserves and State Forests

Expand the Conservation Reserve System

- As part of the current VEAC Investigation into Central West Forests, 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) to 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.

Loss of old hollow bearing tree in fuel reduction burn

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

7.1 Public Land Managed by Local Government

The region 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). Local government manages a range of public land containing native vegetation, including road reserves and some bushland reserves.

Roadside reserves often contain vegetation types that have otherwise been heavily cleared in the surrounding landscape (VEAC 2010). Local councils manage most road reserves in the region. VicRoads manages major roads and highways.

Native vegetation on roadsides and unused road reserves plays a very important role in biodiversity conservation, especially in fragmented landscapes (VEAC 2010). Road reserves often contain rarer vegetation types that have otherwise been heavily cleared in the surrounding landscape, are vital in maintaining landscape connectivity and provide habitat for many native species (VEAC 2010). In the Goldfields and Central Victorian Uplands bioregions a significant portion of remaining native vegetation on public land is found on roadsides (VEAC 2011).

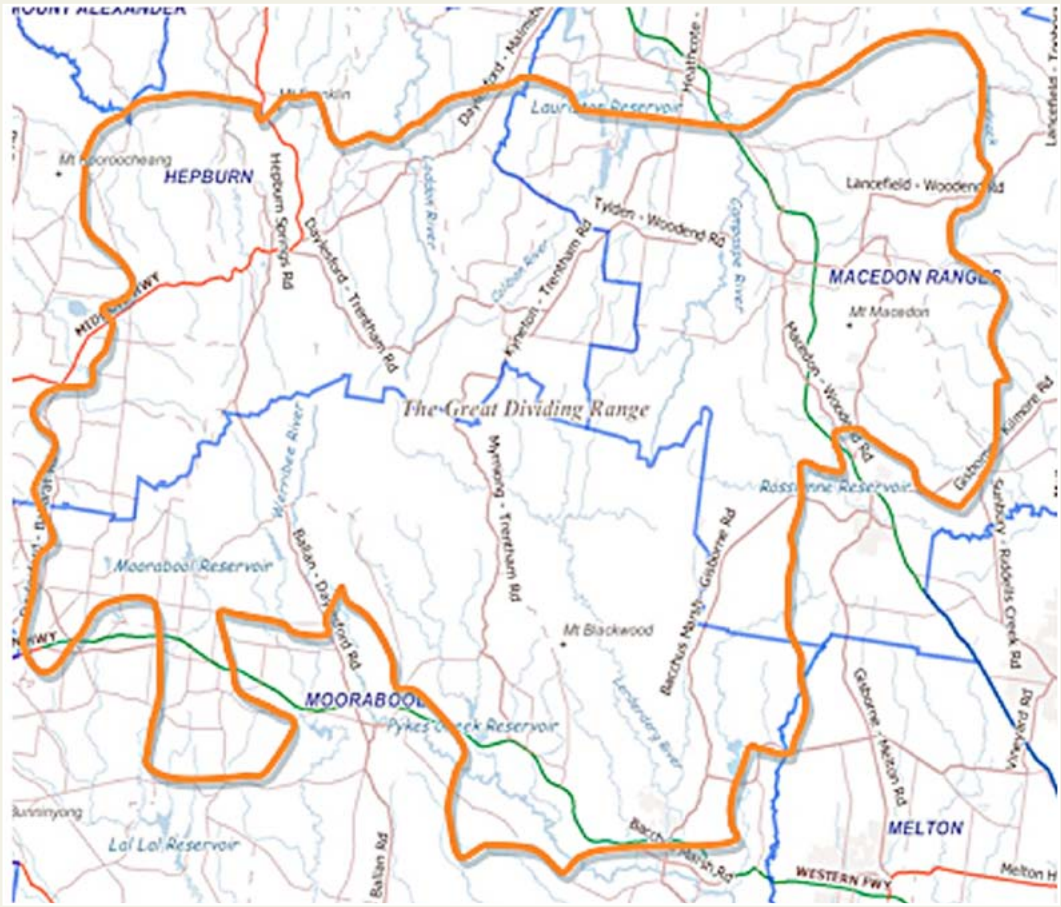
Unused road reserves in particular have high potential to restore landscape connectivity as they have no public safety issues, no 'road kill' issues, less stakeholders are involved and they are less prone to disturbance. It is estimated that there are 122,000 hectares of unused road reserves in Victoria, with most being currently licensed for grazing (VEAC 2010).

Most road reserves are managed by local councils, except for major roads and highways that are managed by VicRoads. Due to a range of threats roadside vegetation continues to decline in quantity and quality. These include road works and maintenance, works related to utilities and fencing, fire prevention activities and firewood collection (VEAC 2011). Poor management and inadequate training of staff by some Councils also contributes, as does a lack of understanding within the community regarding the importance of native vegetation on roadsides, including fallen timber.

To minimise the impacts of such activities it is important that strategic plans are developed and implemented by local councils and Vicroads. Roadside vegetation management strategies have been developed in the past by Moorabool Council, Macedon Ranges Shire Council and Hepburn Shire Council, but require updating.

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.

Map 7.1 **Local Government Areas in the Wombat Forest/Macedon Region**
(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016)



7.2 Conservation Management of Crown Land Water Frontages

Over 25,000 kilometres of water frontages of permanent streams in Victoria are public land (Public Land Consultancy 2008). This represents about 20% of stream frontages in Victoria with the remainder generally being private land (Public Land Consultancy 2008). Crown Land Water Frontages are generally 20-30 metres wide (Public Land Consultancy 2008).

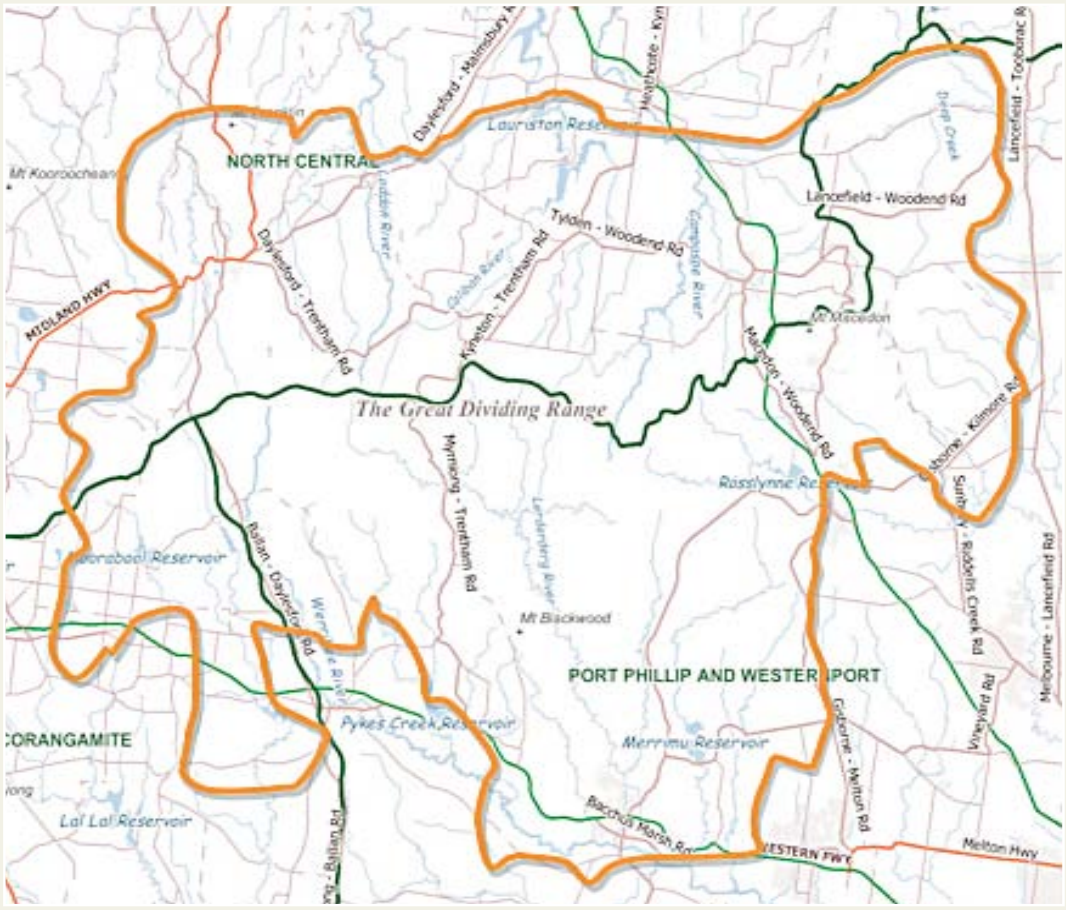
They often contain riparian vegetation and have been identified by VEAC as critical areas for providing high quality habitat and maintaining landscape connectivity in fragmented landscapes (VEAC 2010). Most Crown Land Water Frontages are currently grazed under license by adjacent landowners and are renewed every five years (Public Land Consultancy 2008). 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 region 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

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 region 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 Corangamite 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 Region**
(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016)



7.4 Pine Plantations on Public Land

In some areas of the region, especially around Daylesford and Macedon, large areas of pine plantations have been established on public land (native forest was 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 the 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 Land Water Frontages as recommended in the 2008 SoE report
- High conservation value and key linkage areas of Crown Land 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 Licenses 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.

Roadside Vegetation

Pink Bells (*Tetratheca ciliata)*
Photography © Gayle Osborne

Common Wedge Pea (*Gompholobium huegelii)*
Photography © Gayle Osborne

Trailing Shaggy-pea (*Podolobium procumbens)*
Photography © Gayle Osborne

The Coliban River has high conservation value water frontages
Photography © Alison Pouliot

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

Approximately sixty per cent of the region is private land. Much of the native vegetation on private land in the region has been cleared but many properties still contain some remnant vegetation. The vegetation that remains, including smaller remnants 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 the vegetation types remaining on private land are classified as vulnerable, rare or endangered (VEAC 2010). A number of threatened native species occur on private land in the region, including the endangered Growling Grass Frog and the rare Yarra Gum (Victorian Biodiversity Atlas 2016). Off-reserve protection and management of natural areas are now recognised as one of the most important conservation needs in Australia (MRSC 2009).

Due to the large amount and configuration of public land in the region, 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 (MRSC 2009).

Improved 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 region is also very limited, especially on private land (Loos 2011).

8.1 Key Potentially Threatening Processes on Private Land

Key threatening processes to biodiversity on private land in the region are listed below (CES 2013, NCCMA 2005, VEAC 2010, VEAC 2011, MRSC 2009)

- 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 region still occurs for housing, subdivision of rural properties, upgrading of roads, fire protection, agricultural activities and fencing (MRSC 2009). Although no recent figures are available due to lack of data collection, it was estimated that approximately 4600 hectares of native vegetation was being cleared annually in Victoria as of 2009 (CCMR 2012, DSE 2009). The 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 (VEAC 2010). Threatened EVCs on private land in the Wombat Forest/Macedon Region are listed below.

Table 8.1 **Threatened Vegetation Types on Private Land in the Wombat Forest/Macedon Region**
(Source: Biodiversity Interactive Map © The State of Victoria, DELWP, 2016)

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

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 Growling Grass Frog *(Litoria raniformis)* (Victorian Biodiversity Atlas 2016). 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 (CES 2013). These programs are a very effective way to protect native vegetation on private land, and expand the 'private' reserve system (CES 2013).

Financial incentives for landowners to protect and manage higher conservation value native vegetation on private land should also be significantly increased through programs such as BushTender and Bushbroker (CES 2013). However, this will require increased public funding, as well as potential market-based mechanisms.

The region contains a large number of Trust for Nature and Land for Wildlife properties (CES 2008). In 2003 the Macedon Ranges Shire had the third highest number of Land for Wildlife Properties of all councils in Victoria with 134 properties, while Moorabool Shire had 79 properties and Hepburn 70 properties (DSE 2003). Current Trust for Nature and Land for Wildlife properties properties should be identified as part of a more detailed conservation action plan for the region.

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 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 Area 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 have high conservation values. Improved planning controls are also required in some high conservation value areas.

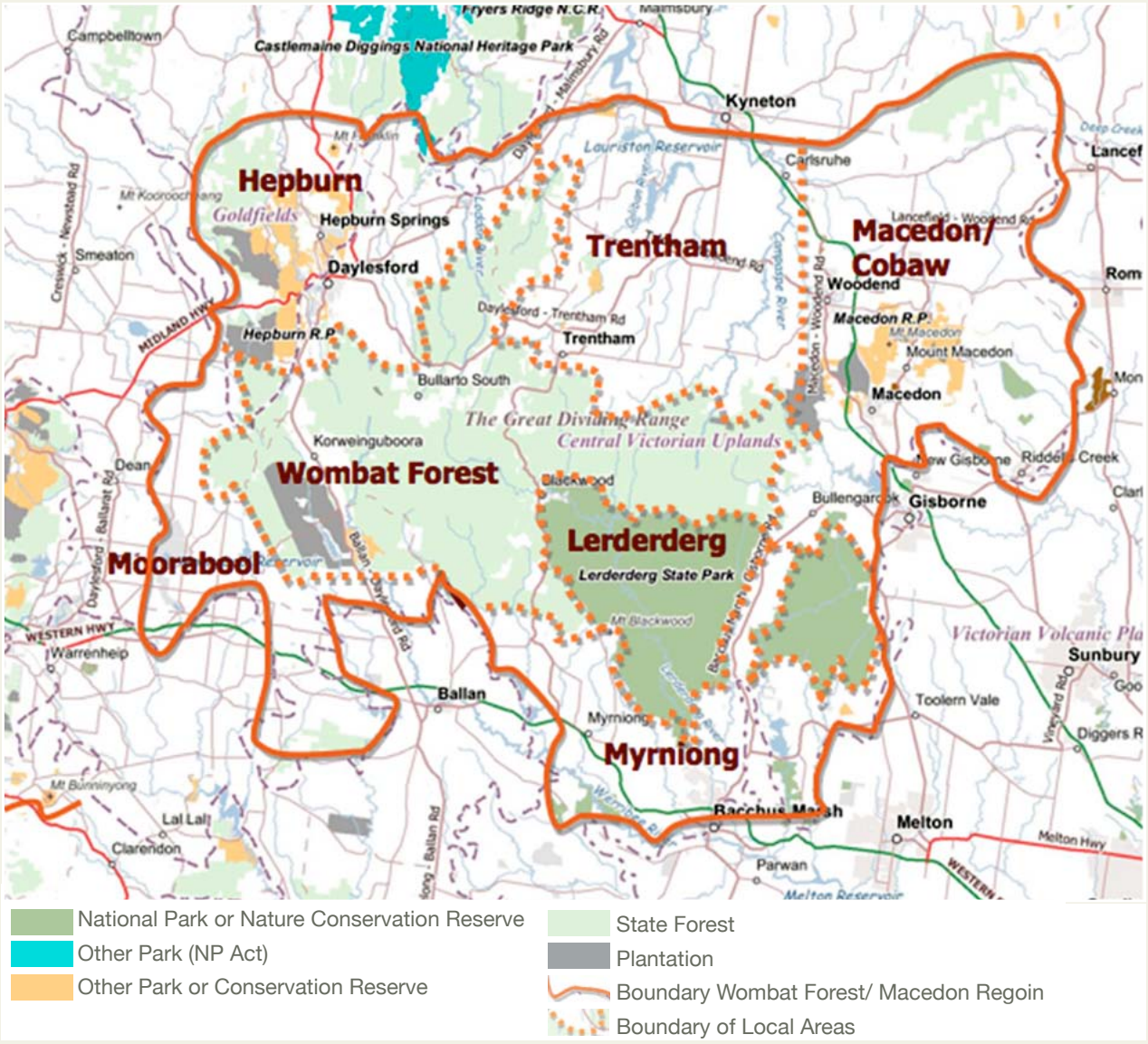
The Koala Connect Project identified gaps in biodiversity planning and data in the Hepburn and Moorabool Shire Councils including a lack of planning and other staff members with required skills, a lack of knowledge in the use of relevant databases, inaccuracies in these databases, long time lags in response to requests for information from DSE and a shortage of locally relevant information for staff and landowners (Loos 2011).

8.6 Key Recommendations for Private Land

- DELWP and local Councils should enforce existing Native Vegetation Retention regulations, including placing a greater emphasis on avoiding the loss of existing native vegetation.
- Councils should significantly increase investment in natural resource management.
- 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.
- DELWP, CMAs 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, CMAs and Councils should provide incentives for improved stewardship of riparian land on private property.
- The State government, CMAs and Councils should provide landowners with stewardship payments to ensure remnant vegetation on private land is protected and managed appropriately i.e. fencing to protect from stock, appropriate grazing regimes, 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.
- DELWP, CMAs and Councils should undertake community awareness and education programs regarding biodiversity conservation on private land.
- Preferentially restore more fertile parts of the landscape.

9. Local Areas in the Wombat Forest/Macedon Region

Map 9.1 **The Wombat Forest/Macedon Region**
(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016)



As previously described, the eastern, southern and western boundaries of the region reflect 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 region has been divided into seven Local Areas. Native flora and fauna recorded for each Local Area are provided in Part Two.

The boundaries of Local Areas are based to some extent on the overall level of fragmentation of native vegetation in different parts of the region but also on land tenure where practical (avoiding overly complex boundaries was also a consideration).

The Lerderderg State Park Local Area comprises the two sections of the Lerderderg State Park and is almost entirely covered by native vegetation. The Wombat Forest Local Area is mostly comprised of the Wombat State Forest but does include some areas of private land that sit within or between forest blocks, and is mostly covered with native vegetation. The Macedon and Hepburn Local Areas contain moderate levels of native vegetation and are comprised of private land with some relatively large blocks of public land. The Trentham, Moorabool and Myrniong Local Areas are largely cleared and are comprised of mostly private land with some smaller areas of public land.

Maps generated from the DELWP Biodiversity Interactive Maps (available through the website at www. delwp.vic.gov. au) have been extensively used in this section of the report. These maps provide a snapshot of data collected over many years by the Victorian government. It should be noted that these maps are based partly on modelling and therefore subject to limitations and may contain some inaccuracies. Despite these limitations the maps provide a very valuable source of information, and are very widely used to inform conservation and land management decisions.

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 Part Two.

9.1.1 Pre-1750 Native Vegetation

See Map 9.1.1. Shrubby Foothill Forest and Herb-rich Foothill Forest were the most common EVCs. Damp Forest occurred in very high rainfall areas and gullies. Heathy Woodland was found on dry ridgetops, while Shrubby Dry Forest, Grassy 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, Creekline Herb-rich Woodland and Sedgy Riparian Woodland occurred along waterways. Small areas of Swampy Riparian Woodland were scattered throughout the Local Area.

The Wombat Forest Local Area at a Glance

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

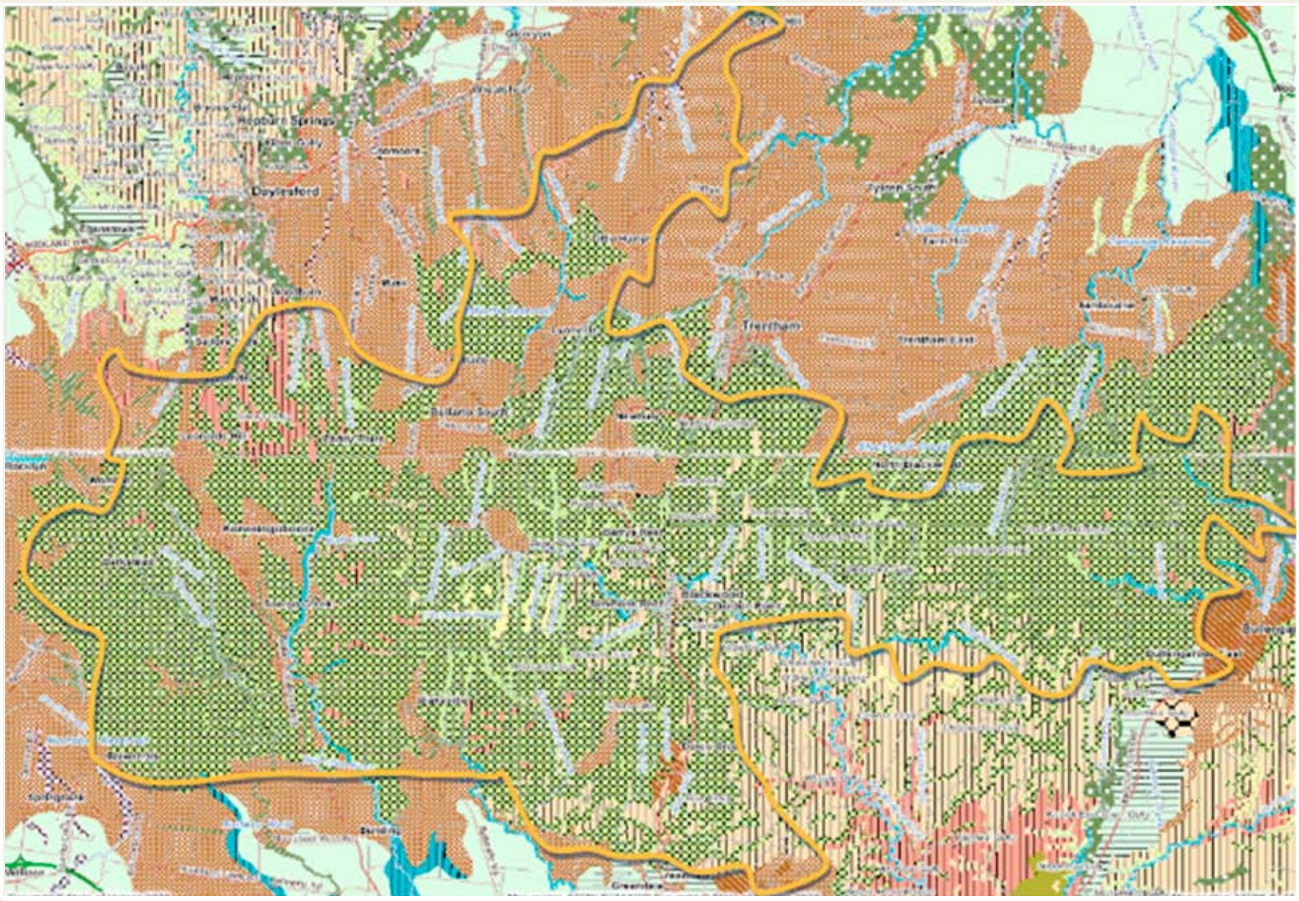
EVCs
16 EVCs including 13 threatened EVCs

Fungi
The area has a very high diversity of fungi

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

(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016, Victorian Biodiversity Atlas 2016

Map 9.1.1 **Pre-1750 Vegetation (EVCs) of the Wombat Forest Local Area**
(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016)



61	Box Ironbark Forest	16	Lowland Forest	198	Sedgy Riparian Woodland
164	Creekline Herb-rich Woodland	859	Montane Grassy Woodland /Rocky Outcrop Complex	21	Shrubby Dry Forest
29	Damp Forest			45	Shrubby Foothill Forest
895	Escarpment Shrubland	132	Plains Grassland	178	Shrubby Foothill Forest/Herb-rich Foothill Forest Complex
22	Grassy Dry Forest	55	Plains Grassy Woodland	851	Streambank Shrubland
128	Grassy Forest	803	Plains Woodland	53	Swamp Scrub
175	Grassy Woodland	292	Red Gum Swamp	83	Swampy Riparian Woodland
20	Heathy Dry Forest	18	Riparian Forest	47	Valley Grassy Forest
48	Heathy Woodland	64	Rocky Chenopod Woodland	30	Wet Forest
23	Herb-rich Foothill Forest	894	Scoria Cone Woodland		Boundary of the Wombat Forest Local Area

9.1.2 Current Vegetation

As most of the area is State Forest, native vegetation cover is very high. Where clearing of native vegetation has occurred it has been on more fertile areas of private land. A large area of forested public land in the Spargo Creek region was converted to pine plantation in the 1970s.

9.1.3 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. The Wombat Forest provides a vital link between the foothill forest on the Great Divide and 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.

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. 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). Vegetation quality assessments undertaken by consultants, Practical Ecology, as part of the VNPA project indicate that generally the understorey within the Wombat State Forest is of good quality (VNPA 2010).

In its 2011 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).

Extract from VNPA 'Better Protection for Special Places' (2010)

The Wombat State Forest - Main section is a long block of 31,448 hectares that abuts Lerderderg State Park at its south-eastern corner. This section of forest has significant wetter habitats, which include Sedgy Riparian Woodland and Damp Forest, linked to the drier forests of the Castlemaine and Bendigo landscape. As well as many creeks, the heritage-listed Lerderderg River runs through this section of the forest. Preliminary analysis using a modelled mapping dataset shows this forest area as generally having medium conservation significance, apart from some patches of high conservation significance vegetation mainly associated with Sedgy Riparian Woodland EVC throughout the forest. Additionally, there are three EVCs Vulnerable in the Central Victorian Uplands within the forest: Grassy Forest (8 ha), Riparian Forest (261 ha) and Valley Grassy Forest (68 ha).

The Wombat State Forest - Bullarto North section covers about 5,300 hectares. Preliminary analysis assessed the area to be primarily of high conservation significance, except for some patches of medium conservation significance vegetation in the south of this forest area), 69% of its EVCs being under-reserved within the Central Victorian Uplands bioregion. Two of its EVCs, Riparian Forest (78 ha) and Creekline Herb-rich Woodland (69 ha), are considered to be Vulnerable within the Central Victorian Uplands Bioregion. The area has some good links to the Upper Loddon State Forest and other large areas of native vegetation along five creek corridors (Kangaroo Creek, Loddon River, Kangaroo Creek (2), Snodgrass Creek and Leitches Creek) that flow to the north. This is in addition to strong links with the main forest area of Wombat State Forest to the south.

The Bullarto North section has important habitat for threatened fauna, with recent records for a range of species including the state-listed Powerful Owl, Musk Duck and Brush-tailed Phascogale (all Vulnerable). Also present are at least four rare and threatened plants including the state-listed Brooker's Gum (*Eucalyptus brookeriana*), Hairy Beard-heath (*Leucopogon microphyllus* var. *pilibundus*) and the endemic Wombat Bush-pea (*Pultenaea reflexifolia* var *reflexifolia*).

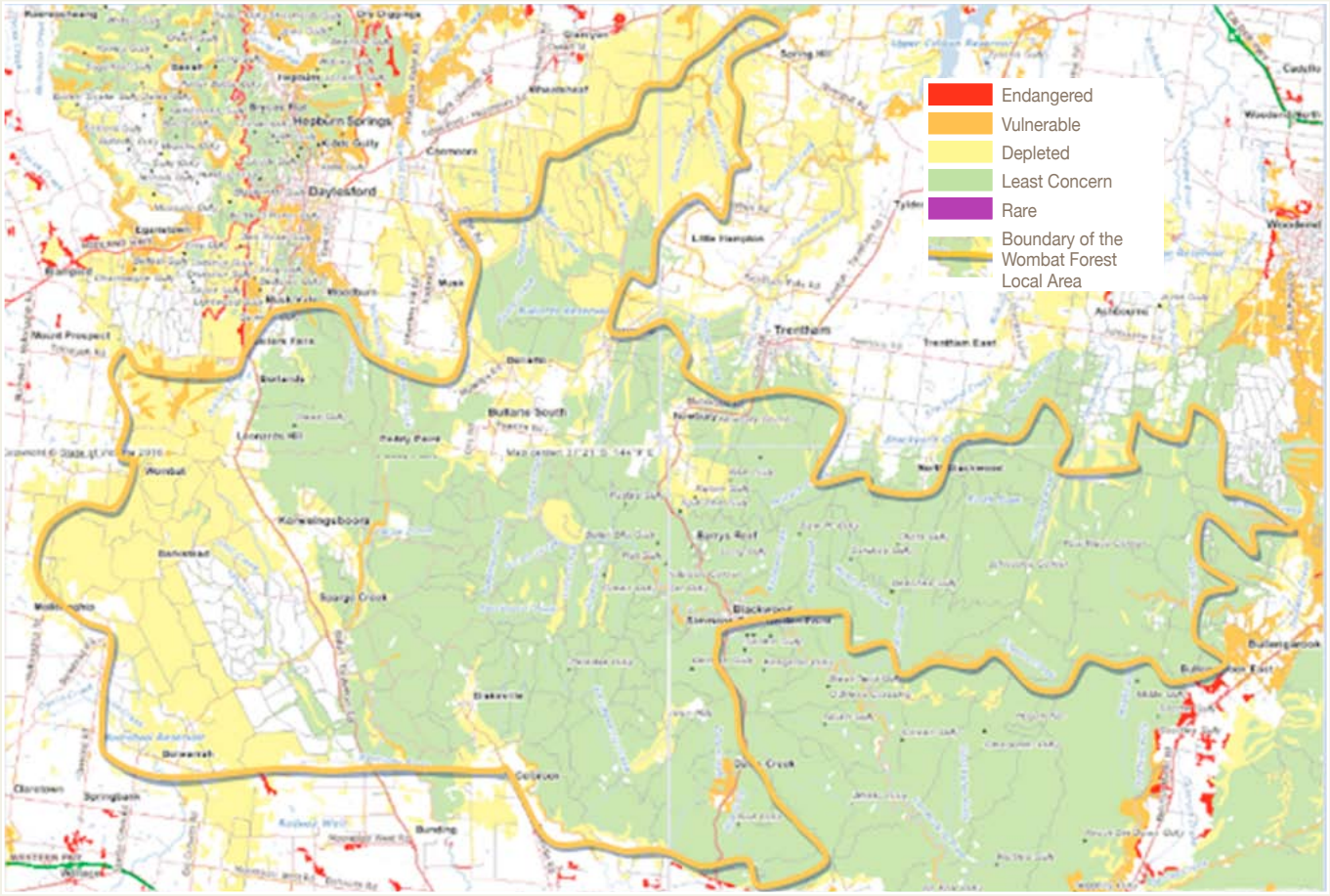
The Bullarto North section is currently managed by DSE for timber harvesting and recreational values. It has nine Special Protection Zones totalling 2,118 ha for the protection of many EVCs including Herb-rich Foothill Forest, Shrubby Foothill Forest, Shrubby Dry Forest, Grassy Dry Forest, Sedgy Riparian Woodland, Heathy Dry Forest and Creekline Herb-rich Woodland. There are also Special Protection Zones to protect habitat for the Powerful Owl. There are also at least four Special Management Zones totalling 752 ha for the protection of EVCs Shrubby Dry Forest, Herb-rich Foothill Forest, Shrubby Foothill Forest and Sedgy Riparian Woodland, as well as Powerful Owl Habitat and designated water supply catchment.

The Wombat State Forest – West section covers about 4,888 hectares. Preliminary analysis found this section to be of high conservation significance, with some patches of very high conservation significance vegetation in the north. In all 75% of its EVCs are under-represented within the Central Victorian Uplands and Goldfields bioregions. Two EVCs present are classified as Vulnerable within the Goldfields bioregion: Sedgy Riparian Woodland (86 ha) and Valley Grassy Forest.

The West section has important habitat for threatened fauna, with recent records for a range of species including the state-listed Powerful Owl (Vulnerable), Eastern Great Egret (Vulnerable), Intermediate Egret (Critically Endangered), Masked Owl (Endangered) and Musk Duck (Vulnerable). Also present are at least four rare and threatened plants including the state-listed Wiry Bossiaea (*Bossiaea cordigera*), Creeping Grevillea (*Grevillea repens*) and Satinwood (*Nematolepis squamea* subsp. *squamea*).

The West section is currently managed by DSE for timber harvesting and recreational values. It has eight Special Protection Zones totalling 976 ha for the protection of many EVCs including Herb-rich Foothill Forest, Shrubby Foothill Forest, Grassy Dry Forest, Sedgy Riparian Woodland, Heathy Dry Forest and Creekline Herb-rich Woodland. There are Special Protection Zones to protect habitat for threatened flora and designated water supply catchment areas. There are also two Special Management Zones totalling 1,601 ha for the protection of the EVCs Shrubby Dry Forest, Herb-rich Foothill Forest and Shrubby Foothill Forest, as well as threatened flora and a designated water supply catchment.

Map 9.1.2 **Bioregional Conservation Status in the Wombat Forest Local Area**
(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016)



9.1.4 Threatened EVCs

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

Table 9.1.1 **Threatened EVCs of the Wombat Forest Local Area**

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 Woodlands Heathy Woodland Grassy Dry Forest Herb-rich Foothill Forest Herb-rich Foothill Forest/Shrubby Foothill Forest Complex

(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016)

9.1.5 Threatened Flora

Twenty-one flora species in the Local Area are listed as rare or threatened at a State or National level. Two species are endemic to the region - *Bossiaea vombata* and *Pultenaea reflexifolia.*

Table 9.1.2 **Threatened Flora of the Wombat Forest Local Area**

Monocotyledons			FFG	EPBC	VROT
	Austrostipa breviglumis	Cane spear-grass			r
	Gahnia microstachya	Slender Saw-sedge			r
	Lemna trisulca	Ivy-leaf Duckweed			k
	Dipodium pardalinum	Spotted Hyacinth-orchid			r
	Entolasia stricta	Upright Panic			k
	Wurmbea uniflora	One-flowered Nancy			r
Dicotyledons					
	Acacia nano-dealbata	Dwarf Silver Wattle			r
	Bossiaea cordigera	Wiry Bossiaea			r
	Bossiaea vombata	Wombat Leafless Bossiaea	FFG		e
	Eucalyptus brookeriana	Brooker's Gum			r
	Eucalyptus yarraensis	Yarra Gum			r
	Grevillea repens	Creeping Grevillea			r
	Lomandra micrantha subsp. *micrantha*	Small-flower Mat rush			r
	Leucopogon microphyllus var. *pilibundus*	Hairy Beard-heath			r
	Olearia speciosa	Netted Daisy-bush			k
	Nematolepis squamea	Satinwood			r
	Prostanthera decussata	Dense Mint Bush			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			n

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: Victorian Biodiversity Atlas 2016

9.1.6 Threatened Fauna

Sixteen fauna species in the region are listed as threatened at a State or National level.

Table 9.1.3 **Threatened Fauna of the Wombat Forest Local Area**

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

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: Victorian Biodiversity Atlas 2016

Koala (*Phascolarctos cinereus)*
Photography © Gayle Osborne

9.1.7 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.

9.1.8 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
- Grazing

(Source: NCCMA 2005, MRSC 2009, VEAC 2010, VEAC 2011)

9.1.9 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 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)*** (VEAC 2010). This connectivity provides a vital link from the foothill forests on the Great Divide, through the drier forest north of the Region to the Box-Ironbark Woodlands in northern Victoria.

9.1.10 Key Recommendations for Wombat Forest Local Area

- As part of the current VEAC Investigation into Central West Forests, 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.

- Increase resources for conservation management of public land including managing key threats.

The Lerderderg Heritage River
Photography © Alison Pouliot

9.2 Hepburn Local Area

The Hepburn Local Area occurs within 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 Part Two.

9.2.1 Pre-1750 Native 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.

The Hepburn Local Area at a Glance

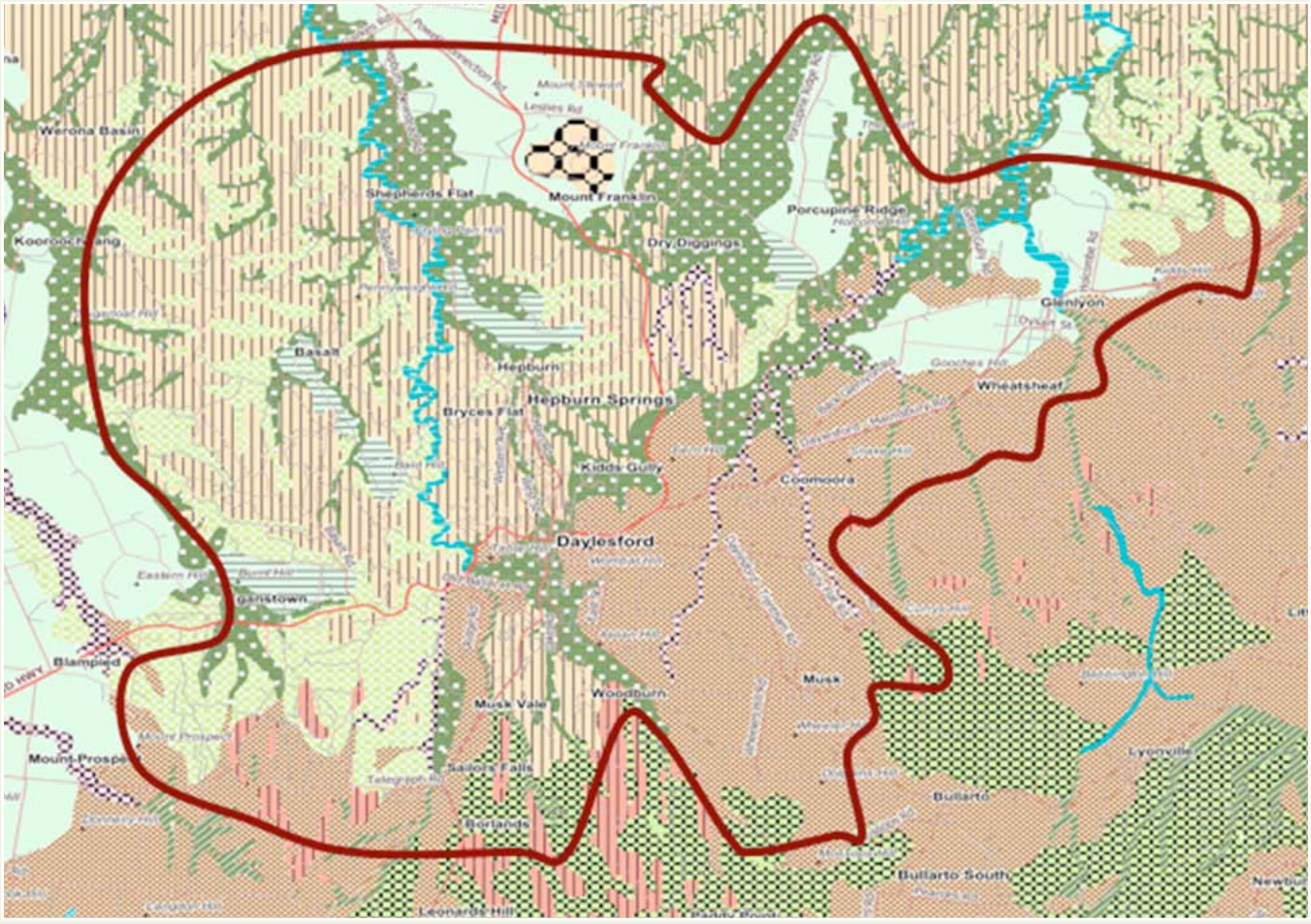
Flora
- 356 indigenous plants have been recorded
- 7 threatened flora species
- 71 serious weeds listed

EVCs
12 EVCs including 9 threatened EVCs

Fauna
- 142 fauna species
- 12 threatened fauna species
- 119 bird species
- 18 mammal species
- 1 reptile species
- 4 frog species

(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016, Victorian Biodiversity Atlas 2016

Map 9.2.1 **Pre-1750 Vegetation (EVCs) of the Hepburn Local Area**
(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016)

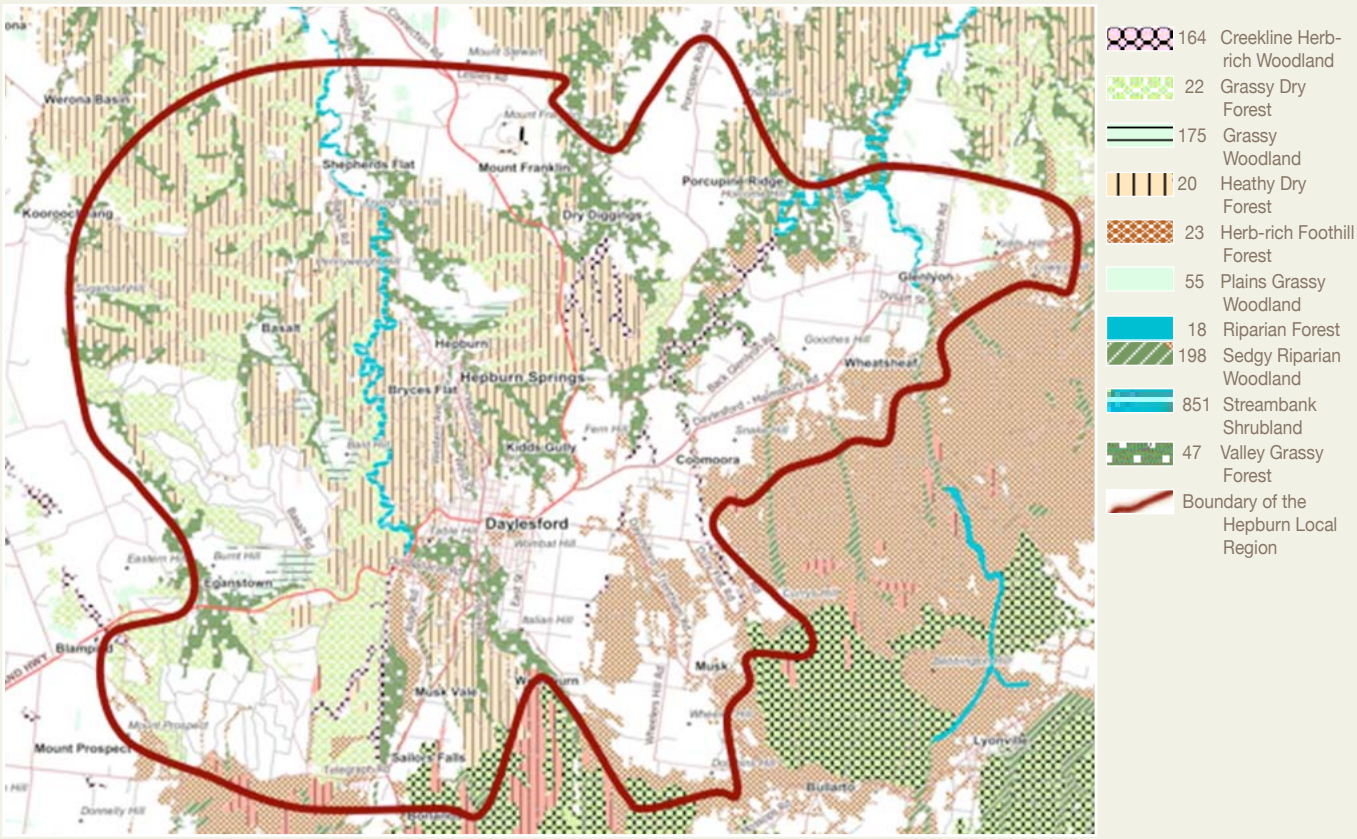


164 Creekline Herb-rich Woodland
22 Grassy Dry Forest
175 Grassy Woodland
20 Heathy Dry Forest

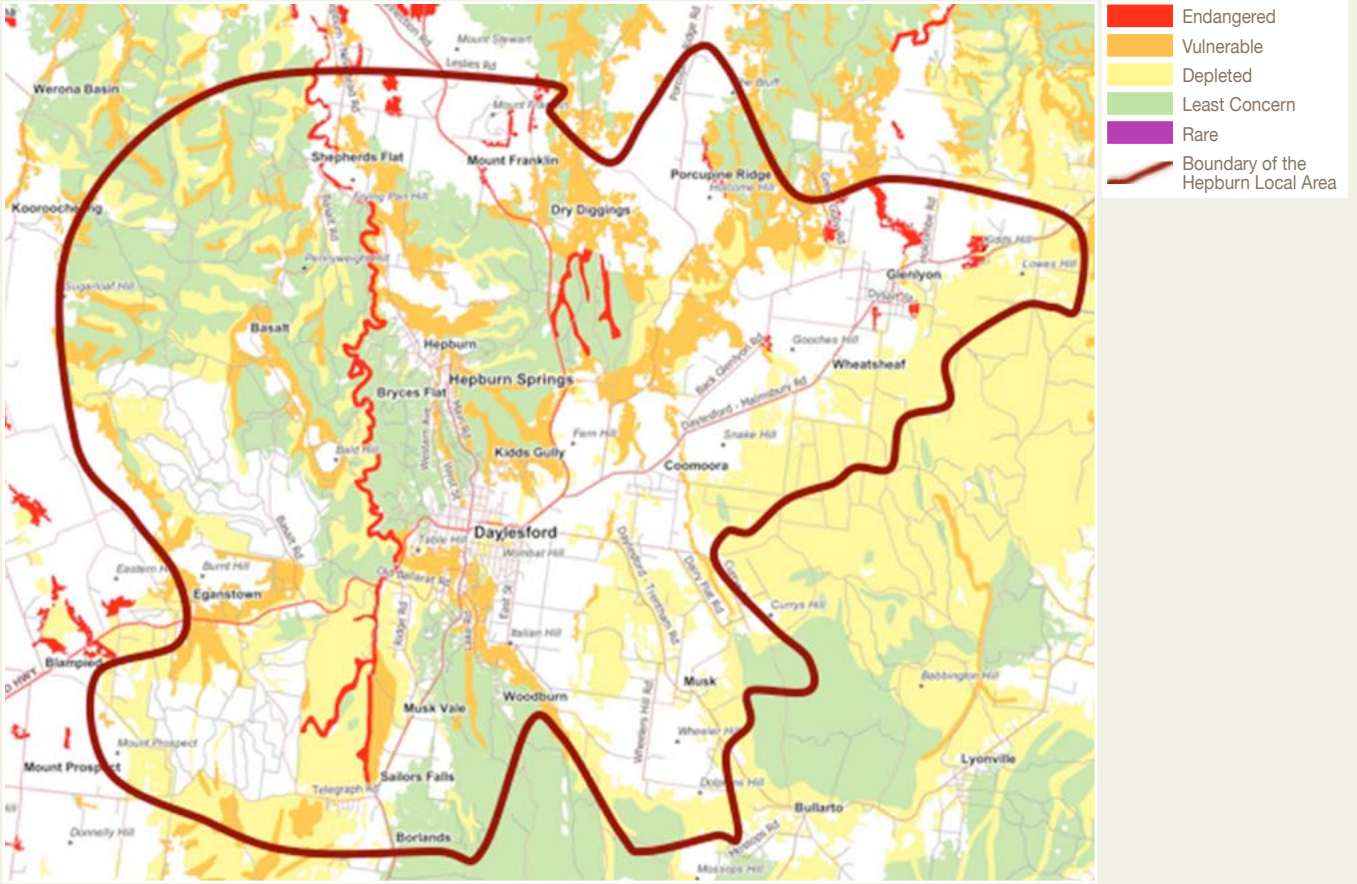
23 Herb-rich Foothill Forest
55 Plains Grassy Woodland
18 Riparian Forest
894 Scoria Cone Woodland

198 Sedgy Riparian Woodland
851 Streambank Shrubland
47 Valley Grassy Forest
Boundary of the Hepburn Local Region

Map 9.2.2 **Current EVCs in the Hepburn Local Area**
(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016)



Map 9.2.3 **Bioregional Conservation Status of EVCs in the Hepburn Local Area**
(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016)



9.2.2 Threatened EVCs

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

Table 9.2.1 **Threatened EVCs of the Hepburn Local Area**

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

(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016)

9.2.3 Threatened Flora

Seven flora species in the Hepburn Local Area are listed as rare or threatened a State level.

Table 9.2.2 **Threatened Flora of the Hepburn Local Area**

Monocotyledons			VROT
	Caladenia clavescens	Midlands Spider-orchid	v
	Dipodium pardalinum	Spotted Hyacinth-orchid	r
Dicotyledons			
	Acacia nano-dealbata	Dwarf Silver Wattle	r
	Bossiaea riparia	River Leafless Bossiaea	r
	Grevillea repens	Creeping Grevillea	r
	Hovea asperifolia subsp. *spinosissima*	Rough Hovea	r
	Swainsona behriana	Southern Swainson-pea	r

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: Victorian Biodiversity Atlas 2016

Creeping Grevillea (*Grevillea repens)*
Photography © Gayle Osborne

9.2.4 Threatened Fauna

Twelve fauna species in the Local Area are listed as threatened a State level.

Table 9.2.3 **Threatened Fauna of the Hepburn Local Area**

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

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: Victorian Biodiversity Atlas 2016

9.2.5 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.

(Source: NCCMA 2005, MRSC 2009, VEAC 2010, VEAC 2011)

9.2.6 Key Areas

Hepburn Regional Park (3,085 hectares)

The Park is located in the Goldfields bioregion and managed by Parks Victoria. It contains a number of threatened fauna species including the Brown Treecreeper (south-eastern ssp.) (*Climacteris picumnus victoriae*) and the Brush-tailed Phascogale (*Phascogale tapoatafa*). The Park provides significant habitat for the Brush-tailed Phascogale with regular surveys undertaken by DELWP and Parks Victoria.

Threatened native plants include the rare *Grevillea obtecta* (Fryerstown Grevillea) and *Grevillea repens* (Creeping Grevillea) and the vulnerable *Pultenaea graveolens* (Scented Bush-pea).

In the north of the Park, Heathy Dry Forest is the most common EVC with smaller areas of Grassy Dry Forest and Valley Grassy Forest. Damper areas in the south of the Park are predominantly Grassy Dry Forest with areas of Valley Grassy Forest and Herb-rich Foothill Forest.

Common birds in the Park include White-browed Scrub Wrens, Grey Currawongs, Crimson Rosellas, White-throated Treecreepers and Yellow Robins, with Rufous Fantails and Satin Flycatchers visiting the gullies seasonally.

Common mammals include Agile Antechinus, Koalas, Swamp Wallabies, Common Ringtail Possums and Eastern Grey Kangaroos.

Wombat State Forest – Hepburn Forest Block
(2,820 hectares)

The Wombat State Forest section of the Hepburn Forest block is managed by DELWP and located within the Central Victorian Uplands and Goldfields bioregions. The forest contains a number of threatened species and provides significant habitat for the Brush-tailed Phascogale.

Extract from VNPA 'Better Protection for Special Places' 2010

Preliminary analysis using a modelled mapping dataset shows this forest area as generally having medium conservation significance, though with many areas of high and very high conservation significance vegetation around the edges of the block, particularly associated with Valley Grassy Forest EVC. Some 289 hectares of this EVC occur within the north-west section. It is classified as Vulnerable within the Goldfields bioregion. Very small patches (less than one hectare) of Grassy Woodland (Vulnerable) and Stream Bank Shrubland (Endangered) EVCs are found there as well.

This section has important habitat for threatened fauna, with recent records for a range of species including the state-listed Brush-tailed Phascogale (Vulnerable), and FFG listed Common Bent-wing Bat.

The section is currently managed by DSE for timber harvesting and recreational values. It has eight Special Protection Zones totalling 1,944 ha (or approximately 70% of this forest area) for the protection of EVCs including Grassy Dry Forest, Valley Grassy Forest and Heathy Dry Forest (all including some old growth), and for the protection of habitat for the Powerful Owl. There are also 20 Special Management Zones totalling 633 ha for the protection of the EVCs Heathy Dry Forest (including some old growth) and Grassy Dry Forest, and habitat for the Powerful Owl.

9.2.7 Landscape Connectivity

Landscape connectivity is very high. The Local Area contains several large blocks of public land. Vegetation cover on private land is high in some areas, although the understorey is often modified. There are 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.

9.2.8 Key Recommendations for Hepburn Local Area

- As part of the current VEAC Investigation into Central West Forests, 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 Map 9.2.3 - Bioregional Conservation Significance with red and orange coloured areas the highest priority).

Scarlet Robin (*Petroica boodang)*
Photography © Gayle Osborne

Rufous Fantail (*Rhipidura rufifrons)*
Photography © Gayle Osborne

9.3 Trentham Local Area

The Trentham Local Area is located in the Central Victorian Uplands bioregion. Due to the fertile soils and higher rainfall most native vegetation in the Trentham Local Area has been widely 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 Part Two.

9.3.1 Pre-1750 Native 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.

The Trentham Local Area at a Glance

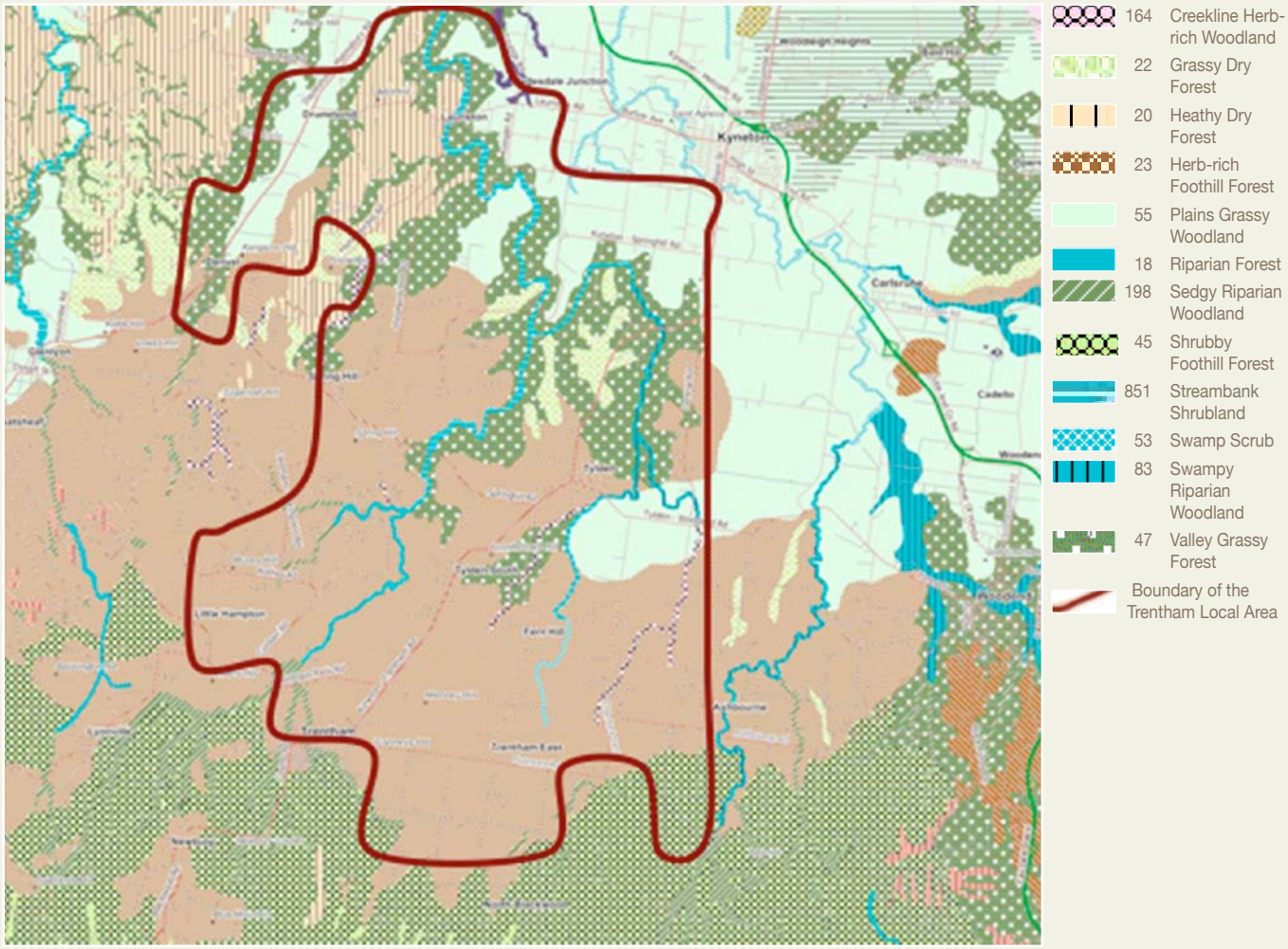
Flora
- 293 indigenous plants have been recorded
- 10 threatened flora species
- 49 serious weeds listed

EVCs
12 EVCs including 10 threatened EVCs

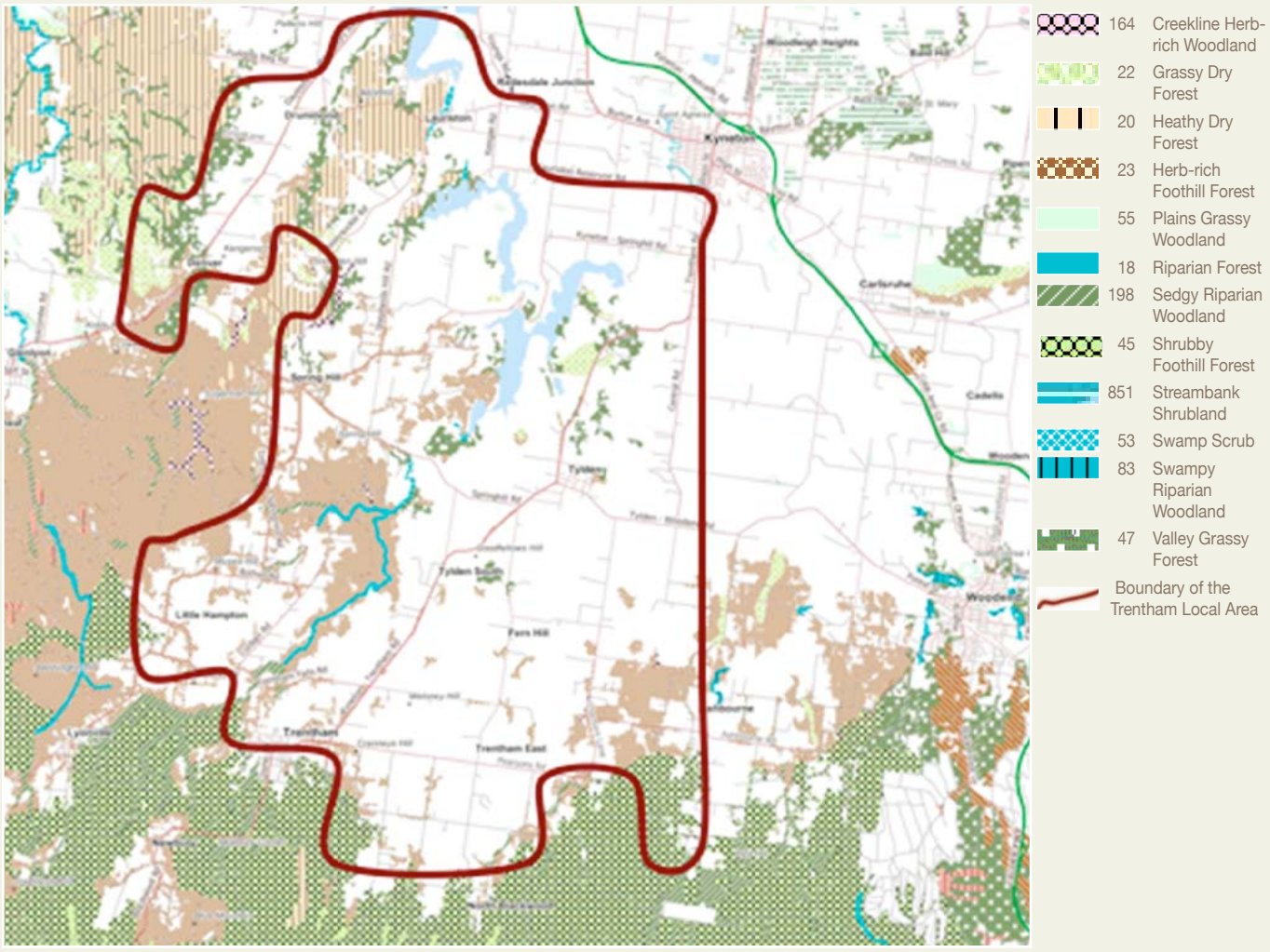
Fauna
- 156 fauna species
- 10 threatened fauna species
- 110 bird species
- 15 mammal species
- 11 reptile species
- 11 frog species

(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016, Victorian Biodiversity Atlas 2016

Map 9.3.1 **Pre-1750 Vegetation (EVCs) of the Trentham Local Area**
(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016)

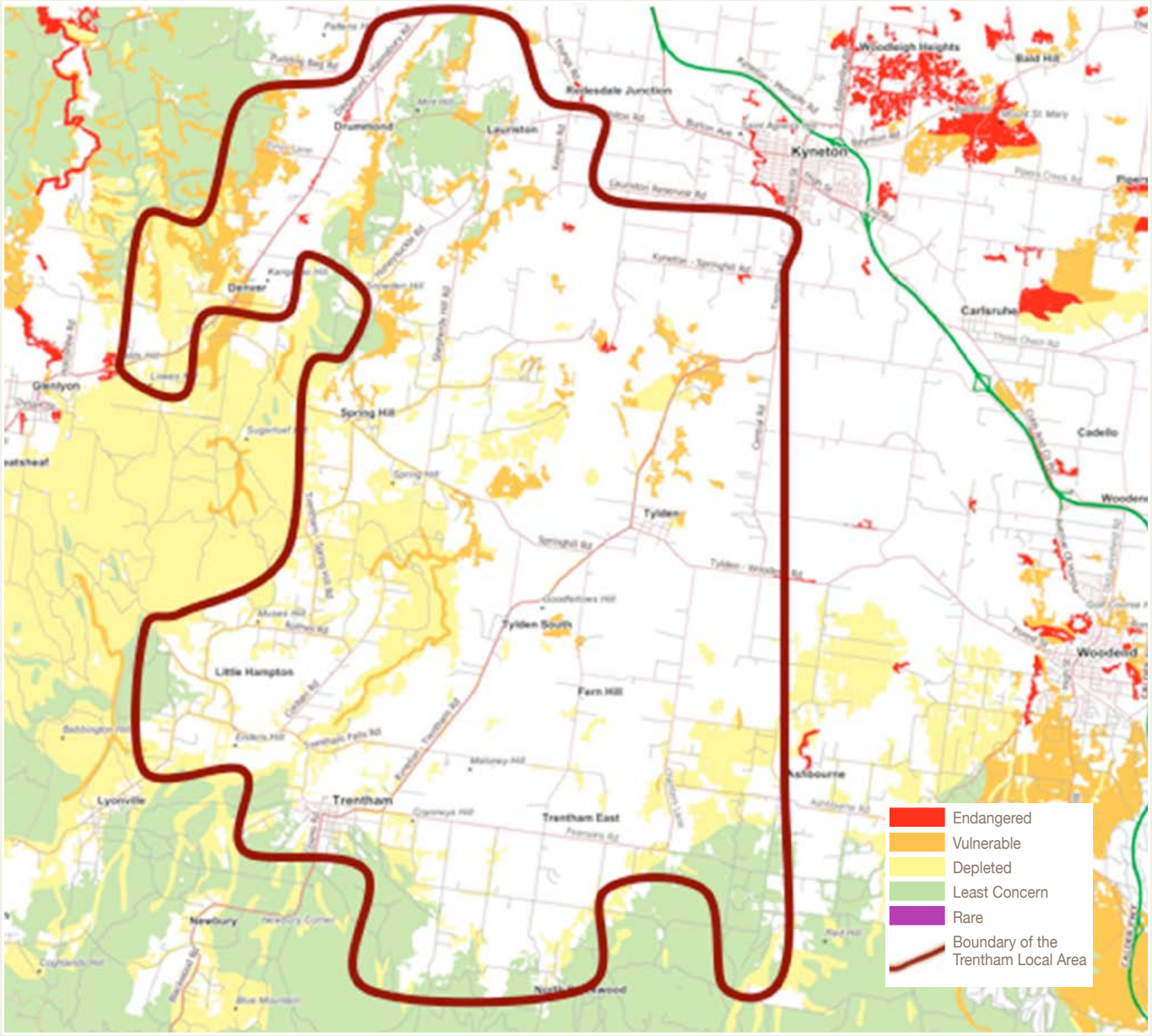


Map 9.3.2 **Current EVCs in the Trentham Local Area**
(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016)



Sedgy Riparian Woodland
Photography © Gayle Osborne

Map 9.3.3 **Bioregional Conservation Status of EVCs in the Trentham Local Area**
(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016)



9.3.2 Current Native Vegetation

Widespread clearing of native vegetation has occurred in fertile areas on private land in the Local Area. Areas of native vegetation remain on public land (see Key Areas). Widely cleared EVCs include Streambank Shrubland, Swampy Riparian Woodland, Plains Grassy Woodland, Herb-rich Foothill Forest, Valley Grassy Forest and Grassy Dry Forest.

9.3.3 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). Significant areas of Plains Grassy Woodland, Valley Grassy Forest, Riparian Forest, Herb-rich Foothill Forest and Grassy Dry Woodland remain in the Local Area.

Table 9.3.1 **Threatened EVCs of the Trentham Local Area**

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

(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016, Victorian Biodiversity Atlas 2016

9.3.4 Threatened Flora

Ten flora species in the region are listed as rare or threatened at a State or National level.

Table 9.3.2 **Threatened Flora of the Trentham Local Area**

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

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: Victorian Biodiversity Atlas 2016. Species in red have been located in the Local Area but are not formally recorded. Records from the Lauriston NCR were provided by John Walter, Malmsbury Landcare Group and by Tim D'Ombrain and Janet Leversha (courtesy of local resident Libby Woodwood) for Denver.

9.3.5 Threatened Fauna

Ten fauna species in the region are listed as threatened at a State or National level.

Table 9.3.3 **Threatened Fauna of the Trentham Local Area**

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

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: Victorian Biodiversity Atlas 2016. Species in red have been located in the Local Area but are not formally recorded. Records from the Lauriston NCR were provided by John Walter, Malmsbury Landcare Group and by Tim D'Ombrain and Janet Leversha (courtesy of local resident Libby Woodwood) for Denver.

9.3.6 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

(Source: NCCMA 2005, MRSC 2009, VEAC 2010, VEAC 2011)

9.3.7 Key Areas

Lauriston Nature Conservation Reserve (148 hectares)

A substantial population (300 plus) of *Grevillea obtecta* occurs in this reserve, which is outside of the recognised distribution range for this species. Two orchids, *Calochilus imberbis* (Naked Beard-orchid) and *Calochilus campestris* (Copper Beard-orchid) have also been observed. None of these species is formally recorded in the region. Twenty 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 has undertaken some weed control on the site with DSE funding.

Wombat State Forest (The Commons) – Lauriston block (109 hectares)

The area is entirely comprised of threatened EVCs. It abuts the Coliban River and forms part of an important riparian corridor.

Tylden South Education Area (120 hectares)

This reserve is mainly comprised of Herb-rich Foothill Forest. It abuts the Coliban River and also forms part of an 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 examples that existed on deep red soils. Over 100 plant species have been recorded in the reserve. The reserve also abuts the Coliban River and forms part of an important riparian corridor.

Upper Coliban Reservoir

A significant Aboriginal heritage site also occurs in the Upper Coliban Reservoir. The site was visited by aboriginals to collect trachylite, a 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.

Other Areas

Areas of remnant Snow Gum (*Eucalyptus pauciflora*) are found in a number of areas, including the Trentham area and Pattens Hill in Drummond. Remnant areas containing Drooping She-oak (*Allocasuarina verticillata*), such as on Pattens Hill in Drummond and Kidds Hill at Glenlyon, are also significant in the area.

9.3.8 Landscape Connectivity

Landscape connectivity ranges from low to very high. The highly cleared areas, especially in the east and north-east of the Trentham Local Area have low connectivity. Areas abutting the Wombat State Forest in the west and south of the Local Area have high connectivity. Opportunities exist to build connectivity in the north-west of the Local Area linking the Wombat Forest with relatively large areas of native vegetation on private land and along the Campaspe River. The Campaspe River also provides a natural wildlife corridor.

Caring for Campaspe

The Caring for the Campaspe project, managed by the North Central Catchment Management Authority, works to engage landowners and the broader community in restoring the streamside vegetation (or riparian zone) along the whole length of the Campaspe River.

Upper Coliban Corridor

The Upper Coliban Corridor project takes in the major waterways in the upper Coliban sub-catchment from the Wombat State Forest to Malmsbury.

9.3.9 Key Recommendations for Trentham Local Area

- The Lauriston block of the Wombat State Forest (The Commons) should be protected as a conservation reserve, and combined with the adjacent Tylden South Education Area.
- The current grazing 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 Map 9.3.3 - Bioregional Conservation Significance with red and orange coloured areas being the highest priority).

9.4 Macedon/Cobaw Local Area

The Macedon/Cobaw Local Area is located in the Central Victorian Uplands bioregion and has very high conservation values. Relatively high levels of native vegetation occur in the southern half and the north-eastern section. The north-western area and some central areas of the region have been extensively 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 Part Two.

9.4.1 Pre-1750 Native 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.

The Macedon/Cobaw Local Area at a Glance

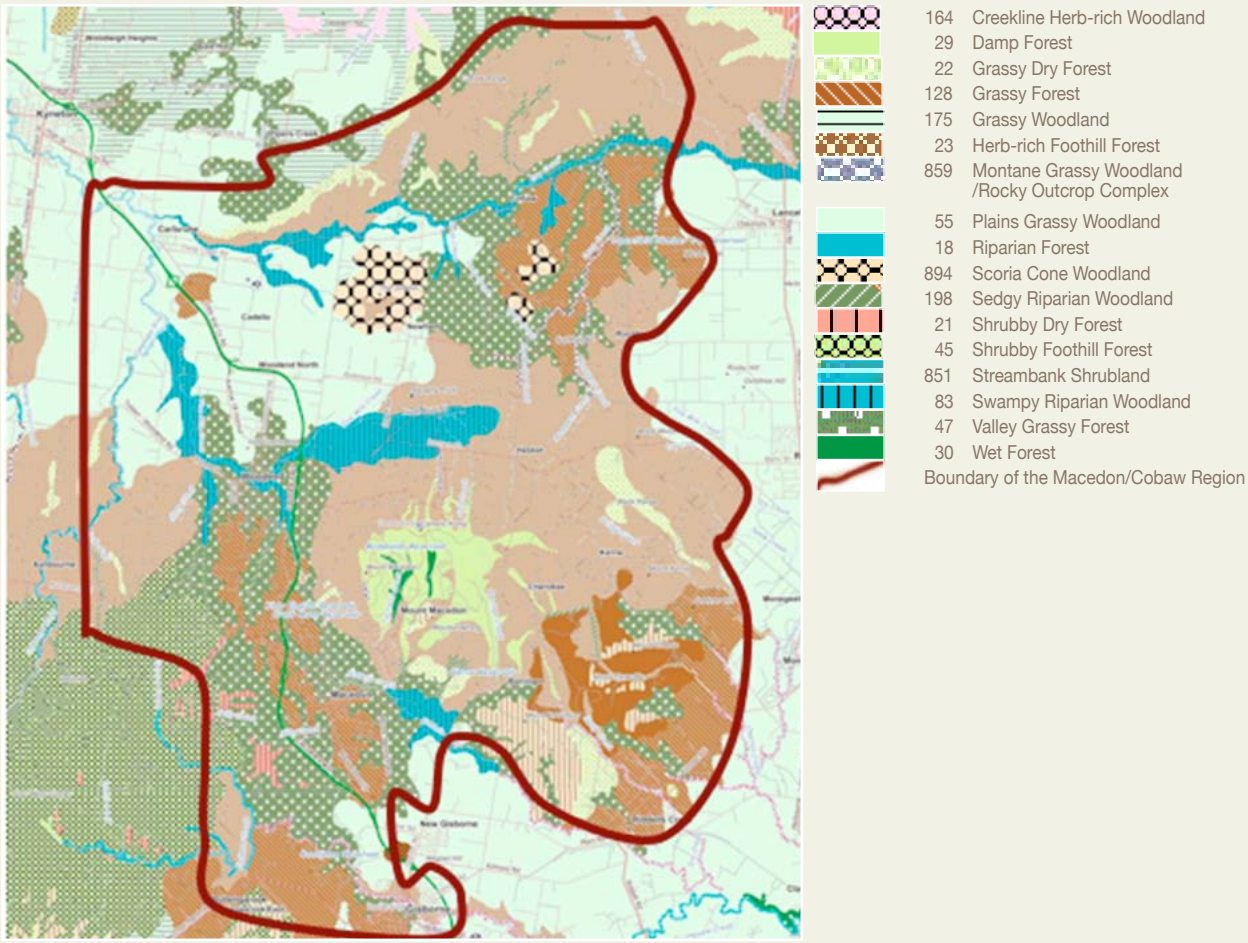
Flora
- 563 indigenous plants have been recorded, including 48 orchid species
- 20 threatened flora species
- 106 serious weeds listed

EVCs
18 EVCs including 14 threatened EVCs

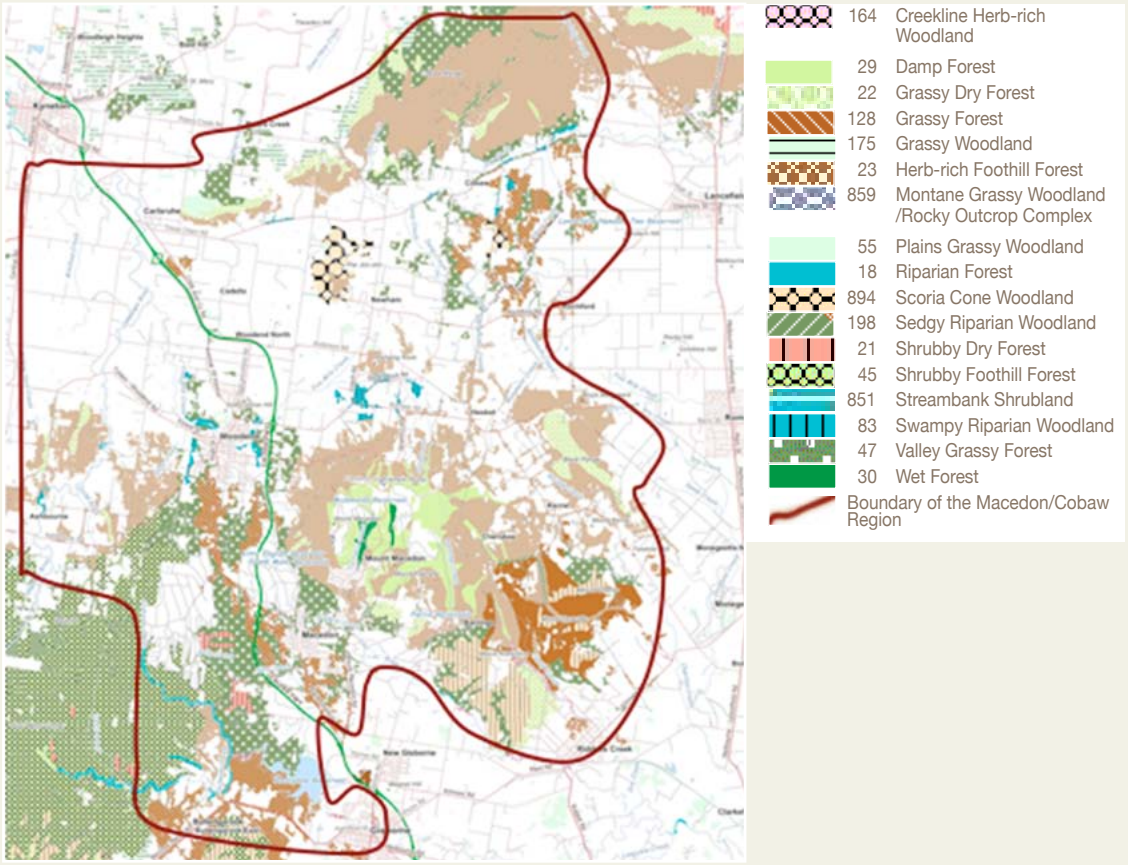
Fauna
- 219 fauna species
- 27 threatened vertebrate fauna species
- 2 threatened invertebrate species
- 164 bird species
- 32 mammals, including 9 bat species
- 14 reptile species including 9 skink species
- 9 frog species

(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016, Victorian Biodiversity Atlas 2016

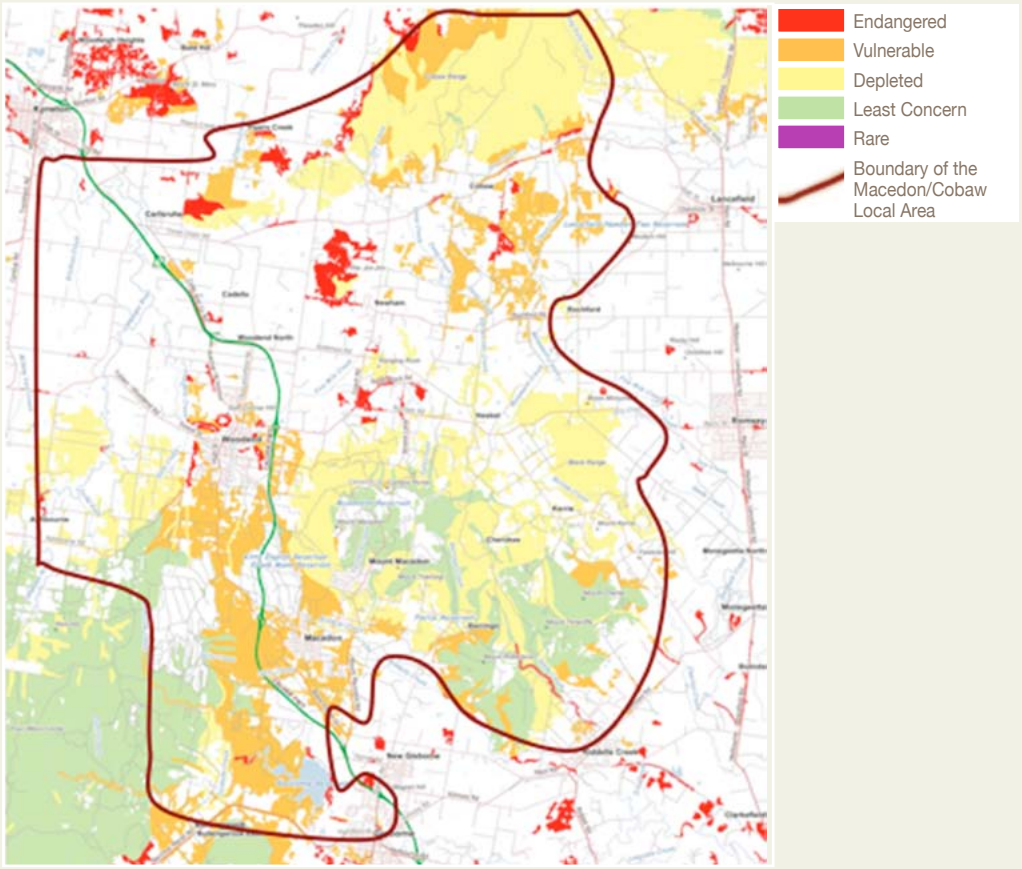
Map 9.4.1 **Pre-1750 Native Vegetation (EVCs) of the Macedon/Cobaw Local Area**
(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016)



Map 9.4.2 **Current EVCs in the Macedon/Cobaw Local Area**
(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016)



Map 9.4.3 **Bioregional Conservation Status of EVCs in the Macedon/Cobaw Local Area**
(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016)



9.4.2 Current Native Vegetation

The foothills of the Great Divide in the south 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, especially in the north-west of the region. The Cobaw Ranges also retain high levels of vegetation cover. Widely cleared EVCs include Herb-rich Foothill Forest, Valley Grassy Forest, Grassy Woodland and Swampy Riparian Woodland. Most remaining vegetation types are considered depleted, vulnerable or endangered. In the Macedon Ranges Shire 90% of endangered and vulnerable EVCs occur on private land (MRSC 2009).

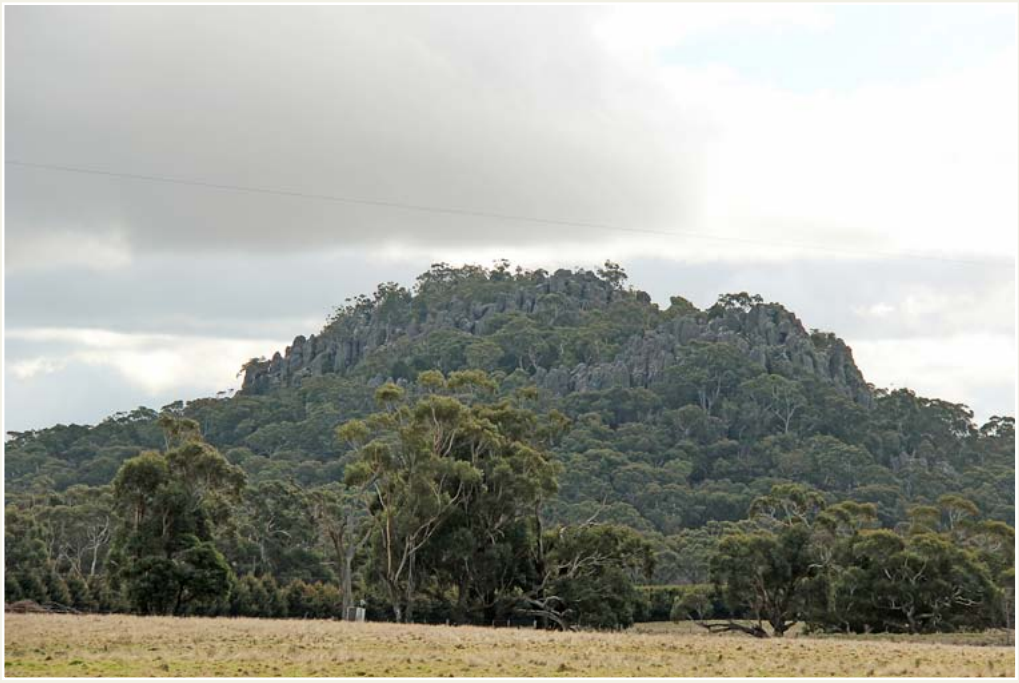
9.4.3 Threatened EVCs

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

Table 9.4.1 **Threatened EVCs of the Macedon/Cobaw Local Area**

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

(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016, Victorian Biodiversity Atlas 2016



Hanging Rock, Macedon Ranges
Photography © Gayle Osborne

9.4.4 Threatened Flora

Twenty flora species in the region are listed as rare or threatened at a State or National level.

Table 9.4.2 **Threatened Flora of the Macedon/Cobaw Local Area**

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

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: Victorian Biodiversity Atlas 2016 except for data in red, which has been provided by Russell Best and David Francis of Riddells Creek Landcare <http://www.riddellscreeklandcare.org.au/>

9.4.5 Threatened Fauna

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

Table 9.4.3 **Threatened Fauna of the Macedon/Cobaw Local Area**

Mammals			FFG	EPBC	VROT
	Brush-tailed Phascogale	*Phascogale tapoatafa*	FFG		v
	Common Dunnart	*Sminthopsis murina*			v
	Eastern Pygmy-possum	*Cercartetus nanus*			n
	Greater Glider	*Petauroides volans*	FFG	V	v
	Spot-tailed Quoll	*Dasyurus maculatus*	FFG	E	e
Birds					
	Australasian Bittern	*Botaurus poiciloptilus*	FFG		e
	Australasian Shoveler	*Anas rhynchotis*			v
	Baillon's Crake	*Porzana pusilla*	FFG		v
	Barking Owl	*Ninox connivens*	FFG		e
	Blue-billed Duck	*Oxyura australis*	FFG		e
	Black Falcon	*Falco subniger*			v
	Brown Treecreeper (south-eastern ssp.)	*Climacteris picumnus victoriae*			n
	Eastern Great Egret	*Ardea modesta*	FFG		v
	Hardhead	*Aythya australis*			v
	Hooded Robin	*Melanodryas cucullata*	FFG		n
	Intermediate Egret	*Ardea intermedia*	FFG		c
	Latham's Snipe	*Gallinago hardwickii*			n
	Masked Owl	*Tyto novaehollandiae*	FFG		e
	Musk Duck	*Biziura lobata*			v
	Nankeen Night Heron	*Nycticorax caledonicus*			n
	Powerful Owl	*Ninox strenua*	FFG		v
	Regent Honeyeater	*Anthochaera phrygia*	FFG	E	c
	Royal Spoonbill	*Platalea regia*			v
	Spotted Quail-thrush	*Cinclosoma punctatum*			n
	Whiskered Tern	*Chlidonias hybridus*			n
Frogs					
	Brown Toadlet	*Pseudophryne* bibronii	FFG		e
	Growling Grass Frog	*Litoria raniformis*	FFG	V	e
Invertebrate Insects					
	Yellow Ochre Butterfly	*Trapezites lutea lutea*	FFG		
	Amethyst Hairstreak Butterfly	*Jalmenus icilius*	FFG		

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 Victorian Biodiversity Atlas 2016 except for data in red which has been provided by Russell Best and David Francis of Riddells Creek Landcare <http://www.riddellscreeklandcare.org.au/>

9.4.6 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

(Source: NCCMA 2005, MRSC 2009, VEAC 2010, VEAC 2011)

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 (MRSC 2009).

9.4.7 Key Areas on Public Land

Macedon Regional Park (2,165 hectares)

The Park contains a very diverse range of vegetation types. Snow Gums (*Eucalyptus pauciflora*) 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)

The Cobaw Range is comprised of rolling hills, long spurs with broad crests, often strewn with large granite boulders. The range forms part of the granitic Cobaw Batholith (DPI) The forest is largely comprised of threatened EVCs. The depleted Herb-rich Foothill Forest is widespread. The vulnerable Valley Grassy Forest is also common. The near threatened Eastern Pygmy-possum (*Cercartetus nanus*) and the vulnerable Weak Daisy (*Brachyscome debilis*) are recorded in the forest.

Hanging Rock Recreation Reserve (88 hectares)

The reserve is 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 forest – the Macedon Ranges and Cobaw Ranges. A Management Plan was developed in 2015. Three distinct woodland vegetation types occur, including a Snow Gum and Candlebark Woodland on the peak and an area of high quality 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 (MRSC 2009).

Woodend Grassland Reserve (9 hectares)

The reserve has very high conservation values and contains the 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. The reserve is managed by MRSC. An environmental management plan was developed in 2012. Ecological burns have been undertaken and the area has been fenced to protect it from trail bikes. Weed invasion is an ongoing issue (MRSC 2009).

Mount Charlie Flora Reserve (319 hectares)

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

T-Hill Flora Reserve (50 hectares)

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

Barringo Recreation Reserve (34 hectares)

Managed by MRSC and an Environmental Management Plan was prepared in 2013. 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.

Stanley Park Waterfall and Reserve (6 hectares)

Contains Damp Forest, the depleted Herb-rich Foothill Forest, a native grassland area and diverse vegetation with over 150 native flora species recorded.

9.4.8 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 a previously unknown subspecies of

Stylidium armeria, Hairy-leaf Triggerplant (*Stylidium armeria* subsp. *pilosifolium*). Noted for the quality of the vegetation. Connects with Conglomerate Gully Flora Reserve.

Black Gum Remnants and Isolated Trees

Black Gum (*Eucalyptus aggregata*) 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 River. The Slatey Creek population has very high conservation values as it is in a relatively undisturbed area. Along Five Mile Creek, Black Gum often remains as isolated trees. Identified by MRSC as a key species and protected in a Vegetation Overlay. Revegetation works have been undertaken.

9.4.9 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.

Kyneton Woodlands Project

This project aims to re-establish 610 hectares of grassy woodland and to enhance 950 hectares of remnant woodland. In 2012, the NCCMA secured $2.46M from the Australian Government to improve carbon storage and the biodiversity of the remnant grassy woodlands on private land in the Kyneton district. The Macedon Ranges Shire will undertake weed management on public land and roadsides within the project area (NCCMA).

Riddells Creek Wildlife Corridor

The Riddells Creek Landcare is 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.

Greening of Riddell

Greening of Riddell are undertaking the construction of a walking path and the revegetation of the north side of Riddells Creek to create a wildlife corridor from the railway station to Conglomerate Gully Flora Reserve.

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 has 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
- 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 – 3 ha.

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 in a 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**
(Source MRSC 2009)

9.4.10 Key Recommendations for Macedon/Cobaw Local Area

- As part of the current VEAC Investigation into Central West Forests, 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 invests greater resources to manage the Macedon Ranges Regional Park and other reserves.
- DELWP, CMAs 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 Map 9.4.3: Bioregional Conservation Status of EVCs in the Macedon/Cobaw Local Area, with red and orange coloured areas 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.

Mount Charlie Flora Reserve
Photography © Gayle Osborne

9.5 Lerderderg State Park Local Area.

Located in the Central Victorian Uplands. The Lerderderg State Park Local Area is composed entirely of the Lerderderg State Park. The area has very high conservation values and contains a range of habitats from the riparian environment of the Lerderderg River, damp forest pockets and drier open woodlands to dry rocky outcrops along high ridges. A list of native flora and fauna in the Lerderderg State Park Local Area is provided in Part Two.

9.5.1 The Lerderderg State Park

The park has two separate sections - the western Lerderderg section and the eastern Pyrete section. The total area is 20,184 hectares. The Park was established in 1988, with the Pyrete section added in 2005. It contains a range of geological and geomorphological features of State and International Significance (Parks Victoria 1999). The park also contains a large section of the Lerderderg Heritage River. Due to gold mining during the 1850-80s the timber in the area was cut intensively for fuel, power and mine support in the western section (Parks Victoria 1999). The Pyrete Range remains relatively undisturbed since European settlement and is an important water catchment for Melton and Bacchus Marsh (LCC 1987).

Common native mammals include the Wombat, Echidna, Common Ringtail Possum, Koala, Swamp Wallaby and Eastern Grey Kangaroo. Peregrine Falcons and Wedge-tailed Eagles are among the many raptors that inhabit the rocky hills and deep valleys of the Park (Parks Victoria 1999). Apart from a comprehensive survey for Powerful Owls, carried out by NRE in 1995, little recent faunal survey work has been undertaken in the Park (Parks Victoria 1999).

The Lerderderg State Park Local Area at a Glance

Flora
- 448 indigenous plants have been recorded, including 31 orchid species
- 21 threatened flora species
- 85 serious weeds listed

EVCs
9 EVCs including 6 threatened EVCs

Fauna
- 176 fauna species
- 20 threatened fauna species (5 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

(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016, Victorian Biodiversity Atlas 2016

The Lerderderg Heritage River
Photography © Alison Pouliot

9.5.2 Pre-1750 and Current Native Vegetation

See Map 9.5.1. Vegetation in the Park tends to follow a rainfall gradient from north to the south (Parks Victoria 1999). Heathy Dry Forest is the dominant EVC in the north along with Shrubby Foothill Forest occurring on more sheltered sites. Scrubby Dry Forest is 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. Small areas of Grassy Dry Forest occur in the south of the park. Riparian EVCs include Riparian Forest in the north changing to Streambank Shrubland in the south. A small area old growth forest is mapped near Blackwood and larger section in Pyrete section. Both are most likely Heathy Dry Forest.

9.5.3 Threatened EVCs

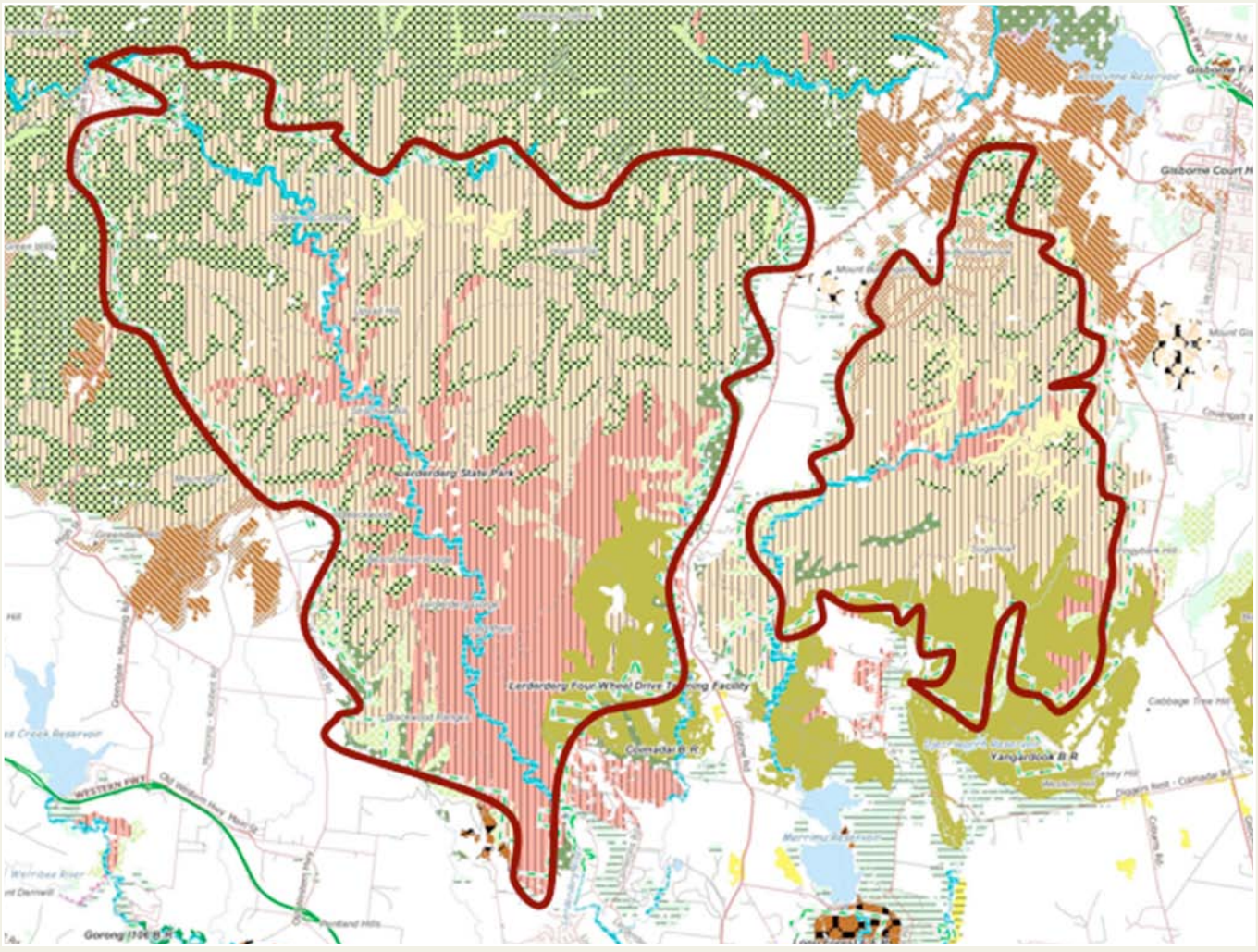
Six of the nine EVCs in the Lerderderg State Park Local Area have a bioregional conservation status of endangered, vulnerable or depleted (Shrubby Foothill Forest and Heathy Dry Forest are least concern).

Table 9.5.1 **Threatened EVCs of the Lerderderg State Park**

Endangered	Vulnerable	Depleted
Streambank Shrubland	Riparian Forest Valley Grassy Forest Box Ironbark Forest	Heathy Woodland Grassy Dry Forest

(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016, Victorian Biodiversity Atlas 2016

Map 9.5.1 **Current Vegetation (EVCs) of the Lerderderg State Park Local Area**
(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016)



61 Box Ironbark Forest
22 Grassy Dry Forest
20 Heathy Dry Forest
48 Heathy Woodland
18 Riparian Forest
21 Shrubby Dry Forest
45 Shrubby Foothill Forest
851 Streambank Shrubland
47 Valley Grassy Forest
Boundary of the Lerderderg State Park Local Region

9.5.4 Threatened Flora

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

Table 9.5.2 **Threatened Flora of the Lerderderg State Park**

Monocotyledons			Location	FFG	EPBC	VROT
	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			r
	Pterostylis truncata	Brittle Greenhood		FFG		e
Dicotyledons						
	Acacia aspera subsp. *parviceps*	Rough Wattle				r
	Allocasuarina luehmannii	Bulok		FFG		f
	Bossiaea cordigera	Wiry Bossiaea	Lerderderg State Park			r
	Desmodium varians	Slender Tick-trefoil				k
	Grevillea repens	Creeping Grevillea	Lerderderg State Park			r
	Leucopogon microphyllus var. *pilibundus*	Hairy Beard-heath	Lerderderg State Park			r
	Nicotiana suaveolens	Austral Tobacco				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				n
	Tetratheca stenocarpa	Long Pink-bells	Lerderderg State Park			r
	Westringia glabra	Violet Westringia				r

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: Victorian Biodiversity Atlas 2016.

9.5.5 Significant Native Flora

Ten plant species in the Park are considered to be significant in the western part of the State due to being localised, depleted, have a disjunct occurrence or are at the edge of their range (Parks Victoria 1999).

Anogramma leptophylla	Annual Fern
Arthropodium fimbriatum	Nodding Chocolate-lily
Bossiaea obcordata	Spiny Bossiaea
Caleana major	Large Duck-orchid
Lepidosperma tortuosum	Tortuous Rapier-sedge
Persoonia chamaepeuce (Source (Parks Victoria 1999)	Dwarf Geebung
Eucalyptus sieberi (Source LCC 1987)	Silvertop (Pyrete Range)

The following species were recorded as being significant by Beuglehole in 1981 (Parks Victoria 1999) but are not recorded in Viridans Biological Database 2009.

Austrodanthonia longifolia	Long-leaf Wallaby-grass
Olearia pimeleoides	Pimelea Daisy-bush
Pterostylis pusilla	Ruddy-hood

Source: (Parks Victoria 1999)

9.5.6 Threatened Fauna

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

Table 9.5.3 **Threatened Fauna of the Lerderderg State Park**

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

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: Victorian Biodiversity Atlas 2016.

9.5.7 Significant Native Fauna

The Park also supports fauna species that are at or close to the western limit of their ranges, such as the Greater Glider, Mountain Brushtail Possum and Red-browed Treecreeper (Parks Victoria 1999).

9.5.8 Key Potentially Threatening Processes

- Fuel reduction burning
- Pest plants and animals
- Recreation
- Cinnamon Fungus *(Phytophthora cinnamomi)* especially along heathy ridge tops where Grass-trees are dying in some areas

(Source: MRSC 2009, Parks Victoria 1999, VEAC 2010, VEAC 2011)

9.5.9 Landscape Connectivity

Very high - The Lerderderg State Park Local Area is a large core area of native vegetation that is contiguous with the 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 Werribee Gorge State Park, and greater linkages are required. 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.

9.5.10 Key Recommendations for Lerderderg State Park

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

Juvenile Powerful Owls *(Ninox strenua)*
Photography © Gayle Osborne

9.6 The Myrniong Local Area

The Myrniong Local Area is mostly located in the Central Victorian Uplands bioregion with small areas of Victorian Volcanic Plain bioregion present east of Bacchus Marsh. The Local Area is largely cleared although very significant areas of native vegetation remain, especially the Werribee Gorge State Park, Long Forest Flora Reserve and areas abutting the Djerriwarrah and Merrimu Reservoirs.
As a result, reserves in the Local Area have very high conservation values. A list of native flora and fauna in the Myrniong Local Area is provided in Part Two.

9.6.1 Pre-1750 Native 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.

The Myrniong Local Area at a Glance

Flora

- 300 indigenous plants have been recorded, including 18 species of chenopod associated with Mallee vegetation in Long Forest
- 16 threatened flora species
- 98 serious weeds listed

EVCs

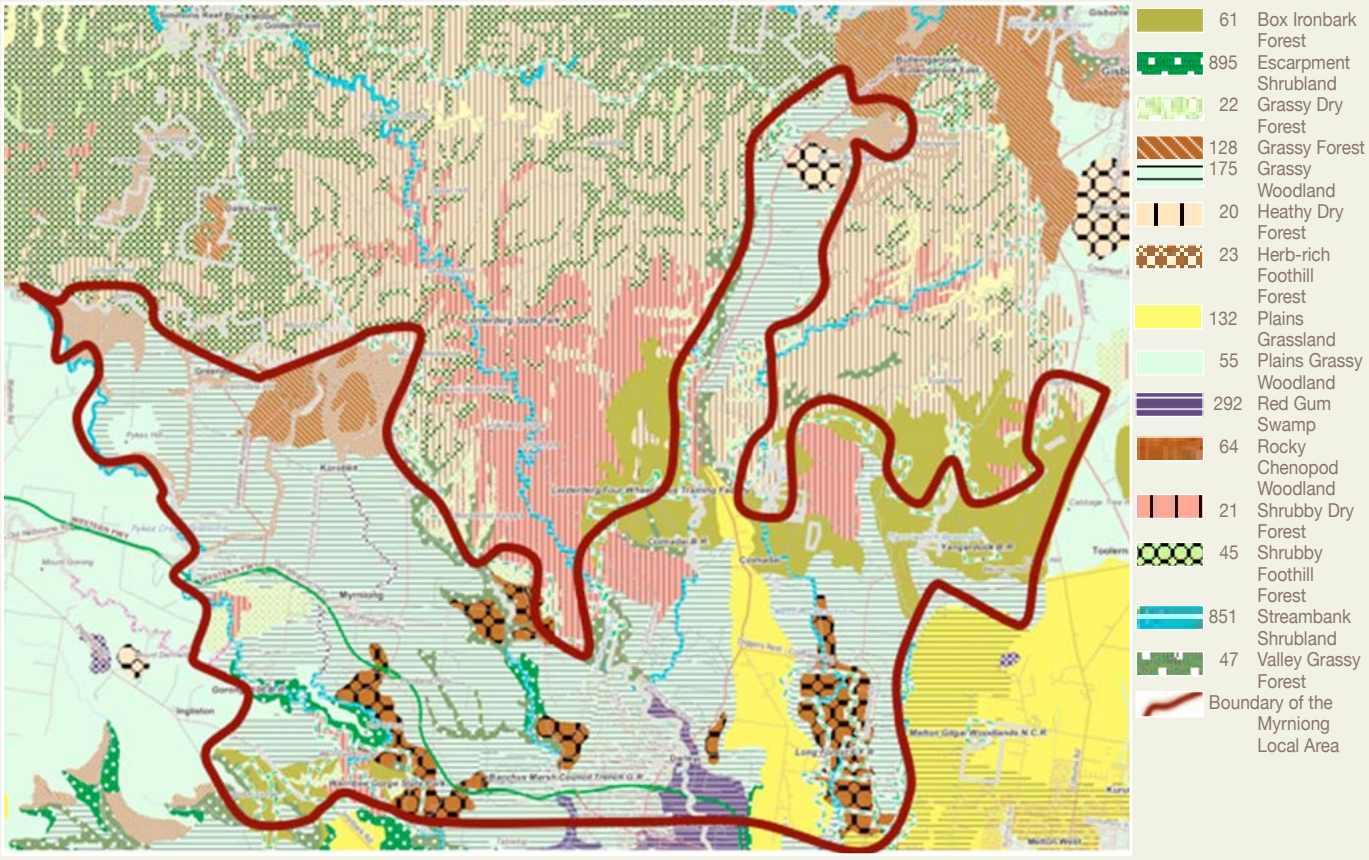
15 EVCs including 12 threatened EVCs

Fauna

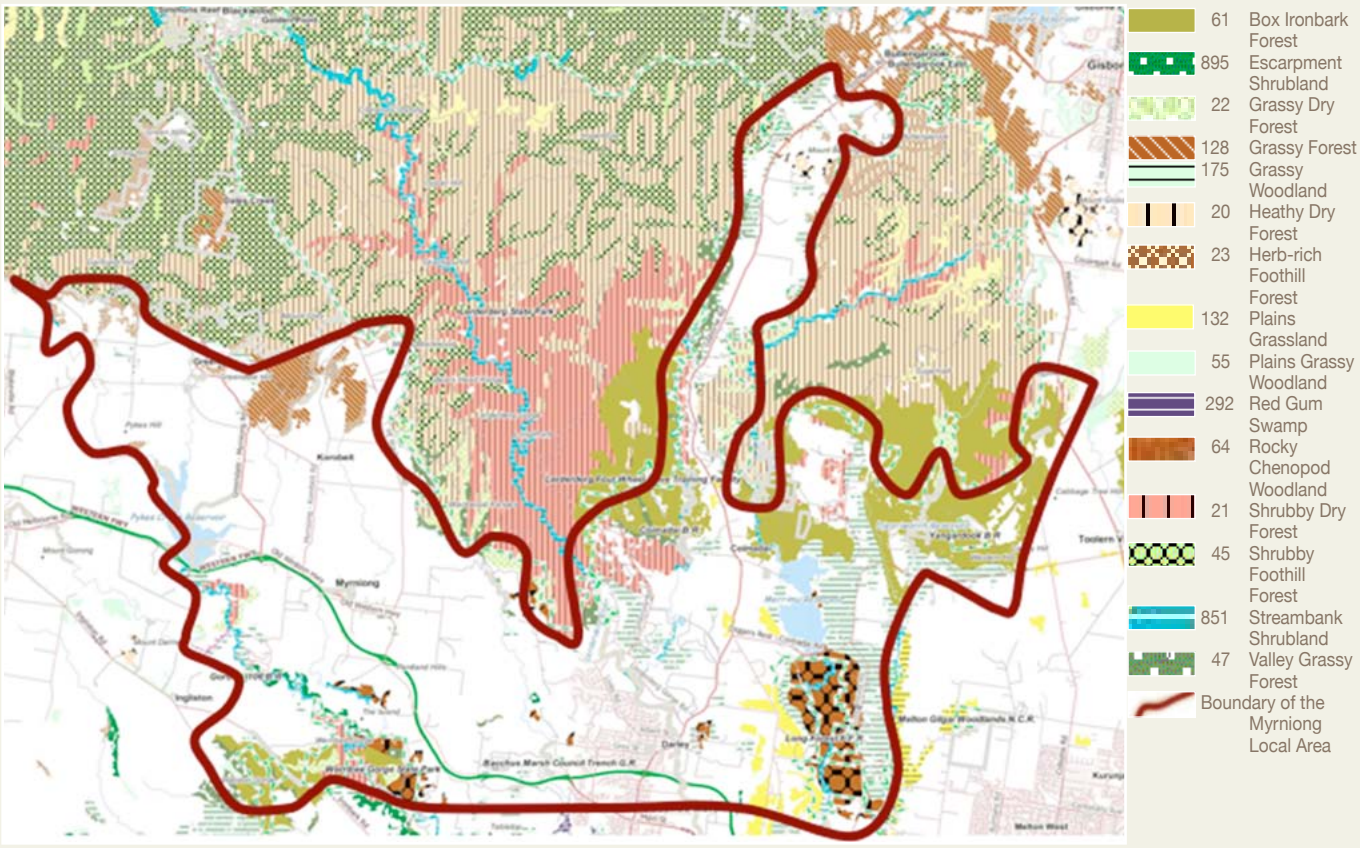
- 251 fauna species
- 37 threatened fauna species (5 mammals, 27 birds, 2 reptiles and 3 frogs)
- 163 bird species
- 28 mammals, including 10 bat species
- 20 reptile species, including 2 dragons, 6 snakes, 9 species of skink, and Lace Goanna

(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016, Victorian Biodiversity Atlas 2016

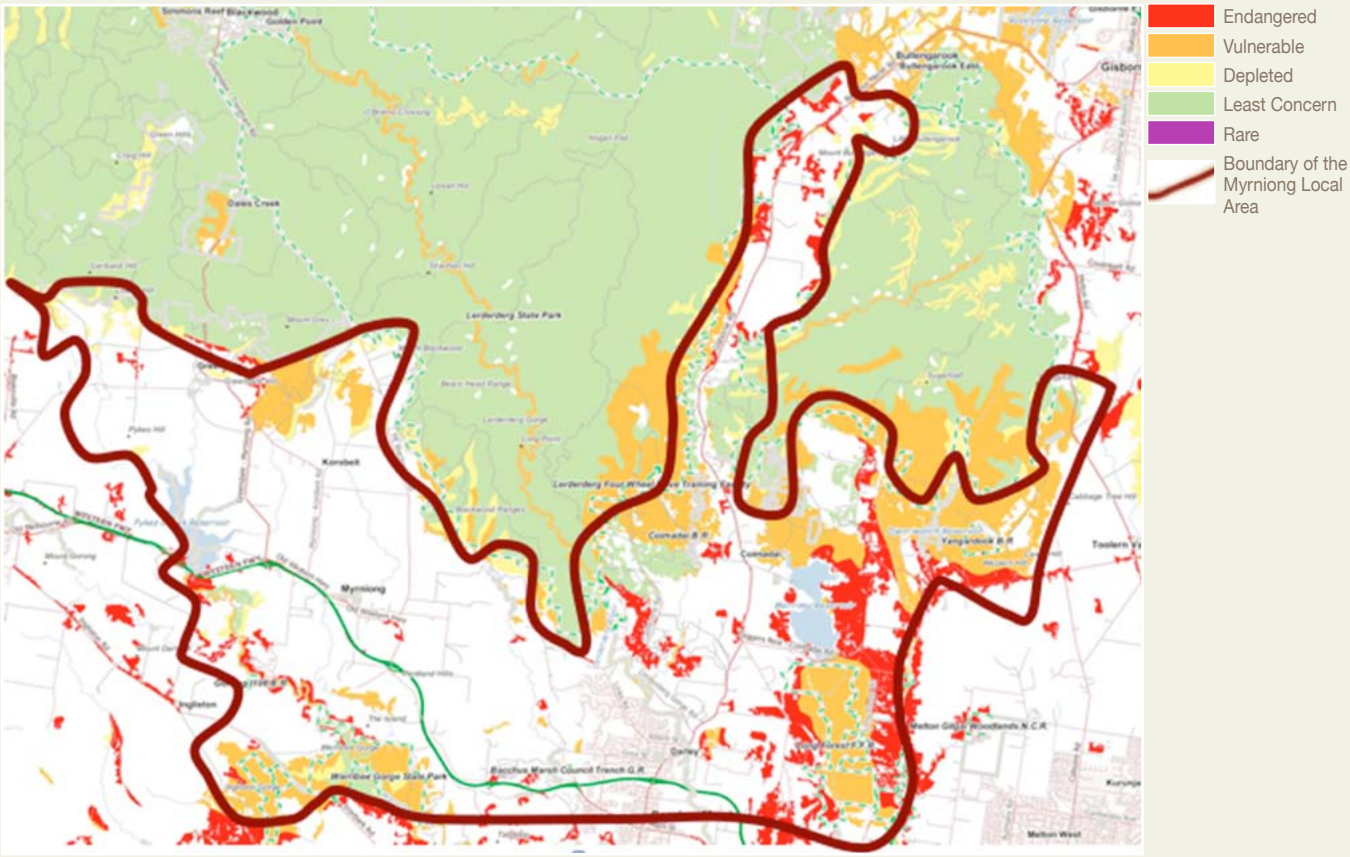
Map 9.6.1 **Pre-1750 Native Vegetation (EVCs) of the Myrniong Local Area**
(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016)



Map 9.6.2 **Current EVCs in the Myrniong Local Area**
(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016)



Map 9.6.3 **Bioregional Conservation Status of EVCs in the Myrniong Local Area**
(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016)



9.6.2 Current Native Vegetation

Native vegetation has been extensively cleared on private land in the Myrniong Local Area. Grassy Woodland was the most common EVC on private land but very little remains, except for an area east and north of the Long Forest Flora and Fauna Reserve. Plains Grassland also occurred west of Bacchus Marsh and has also been very extensively cleared with only a small remnant remaining west of the Long Forest Flora and Fauna Reserve. Other EVCs that were widely cleared include Herb-rich Foothill Forest, Valley Grassy Forest, Plains Grassy Woodland, Grassy Woodland and Creekline Herb-rich Woodland.

Rocky Chenopod Woodland is found in the Long Forest area on both private and public land. Escarpment Shrubland occurs in the Werribee Gorge State Park. Areas of Box-Ironbark Woodland also remain in the west of the Local Area and in the Werribee Gorge State Park. Streambank Shrubland occurs along the Werribee River and Djerriwarrah Creek.

9.6.3 Threatened EVCs

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

Table 9.6.1 **Threatened EVCs of the Myrniong Local Area**

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		

(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016, Victorian Biodiversity Atlas 2016

Kangaroo Apple (*Solanum laciniatum)*
Photography © Gayle Osborne

9.6.4 Threatened and Significant Flora

Sixteen flora species in the region are listed as rare or threatened at a State or National level.

Table 9.6.2 **Threatened Flora of the Myrniong Local Area**

Monocotyledons			FFG	EPBC	VROT
	Pterostylis truncata	Brittle Greenhood	FFG		e
	Austrostipa breviglumis	Cane Spear-grass			r
	Austrostipa exilis	Heath Spear-grass			r
	Poa amplexicaulis	Red-sheath Tussock-grass			r
Dicotyledons					
	Allocasuarina luehmannii	Buloke	FFG		r
	Rhagodia parabolica	Fragrant Saltbush			r
	Sclerolaena muricata var. *muricata*	Black Roly-poly			k
	Goodia medicaginea	Western Golden-tip			r
	Acacia aspera subsp. *parviceps*	Rough Wattle			r
	Eucalyptus leucoxylon subsp. *connata*	Melbourne Yellow-gum			v
	Eucalyptus yarraensis	Yarra Gum			r
	Grevillea steiglitziana	Brisbane Range Grevillea			r
	Nicotiana suaveolens	Austral Tobacco			r
	Pimelea hewardiana	Forked Rice-flower			r
	Pimelea spinescens	Spiny Rice-flower	FFG	C	e
	Pimelea spinescens subsp. *spinescens*	Spiny Rice-flower		C	e

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: Victorian Biodiversity Atlas 2016.

Some plant species in the Park are considered to be significant in the western part of the State due to being localised, depleted, have a disjunct occurrence or are at the edge of their range (Parks Victoria 1999).

Correa glabra	Rock Correa
Enneapogon nigricans	Pappus Grass
Lysiana exocarpi	Harlequin Mistletoe
Myoporum viscosum	Sticky Boobialia
Myosotis australis	Austral Forget-me-not
Pleurosorus rutifolius	Blanket Fern
Scutellaria humilis	Dwarf Skullcap
Senecio odoratus	Scented Groundsel
Solanum laciniatum	Kangaroo Apple
Stuartina muelleri	Spoon Cudweed

9.6.5 Threatened Fauna

Thirty-seven fauna species in the region are listed as threatened at a State or National level.

Table 9.6.3 **Threatened Fauna of the Myrniong Local Area**

Mammals			FFG	EPBC	VROT
	Eastern Pygmy-possum	*Cercartetus nanus*			n
	Brush-tailed Phascogale	*Phascogale tapoatafa*	FFG		v
	Common Dunnart	*Sminthopsis murina*			v
	Eastern Barred Bandicoot	*Perameles gunnii*	FFG	E	c
	Grey-headed Flying-fox	*Pteropus poliocephalus*	FFG	V	v
Birds					
	Spotted Harrier	*Circus assimilis*			n
	White-bellied Sea-Eagle	*Haliaeetus leucogaster*	FFG		v
	Australasian Shoveler	*Anas rhynchotis*			v
	Blue-billed Duck	*Oxyura australis*	FFG		e
	Freckled Duck	*Stictonetta naevosa*	FFG		e
	Hardhead	*Aythya australis*			v
	Musk Duck	*Biziura lobata*			v
	Eastern Great Egret	*Ardea modesta*	FFG		v
	Nankeen Night Heron	*Nycticorax caledonicus*			n
	Brown Treecreeper (south-eastern ssp.)	*Climacteris picumnus victoriae*			n
	Black-eared Cuckoo	*Chrysococcyx osculans*			n
	Black Falcon	*Falco subniger*			v
	Caspian Tern	*Hydroprogne caspia*	FFG		n
	Gull-billed Tern	*Gelochelidon nilotica*	FFG		e
	Black-chinned Honeyeater	*Melithreptus gularis*			n
	Crested Bellbird	*Oreoica gutturalis*	FFG		n
	Chestnut-rumped Heathwren	*Calamanthus pyrrhop*	FFG		v
	Speckled Warbler	*Pyrrholaemus sagittatus*	FFG		v
	Diamond Firetail	*Stagonopleura guttata*	FFG		v
	Hooded Robin	*Melanodryas cucullata*	FFG		n
	Pied Cormorant	*Phalacrocorax varius*			n
	Swift Parrot	*Lathamus discolor*	FFG	E	e
	Latham's Snipe	*Gallinago hardwickii*			n
	Barking Owl	*Ninox connivens*	FFG		e
	Powerful Owl	*Ninox strenua*	FFG		v
	Glossy Ibis	*Plegadis falcinellus*			n
	Royal Spoonbill	*Platalea regia*			v
Reptiles					
	Bearded Dragon	*Pogona barbata*			v
	Lace Goanna	*Varanus varius*			v

continued next page -

Table 9.6.3 **Threatened Fauna of the Myrniong Local Area** continued

Frogs					
	Brown Toadlet	*Pseudophryne bibronii*	FFG		e
	Growling Grass Frog	*Litoria raniformis*	FFG	V	e
	Southern Toadlet	*Pseudophryne semimarmorata*			v

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: Victorian Biodiversity Atlas 2016.

Image from motion-sensing camera
Brush-tailed Phascogale (*Phascogale tapoatafa)*

9.6.6 Key Potentially Threatening Processes

- Clearing of native vegetation on private land
- Fragmentation of habitat
- Fuel reduction burning
- Pest plants and animals
- Recreation
- Rural Subdivision
- Grazing
- Firewood Collection

(Source: Moorabool Shire Council 2001, MRSC 2009, Parks Victoria 1999, VEAC 2010, VEAC 2011)

9.6.7 Key Areas

Werribee Gorge State Park (575 hectares)

Due to its outstanding scenery and geological features, the gorge was reserved for public purposes in 1881 (Parks Victoria 1999). The dominant feature of the Park is the Werribee Gorge, which is classified as being of national significance for its extensive outcrops of Permian sediments and exposed sub-glacial topography (Parks Victoria 1999).

The Park consists of a small area of remnant native bushland almost completely surrounded by cleared agricultural land. The Park contains a range of threatened flora, fauna and the vegetation of the Park is considered to be of State significance (Parks Victoria 1999). Shrubby Dry Forest occurs in west of the Park. The southern section of the Park contains some excellent stands of distinctive Box–Ironbark Woodland dominated by Red Ironbark (*Eucalyptus tricarpa*) and Plains Grassy Woodland occurs in the north-eastern section of the Park. They are of high conservation significance due to their limited distribution in the region (Parks Victoria 1999). The gorge area is extremely rocky and supports Escarpment Shrubland with the understorey dominated by the rare Fragrant Saltbush (*Rhagodia parabolica*).

About 250 native vascular plant species have been recorded, although much of the Park's vegetation has been modified by past mining, timber cutting and grazing, the steepest sections remain in an essentially natural state (Parks Victoria 1999). Some of the more recent land additions to the Park have been subject to quarrying or cropping in the past and these areas have been revegetated by Park staff and the Friends of Werribee Gorge & Long Forest Mallee (Parks Victoria 1999).

The Park also contains a range of native fauna with common species including the Eastern Grey Kangaroo, Black Wallaby, Common Brushtail Possum, Common Ringtail Possum, Sugar Glider and Koala (Parks Victoria 1999). Peregrine Falcons and Wedge-tailed Eagles also nest in the gorge (Parks Victoria 1999).

A management plan for the Park was developed in 1999 (Parks Victoria 1999).

Today, Mallee vegetation is widespread in Victoria's dry north-west, but some thousands of years ago, during a warmer and drier period, it extended much farther south. Subsequent climatic changes favoured other vegetation such as box and stringybark eucalypts and the Long Forest now has the only naturally occurring Mallee south of the Great Dividing Range.

Werribee Gorge State Park
Photography © Gayle Osborne

Long Forest Flora Reserve (491 hectares)

The reserve is of very high conservation value. It contains a disjunct occurrence of the vulnerable EVC Rocky Chenopod Woodland, a vegetation type more commonly associated with the Mallee. It is also the southernmost occurrence of Bull Mallee in Victoria. Due to the absence of fires, some stands of Bull Mallee are believed to be several hundred years old, and is the dominant tree species in the Long Forest (Parks Victoria 2003). There are many other tree and shrub species, some usually associated only with semi-arid areas and a number of rare native grasses and orchids (Parks Victoria 2003). Eight plant species are regarded as threatened in Victoria and twenty-five as regionally significant plant species that occur in isolation from other populations or at the limit of their range.

The Reserve has been assigned the International Union for the Conservation of Nature Category IA for Natural Reserves and Protected Areas (Parks Victoria 2003). The Reserve is also listed on the Register of the National Estate, in recognition of the area's outstanding botanical, scenic, educational and scientific values and its importance as part of our heritage (Parks Victoria 2003). The Long Forest Mallee has also been classified by the National Trust for its scientific and landscape values (Parks Victoria 2003).

The Reserve contains fourteen fauna species regarded as threatened in Victoria (Parks Victoria 2003). About 200 bird species have been recorded in the reserve and it is an important habitat for raptors such as the Wedge-tailed Eagle and Peregrine Falcon (Parks Victoria 2003). Mammals include kangaroos, wallabies, koalas, echidnas, possums and gliders. There are 12 species of bullants found in the reserve, two of which occur nowhere else in Victoria, including the only known habitat of a recently discovered ant species (*Myrmecia* sp.17) and the only Victorian location for *Myrmecia forceps* (Parks Victoria 2003).

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.

9.6.8 Landscape Connectivity

High – Despite being heavily cleared the Myrniong Local Area has high connectivity values. 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.

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.

9.6.9 Key Recommendations for Myrniong Local Area

- Parks Victoria invest greater resources to manage threatening processes in the Werribee Gorge State Park, Long Forest Flora and Fauna Reserve and other reserves under their management.
- Ensure that 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 Map 9.6.3 - Bioregional Conservation Significance with red and orange coloured areas the highest priority).

Eastern Yellow Robin *(Eopsaltria australis)*
Photography © Gayle Osborne

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. 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 high on private land. A list of native flora and fauna in the Moorabool Local Area is provided in Part Two.

9.7.1 Pre-1750 Native 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.

The Moorabool Local Area at a Glance

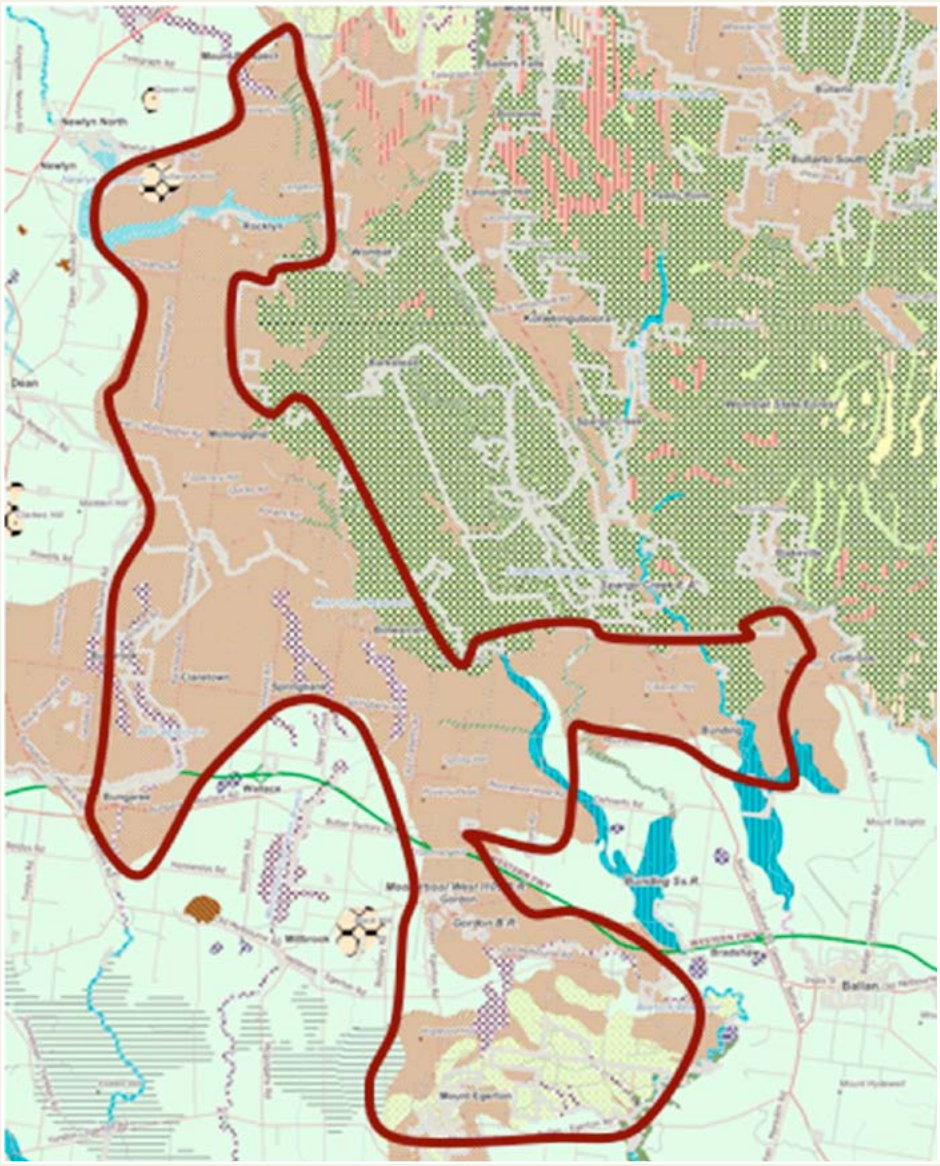
Flora
- 228 indigenous plants recorded
- 3 threatened flora species
- 77 serious weeds listed

EVCs
9 EVCs all of which are threatened EVCs

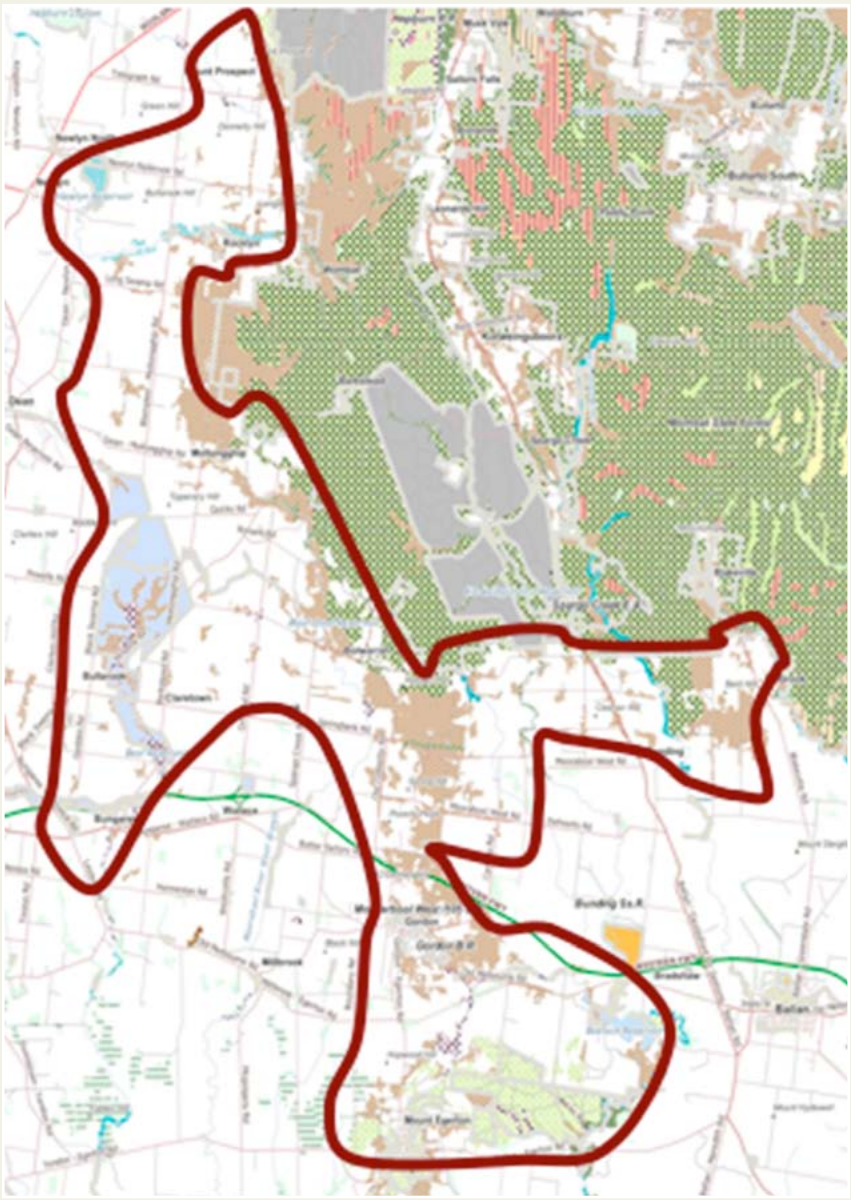
Fauna
- 136 fauna species
- 16 threatened fauna species (1 mammals, 15 birds)
- 114 bird species
- 14 mammals
- 3 reptiles
- 5 frogs

(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016, Victorian Biodiversity Atlas 2016)

Map 9.7.1 **Pre-1750 Native Vegetation (EVCs) of the Moorabool Local Area**
(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016)



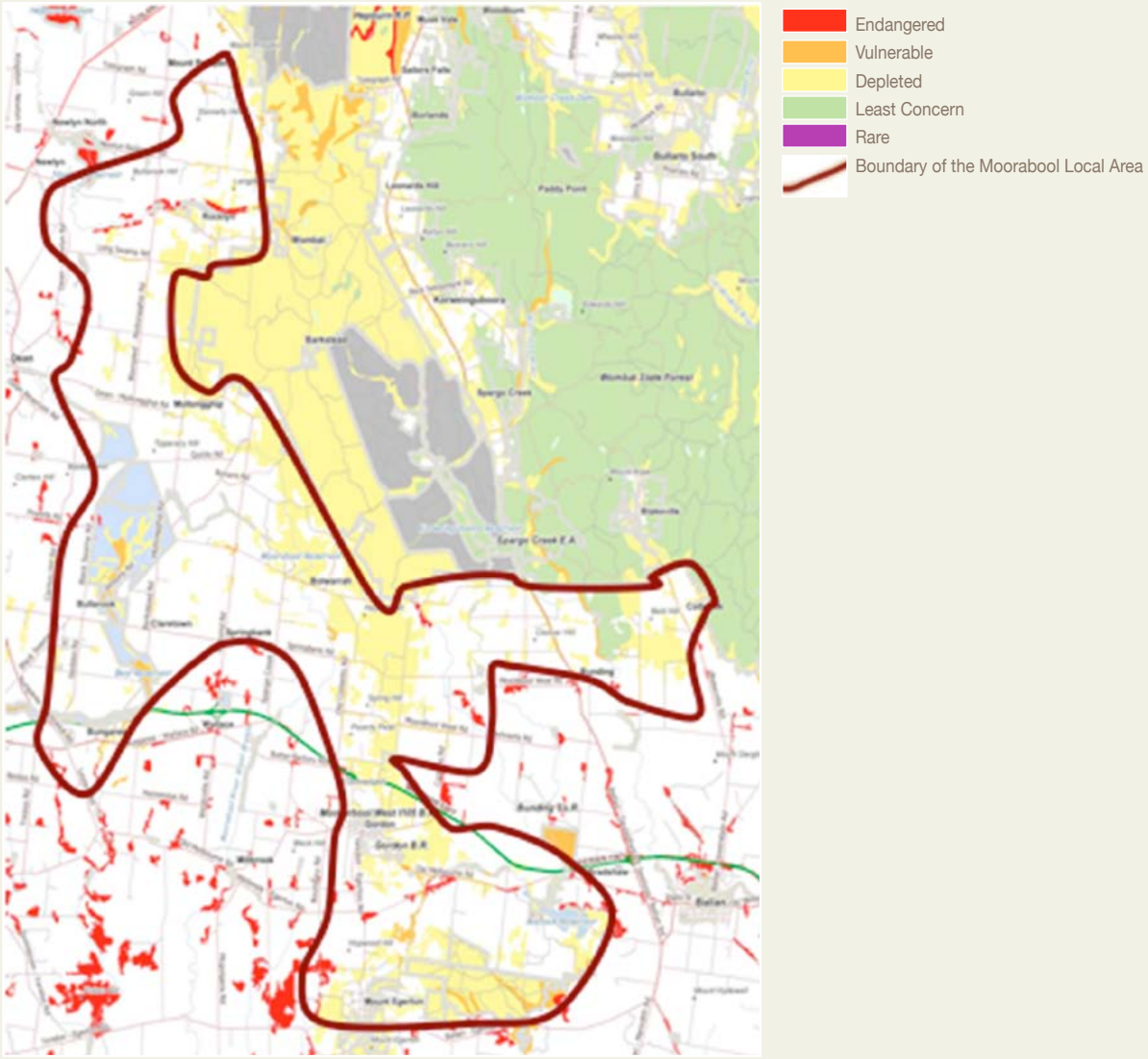
Map 9.7.2 **Current EVCs in the Moorabool Local Area**
(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016)



164 Creekline Herb-rich Woodland
22 Grassy Dry Forest
23 Herb-rich Foothill Forest
894 Scoria Cone Woodland
198 Sedgy Riparian Woodland
178 Shrubby Foothill Forest/Herb-rich Foothill Forest Complex
53 Swamp Scrub
83 Swampy Riparian Woodland
47 Valley Grassy Forest
Boundary of the Moorabool Local Area

Grassy Dry Forest
Photography © Gayle Osborne

Map 9.7.3 **Bioregional Conservation Status of EVCs in the Moorabool Local Area**
(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016)



9.7.2 Current Native 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.

9.7.3 Threatened EVCs

All EVCs in the Moorabool Local area are threatened.

Table 9.7.1 **Moorabool Local Area Threatened EVCs**

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

(Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016, Victorian Biodiversity Atlas 2016

9.7.4 Threatened Flora and Fauna

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

Table 9.7.2 **Threatened Flora of the Moorabool Local Area**

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

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

Table 9.7.3 **Threatened Fauna of the Moorabool Local Area**

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

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: Victorian Biodiversity Atlas 2016

9.7.5 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.

9.7.6 Key Potentially Threatening Processes

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

9.7.7 Landscape Connectivity

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.

9.7.8 Key Recommendations of Moorabool Local Area

- 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 Map 9.7.3 - Bioregional Conservation Significance, with red and orange coloured areas the highest priority).

10. Rebuilding Landscape Connectivity and Ecosystem Resilience

The Wombat Forest/Macedon region 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 Region. That includes 57 flora species and 53 fauna species that are listed as rare or threatened at a State or National level. A large number of fungi species also occur in the Region.

Of the twenty-eight EVCs in the Region, 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 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

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 important native vegetation from grazing.
- Fencing to protect riparian vegetation from grazing and waterway structure from stock damage.
- Examine systems of stewardship for farm land to increase native vegetation conservation.

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.

Restoration

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

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 region for which there is little data, e.g. invertebrates and reptiles.

Legislation

- State Government to introduce legislation to protect riparian land

10.2 High Ecological Value 'Assets' in the Region

- 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 part of the current VEAC Investigation into Central West Forests, 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 short 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

- Increase research and monitoring on 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.

Apiary

- An advisory body (including stakeholder participation) should 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 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.
- 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 Licenses when licenses are due for renewal. Funding for fencing to exclude stock and undertake habitat restoration should be provided to license holders.
- Encourage natural regeneration and undertake revegetation to enhance riparian areas.

Pine Plantations

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

Private Land

General

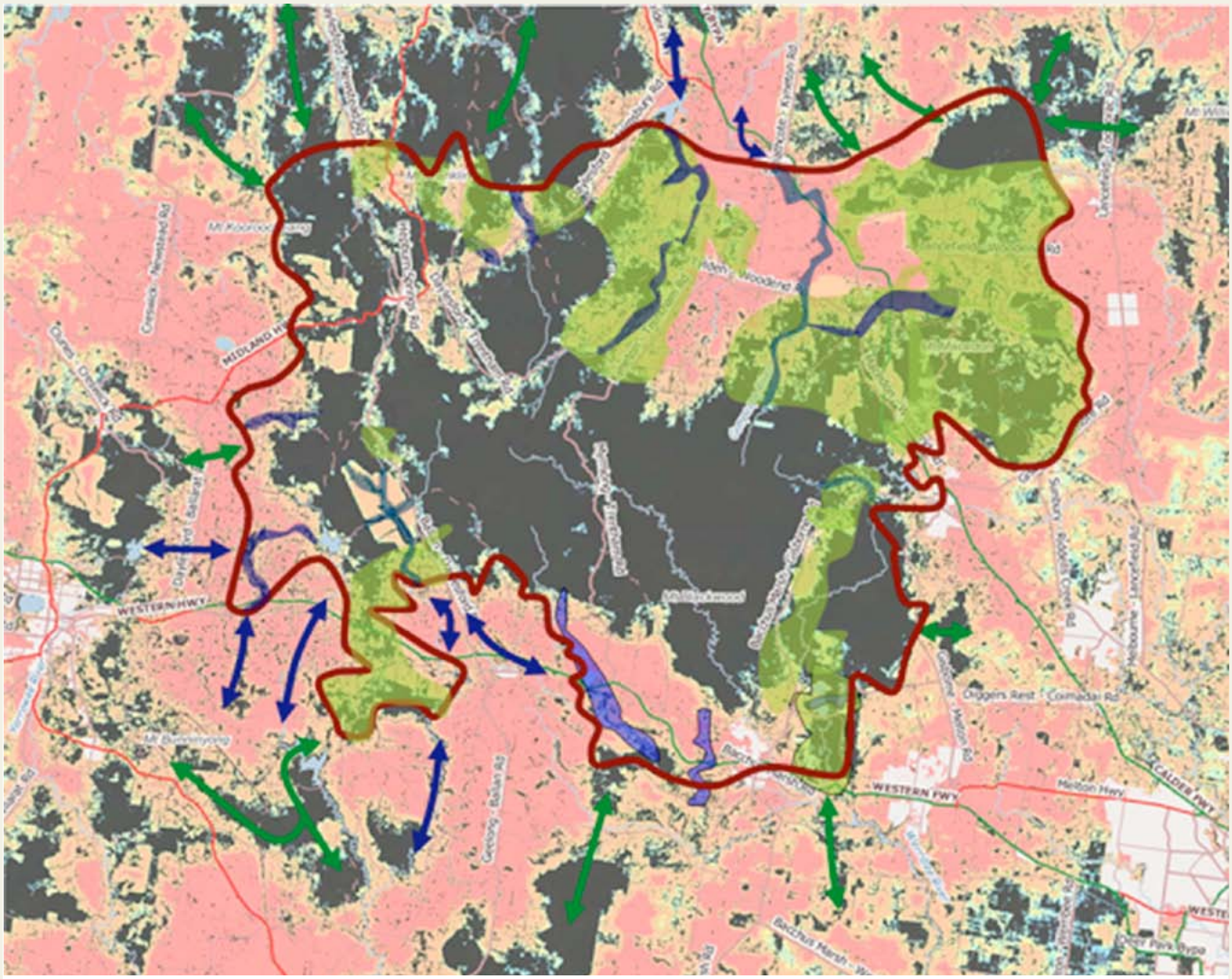
- DELWP and local Councils should enforce existing Native Vegetation Retention regulations, including placing a greater emphasis on avoiding the loss of existing native vegetation.
- All shires should employ a biodiversity officer to train staff, assist with planning decisions regarding native vegetation and biodiversity, and to develop and implement relevant policies and strategies to halt the loss of native vegetation on private land.
- DELWP, CMAs 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, CMAs and Councils should provide incentives for improved stewardship of riparian land on private property.
- The State government, CMAs and Councils should provide landowners with stewardship payments to ensure remnant vegetation on private land is protected and managed appropriately i.e. fencing to protect from stock, appropriate grazing regimes, weed control, pest animal control and enhancement plantings.
- Ensure 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.
- DELWP, CMAs and Councils should undertake education programs regarding biodiversity conservation on private land.
- Preferentially restore the 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 assist in outlining a clear vision for the region. 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 should 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.

Map 10.1 **Map of Potential areas to improve habitat connectivity in the Landscape Zone**
(Base Map Source: Biodiversity Interactive Map © The State of Victoria, DELWP 2016)



Legend for Potential Areas

Connectivity refers to the degree of linkages of habitats, communities and ecological processes at multiple scales (Lindenmayer and Burgman 2005). The Key Biolink Areas, Riparian Corridors and Biolinks have been digitally overlaid on the base map.

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 large remnants (greater than 5ha)
- Protect large old trees
- Expand and enhance riparian vegetation

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

Very Low Connectivity Areas
- Protect and enhance habitat of threatened species
- Protect and enhance large remnants (greater than 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 the landscape

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

Potential Biolinks outside Landscape Zone

Land based Biolinks

Riparian Biolinks

Boundary of Potential Areas

Abbreviations and Acronyms used in the Report

CES	Commissioner for Environmental Sustainability, Victoria
CCMR	Catchment Condition Management Report
CMA	Catchment Management Authority
DELWP	Department of Environment, Land, Water and Planning
DEPI	Department of Environment and Primary Industries
DPI	Department of Primary Industry
DSE	Department of Sustainability and Environment, Victoria
ECC	Environment Conservation Council, Victoria
EVC	Ecological Vegetation Class
FFGA	Flora and Fauna Guarantee Act 1998
IPCC	Intergovernmental Panel on Climate Change
LCC	Land Conservation Council, Victoria
MRSC	Macedon Ranges Shire Council
NCCMA	North Central Catchment Management Authority
SMZ	Special Management Zone
SPZ	Special Protection Zone
VBA	Victorian Biodiversity Atlas
VCMC	Victorian Catchment Management Council
VEAC	Victorian Environmental Assessment Council
VNPA	Victorian National Parks Association

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