East Otway Landcare Group

Local Area Biodiversity Plan

(Photo: Mike Robinson-Koss)

Brown Treecreeper (Photo: DSE/McCann)

(Photo: Mike Robinson-Koss)

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Local Area Biodiversity Plan

This Plan has been compiled by the Flora and Fauna Unit of the Department of Sustainability and Environment (Colac), with assistance from the Biodiversity Unit of the Corangamite Catchment Management Authority and in consultation with the East Otway Landcare Group. The plan is intended to be used as both a community resource and to assist Project Officers in planning and implementing the conservation and restoration of biodiversity within the East Otway Landcare area.

Produced November 2003

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East Otway Landcare Group Biodiversity Plan

Statement of Purpose.

"To protect, enhance and extend indigenous biodiversity while promoting sustainable ways of living in the landscape."

This plan seeks to:

- Increase awareness within the local community of the need for biodiversity conservation
- Outline the processes which threaten biodiversity values within the local area
- Highlight the habitats and species that are most in need of protection
- Provide focus and direction for actions to enhance biodiversity values
- Facilitate partnerships between the community, public land managers and other agencies or organisations with responsibility for environmental protection or natural resource management
- Promote biodiversity conservation within a context of sustainable agricultural production
- Provide a resource that will act as a basis for discussion and future decision-making with regard to biodiversity restoration

Introduction

What is biodiversity?

Biodiversity (or biological diversity) refers to the variety of life forms; the different plants, animals and microorganisms, the genes they contain, and the ecosystems they form. For the purposes of this plan, we are referring to the local native biodiversity of the Linton-Pittong area.

Why is native biodiversity important?

Biodiversity affects us all and is a fundamental part of our lives and of all agricultural production. Local ecosystems provide services, such as clean air and water, on which we all depend and which are vital to agriculture. Many interactions, such as pollination, would not be possible without the presence of other species and processes.

Some examples of benefits to rural landholders from biodiversity conservation practices are outlined below:

MANAGEMENT PRACTICES	BENEFITS TO LANDHOLDERS
Retention of remnant vegetation	Habitat for birds, mammals and insects (potential reduction in insecticide use).
	Increased shelter for stock, pasture and crops (resulting in increased production).
	Potential for family recreational opportunities (bird watching, nature walks, etc).
	Increased property values.
	Conservation and protection of rare species.
	Legacy for future generations.
	Increased gross value of pasture output (at its highest when proportion of remnants is 34%).
	Natural regeneration of indigenous species.
	Seed supply for on-farm revegetation.
	Less reliance on introduced pollinators (as much as 50% of pollination is carried out by native insects that fly from nearby bushland).
	Reduced salinity, waterlogging, wind and water erosion problems.
	Improved property landscape and aesthetics.
Retention or establishment of vegetation around farm dams and wetlands	Increase in wildlife species. Waterfowl eat the snail that hosts the liver fluke parasite in sheep.
	Safer working conditions.
	Decreased stock fatalities.
	Bank stabilisation.
	Interception & use of nutrients before entering storage.
	Natural filtration provides cleaner water for stock and homestead.
Maintenance of native grasses	Fire protection (green fuel in summer).
	Feed source (selective grazing) in summer.
	Low rates of fertilizer required.
	Reduced micron size for wool
Wetlands established	Fire protection (firebreak and water source).

Goals for Biodiversity

The principles and objectives outlined in the *National Strategy for the Conservation of Australia's Biodiversity* (1996) and further refined in the statewide strategy *Victoria's Biodiversity* (1997) provide the framework for biodiversity conservation at a National and State level, and establish "bioregions" as the basic regions for biodiversity planning.

Briefly, the statewide goals for biodiversity management are to:

- Reverse the decline in the extent and quality of native vegetation
- Maintain and improve the diversity and long-term viability of species and ecological communities
- Maintain and restore ecological processes in terrestrial, marine and freshwater environments

The Biodiversity Action Planning Strategic Overviews for the Otway Ranges and Otway Plain bioregions detail the priority biodiversity assets within these bioregions, and translate the principles into actions that will assist in achieving the statewide objectives.

The East Oway Landcare Group Biodiversity Plan acknowledges the guiding principles and core objectives of the national, state and bioregional strategies. The plan outlines at a local level the priorities and actions necessary to conserve and enhance natural habitats and improve the long-term viability of the populations of native plants and animals within them.

Yarra Pigmy Perch (Photo: DNRE)

Field officer inspecting remnant vegetation (Photo: DSE, Colac)

What is Biodiversity Planning?

Biodiversity Action Planning is an approach to identify and protect our native plants and animals. This approach involves prioritising to conserve threatened and declining species.

Overview of the Target Area

The East Otway Landcare Group covers an area of approximately 12,000 ha between Winchelsea in the north and Wymbooliel in the south, and extending from Deans Marsh in the east to Boonah in the west. The area lies within the Barwon Catchment, and is drained northwards by the Deans Marsh Creek, Pennyroyal Creek, Yan Yan Gurt Creek, Retreat Creek and other minor tributaries.

The landscape in the north-western section of the area consists of undulating plains and hillslopes, while the south-eastern half is characterised by deeply dissected hills. The soils of the area are highly prone to erosion.

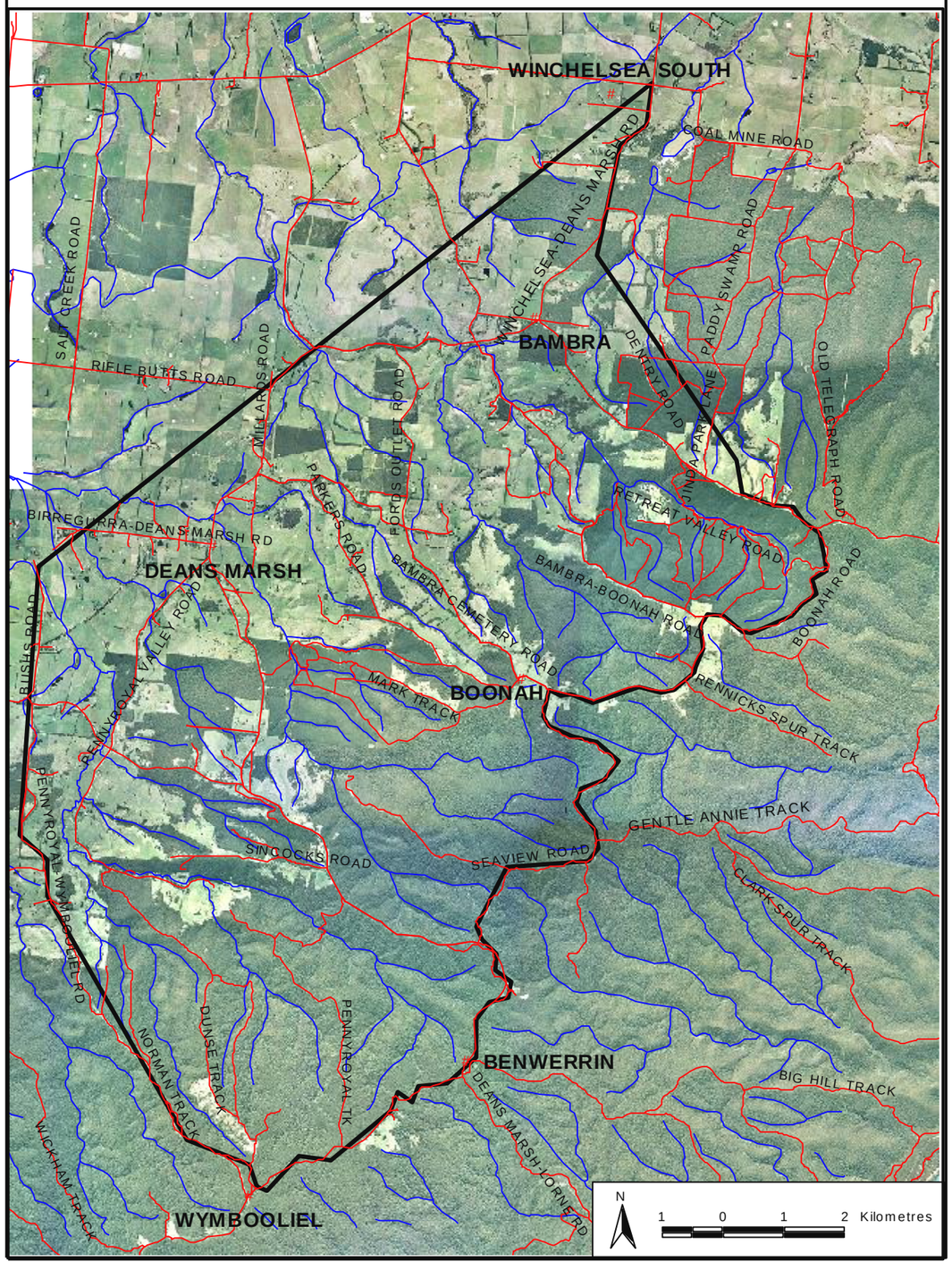
Thirty-six per cent of the study area is public land. Extensive areas in the southern half of the zone are included in the Otway State Forest, and are utilised for timber harvesting (mainly sawlogs for building materials) and recreation. Commercial sawlog harvesting is to be phased out of the Otway State Forest by 2008. The future status of this land, including potential additions to the reserve system, is currently being formulated by the Victorian Environmental Assessment Council.

There are a number of parks and reserves in the area, most notably the Bambra Education Area and Bambra Bushland Reserve.

Freehold land is used primarily for cattle grazing and commercial softwood plantations, with a number of 'lifestyle' properties around Pennyroyal, Boonah and Bambra. Emerging enterprises in the area include Tasmanian Blue Gum plantations, olive groves and viticulture.

Liaison with the managers of public land to ensure that biodiversity conservation actions complement those on private land will be an important component of biodiversity planning in this area.

East Otway Landcare Group Area



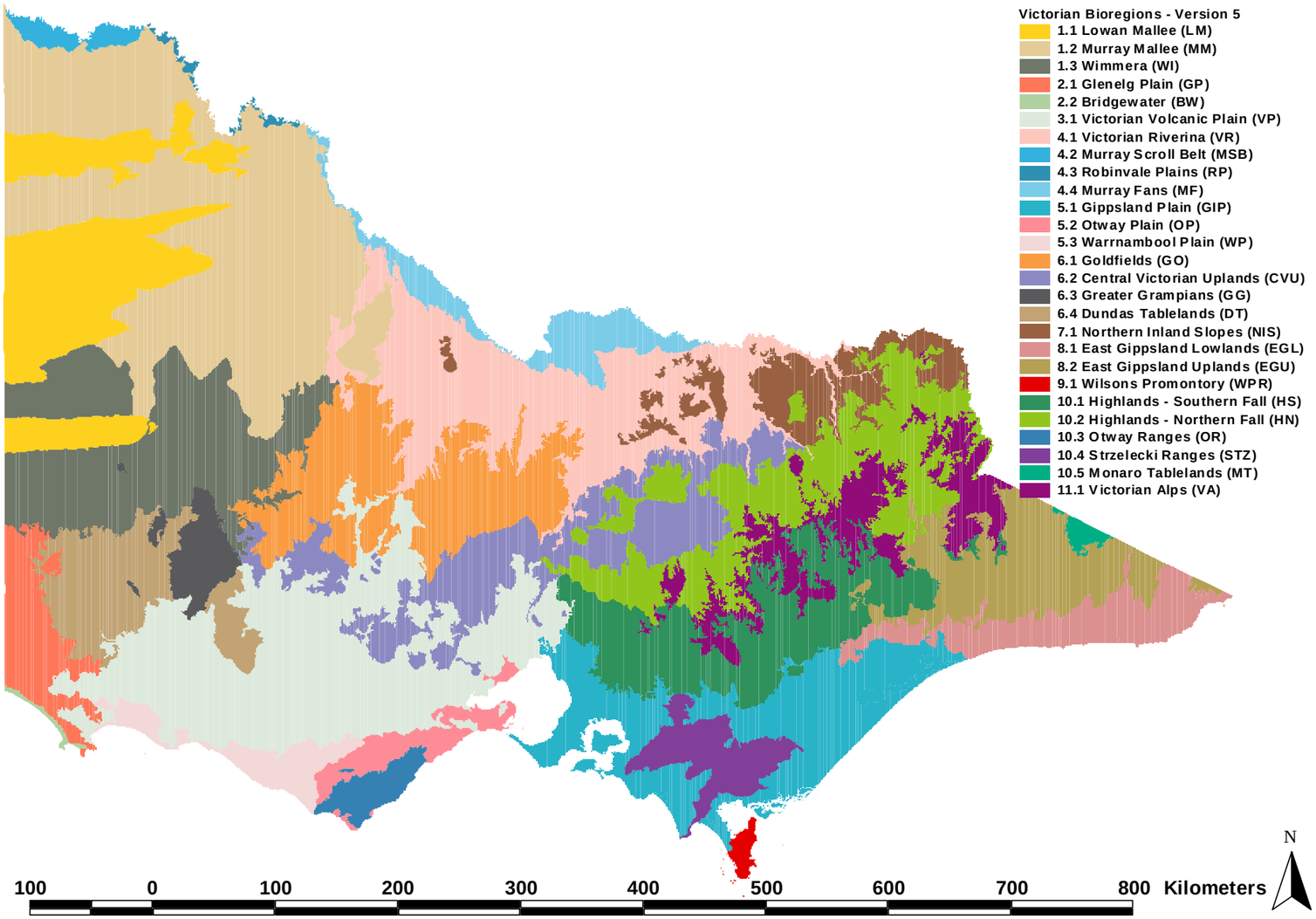
The Bioregional Planning Context

Victorian Bioregions

Bioregions are the principal regional units adopted for biodiversity planning in Victoria. These regions are based on biological and geographical criteria including geology, soil type, topography, climate and vegetation type. Since bioregions reflect underlying environmental features, they can also be related to patterns of land use, and provide a natural framework for recognising and conserving biodiversity values.

Victoria comprises 22 terrestrial bioregions as indicated on the map below.

The East Otway Landcare Group includes parts of the Otway Ranges and Otway Plain bioregions.



Otway Ranges Bioregion

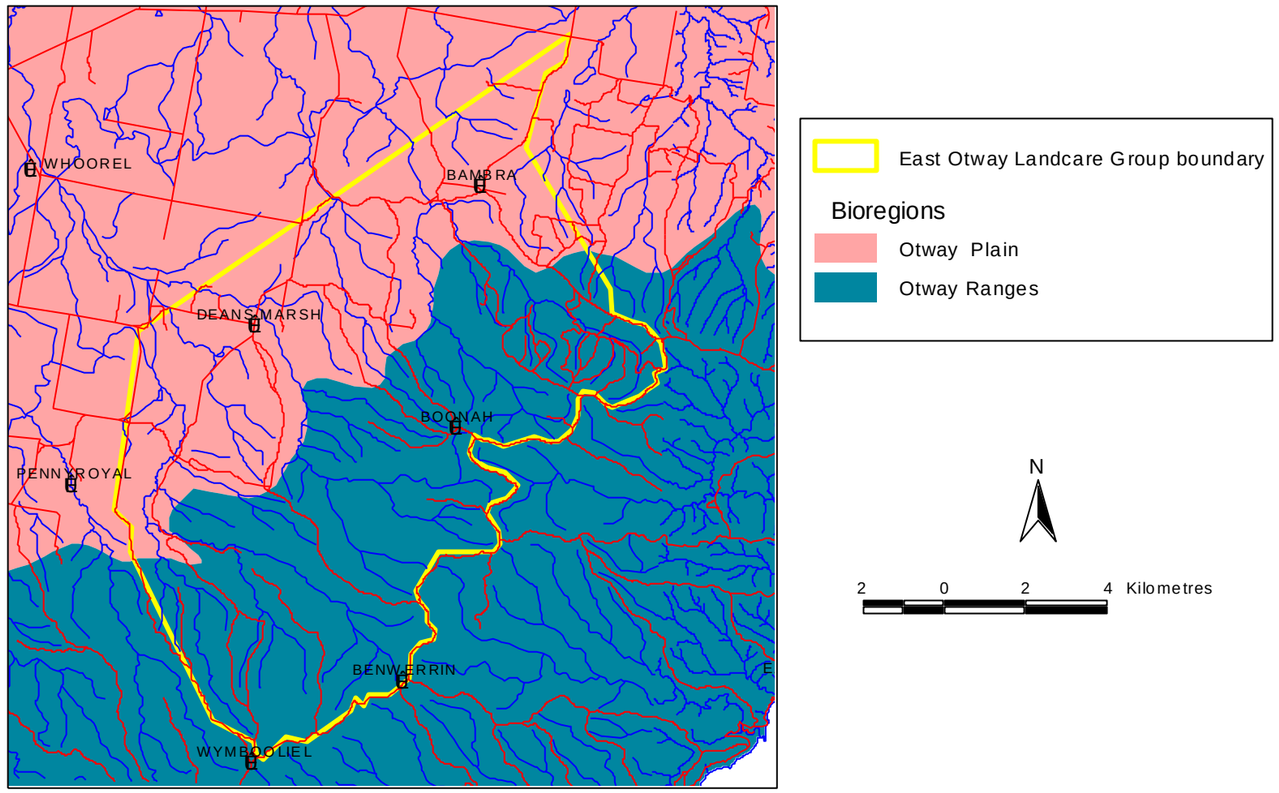
The Otway Ranges bioregion covers 150 thousand hectares and encompasses the Otway Ranges from Moonlight Head in the west towards Bambra in the north-east, extending south to the coast. Most of the region is public land, comprising state forest, national parks and state parks. Over 80% of the Otway Ranges bioregion still has a cover of native vegetation, and 22% of the bioregion is in formal reserves. The bioregion supports a diverse range of vegetation communities, including Cool Temperate Rainforest, and still contains examples of most of its original vegetation types.

The map below shows the bioregional boundaries that fall within the East Otway Landcare Group area.

Otway Plain Bioregion

The Otway Plain bioregion occupies approximately 238 thousand hectares and extends from just east of Princetown to the Bellarine Peninsula, with outlying areas at Werribee, Glenaire and Apollo Bay. It comprises a series of plains, river valleys and foothills, mainly sedimentary in origin. Since European settlement, the landscape has been dramatically altered by timber production, and by agricultural, residential and tourism development. There has been extensive clearing of all vegetation types, particularly those on the deeper, more fertile soils. Most of the bioregion is private freehold dominated by agriculture and there are several large blocks of public land. Only 31% still has a cover of native vegetation, and less than 10% is in formal reserves. However, it still contains examples of most of its original vegetation types, and includes extensive areas of significant wetland habitat.

Bioregional boundaries within the East Otway Landcare Group area



Biodiversity of the Regional Landscape

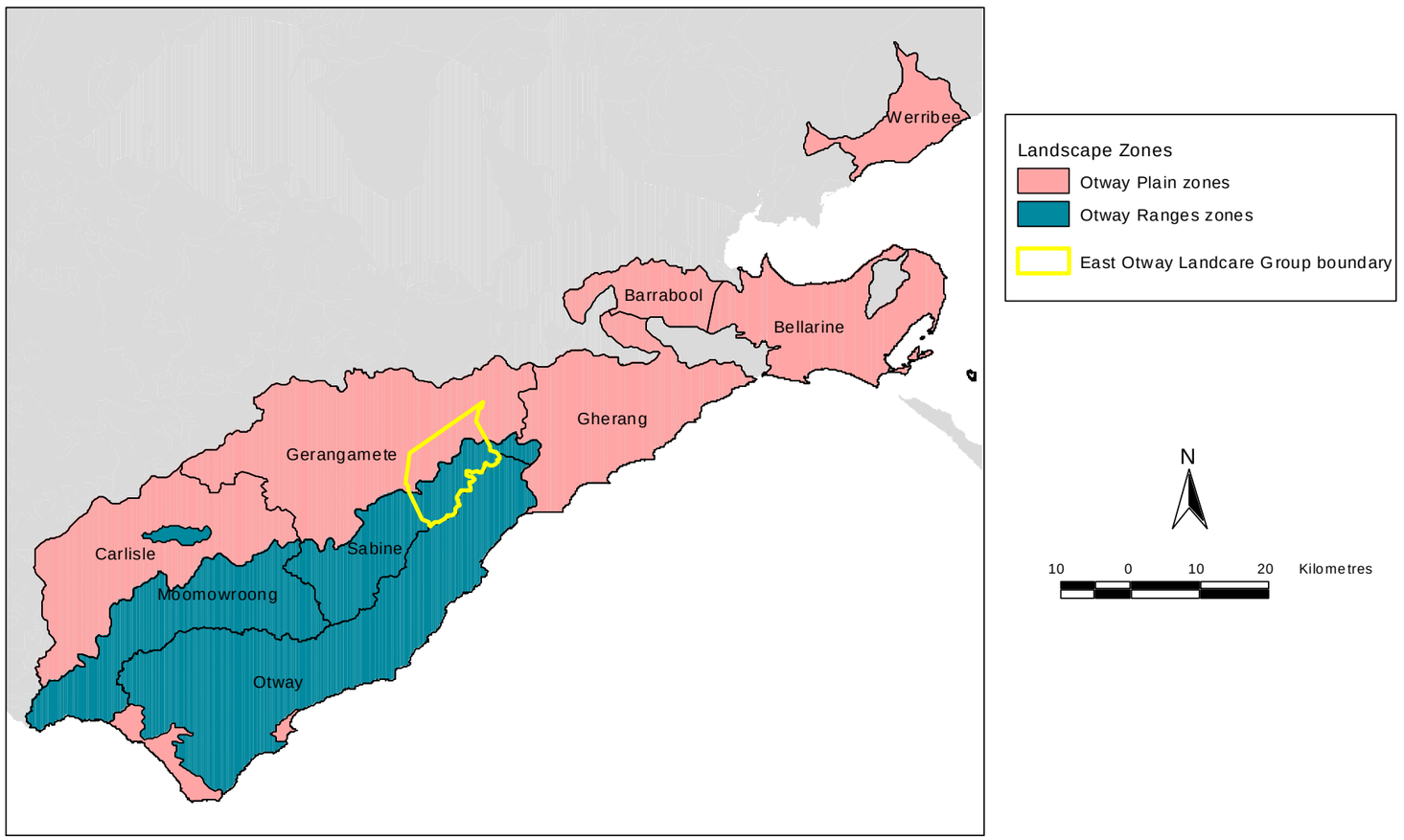
Landscape Zones

Each bioregion has been divided into a number of 'landscape zones'. These units capture areas of common vegetation types and landscape characteristics, and provide an intermediate planning scale between the bioregional and property scale.

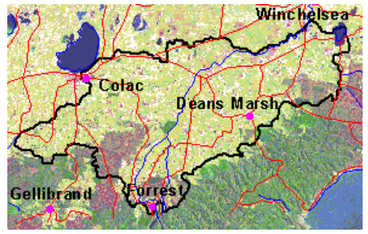
It is at the landscape scale that many ecological processes occur and therefore this is a useful level at which to plan for maintenance of these processes and conservation of biodiversity. These zones or landscapes also provide areas of manageable size in which to work, and are more readily recognised or identified by local communities.

The East Otway Landcare Group area covers parts of Gerangamete Zone in the Otway Plain, and Sabine Zone in the Otway Ranges.

Landscape Zones in the Otway Plain and Otway Ranges Bioregions



Gerangamete Landscape Zone (Otway Plain Bioregion)



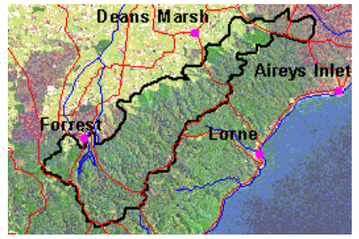
Prior to European settlement, the undulating plains of the Gerangamete Landscape Zone were dominated by Grassy Woodland, with Floodplain Riparian Woodland along the Barwon River and its tributaries. The pattern of land clearing over the past 150 years has resulted in the loss or fragmentation of most of these grassy and riparian woodland areas, as they occupied the most suitable agricultural land. Today, most of the remaining native vegetation is Lowland Forest and Heathy Woodland on public land near Gerangamete, Forrest and Bambra, with significant remnants on freehold land adjoining these blocks.

Major biodiversity issues for the zone include the extensive modification (by grazing and weed invasion) of streams, incremental clearing of native vegetation for housing and firewood, and the grazing of native vegetation remnants and wetlands, including shallow freshwater marshes.

Important biodiversity assets in this zone include native vegetation on private land that provides links and buffers to public land blocks, and wetlands which provide breeding and roosting habitat for a variety of threatened and migratory waterbirds.


(Photo: DSE, Colac)

Sabine Landscape Zone (Otway Ranges Bioregion)



The Sabine Landscape Zone is comprised of a series of steeply dissected spurs and ridges, with a high percentage of forest cover. Most of the zone is covered by the Otway State Forest, which is currently subject to review by the Victorian Environmental Assessment Council. Threatened forest fauna in this zone includes Powerful Owl, Masked Owl, Spot-tailed Quoll, and Broad-toothed Rat.

Pre-1750 vegetation cover in the zone comprised mainly moist foothill forests (eg. Shrubby Foothill Forest, Herb-rich Foothill Forest, Shrubby Wet Forest), with lowland forests (eg. Wet Forest, Riparian Forest) along most drainage lines. There has been extensive clearance of native vegetation on freehold land, where there are now many small and fragmented but significant remnants, particularly in the Pennyroyal/Benwerrin and Sokel areas.

The impact of pest plants and animals, loss of old-growth forest, and sedimentation of streams are major issues in Sabine zone. Protection and restoration of the remaining threatened biodiversity assets is critical to achieving biodiversity gains in this zone.


(Photo: Mike Robinson-Koss)

Biodiversity of the Local Area

East Otway Landcare Group

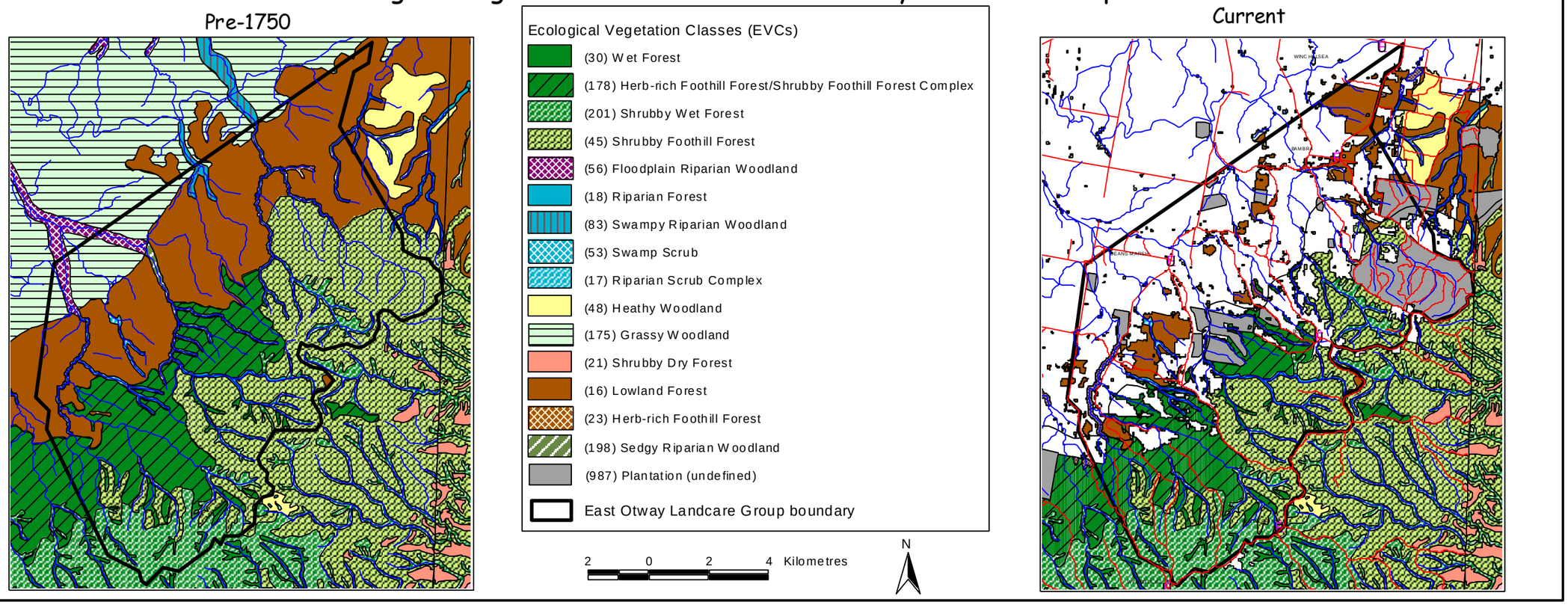
Vegetation

Native vegetation varies significantly across geographic regions in accordance with differences in geology, soil types, climate, rainfall, elevation, drainage and aspect. The group of plants that occur together in association with a particular set of these conditions is referred to as a "vegetation community". It is important to be able to accurately describe and know the native vegetation we are working with, because different vegetation types respond in different ways to management practices.

The Department of Sustainability and Environment has developed a unit of vegetation classification called Ecological Vegetation Classes (EVC). An EVC is comprised of one or more vegetation communities that occur within a particular environmental niche, and is a useful unit for vegetation planning and management.

Prior to European settlement (pre-1750) the north-western half of the area consisted mainly of the Lowland Forest EVC, with Grassy Woodland to the north and west of Deans Marsh. Sedgy Riparian Woodland was common along creek lines, with Floodplain Riparian Woodland and Swampy Riparian Woodland along the creek lines on the flatter plains. In the ranges along the south-eastern half of the area, extensive areas of Shrubby Foothill Forest were present, with Shrubby Wet Forest occurring in the southern section and along many of the creek lines.

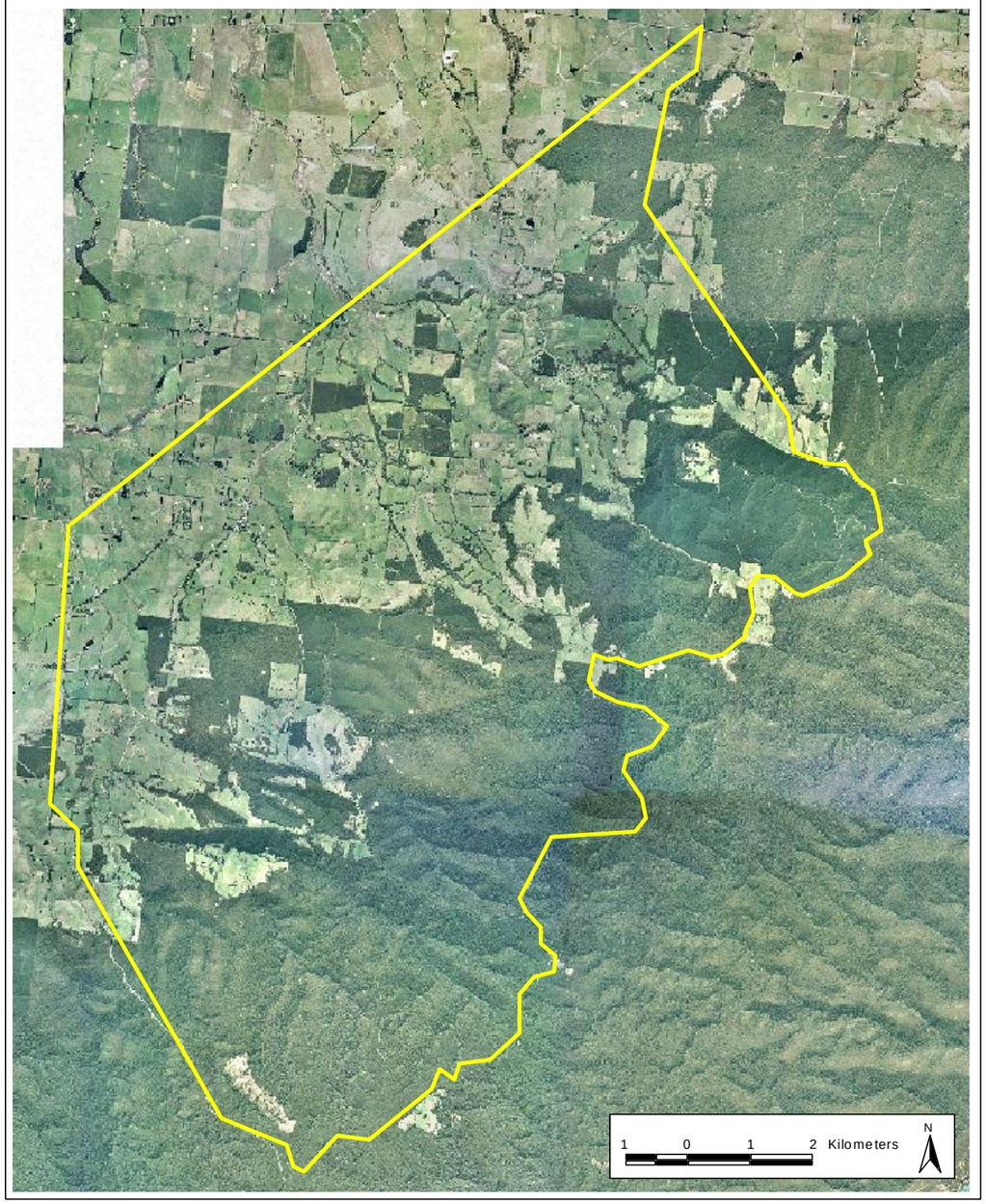
Change in Vegetation Cover in the East Otway Landcare Group area



Today, less than half of the original cover of vegetation remains. The vegetation communities of the flatter, more fertile areas, such as Floodplain Riparian Woodland, Grassy Woodland and Swampy Riparian Woodland have been almost entirely cleared for agriculture.

A large area of forest in the southern half of the area forms part of the contiguous vegetation that extends across the Otways from Kennedys Creek to Anglesea. Most of this block is public land currently in the Otway State Forest, but there are also significant remnants on private land that provide links between isolated blocks of public land. The eastern part of the study area also supports important remnants on freehold that provide linkages between public land blocks.

Current vegetation cover within the East Otway Landcare Group area

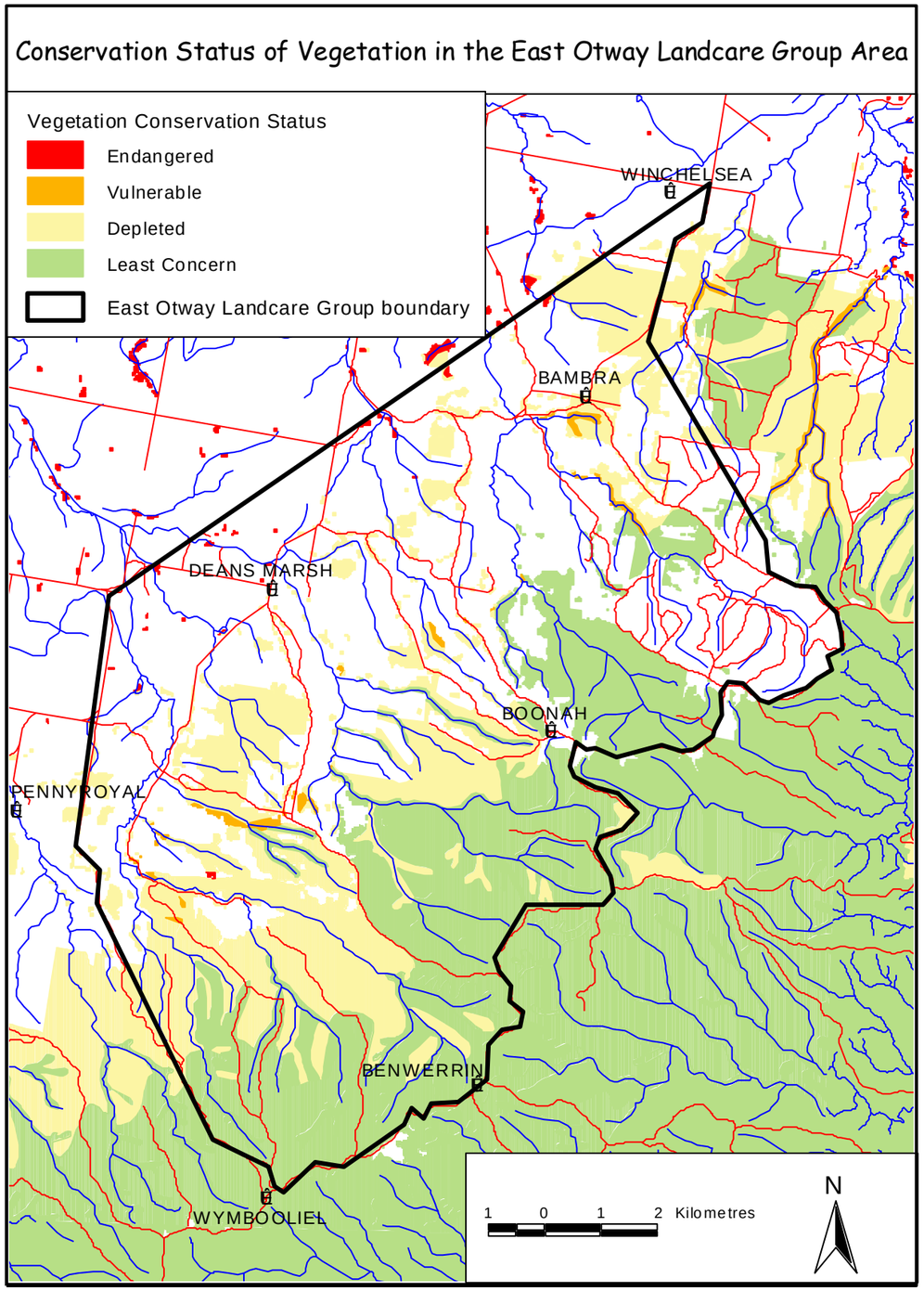


Each vegetation type (Ecological Vegetation Class, EVC) within each bioregion has been classified as Endangered, Vulnerable, Depleted, or of Least Concern according to its current extent compared with its Pre-1750 extent. These classifications are known as the Bioregional Conservation Status of EVCs and are explained further in Appendix 3.

The table below shows the extent and conservation status of each vegetation type found in the East Otway Landcare Group area.

Extent and Status of Vegetation Types in the East Otway Landcare Group area

Ecological Vegetation Class	Pre-1750 area (ha)	Current area (ha)	% remaining	Bioregional Conservation Status
Lowland Forest	4007	925	23%	Depleted
Shrubby Foothill Forest	3298	1927	58%	Least Concern
Herb-rich Foothill Forest / Shrubby Foothill Forest Complex	2319	1580	68%	Vulnerable (Otway Plain) Depleted (Otway Ranges)
Shrubby Wet Forest	1154	1100	95%	Least Concern
Grassy Woodland	658	8	1%	Endangered
Sedgy Riparian Woodland	238	36	15%	Depleted (Otway Plain) Vulnerable (Otway Ranges)
Floodplain Riparian Woodland	129	1	1%	Endangered
Riparian Forest	94	91	97%	Vulnerable (Otway Plain) Least Concern (Otway Ranges)
Riparian Scrub Complex	56	40	71%	Depleted
Swampy Riparian Woodland	46	3	6%	Endangered
Wet Forest	42	42	100%	Least Concern
Herb-rich Foothill Forest	14	10	71%	Vulnerable
Grassy Forest	6	1	14%	Endangered
Heathy Woodland	3	3	100%	Least Concern

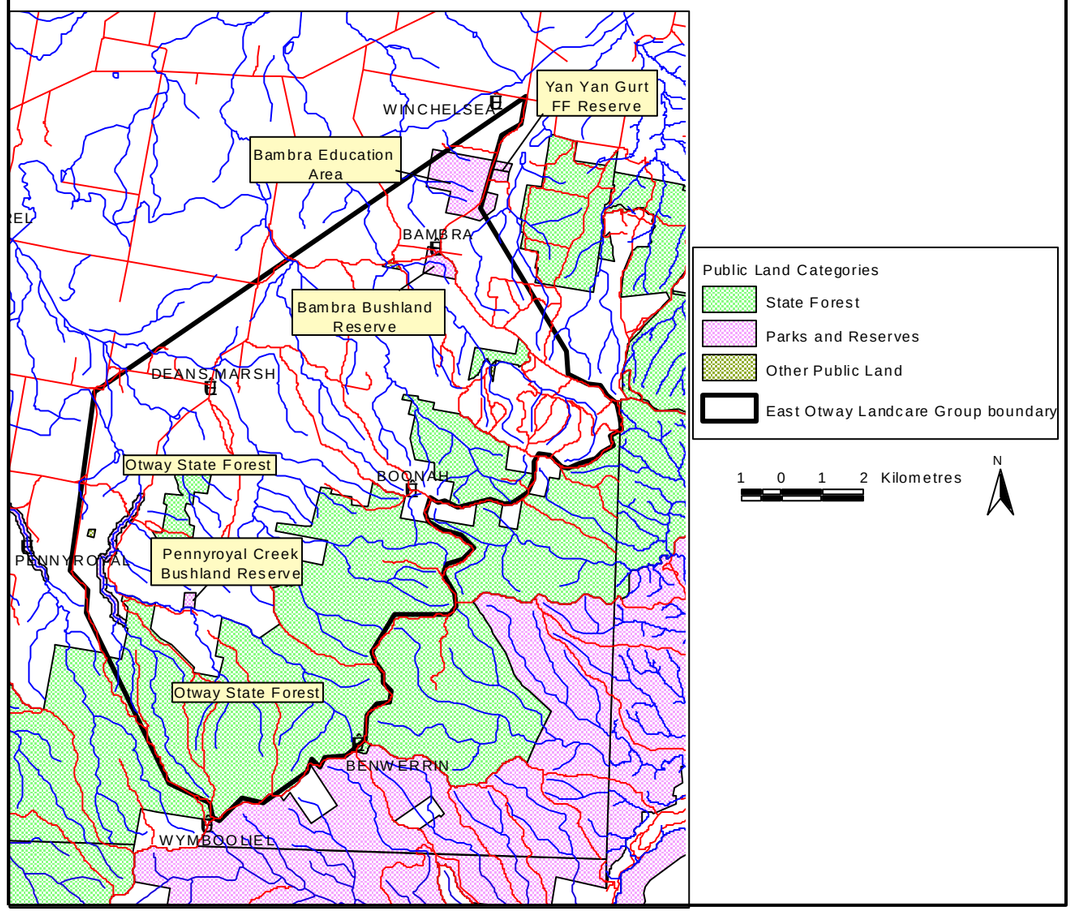


Of the 48% of original vegetation cover that remains in the East Otway Landcare Group Area, 74% is on public land. Freehold land across the area has an average of approximately 20% native vegetation cover. Public land is therefore an important component of the biodiversity in the East Otway Landcare Group area. It supports large blocks of remnant vegetation, and provides areas of core habitat large enough to sustain viable populations of many fauna species.

In the north-east of the area, Bambra Bushland Reserve, Yan Yan Gurt Flora and Fauna Reserve, Bambra Education Area, and the private land between them support an important remnant of Lowland Forest.

The Otway State Forest comprises the largest block of remnant vegetation in the East Otway Landcare area and provides habitat for a number of threatened species. Historical management practices have altered the structure of the vegetation, and resulted in a reduction in the abundance of large, old, hollow-bearing trees. Nevertheless, this large forest remnant retains significant habitat values, and is important for the long-term viability of species that require large areas of mature forest. Appropriate management of this forest block to protect and enhance existing biodiversity assets is a key element in the conservation of biodiversity in the area.

Public Land in the East Otway Landcare Group area



On private land, remnant vegetation has been subject to a number of threats including fragmentation, the removal of trees and fallen timber, invasion by weeds, and grazing by stock. In almost all remnants with a long-term history of grazing, the understorey is extremely sparse and simplified, or completely absent.


(Photo: Mike Robinson-Koss)

Any remnants on private land that retain large old trees, a diverse understorey, and a range of groundcover species are of high biodiversity value. The identification and protection of these remnants is a high priority for biodiversity management in the East Otway Landcare Group area. Native grasses in particular have been severely depleted throughout the area, and the protection of any remaining grassy areas should also be a high priority.


(Photo: Mike Robinson-Koss)


(Photo: Mike Robinson-Koss)

Threatened Flora and Fauna

A number of threatened species have been recorded in the East Otway Landcare Group area. Threatened fauna species include Australasian Shoveller, Hardhead, Grey Goshawk and Yarra Pygmy Perch (see Appendix 1 for details of conservation status). Species that are classified as "near threatened" include Rufous Bristlebird, Brown Treecreeper, Latham's Snipe and Broad-toothed Rat. A number of regionally declining woodland bird species have also been recorded, including Crested Shrike-tit, Golden Whistler, Sacred Kingfisher, White-browed Treecreeper, Eastern Yellow Robin, Rufous Whistler, Restless Flycatcher, and Jacky Winter.


Hardhead (Photo: Viridans Biological Databases)


Broad-toothed Rat (Photo: John Seebeck)


Wrinkled Buttons (Photo: John Eichler)

Threatened flora species recorded in the area include Wrinkled Buttons, Yarra Gum and Netted Daisy Bush (See Appendix 2 for details of conservation status).

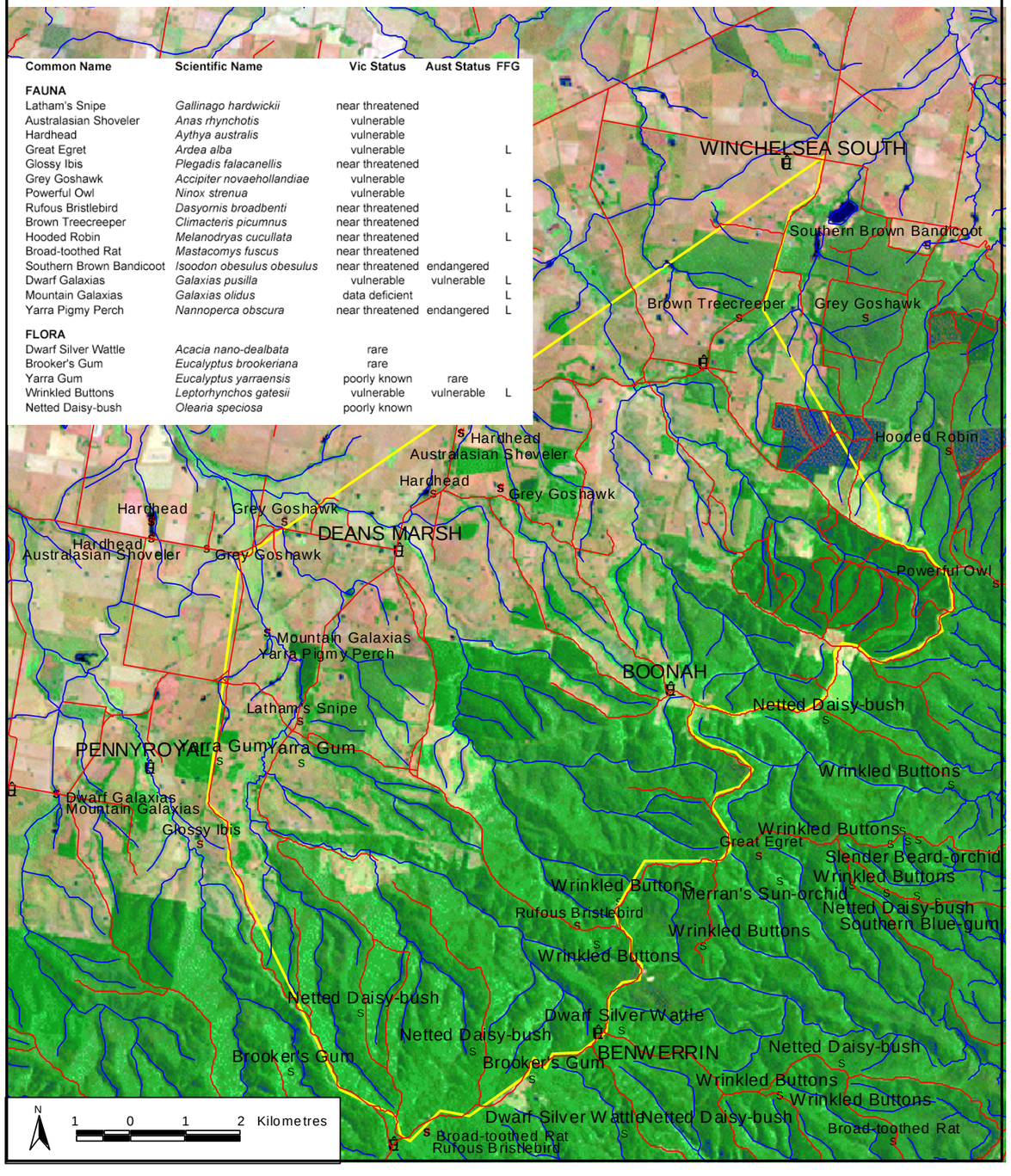
Additional flora species that are not listed as threatened but are regionally significant include Dwarf Silver Wattle, Tasman Flax-lily, Grey Parrot-pea, Red-fruit Saw-sedge, Scented Paperbark, Musk Daisy-bush, Yellow Rice-flower, and Cluster Pomaderris.

Many waterways in the area are degraded due to a history of vegetation removal, drainage of swamps and wetlands, and grazing by stock. This has led to problems such as bank erosion, channelisation, incision of stream beds, and high sediment loads which are discharged into the Barwon River. The East Otway Landcare Group and Corangamite CMA are undertaking major projects to address these issues, including willow removal, erosion control and stream stabilisation works.


Willow infestation (Photo: DSE, Colac)

Threatened Species in the East Otway Landcare Group Area

Common Name	Scientific Name	Vic Status	Aust Status	FFG
FAUNA				
Latham's Snipe	*Gallinago hardwickii*	near threatened		
Australasian Shoveler	*Anas rhynchotis*	vulnerable		
Hardhead	*Aythya australis*	vulnerable		
Great Egret	*Ardea alba*	vulnerable		L
Glossy Ibis	*Plegadis falacanellis*	near threatened		
Grey Goshawk	*Accipiter novaehollandiae*	vulnerable		
Powerful Owl	*Ninox strenua*	vulnerable		L
Rufous Bristlebird	*Dasyornis broadbenti*	near threatened		L
Brown Treecreeper	*Climacteris picumnus*	near threatened		
Hooded Robin	*Melanodryas cucullata*	near threatened		L
Broad-toothed Rat	*Mastacomys fuscus*	near threatened		
Southern Brown Bandicoot	*Isoodon obesulus obesulus*	near threatened	endangered	
Dwarf Galaxias	*Galaxias pusilla*	vulnerable	vulnerable	L
Mountain Galaxias	*Galaxias olidus*	data deficient		L
Yarra Pigmy Perch	*Nannoperca obscura*	near threatened	endangered	L
FLORA				
Dwarf Silver Wattle	*Acacia nano-dealbata*	rare		
Brooker's Gum	*Eucalyptus brookeriana*	rare		
Yarra Gum	*Eucalyptus yarraensis*	poorly known	rare	
Wrinkled Buttons	*Leptorhynchos gatesii*	vulnerable	vulnerable	L
Netted Daisy-bush	*Olearia speciosa*	poorly known		



Biodiversity Planning Principles and Priorities

Principles

The environments most likely to provide the best habitat for native wildlife are the environments that were here prior to 1750.

Although native wildlife are found in farm situations and certain native species have flourished as a result of clearing, research by Birds Australia has found that a 10% increase in native vegetation can result in a 7% increase in the diversity of bird species. Also, in farm sites where understorey shrubs were present, there was a 30% increase in the diversity of woodland-dependent birds. In addition ground-nesting birds were almost three times as diverse where understorey was present.

The more endangered a species or community is the higher priority it is.

Across a region, the estimated pre-1750 extent of a vegetation type can be compared with its current extent. When less than 10% is remaining that vegetation type is said to be "endangered". The more endangered vegetation types tend to be found in creek lines, river flats, and other areas with better soils.


(Photo: DSE, Colac)

Native ecosystem loss is virtually irreversible at human timescales.

It is much easier and more effective to protect and enhance an existing remnant than to establish a new one. Remnants require the least effort to maintain but the most effort to regain, and in any case can never be entirely recreated.
Similarly, new plantings are often more effective if they are close to existing vegetation or if they link patches up. Natural regeneration and dispersal of animals will assist the rehabilitation process.

The protection of strategic biodiversity assets is the key to successful long-term biodiversity conservation

The best patches of native vegetation in our landscape are extremely valuable and if protected and suitably managed will form the core habitat upon which to build a landscape rich in biodiversity.

Priorities

Actions to benefit biodiversity should be prioritised in the order of *protect*, *enhance* and then *restore*.

1. Protect remnants first.

The irreversibility principle is important here: retain rather than regain.

2. Enhance the quality of remnants.

Restore missing species or missing structural elements like shrubs. Buffering by new plantings can enhance a remnant by increasing its size, and by decreasing impacts on the core.

3. Restore some of the extent of indigenous vegetation.

This can be achieved by:
- -Linking remnants.
- -Creating new areas away from existing patches.

Remnant Protection / Enhancement Priorities

Remnant Protection / Enhancement Priority-Setting Criteria

- **Conservation status**

The Bioregional Conservation Status of each vegetation type (EVC) enables priorities to be identified for remnant vegetation. The more threatened the vegetation type comprising the remnant, the higher its priority. Therefore endangered vegetation communities are of higher priority than those classified as vulnerable or depleted.

The presence of threatened flora or fauna species will also increase the conservation status of a remnant.

VICTORIAN STATUS CATEGORIES FOR SPECIES AND COMMUNITIES

(Categories highlighted in blue are those collectively referred to as 'threatened' species and communities)

MOST AT RISK ← → LEAST AT RISK

ANIMALS

Critically endangered → Endangered → Vulnerable → Lower Risk - near threatened → Data deficient → Unlisted

PLANTS

Endangered → Vulnerable → Rare → Poorly Known → Unlisted

VEGETATION COMMUNITIES (ECOLOGICAL VEGETATION CLASSES)

Endangered → Vulnerable → Depleted → Rare → Least Concern

- **Size**

The larger the remnant the higher the priority. Riparian remnants and drought refuges are of higher value for a given size.

- **Quality/condition**

As measured by Habitat Hectares or Vegetation Quality Assessment procedures. Several remnants on private land in the East Otway Landcare Group area have been assessed using a Vegetation Quality Assessment procedure developed by the Corangamite Catchment Management Authority. Factors which contribute to remnant condition in woodland and forest communities include:

- percentage of tree cover
- abundance of large trees
- diversity of understorey (ground cover and shrub species)
- weediness
- level of regeneration of trees and shrubs
- presence of ground litter (eg leaves) and logs

For a given conservation status, the higher the quality, the higher the priority.

- **Shape**

Because of the detrimental impacts on habitat quality known as 'edge effects', the lower the ratio of remnant perimeter to remnant area, the higher the priority.

Elongated blocks like roadsides are a lower priority than those with a more square or circular shape. Riparian remnants that are naturally linear in shape may be exceptions.

- **Spatial distributions – proximity and fragmentation**

The closer to other remnants, the higher the priority. For a given proximity, the size of neighbouring remnants will also influence priority.

As a rule of thumb remnants within 100m of core habitat (patches >50ha) would be accorded the highest priority with those greater than 1km from core habitat accorded the lowest priority.

Patterns of clustering of remnants, even if individual remnants are of small size, can lead to higher priorities.

**Given the scarcity of information on quality or condition of remnants, and the complexity of landscape spatial analysis, conservation status and size are usually the primary determinants of priority.*

Suggested Remnant Protection / Enhancement Actions

Protection

- Fencing to manage stock access
- Controlling pest plants and animals
- Retain fallen timber and large trees
- Establish buffers; minimum 20m, preferably 50m in areas of high priority or riparian remnants
- Monitor threatened species populations

Enhancement

- Expanding size of remnant by buffering as above
- Re-vegetating to replace missing species (to enrich floristics or structure)
- Artificial nest-site placement
- Introducing coarse woody debris onto site, if appropriate

Expanding size of remnant by buffering with revegetation

Restoration Priorities

- **Connectivity**

Many fauna species are restricted in breeding, feeding and movement by fragmentation of native vegetation cover. Priorities for establishing linkages should be determined by the priority of the remnants to be linked and knowledge of specific wildlife requirements.

Where possible smaller remnants should be linked to core (larger) areas, or linkages across different environments (e.g. creeklines to ridges) created. Generally, short linkages are more effective, and long linkages should only be used between large core areas. Because the edges of connecting links tend to be of poorer quality, linkages should preferably be at least 50m wide to be effective for most wildlife. The longer a linkage, the wider it needs to be to provide adequate refuge, foraging and breeding sites.

Long corridors require additional patches or 'nodes'. These should ideally be at least 2ha in size and no more than 500m apart.
Smaller patches or 'stepping stones' at regular intervals can be used to benefit some species if complete linkages cannot be established.

- **Faunal Productivity**

The more fertile and well-watered parts of the landscape are more productive for native wildlife, and are a high priority for revegetation. Creeklines also make good linkages with the added benefits of erosion control and improved water quality if protected and revegetated.

- **Conservation status of Pre-1750 vegetation cover**

Areas that were previously occupied by currently threatened vegetation communities (e.g. Endangered EVCs) are also high priorities for revegetation.

Suggested Restoration Actions

- Select highest priority sites according to above criteria
- Prepare sites carefully, particularly with regard to weed and rabbit control
- Locally indigenous species should always be used for revegetation
- Seed for propagation should be collected locally

Focal Species

Focal Species Approach

The focal species approach is a management approach developed by CSIRO Wildlife and Ecology that links the needs of vulnerable species with the threats responsible for their decline. By managing threatening processes at a level that protects the species most sensitive to those threats, it is considered that a range of other less-sensitive species will also be protected. In any landscape, there will be a number of threatening processes occurring, and a focal species can be assigned for each threat. Focal species can also be assigned according to habitat type, if a particular threat is likely to affect species differently in different habitats.

The steps in applying the focal species approach are:

1. Identify the threats to be managed
2. Determine the species most sensitive to each threat
3. Establish minimum requirements of the most sensitive species
4. Utilise minimum requirements to assist with developing guidelines for landscape restoration
5. Implement restoration program
6. Monitor and evaluate

- ***See following pages for details of focal species selected for the East Otway Landcare Group area***

The following table lists a range of possible threatening processes that may reduce native biodiversity within a landscape. Listed alongside the threats are the selected focal species for the East Otway Landcare Group area.

Key Threats Number	Threat	East Otway Landcare Group Focal Species
1	Reduction in size and connectivity of remnants	White-throated Treecreeper, Crested Shrike Tit, Eastern Yellow Robin
2	Reduction in size of remnants	Grey Goshawk
3	Loss of hollow-bearing trees	White-throated Treecreeper, Grey Goshawk
4	Loss of mature trees for nectar supply / insects	White-throated Treecreeper
5	Loss of shrub cover	Crested Shrike Tit, Eastern Yellow Robin
6	Loss of logs / woody debris	Eastern Yellow Robin
7	Replacement of native grasses with exotics	
8	Predation by cats and foxes	
9	Nest predation by cats and foxes	
10	Inappropriate fire regimes	Grey Goshawk
11	Poor quality riparian habitats	Platypus
12	Over grazing	Platypus
13	Invasion of perennial weed species	
14	Siltation of streams	River Blackfish
15	Clearing of woody debris from streams (desnagging)	River Blackfish
16	Altered flow regimes	River Blackfish
17	Competition from introduced fish	River Blackfish

East Otway Landcare Group area Focal Species

White-throated Treecreeper (Photo: DSE/McCann)

River Blackfish (Photo: DNRE)

Grey Goshawk (white form) (Photo: Lindsay Cupper)

White-throated Treecreeper (*Cormobates leucophaeus*)

Conservation Status: declining woodland species (not listed as threatened)

Patch Size and Isolation: Found in 0-3ha sites, but mostly in >100ha. They are sometimes in semi-isolated sites, but mostly in or close to other suitable habitat areas.

Habitat Requirements: Prefers forests and woodlands with rough-barked eucalypts (stringybarks and peppermints) and old trees. Needs tree hollows for breeding.

EVCs: Lowland Forest, Shrubby Foothill Forest, Herb-rich Foothill Forest, Shrubby Wet Forest

Key Threats:
(1) Reduction in size and connectivity of remnants
(3) Loss of hollow-bearing trees
(4) Loss of mature trees for insects

Management Recommendations:
Protect large remnants
Retain hollow-bearing trees

River Blackfish (*Gadopsis marmoratus*)

Conservation Status: Lower Risk, near threatened (FFG-listed)

Patch Size and Isolation: n/a

Habitat Requirements: Most common in cooler, flowing streams where there is plenty of rock cover with abundant snags, fallen timber and debris, and a gravel bottom..

EVCs: n/a

Key Threats:
(14) Siltation of streams
(15) Clearing of woody debris from streams (desnagging)
(16) Altered flow regimes
(17) Competition from introduced fish

Management Recommendations:
Undertake willow control, revegetation and stock exclusion along waterways that support River Blackfish.
Ensure the allocation of adequate passing flows in waterways that support River Blackfish.
Remove exotic fish species (eg. trout)
Retain woody debris in streams

Grey Goshawk (white form) (*Accipiter novaehollandiae*)

Conservation Status: Lower Risk, near threatened

Patch Size and Isolation: Will use small isolated patches, however patch size and connectivity requirements for breeding sites are unknown. Their home range is unknown, but they would possibly use a core area of about 1000ha.

Habitat Requirements: Prefers mature forest for nesting and foraging. Nest sites are usually in gullies in tall forest. Many of its prey species (eg possums and bats) are dependent on hollows.

EVCs: Lowland Forest, Shrubby Foothill Forest, Herb-rich Foothill Forest, Shrubby Wet Forest, Wet Forest

Key Threats:
(2) Reduction in size of remnants
(3) Loss of hollow-bearing trees
(10) Inappropriate fire regimes
(also possible secondary poisoning from rabbit baiting)

Management Recommendations:
Protect large remnants and remnants with mature trees
Consider alternative rabbit control methods near known habitat areas (Grey Goshawk is known to take rabbits from farmland near forest edges)

East Otway Landcare Group area Focal Species

Crested Shrike Tit (Photo: DSE/McCann)

Eastern Yellow Robin (Photo: DSE/McCann)

Platypus (Photo: DNRE)

Crested Shrike Tit (*Falcunculus frontatus*)

Conservation Status:	declining woodland species (not listed as threatened)
Patch Size and Isolation:	Found in a range of patch sizes. They are sometimes found in semi-isolated sites (up to 200m from similar habitat), otherwise in or close to core areas. Foraging territories can cover over 50 has.
Habitat Requirements:	Prefers gullies containing Narrow-leaf Peppermint and Manna Gum, and River Red-gum woodlands, with a shrubby understorey and good canopy cover. Feeds from the bark and foliage of eucalypts and wattles. Nests are built high in the canopies of eucalypts.
EVCs:	Lowland Forest, Shrubby Foothill Forest, Herb-rich Foothill Forest, Shrubby Wet Forest, Floodplain Riparian Woodland
Key Threats:	(1) Reduction in size and connectivity of remnants (5) Loss of shrub cover
Management Recommendations:	Protect large remnants Link patches <200m from core to core areas – 50+m wide corridors. Enhance by restoring shrub layer if missing.

Eastern Yellow Robin (*Eopsaltria australis*)

Conservation Status:	declining woodland species (not listed as threatened)
Patch Size and Isolation:	Found in a range of patch sizes, but mostly in patches greater than 400 ha. They are rarely found in isolated patches, preferring areas that are closely connected to similar habitat.
Habitat Requirements:	Prefers wet forests (particularly gullly forests), wet woodlands and scrubs with a shrubby understorey and fallen timber on the ground. Feeds among leaf litter, using vantage points such as the sides of tree trunks to located prey. Nests are built in small trees or tall shrubs.
EVCs:	Lowland Forest, Shrubby Foothill Forest, Herb-rich Foothill Forest, Shrubby Wet Forest, Sedgy Riparian Woodland, Floodplain Riparian Woodland, Riparian Forest, Riparian Scrub Complex, Wet Forest
Key Threats:	(1) Reduction in size and connectivity of remnants (5) Loss of shrub cover (6) Loss of logs / woody debris
Management Recommendations:	Protect large remnants Encourage regeneration of shrubs and trees through grazing exclusion as necessary Enhance by restoring patchy shrub layer if missing. Create linkages between isolated remnants. Retain fallen timber

Platypus (*Ornithorhynchus anatinus*)

Conservation Status:	secure but local distribution is patchy
Patch Size and Isolation:	n/a
Habitat Requirements:	Prefers waterways with a good cover of native riparian vegetation, instream woody debris (snags), and banks which are both undercut and stable.
EVCs:	n/a
Key Threats:	(11) Altered flow regimes/ water diversions Declining water quality Loss of native riparian vegetation Increased erosion along banks and channels (12) Poor quality riparian habitats
Management Recommendations:	Improve stability of stream bed where necessary with grade control structures such as rock shoots or weirs Control grazing by livestock along waterways Control rabbits Remove willows and replace with indigenous vegetation

East Otway Landcare Group Area Priorities

The following section of the East Otway Landcare Group Biodiversity Plan contains six maps presented in priority order. As has been noted previously, the highest priority is to **protect** existing and most viable remnants. The next priorities are then to **enhance** remnants, and finally to revegetate to **restore** the extent of native vegetation.

Remnant Priority Map

The best patches of bush are very valuable. The patches of bush we have now will be the best patches in the landscape, despite any revegetation work, for at least the next 100 years. Preserving what is left must therefore be the highest priority.
The Remnant Priority map indicates the priority for protection and enhancement of all remnant patches in the target area.

Threatened Species Habitat Map

Threatened species are generally those most vulnerable to habitat loss and degradation. Often threatened species are associated with depleted vegetation types, or with high-quality habitat that retains important elements such as mature trees, intact understorey or diverse instream habitats.
The Threatened Species Habitat map identifies opportunities to protect and enhance habitat for the long-term viability of threatened species populations.

Priority Creeklines Map

This map identifies those stretches of creekline that are the highest priority for both protection and revegetation. The high priority creeklines typically retain areas of native vegetation, or are linked to adjacent remnants. Protecting and revegetating creeklines will provide important habitat for a range of fauna reliant on riparian environments for foraging, breeding and dispersal.

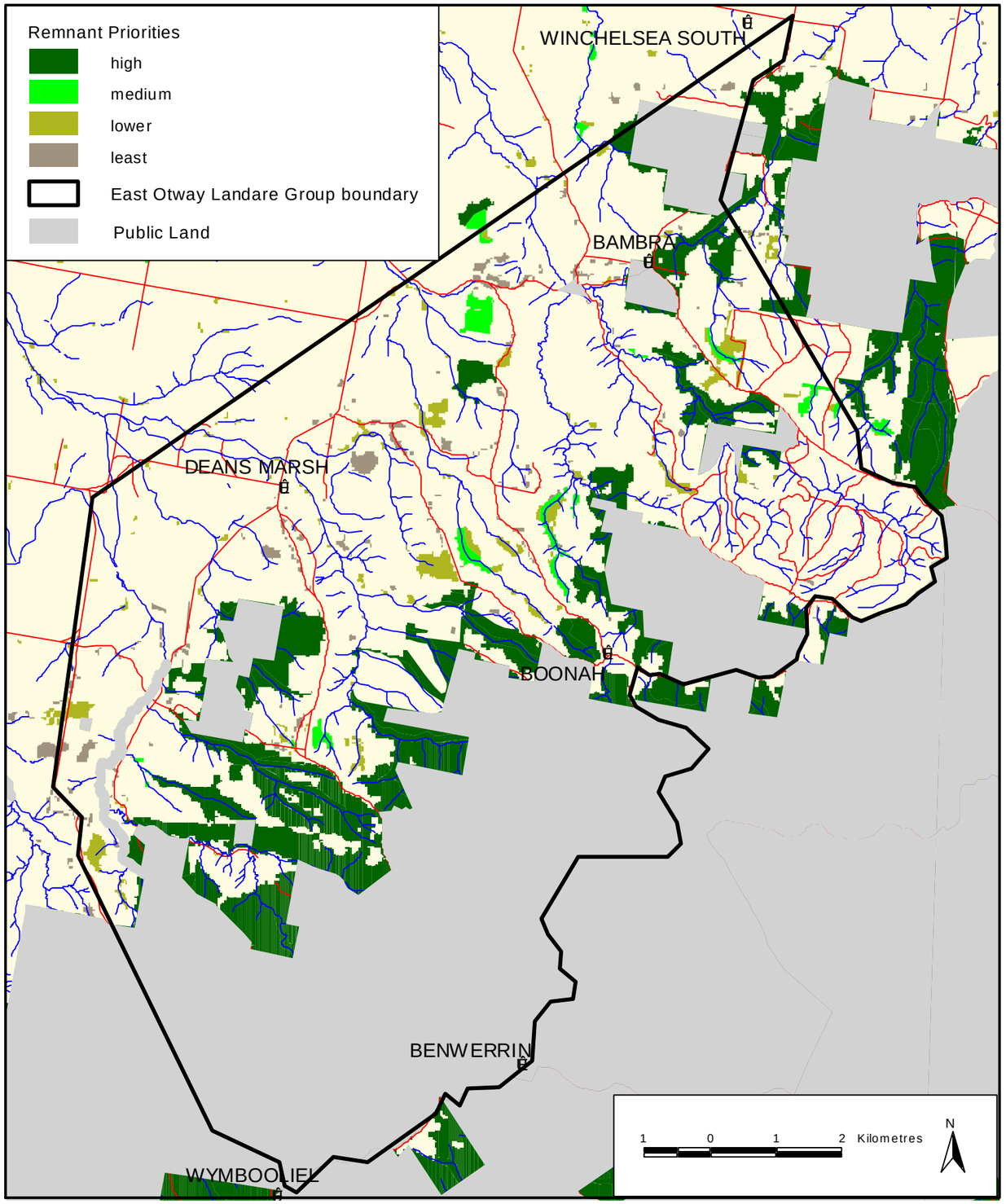
Priority Roadsides Map

Roadsides frequently contain flora species that have disappeared from adjoining farmland, or have the potential for use as the core of a wildllife corridor. This map identifies the roadsides of highest conservation value, and therefore in need of the highest level of protection, based on surveys conducted in 1997.

Linkage Zones Map

Large remnants form the core habitat for most remaining native flora and fauna. Linking up core areas will help to maintain viable breeding populations and will provide more available habitat to fauna species that are not able to cross cleared areas. This map identifies potential zones where linkages could be made.

The following maps have been compiled and presented to identify options, and are not intended to be prescriptive. For example, Linkage Zones are areas where there is high benefit to be gained from revegetating with indigenous species, but exactly where that revegetation should occur depends on local circumstances. Similarly the priority remnants map identifies high priority remnants according to a number of criteria, but leaves many options as to which remnants receive attention.



Focal Species expected to benefit: all

Priority Remnants on private land

Priorities for protection and enhancement of remnant vegetation in the East Otway Landcare Group area were determined primarily on the basis of:

- **Remnant size**
- **EVC Conservation Status (Endangered, Vulnerable, Depleted, Least Concern)**

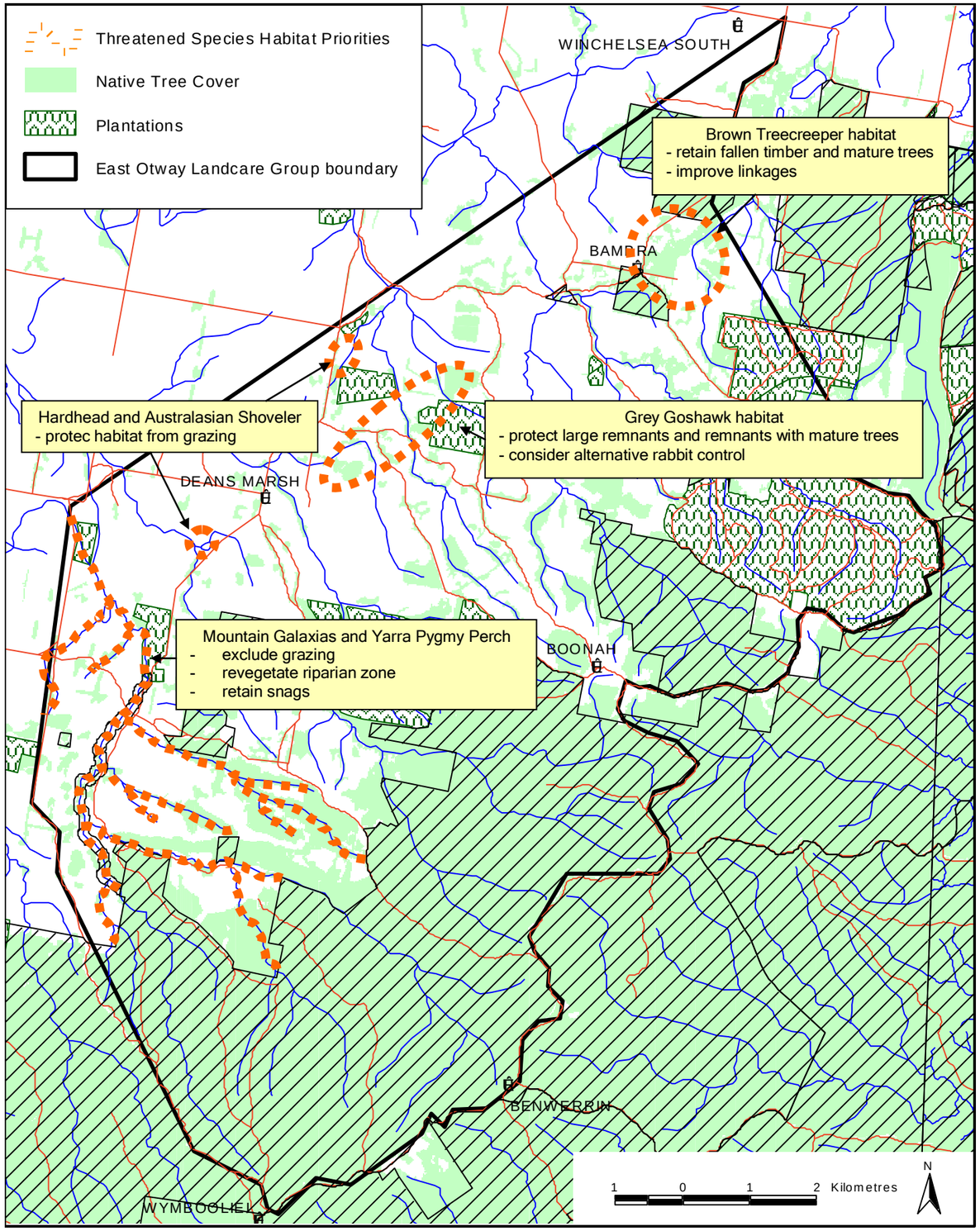
The following Size / Conservation Status criteria were applied:

EVC Conservation Status	Size of remnant (ha.)	Priority
Endangered	>10 ha	High
	5-10 ha	Medium
	0-5 ha	Lower
Vulnerable	> 15 ha	High
	10-15 ha	Medium
	0-10 ha	Lower
Depleted	> 25 ha	High
	20-25 ha	Medium
	15-20 ha	Lower
	< 15 ha	Least
Least Concern	> 30 ha	High
	25-30 ha	Medium
	20-25 ha	Lower
	< 20 ha	Least

Additional landscape distribution criteria were then taken into consideration:

- Isolation: Remnant patches adjacent to large core areas were given a higher priority
- Linkages: Remnants that made valuable linkages were given a higher priority
- Quality: Remnants that were assessed as being of excellent quality were given a higher priority, while poor quality remnants would be given a lower priority
- Riparian zones: Remnants along gullies and waterways were given a higher priority as they tend to support productive habitat and diverse vegetation, and play an important role in maintaining water quality

* ***The remnant priorities shown here are to be considered as guidelines only since the condition of some remnants was not known. Assessment of habitat condition and current management would be required before recommending works in a particular area, and may alter the priority of some remnants.***



Threatened Species Habitat

There are a number of opportunities to mitigate threats and enhance habitat for threatened species in the East Otway Landcare Group area. Actions recommended in this plan have been based on available information on the habitat requirements of the threatened species which have been recorded in the area, and the threats to their long-term viability.

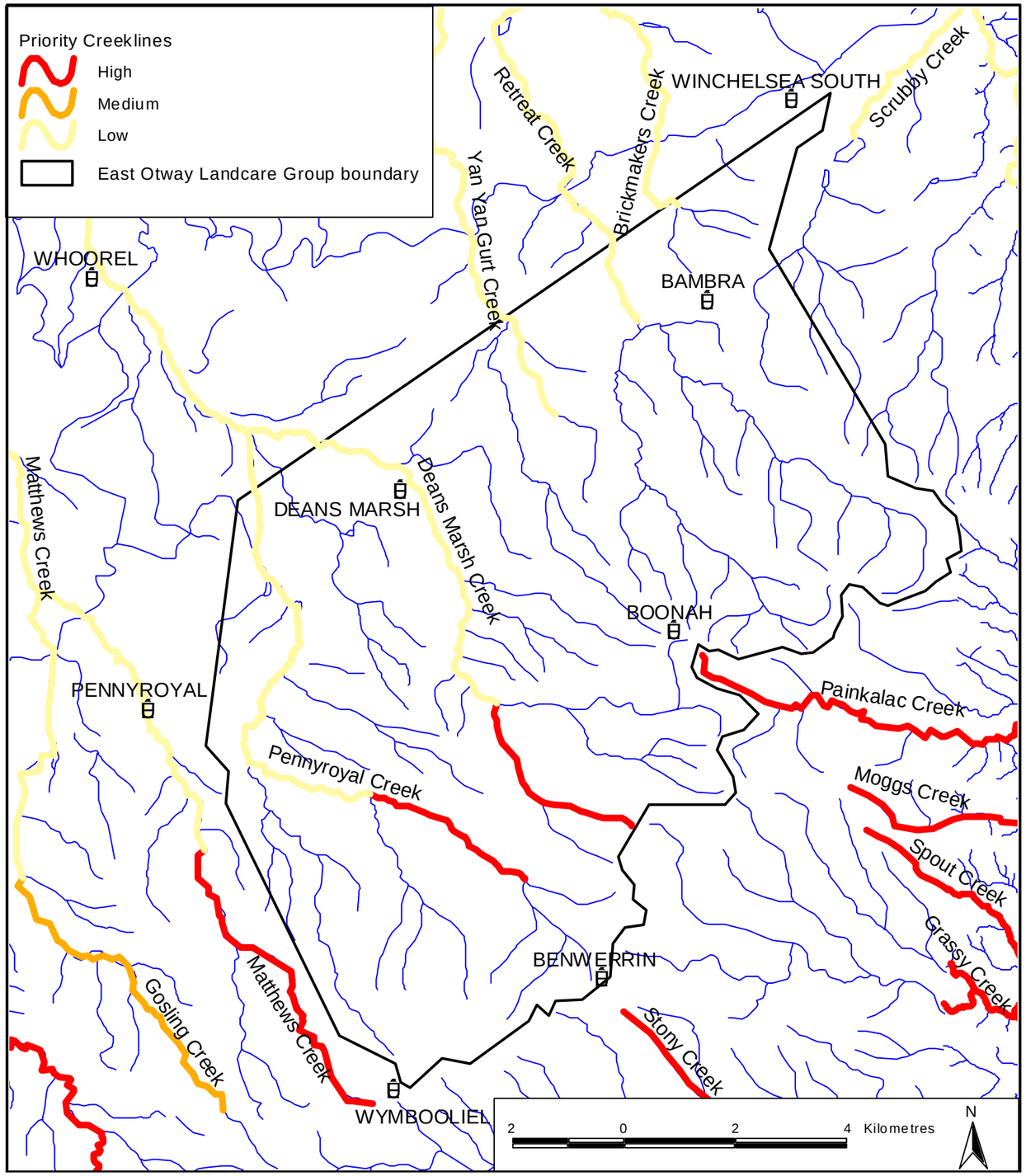
For example, Brown Treecreepers need large remnants (> 300has), with tree hollows in which to build their nests, and fallen timber and leaf litter on the ground in which to forage for insects. Actions to protect and improve habitat for Brown Treecreeper could include the retention of fallen timber and live and dead hollow-bearing trees, management of grazing to allow regeneration of habitat, and revegetation to improve linkages between large blocks of Lowland Forest.

Mountain Galaxias (Photo: DNRE)

Yarra Pigmy Perch (Photo: DNRE)

Threatened fish species such as Mountain Galaxias and Yarra Pygmy Perch need high quality in-steam and riparian habitat. Their habitat can be protected and enhanced by excluding grazing and stock access, revegetation of the riparian zone with appropriate species, and the retention of in-stream habitat such as snags in their waterways. Measures to restore environmental flows, and minimise runoff and erosion from adjacent land, will also benefit these species.

Focal Species expected to benefit: all



Priority Creeklines

Establishing and maintaining good quality vegetation along creeklines is important to:

- Create habitat for particular terrestrial species that preferentially use creeklines, e.g. Sacred Kingfisher, Crested Shrike-tit, Eastern Yellow Robin, and Common Ringtail Possum
- Maintain good quality aquatic habitat for fish, Platypus and invertebrate species
- Ensure water quality is maintained and enhanced
- Prevent erosion
- Provide corridors for wildlife movement
- Provide drought refuges for fauna

To establish priorities for the East Otway Landcare Group area, creeklines were divided into sections or 'reaches', and prioritised according to:

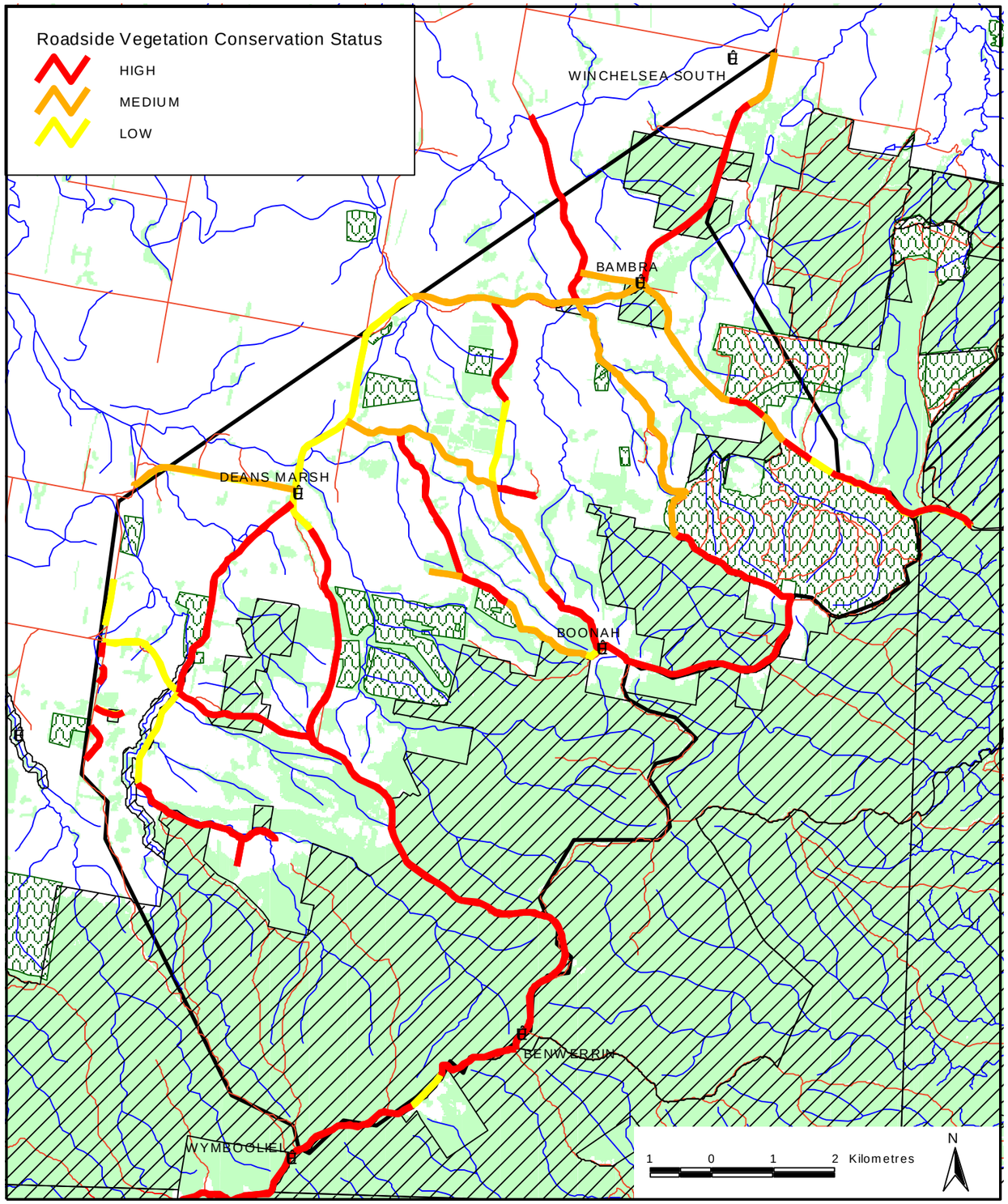
- Instream habitat, eg. fallen branches, roots, rocks, flows, shade
- Presence of established riparian vegetation
- Extent of willows and other pest plants
- Channel stability

Actions to be implemented on priority creeklines include:

- Fencing to manage stock access (Preferably 25m each side of creekline)
- Revegetation with riparian species
- Weed Control
- Erosion control works, eg. bed and bank stabilisation works
- Assessment of barriers to fish passage

Focal Species expected to benefit: River Blackfish, Grey Goshawk, Platypus, Crested Shrike-tit, Eastern Yellow Robin

These Creekline Priorities are intended as guidelines only, and do not preclude work being carried out on other creeklines that have not been prioritised. All creeklines will be subject to an assessment of condition before on-ground works are implemented.



Priority Roadsides

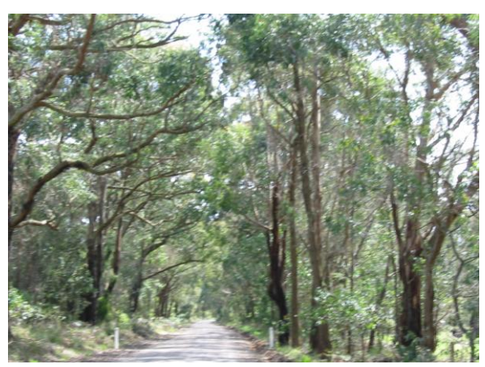
Roadside vegetation, although usually in narrow, linear strips, often includes large old trees, native grasses and understorey species that are absent from adjoining land.

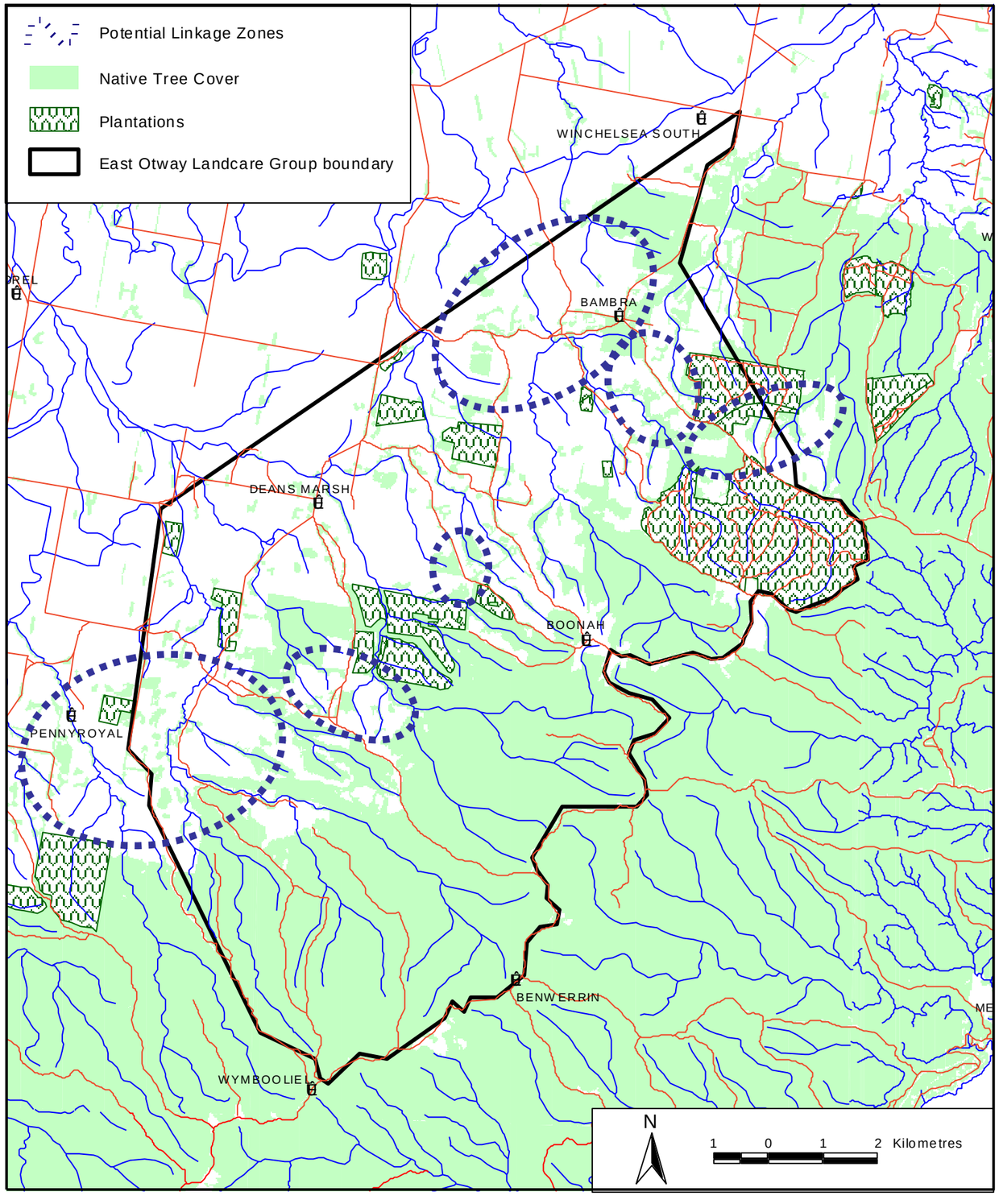
For this reason, roadsides can be important sources of seed for locally indigenous species, and can also be incorporated into corridor linkages between remnants.

Most roadsides in the Surf Coast Shire have been assessed as being of High, Medium or Low conservation value, according to the quality of native vegetation they contain. The Priority Roadsides in the East Otway Landcare Group area are based on these assessments. Not all roadsides have been assessed – completion of this task in the East Otway Landcare Group area would assist in the further development of the Biodiversity Action Plan.

Information on the presence of significant roadside vegetation can be used to identify roadside remnants that should be protected from impacts such as road-works, herbicide spraying, ploughing for fire-breaks and other degrading processes. It can also be used to assist in planning the location of linkage zones.

Focal Species expected to benefit: Eastern Yellow Robin, White-throated Treecreeper, Crested Shrike-tit, Grey Goshawk





Linkage Zones

These zones have been identified as areas where substantial **linkages** are required between large blocks of remnant vegetation.

The purpose of these linkages is to:

- Enable the movement of small mammals, birds and reptiles that will not venture far from cover
- Allow the dispersal of young animals after leaving parental care
- Enable re-colonisation of areas following fire, disease, or other events that may reduce the populations of some species

Important principles for linkages include:

- The wider the better – at least 30m and preferably 50m
- Linkages should provide quality habitat (food, shelter, nesting sites) as well as a pathway for movement
- Long or narrow linkages can be supplemented by regular 'nodes' (larger habitat patches)
- Linkages that connect gullies to ridges may benefit more species than those that join similar land classes
- Links are more effective if they include existing patches of mature vegetation or natural features such as creeklines

Existing vegetation along roadsides and unused road reserves can often provide a good basis for a linkage between remnants.

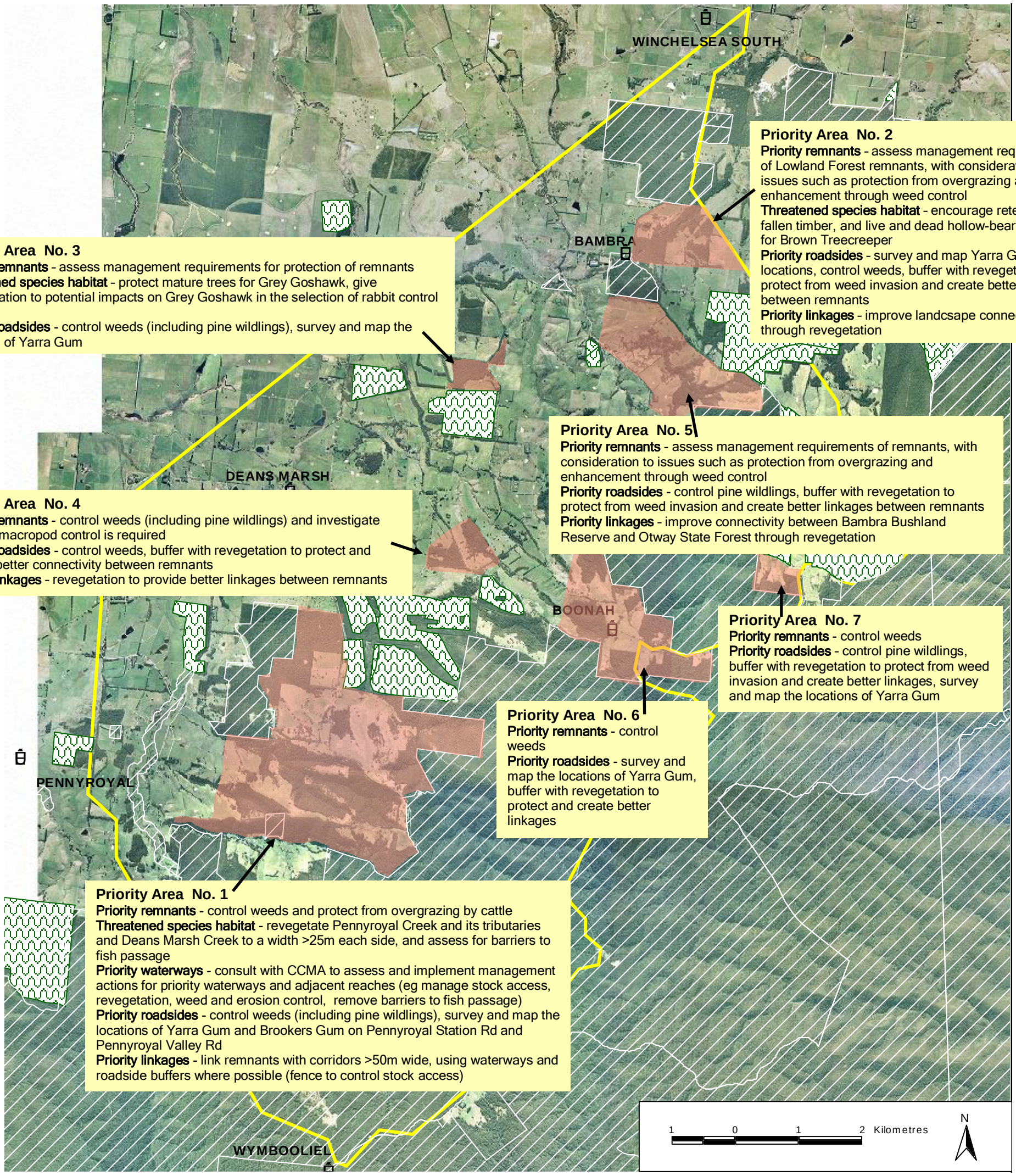
Regularly spaced patches of vegetation or 'stepping stones' can allow for movement of some species where complete linkages cannot be established.

Focal Species expected to benefit: Eastern Yellow Robin, White-throated Treecreeper, Crested Shrike-tit

The linkage zones represented here are indicative only, and are not intended to specify exactly where a linkage should be made.

Priority Areas for Biodiversity Actions

Priority areas for action have been identified where there are a number of biodiversity priorities occurring together in the same area (eg priority remnants, high value roadsides, threatened species habitat and linkage zones), and where on-ground actions could provide multiple benefits for these priorities. These areas are preliminary suggestions based on available biodiversity information, and do not preclude works being undertaken in other areas. Selection of actual sites for on-ground works will need to take into account factors such as landholder interest, community goals, practical constraints and new information.



Priority Area No. 2
Priority remnants - assess management requirements of Lowland Forest remnants, with consideration to issues such as protection from overgrazing and enhancement through weed control
Threatened species habitat - encourage retention of fallen timber, and live and dead hollow-bearing trees for Brown Treecreeper
Priority roadsides - survey and map Yarra Gum locations, control weeds, buffer with revegetation to protect from weed invasion and create better linkages between remnants
Priority linkages - improve landcsape connectivity through revegetation

Priority Area No. 3
Priority remnants - assess management requirements for protection of remnants
Threatened species habitat - protect mature trees for Grey Goshawk, give consideration to potential impacts on Grey Goshawk in the selection of rabbit control methods
Priority roadsides - control weeds (including pine wildlings), survey and map the locations of Yarra Gum

Priority Area No. 5
Priority remnants - assess management requirements of remnants, with consideration to issues such as protection from overgrazing and enhancement through weed control
Priority roadsides - control pine wildlings, buffer with revegetation to protect from weed invasion and create better linkages between remnants
Priority linkages - improve connectivity between Bambra Bushland Reserve and Otway State Forest through revegetation

Priority Area No. 4
Priority remnants - control weeds (including pine wildlings) and investigate whether macropod control is required
Priority roadsides - control weeds, buffer with revegetation to protect and provide better connectivity between remnants
Priority linkages - revegetation to provide better linkages between remnants

Priority Area No. 7
Priority remnants - control weeds
Priority roadsides - control pine wildlings, buffer with revegetation to protect from weed invasion and create better linkages, survey and map the locations of Yarra Gum

Priority Area No. 6
Priority remnants - control weeds
Priority roadsides - survey and map the locations of Yarra Gum, buffer with revegetation to protect and create better linkages

Priority Area No. 1
Priority remnants - control weeds and protect from overgrazing by cattle
Threatened species habitat - revegetate Pennyroyal Creek and its tributaries and Deans Marsh Creek to a width >25m each side, and assess for barriers to fish passage
Priority waterways - consult with CCMA to assess and implement management actions for priority waterways and adjacent reaches (eg manage stock access, revegetation, weed and erosion control, remove barriers to fish passage)
Priority roadsides - control weeds (including pine wildlings), survey and map the locations of Yarra Gum and Brookers Gum on Pennyroyal Station Rd and Pennyroyal Valley Rd
Priority linkages - link remnants with corridors >50m wide, using waterways and roadside buffers where possible (fence to control stock access)

Appendix 1
Flora Species List for East Otway Landcare Group Area
*** Introduced Species**

	Mosses	
	Portuguese Pocket-moss	*Fissidens curvatus*
	Tiny Pocket-moss	*Fissidens serratus* var. *serratus*
	Ferns and Fern-like Plants	
	Common Maidenhair	*Adiantum aethiopicum*
	Common Rasp-fern	*Doodia australis*
	Rough Tree-fern	*Cyathea australis*
	Austral Bracken	*Pteridium esculentum*
	Screw Fern	*Lindsaea linearis*
	Monocotyledons	
	Chocolate Lily	*Arthropodium strictum s.l.*
	Milkmaids	*Burchardia umbellata*
	Grassy Club-sedge	*Isolepis hookeriana*
	Knob Sedge	*Carex inversa*
	Red-fruit Saw-sedge	*Gahnia sieberiana*
	Slender Bog-sedge	*Schoenus lepidosperma*
	Tall Sedge	*Carex appressa*
	Variable Sword-sedge	*Lepidosperma laterale*
	Short Purple-flag	*Patersonia fragilis*
	Gold Rush	*Juncus flavidus*
	Rush	*Juncus spp.*
	Tall Rush	*Juncus procerus*
	Toad Rush	*Juncus bufonius*
	Woodrush	*Luzula spp.*
	Streaked Arrowgrass	*Triglochin striatum*
	Green-comb Spider-orchid	*Arachnorchis dilatata s.l.*
	Heart-lip Spider-orchid	*Arachnorchis cardiochila*
	Tall Greenhood	*Pterostylis longifolia s.l.*
	Black-anther Flax-lily	*Dianella revoluta s.l.*
	Tasman Flax-lily	*Dianella tasmanica*
	Australian Sweet-grass	*Glyceria australis*
*	Cocksfoot	*Dactylis glomerata*
	Common Blown-grass	*Lachnagrostis filiformis*
	Common Plume-grass	*Dichelachne rara*
	Common Tussock-grass	*Poa labillardierei*
	Forest Wire-grass	*Tetrarrhena juncea*
*	Great Brome	*Bromus diandrus*
	Grey Tussock-grass	*Poa sieberiana*
	Hairy Rice-grass	*Tetrarrhena distichophylla*
	Kangaroo Grass	*Themeda triandra*
	Kneed Wallaby-grass	*Austrodanthonia geniculata*
*	Marsh Fox-tail	*Alopecurus geniculatus*
*	Quicksilver Grass	*Aira cupaniana*
	Reed Bent-grass	*Deyeuxia quadriseta*
	Scaly-foot Wallaby-grass	*Joycea lepidopoda*
	Short-hair Plume-grass	*Dichelachne sciurea spp. agg.*
	Silvertop Wallaby-grass	*Joycea pallida*
*	Silvery Hair-grass	*Aira caryophyllea*
	Slender Tussock-grass	*Poa tenera*
	Slender Wallaby-grass	*Austrodanthonia penicillata*
	Soft Tussock-grass	*Poa morrisii*
	Spear Grass	*Austrostipa spp.*
*	Squirrel-tail Fescue	*Vulpia bromoides*
	Sword Tussock-grass	*Poa ensiformis*
	Tasman Bent-grass	*Deyeuxia rodwayi*
*	Toowoomba Canary-grass	*Phalaris aquatica*
	Veined Spear-grass	*Austrostipa rudis ssp. rudis*
	Wallaby Grass	*Danthonia s.l. spp.*
	Weeping Grass	*Microlaena stipoides var. stipoides*
*	Yorkshire Fog	*Holcus lanatus*
	Spreading Rope-rush	*Empodisma minus*
	Austral Grass-tree	*Xanthorrhoea australis*
	Many-flowered Mat-rush	*Lomandra multiflora ssp. multiflora*
	Spiny-headed Mat-rush	*Lomandra longifolia*
	Spiny-headed Mat-rush	*Lomandra longifolia ssp. longifolia*
	Wattle Mat-rush	*Lomandra filiformis*
	Dicotyledons	
	Hairy Pennywort	*Hydrocotyle hirta*
*	Hemlock	*Conium maculatum*
	Shining Pennywort	*Hydrocotyle sibthorpioides*
*	English Ivy	*Hedera helix*
	Annual Fireweed	*Senecio glomeratus*
	Austral Bear's-ear	*Cymbonotus preissianus*
	Beaked Fireweed	*Senecio sp. aff. tenuiflorus*
	Blanket-leaf	*Bedfordia arborescens*
	Button Everlasting	*Helichrysum scorpioides*
*	Cat's Ear	*Hypochoeris radicata*
	Clustered/Creeping Cudweed	*Euchiton collinus s.l.*
	Common Cassinia	*Cassinia aculeata*
	Creeping Cotula	*Leptinella reptans s.l.*
	Creeping Cudweed	*Euchiton collinus s.s.*
	Fireweed Groundsel	*Senecio linearifolius*
	Musk Daisy-bush	*Olearia argophylla*
k	Netted Daisy-bush	*Olearia speciosa*
*	Oxeye Daisy	*Leucanthemum vulgare*
*	Ragwort	*Senecio jacobaea*
	Rough Fireweed	*Senecio hispidulus*
	Shrubby Fireweed	*Senecio minimus*
*	Smooth Hawksbeard	*Crepis capillaris*
	Snowy Daisy-bush	*Olearia lirata*
*	Spear Thistle	*Cirsium vulgare*
*	Spiked Cudweed	*Gamochaeta purpurea s.s.*
	Tree Everlasting	*Ozothamnus ferrugineus*
	Variable Groundsel	*Senecio pinnatifolius*
Vv	Wrinkled Buttons	*Leiocarpa gatesii*

	Australian Hound's-tongue	*Cynoglossum australe*
	Blue Pincushion	*Brunonia australis*
	Bluebell	*Wahlenbergia spp.*
	Matted Pratia	*Lobelia pedunculata s.l.*
	Sprawling Bluebell	*Wahlenbergia gracilis s.l.*
*	Common Mouse-ear Chickweed	*Cerastium glomeratum s.l.*
*	Mouse-ear Chickweed	*Cerastium spp.*
	Prickly Starwort	*Stellaria pungens*
	Small St John's Wort	*Hypericum gramineum*
	Kidney-weed	*Dichondra repens*
	Tall Sundew	*Drosera peltata* ssp. *auriculata*
	Scented Sundew	*Drosera whittakeri* ssp. *aberrans*
	Honey-pots	*Acrotriche serrulata*
	Common Heath	*Epacris impressa*
	Common Beard-heath	*Leucopogon virgatus*
	Broom Spurge	*Amperea xiphoclada var. xiphoclada*
	Small Poranthera	*Poranthera microphylla*
	Austral Indigo	*Indigofera australis*
*	Clover	*Trifolium* spp.
	Common Aotus	*Aotus ericoides*
	Common Flat-pea	*Platylobium obtusangulum*
*	English Broom	*Cytisus scoparius*
	Golden Tip	*Goodia lotifolia*
*	Gorse	*Ulex europaeus*
	Gorse Bitter-pea	*Daviesia ulicifolia*
*	Greater Bird's-foot Trefoil	*Lotus uliginosus*
	Grey Parrot-pea	*Dillwynia cinerascens s.l.*
	Large-leaf Bush-pea	*Pultenaea daphnoides*
	Prickly Bush-pea	*Pultenaea juniperina s.l.*
	Running Postman	*Kennedia prostrata*
	Showy Parrot-pea	*Dillwynia sericea s.l.*
	Smooth Parrot-pea	*Dillwynia glaberrima*
	Twining Glycine	*Glycine clandestina*
*	Vetch	*Vicia* spp.
*	Slender Centaury	*Centaurium tenuiflorum*
*	Slender Cicendia	*Cicendia filiformis*
	Austral Cranesbill	*Geranium solanderi s.l.*
	Cinquefoil Cranesbill	*Geranium potentilloides*
	Crane's Bill	*Geranium spp.*
	Grassland Cranesbill	*Geranium retrorsum s.l.*
	Trailing Goodenia	*Goodenia lanata*
	Hop Goodenia	*Goodenia ovata*
	Common Raspwort	*Gonocarpus tetragynus*
	Shade Raspwort	*Gonocarpus humilis*
	Austral Bugle	*Ajuga australis*
	Balm Mint-bush	*Prostanthera melissifolia*
	Forest Mint	*Mentha laxiflora*
*	Self-heal	*Prunella vulgaris*
	Downy Dodder-laurel	*Cassytha pubescens s.s.*
	Slender Dodder-laurel	*Cassytha glabella*
	Hairy Mitrewort	*Mitrasacme pilosa*
	Hemp Bush	*Gynatrix pulchella s.l.*
	Black Wattle	*Acacia mearnsii*
	Blackwood	*Acacia melanoxylon*
*	Cootamundra Wattle	*Acacia baileyana*
	Dwarf Silver Wattle	*Acacia nano-dealbata*
	Hop Wattle	*Acacia stricta*
	Myrtle Wattle	*Acacia myrtifolia*
	Narrow-leaf Wattle	*Acacia mucronata ssp. longifolia*
	Prickly Moses	*Acacia verticillata*
	Varnish Wattle	*Acacia verniciflua*
	Manna Gum	*Eucalyptus viminalis*
	Messmate Stringybark	*Eucalyptus obliqua*
	Mountain Grey-gum	*Eucalyptus cypellocarpa*
	Narrow-leaf Peppermint	*Eucalyptus radiata s.l.*
	Narrow-leaf Peppermint	*Eucalyptus radiata ssp. radiata*
	Prickly Tea-tree	*Leptospermum continentale*
	Scentbark	*Eucalyptus aromaphloia*
	Scented Paperbark	*Melaleuca squarrosa*
#	Southern Blue-gum	*Eucalyptus globulus*
	Swamp Gum	*Eucalyptus ovata var. ovata*
	West Coast Peppermint	*Eucalyptus aff. willisii (South-western Victoria)*
	White Sallee	*Eucalyptus pauciflora ssp. pauciflora*
Rk	Yarra Gum	*Eucalyptus yarraensis*
	Privet Mock-olive	*Notelaea ligustrina*
	Variable Willow-herb	*Epilobium billardierianum*
	Yellow Wood-sorrel	*Oxalis corniculata s.l.*
	Common Apple-berry	*Billardiera scandens*
	Variable Plantain	*Plantago varia*
	Heath Milkwort	*Comesperma ericinum*
	Love Creeper	*Comesperma volubile*
*	Sheep Sorrel	*Acetosella vulgaris*
*	Hogweed	*Polygonum aviculare s.s.*
	White Purslane	*Neopaxia australasica*
	Silver Banksia	*Banksia marginata*
	Holly Lomatia	*Lomatia ilicifolia*
	Prickly Geebung	*Persoonia juniperina*
	Buttercup	*Ranunculus spp.*
	Mountain Clematis	*Clematis aristata*
	Cluster Pomaderris	*Pomaderris racemosa*
	Dusty Miller	*Spyridium parvifolium*
	Hazel Pomaderris	*Pomaderris aspera*
	Small-leaf Pomaderris	*Pomaderris elachophylla*
	Bidgee-widgee	*Acaena novae-zelandiae*
*	Blackberry	*Rubus fruticosus spp. agg.*
*	Parsley Piert	*Aphanes arvensis*
	Sheep's Burr	*Acaena echinata*
	Small-leaf Bramble	*Rubus parvifolius*
	Common Woodruff	*Asperula conferta*
	Prickly Currant-bush	*Coprosma quadrifida*
	Prickly Woodruff	*Asperula scoparia*
	Rough Bedstraw	*Galium gaudichaudii*
	Variable Stinkweed	*Opercularia varia*
	Woodruff	*Asperula spp.*
	Hairy Speedwell	*Veronica calycina*
	Grass Trigger-plant	*Stylidium graminifolium s.l.*
	Bootlace Bush	*Pimelea axiflora*
	Common Rice-flower	*Pimelea humilis*
	Yellow Rice-flower	*Pimelea flava*
	Pink-bells	*Tetratheca ciliata*
	Ivy-leaf Violet	*Viola hederacea sensu Willis (1972)*
	Tiny Violet	*Viola sieberiana spp. agg.*

Appendix 2
Vertebrate Fauna Species List for East Otway Landcare Group Area

Mammals

	Platypus	*Ornithorhynchus anatinus*
	Common Ringtail Possum	*Pseudocheirus peregrinus*
	Feathertail Glider	*Acrobates pygmaeus*
	Black Wallaby	*Wallabia bicolor*
	Eastern Grey Kangaroo	*Macropus giganteus*
	White-striped Freetail Bat	*Tadarida australis*
*	Black Rat	*Rattus rattus*
	Bush Rat	*Rattus fuscipes*
*	Cat (feral)	*Felis catus*
*	Goat (feral)	*Capra hircus*
*	Red Fox	*Canis vulpes*
*	Pig (feral)	*Sus scrofa*
*	European Rabbit	*Oryctolagus cuniculus*
	Short-beaked Echidna	*Tachyglossus aculeatus*

Birds

	Australasian Grebe	*Tachybaptus novaehollandiae*
v	Australasian Shoveler	*Anas rhynchotis*
	Australian Hobby	*Falco longipennis*
	Australian King-Parrot	*Alisterus scapularis*
	Australian Magpie	*Gymnorhina tibicen*
	Australian Pelican	*Pelecanus conspicillatus*
	Australian Raven	*Corvus coronoides*
	Australian Shelduck	*Tadorna tadornoides*
	Australian White Ibis	*Threskiornis molucca*
	Australian Wood Duck	*Chenonetta jubata*
	Black Swan	*Cygnus atratus*
	Black-faced Cuckoo-shrike	*Coracina novaehollandiae*
	Black-fronted Dotterel	*Elseyornis melanops*
	Black-shouldered Kite	*Elanus axillaris*
	Black-tailed Native Hen	*Gallinula ventralis*
	Blue-winged Parrot	*Neophema chrysostoma*
	Brown Falcon	*Falco berigora*
	Brown Goshawk	*Accipiter fasciatus*
	Brown Thornbill	*Acanthiza pusilla*
lr	Brown Treecreeper	*Climacteris picumnus*
	Brown-headed Honeyeater	*Melithreptus brevirostris*
*	Common Blackbird	*Turdus merula*
	Common Bronzewing	*Phaps chalcoptera*
*	Common Starling	*Sturnus vulgaris*
	Crescent Honeyeater	*Phylidonyris pyrrhoptera*
	Crested Shrike-tit	*Falcunculus frontatus*
	Crimson Rosella	*Platycercus elegans*
	Dusky Moorhen	*Gallinula tenebrosa*
	Dusky Woodswallow	*Artamus cyanopterus*
	Eastern Rosella	*Platycercus eximius*
	Eastern Spinebill	*Acanthorhynchus tenuirostris*
	Eastern Yellow Robin	*Eopsaltria australis*
	Eurasian Coot	*Fulica atra*
*	European Goldfinch	*Carduelis carduelis*
*	European Greenfinch	*Carduelis chloris*
	Fan-tailed Cuckoo	*Cacomantis flabelliformis*
	Flame Robin	*Petroica phoenicea*
	Galah	*Cacatua roseicapilla*
	Gang-gang Cockatoo	*Callocephalon fimbriatum*
	Golden Whistler	*Pachycephala pectoralis*
	Golden-headed Cisticola	*Cisticola exilis*
	Great Cormorant	*Phalacrocorax carbo*
	Great Crested Grebe	*Podiceps cristatus*
	Grey Butcherbird	*Cracticus torquatus*
	Grey Currawong	*Strepera versicolor*
	Grey Fantail	*Rhipidura fuliginosa*
v	Grey Goshawk	*Accipiter novaehollandiae*
	Grey Shrike-thrush	*Colluricincla harmonica*
	Grey Teal	*Anas gracilis*
v	Hardhead	*Aythya australis*
	Hoary-headed Grebe	*Poliocephalus poliocephalus*
	Horsefield's Bronze Cuckoo	*Chrysococcyx basalis*
*	House Sparrow	*Passer domesticus*
	Jacky Winter	*Microeca fascinans*
lr	Latham's Snipe	*Gallinago hardwickii*
	Laughing Kookaburra	*Dacelo novaeguineae*
	Little Pied Cormorant	*Phalacrocorax melanoleucos*
	Little Raven	*Corvus mellori*
	Little Wattlebird	*Anthochaera chrysoptera*
	Long-billed Corella	*Cacatua tenuirostris*
	Magpie-lark	*Grallina cyanoleuca*
	Masked Lapwing	*Vanellus miles*
	Mistletoebird	*Dicaeum hirundinaceum*
	Musk Lorikeet	*Glossopsitta concinna*
	Nankeen Kestrel	*Falco cenchroides*
	New Holland Honeyeater	*Phylidonyris novaehollandiae*
	Noisy Miner	*Manorina melanocephala*
	Olive Whistler	*Pachycephala olivacea*
	Olive-backed Oriole	*Oriolus sagittatus*
	Pacific Black Duck	*Anas superciliosa*
	Pallid Cuckoo	*Cuculus pallidus*
	Peregrine Falcon	*Falco peregrinus*
	Pied Currawong	*Strepera graculina*
	Pink-eared Duck	*Malacorhynchus membranaceus*
	Purple Swamphen	*Porphyrio porphyrio*
	Red Wattlebird	*Anthochaera carunculata*
	Red-browed Finch	*Neochmia temporalis*
	Restless Flycatcher	*Myiagra inquieta*
	Richard's Pipit	*Anthus novaeseelandiae*
	Rufous Bristlebird	*Dasyornis broadbenti*
	Rufous Fantail	*Rhipidura rufifrons*
	Rufous Whistler	*Pachycephala rufiventris*
	Sacred Kingfisher	*Todiramphus sanctus*
	Satin Bowerbird	*Ptilonorhynchus violaceus*
	Satin Flycatcher	*Myiagra cyanoleuca*
	Scarlet Robin	*Petroica multicolor*
	Silver Gull	*Larus novaehollandiae*
	Silvereye	*Zosterops lateralis*
*	Skylark	*Alauda arvensis*
	Southern Boobook	*Ninox novaeseelandiae*
	Spotted Pardalote	*Pardalotus punctatus*
*	Spotted Turtle-Dove	*Streptopelia chinensis*
	Straw-necked Ibis	*Threskiornis spinicollis*

	Striated Thornbill	*Acanthiza lineata*
	Stubble Quail	*Coturnix pectoralis*
	Sulphur-crested Cockatoo	*Cacatua galerita*
	Superb Fairy-wren	*Malurus cyaneus*
	Swamp Harrier	*Circus approximans*
	Tawny Frogmouth	*Podargus strigoides*
	Varied Sittella	*Daphoenositta chrysoptera*
	Wedge-tailed Eagle	*Aquila audax*
	Welcome Swallow	*Hirundo neoxena*
	Whistling Kite	*Haliastur sphenurus*
	White-browed Scrubwren	*Sericornis frontalis*
	White-eared Honeyeater	*Lichenostomus leucotis*
	White-faced Heron	*Egretta novaehollandiae*
	White-necked Heron	*Ardea pacifica*
	White-naped Honeyeater	*Melithreptus lunatus*
	White-plumed Honeyeater	*Lichenostomus penicillatus*
	White-throated Treecreeper	*Cormobates leucophaeus*
	Willie Wagtail	*Rhipidura leucophrys*
	Yellow-billed Spoonbill	*Platalea flavipes*
	Yellow-faced Honeyeater	*Lichenostomus chrysops*
	Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*
	Yellow-tailed Black-Cockatoo	*Calyptorhynchus funereus*
	Reptiles	
	Lowland Copperhead	*Austrelaps superbus*
	Amphibians	
	Common Froglet	*Crinia signifera*
	Victorian Smooth Froglet	*Geocrinia victoriana*
	Fish	
ins, L	Mountain Galaxias	*Galaxias olidus*
E,lr, L	Yarra Pygmy Perch	*Nannoperca obscura*
Ins	River Blackfish	*Gadopsis marmoratus*

Fauna Status Codes

*	introduced
lr	lower risk (near threatened) in Victoria
v	vulnerable in Victoria
ins	insufficiently known in Victoria
E	endangered nationally
F	Flora Fauna Guarantee (FFG) listed

Flora Status Codes

*	introduced
#	native but may be outside its natural range
k	poorly known in victoria
v	vulnerable in Victoria
V	vulnerable nationally
R	rare nationally

Appendix 3
Bioregional Conservation Status of Ecological Vegetation Classes (EVCs)

Status	Definition*
Endangered (E)	On verge of extinction. 90% or more cleared. Less than 10% of its pre-European (1750) extent remains.
Vulnerable (V)	Moving towards extinction. 70% or more has been cleared. 10-30% of its pre-European (1750) extent remains.
Depleted (D)	Likely to become threatened if clearing or other threatening processes continue. 50-70% has been cleared. 30-50% of its pre-European (1750) extent remains.
Rare (R)	Vegetation that is inherently rare and naturally restricted in range. Total range less than 10 000 ha, and/or area less than 1000 ha, and/ or patch size < 100 ha.
Least Concern (LC)	More than 50% of pre-European (1750) extent remaining.

Appendix 4
Information and Contacts

Project Funding Sources

Natural Heritage Trust Funding
Sonia Mahony, Community Funding Officer, Corangamite CMA,
52329100 / 0407053226
www.nht.gov.au/envirofund/index.html

National Action Plan for Salinty and Water Quality (NAP) Funding
Shane Herbertson, NAP Project Officer, Corangamite CMA
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Conservation Works on Public Land
Parks Victoria Community Grants
131963

Botanic Guardians (threatened species)
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Biodiversity Protection and Enhancement
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Trust For Nature
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