

**DRAFT**

**CORANGAMITE NATIVE  
VEGETATION PLAN**

Prepared by the

**CORANGAMITE CATCHMENT MANAGEMENT  
AUTHORITY**

For Public Consultation

August 2000

# Draft Corangamite Native Vegetation Plan

Draft Corangamite Native Vegetation Plan

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# CONTENTS

Executive Summary .....	1
Acknowledgments .....	2
Plan Finalisation .....	2
Vision for the Future .....	3
Foreword .....	4
<b>Part A – Introduction and Framework for Action .....</b>	<b>5</b>
<b>1. Introduction.....</b>	<b>5</b>
1.1 How to use this Plan .....	5
1.2 Mission .....	5
1.3 Background .....	6
1.4 Purpose and Content of Plan.....	6
<b>2. Policy and Strategy Framework for Native Vegetation Planning.....</b>	<b>7</b>
<b>3. Role and Partnerships of Key Agencies and Groups in Planning for Native Vegetation Conservation.....</b>	<b>8</b>
3.1 Commonwealth Government .....	8
3.2 State Government .....	8
3.3 Local Government .....	10
3.4 Non Government Organisations, Community Groups and Industry.....	12
<b>4. Shared Principles for Management of Native Vegetation .....</b>	<b>13</b>
4.1 Principles for the Management of Native Vegetation .....	13
4.2 Getting a Handle on the Measurement of Outcomes – Net Gain .....	14
4.3 Cost Sharing Arrangements for Implementation .....	16
<b>5. Monitoring, Evaluation and Review.....</b>	<b>18</b>
<b>6. Mechanisms for Setting Management Priorities.....</b>	<b>18</b>
6.1 Hierarchy of Management Action.....	19
6.2 Biodiversity “Hotspots”.....	19
<b>PART B - An Overview of Native Vegetation in the Corangamite CMA.....</b>	<b>21</b>
<b>Region .....</b>	<b>21</b>
7.1 Describing, Mapping and Managing Native Vegetation Information .....	21
7.2 An Analysis by Bioregion and EVCs of the Corangamite CMA region.....	27
7.2.1 Central Victorian Uplands.....	28
7.2.2 Otway Plain.....	30
7.2.3 Otway Ranges.....	32
7.2.3 Victorian Volcanic Plain .....	34
7.2.4 Warrnambool Plain.....	36
<b>Part C The Corangamite Native Vegetation Plan .....</b>	<b>38</b>
8. Goals of the Corangamite Native Vegetation Plan.....	38
8.1 GOAL 1: Protecting Existing Levels of Remnant Vegetation.....	38
8.2 Goal 2: Enhancing the Quality of Existing Remnants.....	38
8.3 GOAL 3: Targeted Revegetation and Regeneration of Native Vegetation.....	40
8.4 GOAL 4: Increasing the Viability of Threatened Communities and Species ...	40
<b>9. Key Lead Programs – Proposed Actions, Implementation Responsibilities &amp; Timeframes .....</b>	<b>42</b>
9.1 Native Vegetation Retention Controls (NVR) .....	43
9.1 Native Vegetation Retention Controls.....	46
9.3 Waterway and Wetland Vegetation Management.....	49
9.4 Roadside Vegetation Management .....	51
9.5 Native Vegetation in Plantations.....	52
<b>10. Key Supporting Programs - – Actions, Implementation Responsibilities &amp; Timeframes .....</b>	<b>53</b>
10.1 CONSERVATION OF BIODIVERSITY VALUES .....	53
10.2 INFORMATION MANAGEMENT.....	55
10.3 TARGETED & STRATEGIC VEGETATION .....	56
10.4 Integrated Planning and Implementation .....	59

# Draft Corangamite Native Vegetation Plan

10.5	Managing Threatening Processes.....	61
10.6	Research and Monitoring .....	62
10.7	Cost Sharing and Commitment .....	63
10.8	Education, Communication and Consultation.....	64
<b>11.</b>	<b>References .....</b>	<b>66</b>
	<b>Part D – Resource and Management Information – Appendices .....</b>	<b>69</b>
	Appendix 1: Current Policies and Programs in relation to Regional Native Vegetation Planning .....	<b>69</b>
	Appendix 2: Descriptions of Ecological Vegetation Classes (EVCs) occurring in the Corangamite CMA Region .....	<b>75</b>
	Appendix 3: Ecological Vegetation Class Analysis .....	92
	Appendix 4: Threatened Species Information.....	97
	Appendix 5: Flora and Fauna Guarantee Statements.....	102
	Appendix 6: Wetlands Depletion Data.....	103
	Appendix 7: Land and Water Degradation Issues .....	104
	Appendix 8: Best Management Practices.....	105

## FIGURES

Fig.1	Sunrise in the Heystebury .....	3
Fig 2:	Intact riparian vegetation plays an important role in waterway health .....	13
Fig 3:	Common Everlasting and Pink Bindweed.....	15
Fig 4:	Pitlotus macrocarpus,.....	20
Fig 5:	CORANGAMITE CMA – VEGETATION STATUS ALL BIOREGIONS .....	27
FIG 6:	Vegetation Status – CENTRAL VICTORIAN UPLANDS BIOREGION.....	29
Fig 7:	Vegetation Status – OTWAY PLAIN BIOREGION.....	31
Fig 8:	Vegetation Status – OTWAY RANGES BIOREGION .....	33
Fig 9:	Vegetation Status – VICTORIAN VOLCANIC PLAIN BIOREGION.....	35
Fig 10:	Vegetation Status – WARRNAMBOOL PLAIN BIOREGION .....	37
Fig 11:	In some areas the only component of the original vegetation remaining is the overstory eucalypts with little or no understory.....	39
Fig 12:	In some areas of the Heystebury roads are being revegetated.....	41
	Wetland Categories and Depletion.....	103

## TABLES

Table 1:	Quick Guide to Accessing Information in this Document .....	5
Table 2:	CONSERVATION STATUS OF ECOLOGICAL VEGETATION CLASSES (EVCs) AT BIOREGIONAL LEVEL.....	24
Table 3:	Conservation Significance of Native Vegetation .....	44
Table 4:	Reflecting conservation significance in application of the Net Gain approach to regional outcomes and local responses .....	45

# Draft Corangamite Native Vegetation Plan

## Executive Summary

The Draft Corangamite Native Vegetation Plan has been prepared to strategically direct future programs and actions in relation to the management of native vegetation and related biodiversity issues across the region. The Draft Plan has been developed with extensive community input and reflects priorities determined on a regional basis.

The Draft Corangamite Native Vegetation Plan will become a component of the Corangamite Regional Catchment Strategy, which provides a framework for the coordinated, strategic implementation of catchment management across the region. The Plan should also be viewed in conjunction with Victoria's Native Vegetation Management Framework, which outlines the consistent approach that will be taken with the management of native vegetation across the State.

This plan has four broad goals that are to guide the strategies and actions developed to address issues relating to native vegetation and biodiversity. They are:

- The maintenance of all native vegetation types at 1999 levels in keeping with the goal listed in Victoria's Biodiversity Strategy 1997.
- To enhance the quality of existing native vegetation by managing 90% of native vegetation cover on both public and private land according to Best Management Practices by 2010.
- To increase overall cover of native vegetation to 30% of the catchment and the cover of the majority of threatened Ecological Vegetation Classes (EVCs) to at least 10% of their pre-European vegetation cover by 2030
- To increase the viability of threatened species and the extent and quality of threatened ecological communities.

The implementation of this plan over the first five years will be particularly important to a number of issues within the region. To address the most pressing of these issues Key Lead Programs have been developed in Section 9. They are:

1. Native Vegetation Retention Controls
2. Grassy Ecosystem Management
3. Waterway and Wetland Vegetation Management
4. Roadside Vegetation Management
5. Native Vegetation Management and Plantations

The Key Lead Programs listed above will need to be supported by ongoing programs that provide continuous improvement in the management of native vegetation within the region. The Key Supporting Programs in Section 10 are:

1. Conservation of Biodiversity Values
2. Information Management
3. Targeted and Strategic Revegetation
4. Integrated Planning and Implementation
5. Management of Threatening Processes
6. Research and Monitoring
7. Cost Sharing and Commitment
8. Education, Communication and Consultation

## **Draft Corangamite Native Vegetation Plan**

The implementation of the Draft Corangamite Native Vegetation Plan will rely on the support and cooperation of all stakeholders within the region. The restoration of catchment values through the wise conservation and use of native vegetation is a long term proposition. The benefits to be gained however, from a sustained committed approach to these issues will result in a healthy and balanced environment that will support both the communities we live in and the biodiversity we rely upon.

### **Acknowledgments**

The development of this plan has involved the collective effort of many interested people within the community. In particular the active participation and feedback from the Corangamite Native Vegetation Plan Steering Committee has been invaluable to the project. The Steering Committee comprised Val Lang (Chair), Robert Missen, Claire Dennis, Cliff Tann, Ian Smith, Andrew Boyle and Peter Codd.

### **Plan Finalisation**

Sincere appreciation is extended to all those who have contributed to the Draft Plan. We trust that those people, along with the broader community, will now participate in the public consultation and finalisation of the Plan.

# Draft Corangamite Native Vegetation Plan

## Distribution and Feedback

Hard copies will be distributed throughout the community to the key stakeholders who have been involved with consultation to this stage and who will be involved with the implementation of the Plan. Plans have been sent to community landcare and environment groups, government and non-government agencies, industry and interested individuals who have participated in the consultation process. For a copy of the Draft Plan please contact the Corangamite Catchment Management Authority on 03 5232 9100. An electronic version will be available via the Authority's web site <http://www.ccma.vic.gov.au>

Comments on the Draft Plan can be sent to 'Draft Corangamite Native Vegetation Plan', Corangamite Catchment Management Authority 64 Dennis St, Colac, 3250 or emailed to [info@ccma.vic.gov.au](mailto:info@ccma.vic.gov.au)

## Vision for the Future

By the year 2030 native vegetation in the Corangamite region will be managed sustainably to protect biodiversity and contribute to a healthy, prosperous catchment. Existing remnant vegetation and revegetation works will be managed to ensure there is a Net Gain across the landscape. The vision for the Corangamite region includes:

- The maintenance of all native vegetation types at 1999 levels in keeping with the goal listed in Victoria's Biodiversity Strategy 1997.
- To enhance the quality of existing native vegetation by managing 90% of native vegetation cover on both public and private land according to Best Management Practices by 2010.
- To increase overall cover of native vegetation to 30% of the catchment and the cover of the majority of threatened Ecological Vegetation Classes (EVCs) to at least 10% of their pre-European vegetation cover by 2030
- To increase the viability of threatened species and the extent and quality of threatened ecological communities.



Fig.1 Sunrise in the Heystebury

# Draft Corangamite Native Vegetation Plan

## Foreword

The natural landscape of the Corangamite region has been altered dramatically since European settlement. These changes have been most evident in areas largely cleared for agriculture. From a total area of 1.3 million hectares less than 25% remains with a cover of the original native vegetation and much of this is found in the forests of the Otway Ranges and the Ballarat area. In some parts of the Region, particularly on the Volcanic Plains between Geelong and Lismore, the native vegetation has almost been totally cleared and very little of what is left is protected in conservation reserves.

This loss of native vegetation has contributed to the main natural resource management problems in the region. Loss of biodiversity, salinity, soil erosion, poor water quality and the spread of exotic species are just some of the problems that have emerged.

The Corangamite Native Vegetation Plan is intended to address the key issues in the management of native vegetation and will lead to the development of strategies and priorities that will enable a committed approach to implementation by all stakeholders. The draft Plan has been developed with the input and involvement of the community and will establish a framework that a sustainable long-term future can be built on.

When completed the Plan will provide relevant, accessible information to the community that will lead to the improved management of native vegetation and biodiversity values. The principles, information and strategies will enable decisions involving native vegetation to be based on accurate scientific data and best management practices. The Plan will be viewed as a living document that is reviewed as issues, values, techniques and scientific information change. It will form a benchmark that we can use to monitor and evaluate our progress towards shared outcomes.

The challenge to reverse the decline of native vegetation and associated catchment values is great. The Native Vegetation Plan is just one step in a process that will require the support and commitment of the whole community.

On behalf of the Corangamite Native Vegetation Plan Steering Committee I look forward to your involvement with the finalisation of the Plan and the exciting challenges we face in the future management of native vegetation in our region.



Val Lang

Chair - Corangamite Native Vegetation Plan Steering Committee



# Draft Corangamite Native Vegetation Plan

## Part A – Introduction and Framework for Action

### 1. Introduction

This Plan addresses the conservation and management of native vegetation, biodiversity and in turn, the resulting catchment benefits within the Corangamite catchment. A Steering Committee was formed in 1998 to guide the development of this Plan and to oversee the community consultation process.

This Plan provides a tool for local and state government and other authorities and members of the community to understand and apply the decision-making process for the management of native vegetation and biodiversity.

#### 1.1 How to use this Plan

The following table will allow the reader to access information within this Plan readily.

Table 1: Quick Guide to Accessing Information in this Document

Subject	Relevance to				Section
	Community/ landholders	Local Government	State Government	Industry	
Native Vegetation Retention Controls and Decision Making	✓	✓	✓	✓	9.1
Regional Priorities for Protection	✓	✓	✓	✓	7.2
Status of Ecological Vegetation Classes	✓	✓			Appendix 3
Actions to be implemented by this Plan	✓	✓	✓	✓	9 & 10
Threatened Species Information	✓	✓			Appendix 4
Descriptions of Ecological Vegetation Classes	✓	✓			Appendix 2

#### 1.2 Mission

The Corangamite Native Vegetation Plan will provide clear strategic directions for the management of native vegetation and biodiversity through:

- Providing access to appropriate information and technical knowledge
- Encouraging the protection of existing native vegetation through a range of incentives
- Establishing strong linkages between all sectors of the community working on native vegetation and biodiversity
- Promoting and encouraging the adoption of best management practices in relation to native vegetation management
- Integrating native vegetation into sustainable long-term catchment management.

# Draft Corangamite Native Vegetation Plan

## 1.3 Background

In 1989 the Native Vegetation Retention controls (NVR) were introduced by the State Government into the State Section of all Planning Schemes. These controls were introduced to reduce the level of native vegetation clearing in Victoria.

While these controls provide guidance at a statewide level through the 'Statewide Planning Policy Framework' (SPPF) and 'Particular Provisions' of the 'Victoria Planning Provisions' (VPP), they do not facilitate the use of regional variations in the application of the controls.

To address this issue Catchment Management Authorities (which were established in July 1997) were requested to prepare Native Vegetation Plans.

This Native Vegetation Plan provides a framework for a regional catchment approach to NVR which is consistent with statewide guidelines and importantly which recognizes the conservation status of vegetation communities in the Corangamite CMA region.

In 1997 the Victorian Government released the Victorian Biodiversity Strategy, which provides the context and direction for many of the actions outlined in this Plan. The goals for biodiversity management are to ensure that within Victoria:

- There is a reversal, across the entire landscape, of the long-term decline in the extent and quality of native vegetation, with the first target being a Net Gain by the Year 2001.
- The ecological processes and the biodiversity dependent upon terrestrial, freshwater and marine environments are maintained and, where necessary, restored.
- The present diversity of species and ecological communities and their viability is maintained or improved across each bioregion (see Section 7.12 for an explanation of bioregions).
- There is no further preventable decline in the viability of any rare species or of any rare ecological community.
- There is an increase in the viability of threatened species and in the extent and quality of threatened ecological communities.

## 1.4 Purpose and Content of Plan

*The Plan provides:*

- a reference document on the current extent of vegetation communities in the Corangamite CMA area.
- priorities for the allocation of funds by Federal and State Government, Corangamite Catchment Management Authority (CCMA), agencies and community groups.
- the regional context and background for determining NVR so that targets and priorities for vegetation protection and enhancement are met for Planning permit applications.
- a framework for involving and supporting communities in conservation activities that provides positive outcomes at a social, economic and environmental level.
- a reference for community groups.
- a baseline to monitor the status of native vegetation in the Corangamite CMA region.

*The Plan identifies:*

- priorities and targets for vegetation communities
- species for protection and enhancement;
- threatening processes affecting native vegetation; and
- priorities and targets for remnant vegetation management and revegetation projects.

# Draft Corangamite Native Vegetation Plan

*Implementation of the Native Vegetation Plan will:*

- ensure there is a reversal across the regional landscape of the long term decline in the quality and extent of native vegetation.
- ensure that ecological processes are maintained and enhanced across the region;
- ensure the present diversity of species and ecological communities and their viability is maintained or improved across each bioregion.
- ensure that there is no further preventable decline in the viability of rare or threatened species or ecological communities.

The outcomes of implementing this Plan will be a better managed natural environment through improved land, water and vegetation quality. This in turn will contribute to the sustainability of our regional communities.

## 2. Policy and Strategy Framework for Native Vegetation Planning

Australia is signatory to several International conventions. At a National and state level, it also must comply with a number of agreements, strategies, policies and legislation in relation to the conservation of native vegetation.

There is a requirement for Local and State Governments, through their decision-making processes, to consider these strategies and policies and for landholders and government to comply with legislation relating to native vegetation conservation.

The following is a summary of the conventions, agreements, strategies, and statements relevant to the conservation of native vegetation in Australia. Further details of each are provided in Appendix 1

### International Conventions

- The Convention on Biological Diversity (1993)
- The United Nations Framework Convention on Climate Change (1994)

### National Agreements and Strategies

- The Inter-governmental Agreement on the Environment (1992)
- The National Strategy for Ecologically Sustainable Development (1992)
- The National Forest Policy Statement – A New Focus for Australia's Forests
- The National Strategy for the Conservation of Australia's Biodiversity (1996)
- Plantations for Australia – The 2020 Vision (1997)

### State Agreements, Strategies and Legislation

- "Managing Victoria's Catchments – Partnerships in Action" (1997)
- Victoria's Biodiversity Strategy (1997)
- Victoria's Greenhouse Action: Responding to a global warning' (1998)
- *Flora and Fauna Guarantee Act* (1988)
- *Catchment and Land Protection Act* (1994)
- *Victorian Conservation Trust Act* (1972)
- Victoria Planning Provisions
- Native Vegetation Retention Controls

### 3. Role and Partnerships of Key Agencies and Groups in Planning for Native Vegetation Conservation

#### 3.1 Commonwealth Government

The Commonwealth Government provides funding for vegetation retention and enhancement and the protection of rare or threatened species through agencies including Environment Australia. Funding for activities related to vegetation and biodiversity conservation is directed through the National Heritage Trust (NHT) in partnership with the State Government.

Key NHT programs for the region include Bushcare (The National Vegetation Initiative), National Landcare Program, National Reserve System Program, Farm Forestry Program, Endangered Species Program and the National Wetlands Program. These programs are delivered through the One-Stop-Shop process which enables community groups, agencies and regional organisations to access funding for environmental and natural resource management initiatives.

#### 3.2 State Government

The State Government provides funding for managing natural resources through a range of programs including Planting for Greenhouse, Tree Victoria (through the Second Generation Landcare Grants), Community Salinity Grants, the Good Neighbour program and the Land Protection Incentive Scheme.

#### The Corangamite Catchment Management Authority

The CCMA provides strategic direction over a three year period through the *Regional Catchment Management Strategy* to manage the natural resources of the region. Funding is directed at a regional level through the six priority programs outlined in the Regional Catchment Strategy;

- Sustainable Production
- Water Resources
- Biodiversity Conservation
- Community Education
- Catchment Amenity
- Monitoring and Evaluation

## Draft Corangamite Native Vegetation Plan



Map1: Corangamite Catchment Management Authority region

### Department of Natural Resources and Environment

The Department of Natural Resources and Environment (NRE) is the principal State Government department responsible for the administration and the management of Victoria's natural resources and public lands. It is composed of a number of Head Office Divisions with responsibility for developing a range of government services and policies. Implementation of programs and policies is largely undertaken through the NRE Regional Services.

The State is divided into six regions, each headed by a Regional Manager. Regional Managers coordinate the delivery of services, allocating appropriate resources, ensuring that Head Office requirements are met and that NRE policy is applied uniformly.

The regional Structure of NRE is organised according to the following businesses:

#### Land Victoria

- Delivers the Crown Land Management program including the management of occupied Crown Lands, water frontages, and manager's licenses and other Crown land tenures. Crown Land Management provides the broad land use Planning and statutory Planning coordination function for the whole region, including the coordination of responses to referrals from Local Government for planning permit application for native vegetation clearance.

#### Flora and Fauna

- Delivers the planning, community education and participation and compliance components of the Flora and Fauna program in consultation with other parts of the Department. Flora and Fauna have a role in protecting native vegetation through biodiversity conservation assessments and advice to Local Government, landowners and development proponents and through the development of management prescriptions. Flora and Fauna provide advice and recommendations on referred planning permit applications for native vegetation clearance.

## Draft Corangamite Native Vegetation Plan

### Forest Services

- Delivers the forest Planning, recreational, biodiversity conservation, cultural and community components for the State's public forests. This role includes the development and audit of timber management prescriptions as part of the implementation of the Code of Forest Practices in State forest.

### Fire Management

- Is responsible for the delivery of fire suppression and prevention responsibilities on public land. The delivery of the suppression component of this task enlists other NRE businesses to assist in the management of effective fire suppression operations on public land.

### Catchment and Water

- Catchment and Water provides a strategic and statewide approach to the whole of catchment management in Victoria through sustainable water, land and community programs. CAW has the responsibility for policy associated with the native vegetation retention control.

### Catchment and Agriculture Services

- Is the major extension-service delivery business for NRE. Its' key role is to provide land-use advice for the protection and enhancement of catchments, management of pest Plants and animals, salinity control and to facilitate sustainable and more productive natural resource industries. Catchment and Agriculture Services provide advice and recommendation on referred planning permit application for native vegetation clearance.

### Parks Victoria

- Manages the State's parks and conservation reserve network.

NRE actively supports the contribution of regional industries to the State's economy through each of its businesses. This support is balanced by a strong commitment to managing the environment in a wise and sustainable manner, protecting and enhancing biodiversity and working with local communities.

## 3.3 Local Government

Local Government has a key role in deciding on, issuing and enforcing Planning permit applications for the clearance of native vegetation. The enforcement requirements are a significant issue for Local Government.

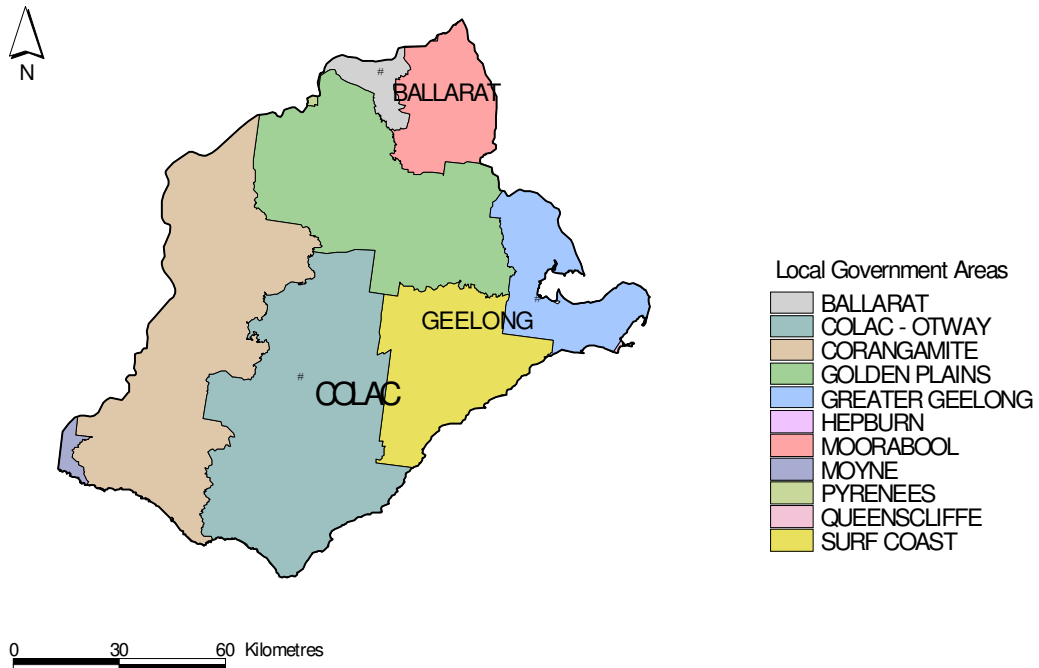
Responsibilities include:

- management of public land including road reserves;
- regulation of landuse activities;
- providing mechanisms in the Planning scheme to protect biodiversity;
- administering the Native Vegetation Retention controls in consultation with NRE;
- applying the *Code of Forest Practice* for timber production on private land;
- providing incentives to encourage appropriate land management;
- facilitation of community activities (e.g. Friends groups);
- community education;
- having areas of conservation significance mapped for the Planning scheme to ensure their protection;
- preparing Natural Resource Conservation Strategies and Roadside Management Plans;
- State of the Environment reporting.

## Draft Corangamite Native Vegetation Plan

There are 9 Local Government Authorities associated with the CCMA region. They are: Ballarat, Colac-Otway, Corangamite, Geelong, Golden Plains, Moorabool, Moyne, Queenscliff and Surfcoast.

Map 2: Local Government Areas within the Corangamite CMA region



## Draft Corangamite Native Vegetation Plan

### 3.4 Non Government Organisations, Community Groups and Industry

Greening Australia's mission is to assist the community to achieve sustainable land management through the conservation and establishment of native vegetation for the environmental, social and economic benefit of all Australians.

**Greening Australia Victoria (GAV)**. To achieve this GAV works with community organisations, government agencies, authorities and businesses. Greening Australia play a key role through provision of technical support in the implementation of the Bushcare program across the region.

**Trust for Nature (Victoria)** works with the community to protect significant bushland through public appeals. It manages a revolving fund for the purchase of environmentally significant sites and works with landowners to covenant land of high conservation value. The Trust provides management advice and runs field days on habitat management.

**The Grassy Ecosystem Reference Group (GERG)** is a combined government/non-government group established to address the problem of grassy ecosystem conservation on a statewide basis. Sectors of the community actively involved in the conservation and management of native grasslands and grassy woodlands are represented with two Project Officers being employed. GERG has developed an Implementation Schedule to provide a coordinated direction for grassy ecosystem conservation initiatives in Victoria

**Landcare (and other) Groups:** with over 100 Community Landcare groups involved in caring for the land in this region, Landcare has a major role in carrying out the onground tasks required to protect existing remnants, revegetate degraded areas and integrate native vegetation into agricultural systems.

**Victorian Farmers Federation** plays a major role in supporting Landcare and providing information to the farming community.

**Australian Trust for Conservation Volunteers** manages Green Corps and provides labour at a nominal cost for conservation works on both private and public land.

**Field Naturalists Clubs** provide valuable knowledge and skills particularly with respect to the local flora and fauna and sites of significance. Field Naturalists also play an important role in ensuring significant areas are conserved.

**The Society for Growing Australian Plants** has a valuable role to play in educating the community and encouraging the use of native Plants.

**Local Environment and Friends Groups** are important in raising awareness of local issues and protecting sites of significance.

Sporting groups, such as the **Victorian Field and Game Association** and fishing groups, can contribute to protecting sites of value and raising awareness of issues and threats.

Major industries such as **Alcoa** and **Ford** play an important role in supporting onground projects through sponsorship and community assistance programs.



### 4. Shared Principles for Management of Native Vegetation

#### 4.1 Principles for the Management of Native Vegetation

These principles (which have been developed as part of a statewide framework) form the underlying approach to the development of priorities and actions outlined in this Plan. A fundamental premise underpinning these principles is that protection of remnant vegetation will conserve and improve biodiversity more effectively than by the recreation of habitat through revegetation. While revegetation is vital for land protection works and improving the quality of soil and water, better conservation and management of existing remnant vegetation is the first priority in achieving the vision of this Plan.

##### Principles:

- The conservation of ecosystems in a landscape is dependent on the maintenance of ecological processes.
- Retention and management of remnant native vegetation is the principal means available for conservation of natural terrestrial biodiversity across the landscape.
- All viable habitats, and populations, of endangered species should be protected through voluntary or regulatory means.
- Biodiversity values are not restricted to threatened and depleted vegetation communities. An adequate proportion of each non- – threatened vegetation community must also be managed principally for conservation.
- Native vegetation management strategies must be integrated with land protection and resource use, including productive agriculture, for long term success.
- Large natural areas of remnant vegetation are of fundamental importance for nature conservation and are irreplaceable. All other things being equal, large remnants are inherently more valuable than the same area contained in smaller patches.
- A landscape approach to Planning native vegetation management maintaining linkages and corridors between areas of native vegetation is required.
- Multiple patches of the same vegetation community should be retained or enhanced across their geographic range.  
*This approach serves to; increase protection from chance events of destruction or degradation, provides for species requirements, allows evolutionary processes to occur, and conservation variations within the ecological vegetation class i.e. conservation at the community level for a range of age classes across the landscape.*
- The position of remnants in the landscape affects their conservation value.  
*Some areas act as; refuges in times of environment extremes, a 'stepping stone' for migration, or a corridor or link with other habitat; or may represent the edge of the geographic range for a species or community.*

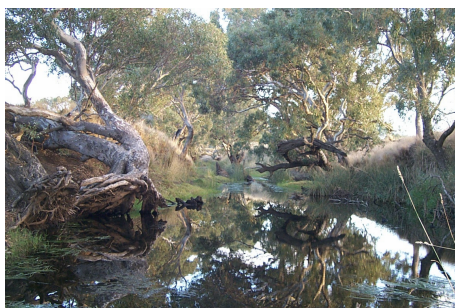


Fig 2: Intact riparian vegetation plays an important role in waterway health

and is sometimes the only remaining vegetation across parts of the Victorian Volcanic Plains Bioregion.

## Draft Corangamite Native Vegetation Plan

### 4.2 Getting a Handle on the Measurement of Outcomes – Net Gain

#### Net Gain

Within the context of this Plan successful implementation depends on the development of a mechanism that accommodates the need for rational on-going development without compromising the principle of Net Gain.

The Net Gain principle has been developed to facilitate the achievement of the Victorian Biodiversity Strategy goals, in particular the goal that:

‘there is a reversal, across the entire landscape, of the long-term decline in the extent and quality of native vegetation, leading to a Net Gain with the first target being Net Gain by the year 2001’.

The definition of the Net Gain principle for native vegetation and habitat is:

"Net Gain is where, over a specified area and period of time, losses of native vegetation and habitat, as measured by a combined quality - quantity measure (habitat - hectare), are reduced, minimised and more than offset by commensurate gains."

Consistent with the other goals of the Victorian Biodiversity Strategy, the Net Gain approach aims to achieve:

- Increases in the viability of threatened species
- Increases in the quality-quantity measure for threatened communities,
- Maintenance or improvement of the current diversity and viability of ecological communities within each bioregion.

The Net Gain principle recognises the capacity for partial recovery of extent and quality in native vegetation through active intervention.

Implementation of the Net Gain principle:

Implementation of the Net Gain principle is based on the adoption of a Planned approach for catchment management and developments. The first step is the protection and enhancement of significant native vegetation values. Any proposed actions should, through Planning and design, avoid impact on native vegetation and habitats and where this is not possible the impacts should be minimised. Only after these steps is it appropriate to consider offsets for impacts on native vegetation.

Criteria for establishing offsets:

Offsets need to be closely linked to the nature of the impacts. The following criteria are intended to facilitate the linkage between impact and offset:

1. Areas selected for enhancement or restoration should be the same Ecological Vegetation Class (EVC) as the area impacted.
2. Areas selected for revegetation should be revegetated as the same EVC.
3. The ecological function of the offsets should be similar, or more effective, as the vegetation impacted (e.g. corridor values or breeding sites).
4. The vegetation quality of areas proposed for offset should preferably be the same or better than the vegetation quality in the area being lost (or at least have the capacity to reach the same or better quality following offsets).

## Draft Corangamite Native Vegetation Plan

5. Offsets should be within the same bioregion as the area impacted and preferably close by.
6. Offsets should not be delayed, and, if possible, should take place before the loss. The time to equivalence should be minimised.

Net Gain embodies the principle that where losses are permitted effort should be expended to balance the losses with commensurate gains. The extent of offset required for any particular loss scenario should be determined using the quality- quantity accounting system (habitat-hectares) developed by NRE and described in the *Victoria's Native Vegetation Management Framework* (NRE, in prep)

The habitat quality component of habitat-hectares is modelled on the basis of commonly accepted indicators for native vegetation condition and viability. The number of habitat-hectares equals the habitat quality score multiplied by the area (in hectares) of the remnant stand. The habitat-hectares lost should be balanced by gains of an equal number of habitat-hectares obtained through a range of activities in line with the offset criteria outlined above.

Use of the habitat-hectares accounting system will facilitate the establishment of a complete picture of the native vegetation asset against which incremental losses can be evaluated.

### **Aims in applying Net Gain principle:**

The broad approach to putting Net Gain into practice aims for:

1. Use of quantitative contextual information to guide decisions and report outcomes.
2. More consistency and certainty in Planning by enabling proponents of large developments to calculate, at the feasibility stage, whether mitigation works are feasible and to estimate their cost.
3. The ability to link across areas and scales and to provide a whole of landscape view.
4. Mechanisms that are simple to understand and to deliver by natural resource Planners and managers that are typically not specialists in conservation ecology.
5. Robust results.
6. Mechanisms that apply efficiently, equitably and transparently.



Fig 3: Common Everlasting and Pink Bindweed.

Some grassland remnants have been managed well for years and are flourishing. Others are rapidly disappearing through bad management

## Draft Corangamite Native Vegetation Plan

### 4.3 Cost Sharing Arrangements for Implementation

#### Determining Cost Sharing Arrangements for Implementation

Communities in the Corangamite region have been addressing natural resource management issues in a coordinated and integrated fashion for many years. In particular regional communities were quick to identify the threats posed by salinity, weed invasion and algal blooms in contributing to the development of management Plans to address these issues.

The successful implementation of many aspects of these Plans provides a solid foundation for furthering the partnership between all levels of government and community in vegetation management actions.

This Plan acknowledges the strong spirit of community consultation and cooperation that has been built over many years in tackling the challenges of land degradation and moving towards improved natural resource management.

The community, especially those people who depend on the health of the native vegetation in their area, do not wish to be seen as part of the problem of loss of biodiversity, but as part of the solution. Involving and supporting communities in activities that lead to improved management of biodiversity will ensure that regional development provides positive outcomes at a social, economic and environmental level.

Young et al (1996) argues that a mix of policy instruments should be created that are capable of harnessing community participation in biodiversity conservation. They propose that a package of arrangements (including tax incentives, compensatory payments, rate rebates etc) to facilitate the conservation of biodiversity will be successful in motivating people if it is focused and delivered at the local level.

In the past, regulatory mechanisms and instruments have been applied by government for the community, landowners and resource users to accept and use, or reject and ignore.

This Plan advocates the strengthening of a partnership approach between individuals, the community and policy makers to find innovative and sustainable solutions to what are often conflicting resource use issues.

Existing responsibilities in land management are defined by legislation and policies (Binning and Young 1998) and by what is generally accepted as reasonable and fair within a region or community (Industry Commission 1997). The term 'duty of care' is used to explain these responsibilities.

Successful implementation of this Plan will require significant investment of resources by both government and the community in activities to protect and enhance native vegetation. Determining where these resources will be invested and the nature of cost sharing between stakeholders poses a major challenge to the regional community. Past actions that have led to the loss and degradation of native vegetation should not be attributed to current land managers in determining who pays for remediation. It is widely accepted that the wider community is the major beneficiary of actions that protect and restore native vegetation. Private land managers already make significant contributions, in both land and resources to activities that extend beyond the "farm gate".

Considerable research has been undertaken in recent times into the formulation and application of cost-sharing principles for natural resource management. These studies demonstrate that successful programs depend on identifying the public and private benefit accruing from a range of remedial actions. Cost sharing principles have been established for a range of environmental works in the

## Draft Corangamite Native Vegetation Plan

region, including salinity, waterway protection, soil conservation, pest Plant and animal control and nutrient management. Many of these works also have significant benefits for vegetation protection and biodiversity conservation.

Implementation of native vegetation conservation works will often have multiple benefits that accumulate over time. These benefits are likely to accrue without being recognised and this has the potential to undermine the equity of cost share arrangements with land managers and between programs. A system that recognizes the cumulative impact of native vegetation works would allow for more equitable cost-share arrangements (Draft Goulburn Broken Native Vegetation Management Strategy, 1999). Promotion of equity and rational cost share arrangements that reflect the extent of private and public benefit is a key challenge for the future.

Elements of Cost-Sharing to be applied to native vegetation management:

In developing a cost sharing approach this Plan advocates that the following elements should be applied to native vegetation management.

1. Do not provide government payments to landholders to meet existing legal requirements, such as those specified under the Native Vegetation Retention Controls.
2. If legal requirements are shifted to a higher threshold, 'once-off' payments to landholders are justified to encourage compliance with the new requirements.
3. On-going payments to landholders are justified when it is predominately in the community interest to secure the on-going management of vegetation by a landholder, over and above current legal requirements.
4. Any payments to landholders should be made subject to a guarantee that vegetation will be protected in the long term.
5. In order to reduce costs to government, payments to landholders which have caused unintended declines in vegetation should be identified and removed with a view to subsidising activities which protect native vegetation whilst achieving land protection objectives.
6. Resource allocation decisions should be made within the context of this Native Vegetation Plan.

### **The Importance of Local Government in implementing NVR - Supporting Local Government**

Local Government, in collaboration with NRE has a pivotal role in implementing mechanisms to ensure that before clearing of native vegetation occurs Net Gain is clearly demonstrated by proponents. The opportunity exists for more effective and consultative processes to be established when development applications may incur an initial loss of native vegetation.

Local Government (the responsible authority) has a statutory responsibility for considering Planning permits to clear native vegetation under an area of 10 hectares. Where the area in question is greater than 10 hectares the application must be referred to NRE (referral authority) for assessment. Local Government must observe any conditions a referral body requests. Where NRE does not object to a permit being issued by Local Government, with or without conditions, Local Government can itself decide not to issue a permit.

This requirement places a significant potential burden on the responsible authority to assess the nature and significance of native vegetation that is subject to an application to clear. In many cases the skills for assessment do not reside with Local Government, thus creating potential for uninformed decision making.

A further issue may arise where proponents of a development are unaware of the requirements that need to be met for a permit to be issued to clear native vegetation. It is in the interests of all to improve channels of communication that allows certainty and clarity for responsible authorities, developers and the general community in relation to clearance of native vegetation.

## Draft Corangamite Native Vegetation Plan

The implementation of this Plan will result in an increased number of long term management agreements and conservation covenants being placed on privately owned native vegetation. The workload involved in monitoring and enforcing conditions of the agreements will require additional resources positioned in Local Government. This will particularly be the case where landholders have not entered into the management agreement voluntarily but through a compromise to meet Net Gain outcomes from a permit application. Landholders in this situation may require a greater level of support in managing native vegetation.

In Summary : Improved support needs to be provided for Local Government in the form of:

1. Training for local staff in assessment of NVR applications.
2. Provision of detailed mapping products that show the location and characteristics of vegetation communities, including conservation significance.
3. Development of community awareness materials that outline the process for assessing NVR applications, opportunities for achieving Net Gain and guidelines for determination of offsets and permit conditions.
4. Funding to allow Local Government to monitor and manage the increased number of management agreements and covenants placed on native vegetation through Planning applications as this Plan is implemented.
5. Assistance in preparing and delivering a training and development program for planning scheme administration.

### 5. Monitoring, Evaluation and Review

The monitoring, evaluation and review process for the Plan will follow guidelines outlined in the 'National Framework for the Management and Monitoring of Australia's Native Vegetation', ANZECC, 2000. Monitoring guidelines and indicators being developed by NRE will also be incorporated into the evaluation program for this Plan.

The monitoring framework for the biodiversity component of this Plan will be the Bioregional Network Reporting that is coordinated through the Flora and Fauna Section of the NRE.

The implementation of the Plan will be evaluated against performance indicators and reported through the CCMA annual reporting system.

Components of the Plan will be reviewed yearly as action Plans are developed and implemented. The goals and targets in the Plan will be reviewed after 5 years.

### 6. Mechanisms for Setting Management Priorities

Principles to determine implementation or management priorities are required for the effective delivery of limited funds to a range of projects. A prioritised and agreed order of action that can be followed by agencies, community groups and individuals will ensure that the majority of resources are allocated to where the most long term benefit will be achieved.

Biodiversity or Vegetation Management "Hotspots" will be developed taking into account factors including threatened EVCs, Endemic flora and fauna, threatened flora and fauna, International agreements (e.g. Ramsar, JAMBA, CAMBA), Threat Ratings, and Complimentary Natural Resource Management Priorities (eg. Salinity recharge, Nutrient Management, Greenhouse). Part 6.2 discusses "Hotspots" further.

## Draft Corangamite Native Vegetation Plan

### 6.1 Hierarchy of Management Action

As biodiversity management programs are developed for the implementation of ground on works a hierarchy of action should be followed. Within a given vegetation category and for habitat of equal value, priority will be given to:

<b>Priority</b>	<b>Action</b>
P1	Protection of remnants (e.g. reservation, covenants, management agreements, fencing, destocking).
P2	Management of existing remnants (weed control, maintenance of the hydrological regime, revegetation for buffering, promoting/enhancing natural species and/or structural and/or age class and/or size class diversity).
P3	Enhancement of degraded remnants.
P4	Enhancement of connectivity and integrity through recreation of habitat (including riparian re-vegetation) e.g. corridors, buffers, restoration of ecological processes.
P5	Revegetation for land degradation mitigation works.
P6	Re-creation of isolated areas of habitat.
P7	Revegetation works of lower order than above.

Within the above hierarchy consideration will be given to the:

- Contribution to protection or enhancement of land and water resources.
- Viability of existing or proposed vegetation and habitat.
- Feasibility of the proposed actions (probability of success, need for ongoing management).
- Benefits in relation to the cost of the project.

### 6.2 Biodiversity “Hotspots”

Biodiversity or Vegetation Management Hotspots will be identified across the Region to assist in the allocation of funds and other assistance to land managers. The main factors or filters to be used in determining the priority hotspots are listed below.

Factors determining priority Hotspots:

- Threatened EVCs.
- Endemic flora and fauna.
- Threatened flora and fauna.
- International agreements (Ramsar, JAMBA, CAMBA).
- Threat Ratings (Weeds, Changed Land Use and Inappropriate Management).
- Complimentary Natural Resource Management Priorities (Salinity recharge, Nutrient Management, Greenhouse).

## Draft Corangamite Native Vegetation Plan



Fig 4: *Pitlotus macrocarpus*,

a rare Plant found in the Plains Grassland Ecological Vegetation Class, which is threatened by inappropriate fire protection actions and incremental clearing.



## PART B - An Overview of Native Vegetation in the Corangamite CMA Region

### 7.1 Describing, Mapping and Managing Native Vegetation Information / Mapping of Native Vegetation – a Management Planning tool.

Vegetation Mapping is being undertaken at both a national and state level, gathering information that will assist in Planning the conservation and management of native vegetation. The information is provided in a number of layers.

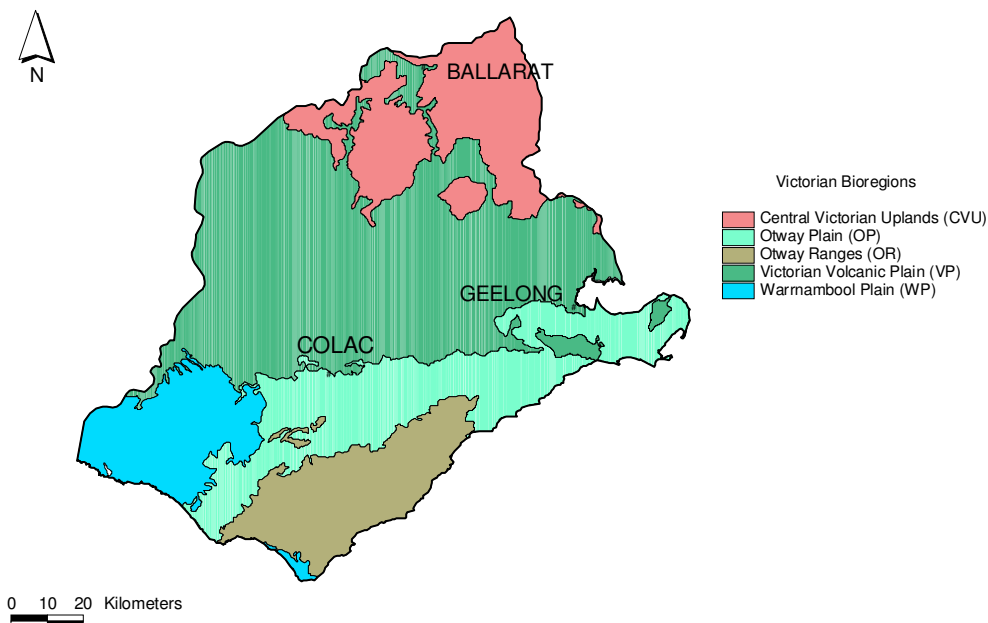
#### Bioregions

Biogeographic regions (bioregions) capture the patterns of ecological characteristics in the landscape, providing a natural framework for recognising and responding to biodiversity values. Bioregions reflect underlying environmental features, can be related to patterns of land use and can be used to identify the relationship between many natural resource based activities and biodiversity assets.

Bioregions identified in Victoria form part of a national framework (IBRA - Interim Biogeographical Regionalisation of Australia). Of the 21 Victorian bioregions, five are represented in the CCMA region. These are the:

- Central Victorian UPlands
- Victorian Volcanic Plain
- Otway Ranges
- Otway Plain
- Warrnambool Plain

The distribution of these bioregions is shown on Map 3.



**Map 3: Bioregions within the Corangamite CMA region**

## Draft Corangamite Native Vegetation Plan

This Plan recognises the need to conserve and protect native vegetation communities within and across bioregions. While some vegetation types are relatively well conserved in some parts of their range, adequate protection is required at a bioregional scale to ensure their long term viability, value for fauna and land and water benefits.

### Ecological Vegetation Classes (EVCs)

Detailed vegetation community mapping is being produced using Ecological Vegetation Classes (EVCs). Descriptions of these detailed EVC communities are found in Appendix 2. EVCs provide a finer level of description and mapping of native vegetation and have been used to analyse issues, threats and priorities in this Plan.

Ecological Vegetation Classes have been mapped at a range of scales from 1:25,000 to 1:100,000. They are based on vegetation structure and floristics (the species that occur at a site), land systems and other environmental information including aspect, slope, elevation, rainfall, fire frequency and ecological responses to disturbance. They describe local patterns of vegetation diversity and are complex and variable. EVCs are not bioregion specific. Ecological Vegetation Classes are important for strategic regional Planning across the CCMA area and provide valuable information about the level of depletion and threat status of different vegetation types.

EVC mapping has been completed for the Corangamite Region as part of the West Victoria Regional Forest Agreement process. Detailed information can be found in the RFA reports or on [www.rfa.gov.au](http://www.rfa.gov.au)

### PROVISIONAL ASSESSMENT OF THE CONSERVATION STATUS OF ECOLOGICAL VEGETATION CLASSES (EVCs)

Assessment of the conservation status of vegetation types is traditionally based on the broad concepts of inherent rarity, degree of threat (including consideration of historic and on-going impacts) and importance for supporting other significant features (for example, as a drought refuge for native fauna). These concepts have been expressed as more specific criteria in a number of processes at State and National levels. The Regional Forest Agreement process undertaken in partnership by Commonwealth and State agencies used National Forest Reserve Criteria which included a number of biodiversity criteria for establishing a *Comprehensive Adequate and Representative reserve system* (outlined in JANIS 1997). Some of these criteria can be used as the basis for assessing conservation status of vegetation types in the Native Vegetation Plan process. However, there are inherent differences between the processes - RFAs focus primarily on establishing a reserve system for forests in largely natural landscapes across public land, while NVPs focus primarily on prioritising protection of all types of remnant vegetation in rural landscapes across private land. These differences necessitate a refinement of the criteria.

The key refinements are as follows:

- depletion and rarity of occurrence assessments are made within a Victorian bioregional framework which is more informative than the RFA study area framework;
- combinations of depletion-degradation-rarity which give equivalent conservation status to depletion-only thresholds are more explicitly defined;
- a “depleted” category is added to allow identification of vegetation types which may become threatened if broad-scale depletion or degradation activities are not managed appropriately;

The criteria are detailed in the following table and have been used to assign a provisional conservation status for each combination of EVC and bioregion. The status of each combination may

## Draft Corangamite Native Vegetation Plan

be amended with time as more complete or better scale mapping of vegetation type and condition becomes available. Where an EVC is only a minor occurrence in a bioregion it is assigned the conservation status from an appropriate neighbouring bioregion, unless the occurrence is considered to represent a threatened floristic community. Complexes/mosaics are assigned the conservation status of the most threatened component EVC.

Similarly, where threatened EVCs / floristic communities are known to exist but mapping is not available at this level of discrimination, decision-making processes based on more generalised datasets (for example, Broad Vegetation Types at 1:250 000) should be driven by the conservation status of the most threatened component likely to be present in a mapped polygon.

Definitions used in the criteria are:

- subject to a threatening process - includes currently acting threats that will lead to degradation (moderate or severe) OR risk of significant rapid change (e.g. rising groundwater; change of land use)
- majority - greater than 50% of area
- minority - greater than 10% and up to 50% of area
- severely degraded - floristic and/or structural diversity is greatly reduced (and/or subject to a threatening process which will lead to an equivalent reduction) and unlikely to recover naturally in medium to long term
- moderately degraded - floristic and/or structural diversity is significantly reduced (and/or subject to a threatening process which will lead to an equivalent reduction) but may recover naturally with removal of threatening processes
- little to no degradation range - floristic and/or structural diversity is largely intact
- range - area of smallest concave polygon which includes all occurrences

## Draft Corangamite Native Vegetation Plan

Table 2: Bioregional Conservation Status of Ecological Vegetation Classes (EVCs)

<b>STATUS</b>		<b>CRITERIA</b>
Presumed Extinct	X	<ul style="list-style-type: none"> <li>probably no longer present in the bioregion (the accuracy of this presumption is limited by the use of remotely-sensed 1:100 000 scale woody vegetation cover mapping to determine depletion - grassland, open woodland and wetland types are particularly affected)</li> </ul>
Endangered	E1	<ul style="list-style-type: none"> <li>contracted to less than 10% of former range; or</li> <li>less than 10% pre-European extent remains;</li> </ul>
	E2	Combination of depletion, degradation, current threats and rarity is comparable overall to E1: <ul style="list-style-type: none"> <li>10 to 30% pre-European extent remains <u>and</u> severely degraded over a majority of this area; or</li> <li>naturally restricted EVC reduced to 30% or less of former range <u>and</u> moderately degraded over a majority of this area; or</li> <li>rare EVC cleared and/or moderately degraded over a majority of former area.</li> </ul>
Vulnerable	V1	<ul style="list-style-type: none"> <li>10 to 30% pre-European extent remains;</li> </ul>
	V2	Combination of depletion, degradation, current threats and rarity is comparable overall to V1: <ul style="list-style-type: none"> <li>greater than 30% and up to 50% pre-European extent remains <u>and</u> moderately degraded over a majority of this area; or</li> <li>greater than 50% pre-European extent remains <u>and</u> severely degraded over a majority of this area; or</li> <li>naturally restricted EVC where greater than 30% pre-European extent remains <u>and</u> moderately degraded over a majority of this area; or</li> <li>rare EVC cleared and/or moderately degraded over a minority of former area.</li> </ul>
Depleted	D1	<ul style="list-style-type: none"> <li>greater than 30% and up to 50% pre-European extent remains;</li> </ul>
	D2	Combination of depletion, degradation and current threats is comparable overall to D1: <ul style="list-style-type: none"> <li>greater than 50% pre-European extent remains <u>and</u> moderately degraded over a majority of this area;</li> </ul>
Least Concern (= Common in map legend)	L C	<ul style="list-style-type: none"> <li>greater than 50% pre-European extent remains <u>and</u> subject to little to no degradation over a majority of this area</li> </ul>
Rare	R1	- total range generally less than 10 000ha; or
	R2	- pre-European extent in Victorian bioregion less than 1000 ha; or
	R3	- patch size generally less than 100 ha
Naturally Restricted	NR	- pre-European extent in Victorian bioregion less than 10 000 ha.
Common	C	- pre-European extent in Victorian bioregion greater than 10 000 ha.
Minor	M	- pre-European extent in Victorian bioregion less than approximately 1% of Statewide extent

## Draft Corangamite Native Vegetation Plan

Map 4: Conservation Status of EVCs in the Corangamite CMA region.

## Draft Corangamite Native Vegetation Plan

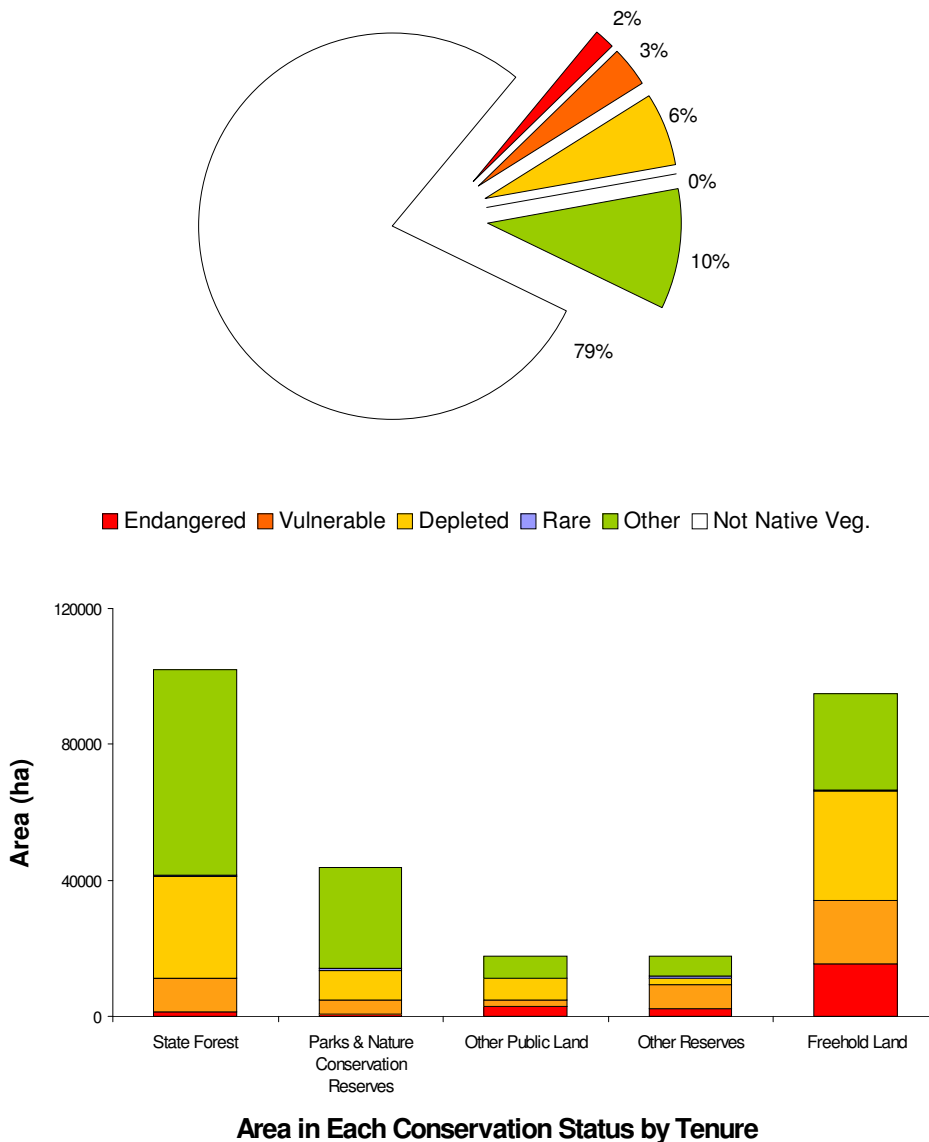
# Draft Corangamite Native Vegetation Plan

## 7.2 An Analysis by Bioregion and EVCs of the Corangamite CMA region

The following analysis of each Bioregion within the Corangamite CMA Region details the current status of EVCs and their major threats.

The overall picture for the region is not a pretty one. Only 21 % of the original native vegetation remains and 52 % of this remaining vegetation is considered threatened. The situation for native vegetation on freehold land is particularly concerning. Of the approximately 95,000 hectares of native vegetation remaining on freehold land, 70 % or 66000 hectares is threatened. An analysis of the vegetation status for each bioregion is given in Appendix 3 and shown visually in Map 4. Figure 5 provides an overview of the situation across the Corangamite CMA region.

Fig 5: CORANGAMITE CMA – VEGETATION STATUS ALL BIOREGIONS



## Draft Corangamite Native Vegetation Plan

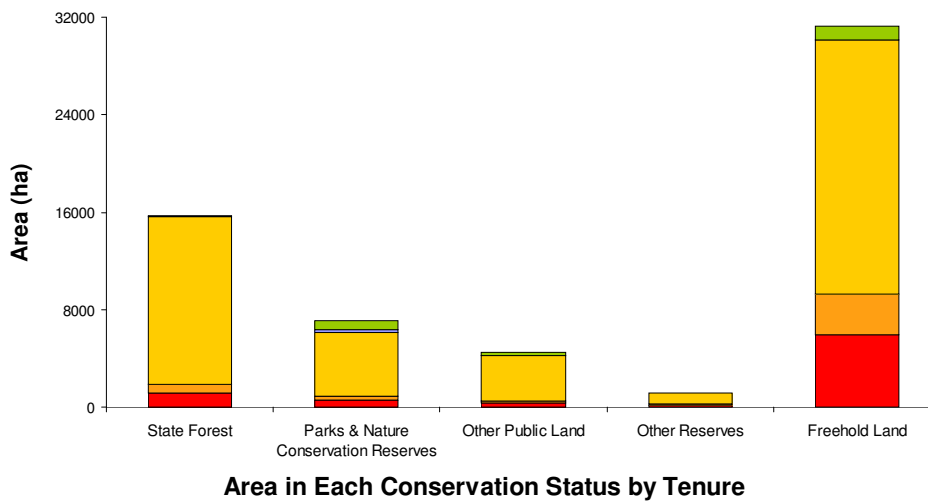
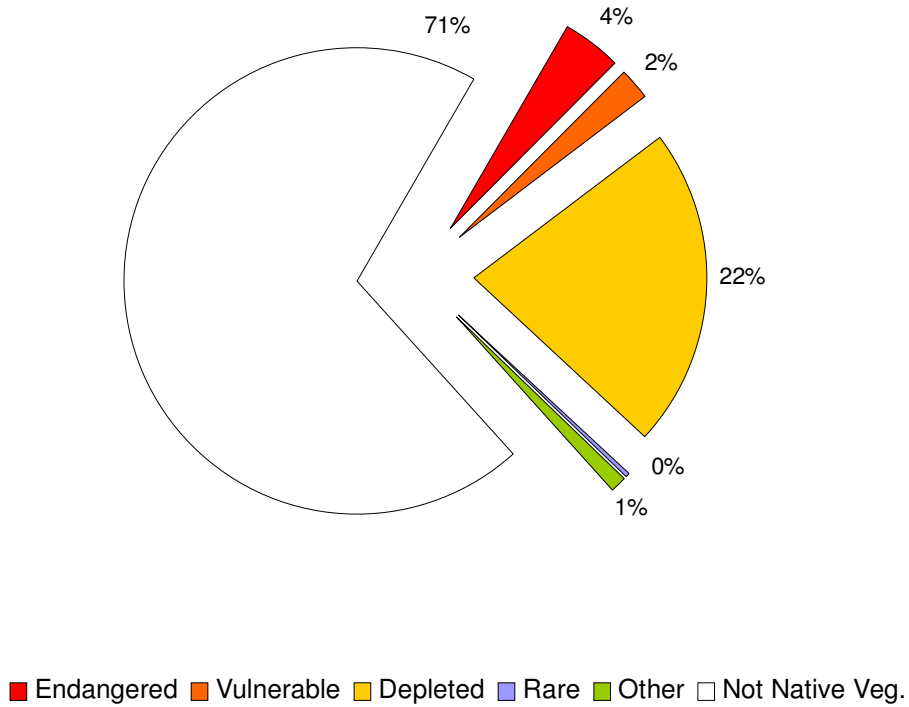
### 7.2.1 Central Victorian Uplands

<b>Central Victorian UPLands Bioregion Analysis</b>	
<b>Description of Bioregion</b>	<ul style="list-style-type: none"> <li>• The Central Victorian UPLands bioregion extends from Ballan in the east through Ballarat, Scarsdale and Linton to Rokewood and the Brisbane Ranges in the south. Outliers occur at the You Yangs and in the Meredith-Bangamie area. This bioregion was formerly dominated by foothill forest, some of which is still found on the upper slopes. The flatter and more fertile areas are largely cleared for agriculture.</li> <li>• Important parks and reserves include Brisbane Ranges National Park. The major primary industry activities are agriculture (sheep and cattle grazing, cropping) and timber production. The area includes important water catchments and water storages.</li> <li>• Dry Foothill Forest Complexes dominated the Central Victorian UPLands, but large areas of Moist Foothill Forest complexes and Valley Grassy Woodland Complexes also occurred.</li> </ul>
<b>Current EVC Status</b>	<ul style="list-style-type: none"> <li>• 30.2 % (60738.3 ha) of native vegetation remaining.</li> <li>• 95.3 % (57891.0 ha) of remaining vegetation is threatened.</li> <li>• 13.9% Endangered, 7.7% Vulnerable, 73.7% Depleted.</li> <li>• 18 Endangered EVCs, 3 Vulnerable EVCs, 4 Depleted EVCs.</li> </ul>
<b>Priority EVCs to Protect</b>	<ul style="list-style-type: none"> <li>• Alluvial Terraces Herb-rich Woodland</li> <li>• Aquatic Herbland/Plains Sedgy Wetland Mosaic</li> <li>• Basalt Escarpment Shrubland</li> <li>• Creekline Herb-rich Woodland</li> <li>• Damp Sands Herb-rich Woodland</li> <li>• Granitic Hills Woodland</li> <li>• Grassy Woodland</li> <li>• Hills Herb-rich Woodland</li> <li>• Plains Grassland</li> <li>• Plains Grassland/Plains Grassy Woodland Mosaic</li> <li>• Plains Grassy Wetland</li> <li>• Plains Grassy Woodland</li> <li>• Plains Sedgy Wetland</li> <li>• Riparian Woodland</li> <li>• Sand Forest</li> <li>• Scoria Cone Woodland</li> <li>• Swampy Riparian Woodland</li> <li>• Wetland Formation</li> </ul>
<b>Major Threats</b>	<ul style="list-style-type: none"> <li>• Changed Land Use and fragmentation of habitat from urban and rural residential subdivisions around Ballarat.</li> <li>• Pressure on small remnants in productive potato cropping areas around Bungaree.</li> <li>• Encroachment of environmental weeds (e.g. Gorse, Serrated tussock) on escarpments, roadsides and waterways.</li> <li>• Incremental clearing of native vegetation during the establishment and harvesting of Plantations.</li> <li>• Impacts from firewood collection on habitat for hollow dependent fauna.</li> </ul>



## Draft Corangamite Native Vegetation Plan

FIG 6: Vegetation Status – CENTRAL VICTORIAN UPLANDS BIOREGION



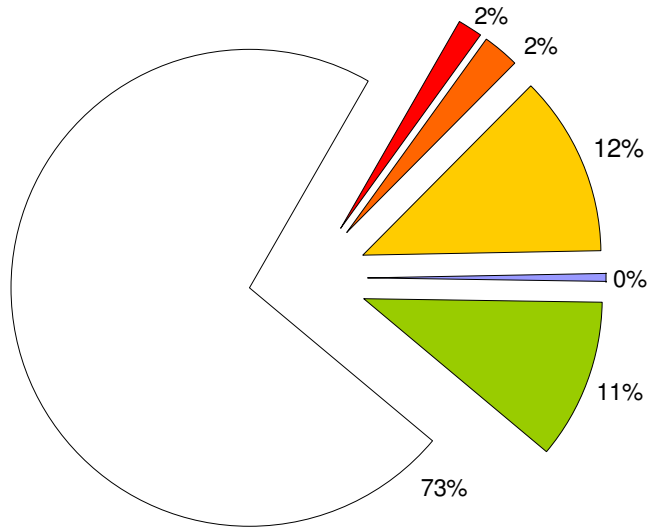
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### 7.2.2 Otway Plain

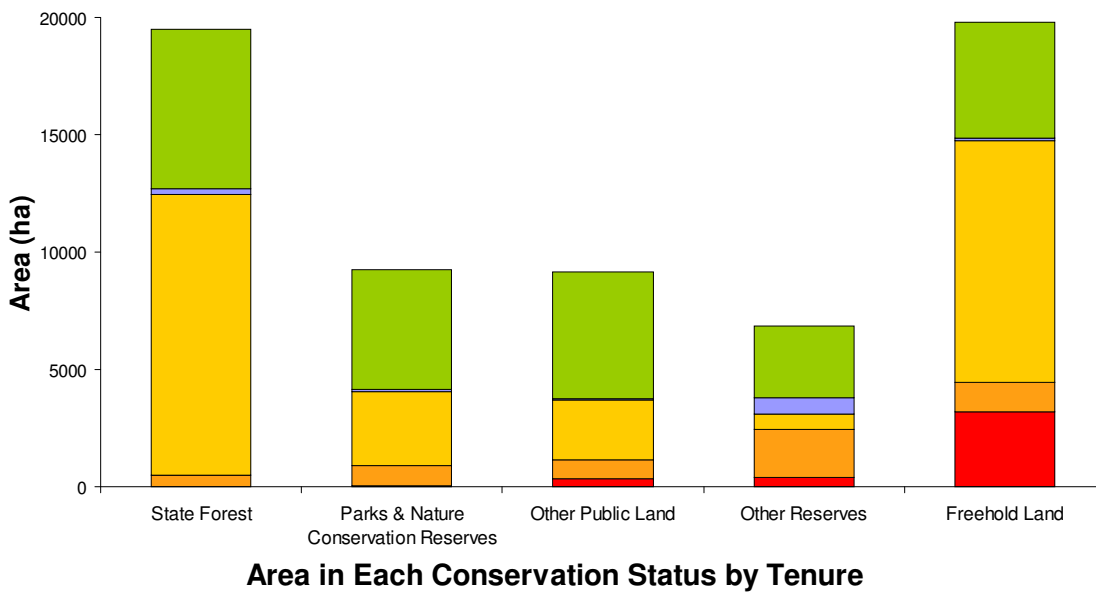
<b>Otway Plain Bioregion Analysis</b>	
<b>Description of Bioregion</b>	<ul style="list-style-type: none"> <li>• The Otway Plain includes coastal plains, river valleys and foothills from the Bellarine Peninsula west to Princetown.</li> <li>• The bioregion is characterised by coastal heathland and woodland, and open forests with heathy understoreys dominated by Brown Stringybark and Messmate. Dry sclerophyll forest dominated by Mountain Grey Gum and Messmate occurs around the Otway foothills. River Red Gum woodlands occur along some drainage lines. The bioregion is drained in the east mainly by the Barwon River (which originates in the Otway Ranges) and its tributaries, and several small coastal streams. In the west the bioregion is drained mainly by tributaries of the Gellibrand River, although some streams flow to lakes Corangamite and Colac located in the Victorian Volcanic Plain.</li> <li>• Today most people live in towns on or near the coast and in smaller inland towns. Part of the greater Geelong urban area occurs in the bioregion, with Colac being the next largest city (on the edge of the bioregion). Smaller urban areas include Anglesea and Birregurra. The single largest land use is agriculture, with the focus on sheep and cattle grazing and dairy farming.</li> <li>• At the time of European settlement the Coastal Plains were dominated by lowland and foothill forests, heathy and grassy woodlands, and coastal scrubs and grasslands. There has been substantial clearing of all vegetation types, particularly those on the deeper more fertile soils.</li> <li>• Much of the Otway Plain is used for agriculture. The foothill forests support a minor forest industry based on timber, firewood and tea tree cutting, and private farm and commercial forestry is increasing.</li> <li>• Only a small percentage of the remaining native vegetation is in conservation reserves, mainly flora and fauna and lake reserves. Roadsides often retain the last areas of some high value biodiversity assets. Significant urban areas with related recreational and tourism activities occur on the Bellarine Peninsula and are increasing.</li> </ul>
<b>Current EVC Status</b>	<ul style="list-style-type: none"> <li>• 31.9 % (77372 ha) of native vegetation remaining.</li> <li>• 50.3 % (38950 ha) of remaining vegetation is threatened.</li> <li>• 6.3% Endangered, 6.9% Vulnerable, 37.2% Depleted.</li> <li>• 3 Extinct EVCs, 15 Endangered EVCs, 12 Vulnerable EVCs, 1 Depleted EVC.</li> </ul>
<b>Priority EVCs to Protect</b>	<ul style="list-style-type: none"> <li>• Aquatic Herbland/Plains Sedgy Wetland Mosaic</li> <li>• Calcarenite Dune Woodland</li> <li>• Damp Heath Scrub</li> <li>• Damp Sands Herb-rich Woodland</li> <li>• Floodplain Riparian Woodland</li> <li>• Grassy Forest</li> <li>• Grassy Woodland</li> <li>• Lignum Wetland</li> <li>• Plains Grassland</li> <li>• Plains Sedgy Wetland</li> <li>• Shallow Freshwater Marsh</li> <li>• Stream-bank Shrubland</li> <li>• Swamp Scrub</li> <li>• Swampy Riparian Woodland</li> <li>• Wetland Formation</li> </ul>
<b>Major Threats</b>	<ul style="list-style-type: none"> <li>• Pressure on existing remnants from urban and rural residential subdivision, particularly on Bellarine Peninsula, Coastal areas of Surfcoast Shire and south of Colac.</li> <li>• Incremental loss of native vegetation from Plantation establishment and management.</li> <li>• Environmental weed invasion, particularly near urban areas and waterways.</li> <li>• Gradual decline in isolated remnants which are grazed or inappropriately managed.</li> <li>• Uncontrolled stock access to riparian vegetation.</li> <li>• Draining and cropping of shallow wetlands in the Barwon and Gellibrand catchments.</li> <li>• Impacts from firewood collection on habitat for hollow dependent fauna.</li> </ul>

## Draft Corangamite Native Vegetation Plan

Fig 7: Vegetation Status – OTWAY PLAIN BIOREGION



■ Endangered 
 ■ Vulnerable 
 ■ Depleted 
 ■ Rare 
 ■ Other 
 ■ Not Native Veg.



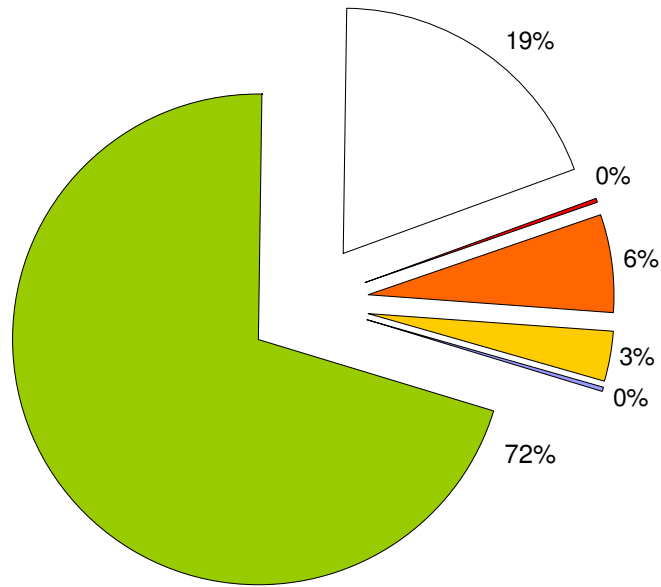
## Draft Corangamite Native Vegetation Plan

### 7.2.3 Otway Ranges

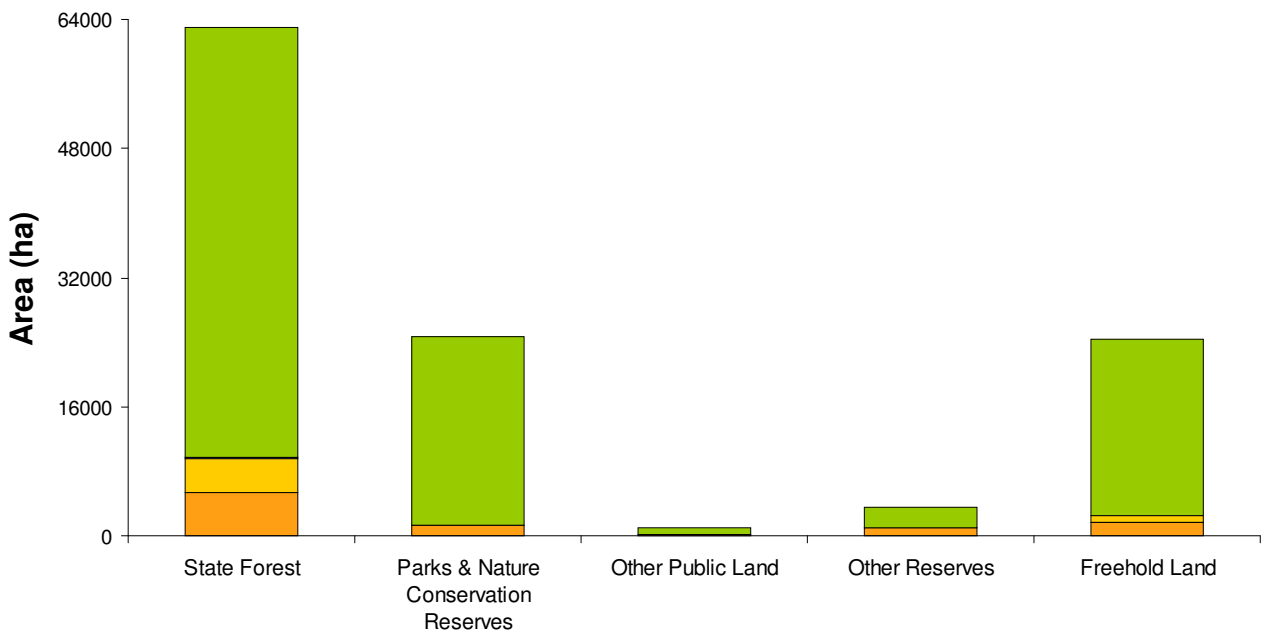
<b>Otway Ranges Bioregion Analysis</b>	
<b>Description of Bioregion</b>	<ul style="list-style-type: none"> <li>• The Otway Ranges bioregion is generally sparsely settled despite the efforts of early pioneers to develop agriculture pursuits. Parts of the bioregion were cleared for agriculture and settlement was attempted.</li> <li>• Settlement in the Otway Ranges bioregion is concentrated between Beech Forest and Lavers Hill and coastal areas. Most of the settlement is based on agriculture, though tourism is increasing, especially along the coast at Apollo Bay, Lorne and Aireys Inlet.</li> <li>• Major conservation reserves include the Otway National Park.</li> <li>• Moist Foothill Forest Complexes and Dry Foothill Forest Complexes, with smaller occurrences of Lowland Forest Complexes, Heathy Woodland Complexes and Valley Grassy Forest Complexes, dominate the vegetation of the Otway Ranges bioregion.</li> </ul>
<b>Current EVC Status</b>	<ul style="list-style-type: none"> <li>• 81.4 % (121535 ha) of native vegetation remaining.</li> <li>• 11.5 % (13943 ha) of remaining vegetation is threatened.</li> <li>• 0.2 % Endangered, 7.2 % Vulnerable, 4.1 % Depleted.</li> <li>• 1 Extinct EVC, 1 Endangered EVC, 3 Vulnerable EVCs, 2 Depleted EVCs.</li> </ul>
<b>Priority EVCs to Protect</b>	<ul style="list-style-type: none"> <li>• Coastal Tussock Grassland</li> <li>• Cool Temperate Rainforest</li> <li>• Floodplain Reedbed</li> <li>• Swamp Scrub</li> <li>• Wet Sands Thicket</li> </ul>
<b>Major Threats</b>	<ul style="list-style-type: none"> <li>• Decline of rainforest communities from Myrtle Wilt.</li> <li>• Wetland vegetation impacts from grazing pressure at Glenaire.</li> <li>• Pressure on threatened fauna (Tiger Quoll) from forest fragmentation.</li> <li>• Invasion of blackberries into remnant native vegetation, particularly along waterways.</li> </ul>

## Draft Corangamite Native Vegetation Plan

Fig 8: Vegetation Status – OTWAY RANGES BIOREGION



■ Endangered 
 ■ Vulnerable 
 ■ Depleted 
 ■ Rare 
 ■ Other 
  Not Native Veg.



**Area in Each Conservation Status by Tenure**

## Draft Corangamite Native Vegetation Plan

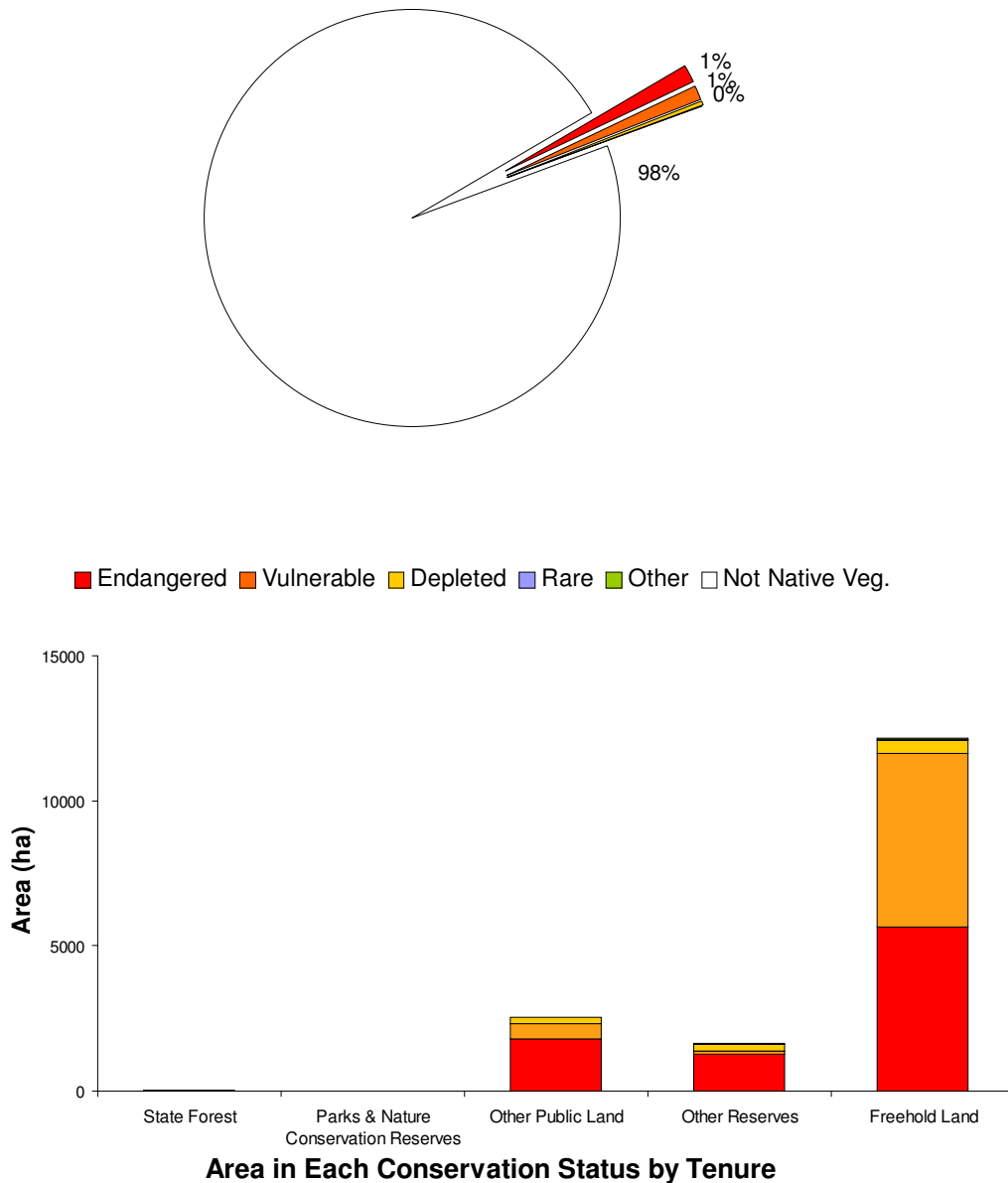
### 7.2.3 Victorian Volcanic Plain

<b>Victorian Volcanic Plain Bioregion Analysis</b>	
<b>Description of Bioregion</b>	<ul style="list-style-type: none"> <li>• The Victorian Volcanic Plain is an area of flat to undulating plains in south-western Victoria, stretching in the Corangamite region from Lara west to Derrinallum, south to Camperdown and Colac and north to Elaine and Rokewood. It is characterised by vast open areas of grasslands, small patches of open woodland, stony rises denoting old lava flows, the low peaks of long extinct volcanoes dotting the landscape and numerous scattered large shallow lakes.</li> <li>• The major land use is agriculture, especially sheep and cattle grazing and cropping.</li> <li>• Settlement on the Victorian Volcanic Plains is generally sparse, although denser in areas on the outskirts of Geelong and Ballarat. Being one of the first areas settled for agriculture in Victoria, there is very little public land.</li> <li>• Nine lakes in the Victorian Volcanic Plain, including Lake Corangamite and Lake Murdeduke, are included in the Ramsar Convention on wetlands of international importance.</li> <li>• The most prominent vegetation in this bioregion were grasslands and associated communities. Other vegetation included woodlands, shrublands, riparian vegetation and extensive wetlands. The grassland communities are floristically rich, usually dominated by Kangaroo Grass with a wide variety of perennial herbs.</li> <li>• The remaining native ecosystems, particularly those severely depleted such as grasslands, woodlands and shallow freshwater wetlands, are all highly significant and vital for biodiversity conservation in the bioregion.</li> </ul>
<b>Current EVC Status</b>	<ul style="list-style-type: none"> <li>• 3.6 % (19935 ha) of native vegetation remaining.</li> <li>• 98.8 % (19686 ha) of remaining vegetation is threatened.</li> <li>• 61.2% Endangered, 33.5% Vulnerable, 4.0% Depleted.</li> <li>• 25 Endangered EVCs, 7 Vulnerable EVCs, 3 Depleted EVCs.</li> </ul>
<b>Priority EVCs to Protect</b>	<ul style="list-style-type: none"> <li>• Aquatic Herbland/Plains Sedgy Wetland Mosaic</li> <li>• Basalt Escarpment Shrubland</li> <li>• Calcarenite Dune Woodland</li> <li>• Creekline Grassy Woodland</li> <li>• Creekline Herb-rich Woodland</li> <li>• Damp Heathland / Damp Heathy Woodland</li> <li>• Floodplain Riparian Woodland</li> <li>• Granitic Hills Woodland</li> <li>• Grassy Forest</li> <li>• Grassy Woodland</li> <li>• Hills Herb-rich Woodland</li> <li>• Lignum Wetland</li> <li>• Mangrove Shrubland</li> <li>• Plains Grassland</li> <li>• Plains Grassland/Plains Grassy Woodland Mosaic</li> <li>• Plains Grassy Wetland</li> <li>• Plains Grassy Woodland</li> <li>• Plains Sedgy Wetland</li> <li>• Red Gum Wetland</li> <li>• Riparian Woodland</li> <li>• Scoria Cone Woodland</li> <li>• Shallow Freshwater Marsh</li> <li>• Stream-bank Shrubland</li> <li>• Swamp Scrub</li> <li>• Swampy Riparian Woodland</li> </ul>

## Draft Corangamite Native Vegetation Plan

<b>Major Threats</b>	<ul style="list-style-type: none"> <li>Incremental loss of native vegetation through changed land use.</li> <li>Loss of native vegetation from roadsides and rail lines through inappropriate management actions (e.g. chemical spraying and cultivation for fire control).</li> <li>Impact from utilities maintenance and upgrades (phone, water, gas etc) on native vegetation.</li> <li>Invasion of environmental weeds (serrated tussock, phalaris) into native grasslands.</li> <li>One dimensional control methods being used for serrated tussock control (Rock clearing, boom spraying).</li> <li>Vegetation and habitat loss from changed hydrological regimes in the Corangamite catchment.</li> </ul>
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Fig 9: Vegetation Status – VICTORIAN VOLCANIC PLAIN BIOREGION



## Draft Corangamite Native Vegetation Plan

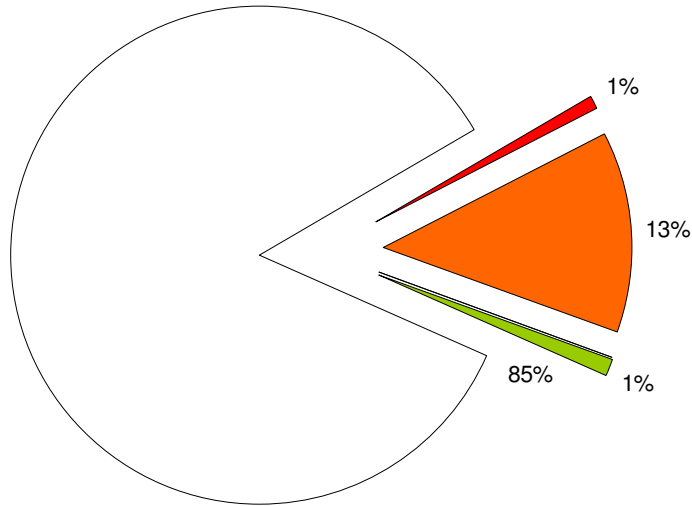
### 7.2.4 Warrnambool Plain

<b>Warrnambool Plain Bioregion Analysis</b>	
<b>Description of Bioregion</b>	<ul style="list-style-type: none"> <li>• The identifying features of the Warrnambool Plain bioregion are nutrient deficient soils over low calcareous dune formations and the distinctive cliffed coastline. The area east of Warrnambool is characterised by deeper soils of volcanic origins overlying limestone, which are dissected by streams.</li> <li>• Most people live in towns on or near the coast and in smaller inland towns. Sheep and cattle grazing are widespread land uses, however the prime agricultural focus of the bioregion is the dairy industry.</li> <li>• At the time of European settlement the Coastal Plains were dominated by lowland and foothill forests, heathy and grassy woodlands, and coastal scrubs and grasslands. There has been substantial clearing of all vegetation types, particularly those on the deeper more fertile soils.</li> <li>• The land management themes of the Warrnambool Plain are tourism and agriculture, particularly dairying and some beef production. The bioregion has been largely cleared of native vegetation and modified with the introduction of pasture species. Approximately 85% has been cleared, although some significant remnants of Manna Gum/Messmate bushland remain on private land.</li> <li>• Jancourt forest block is the largest forest area. Several significant areas of riparian vegetation exist within the bioregion, including portions of the Lower Curdies River.</li> </ul>
<b>Current EVC Status</b>	<ul style="list-style-type: none"> <li>• 15.9 % (20487 ha) of native vegetation remaining.</li> <li>• 86.1 % (1764 ha) of remaining vegetation is threatened.</li> <li>• 5.1% Endangered, 80.6% Vulnerable, 0.4% Depleted.</li> <li>• 1 Extinct EVC, 11 Endangered EVCs, 12 Vulnerable EVCs, 1 Depleted EVC.</li> </ul>
<b>Priority EVCs to Protect</b>	<ul style="list-style-type: none"> <li>• Aquatic Herbland/Plains Sedgy Wetland Mosaic</li> <li>• Damp Heathland / Damp Heathy Woodland</li> <li>• Deep Freshwater Marsh</li> <li>• Estuarine Wetland</li> <li>• Grassy Woodland</li> <li>• Plains Grassy Woodland</li> <li>• Plains Sedgy Wetland</li> <li>• Reed Swamp</li> <li>• Riparian Forest</li> <li>• Scoria Cone Woodland</li> <li>• Swamp Scrub</li> </ul>
<b>Major Threats</b>	<ul style="list-style-type: none"> <li>• Grazing pressure in unfenced remnants.</li> <li>• Incremental removal of vegetation from roadsides through electric fencing and then grazing.</li> <li>• Environmental weeds (Pampas grass, Ivy, blackberry and other waterway weeds).</li> <li>• Habitat fragmentation and the impact on associated fauna.</li> <li>• Uncontrolled stock access to riparian vegetation.</li> </ul>

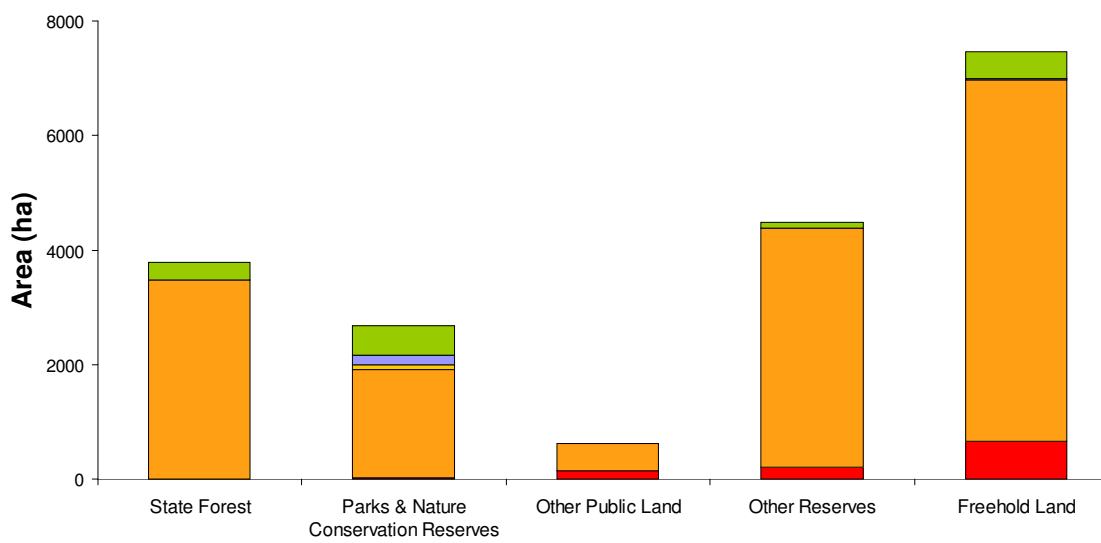


## Draft Corangamite Native Vegetation Plan

Fig 10: Vegetation Status – WARRNAMBOOL PLAIN BIOREGION



■ Endangered ■ Vulnerable ■ Depleted ■ Rare ■ Other □ Not Native Veg.



Area in Each Conservation Status by Tenure

### Part C The Corangamite Native Vegetation Plan

#### 8. Goals of the Corangamite Native Vegetation Plan

The following goals outline the broad approach that will be taken with respect to the management of native vegetation in the Corangamite region.

##### 8.1 GOAL 1: Protecting Existing Levels of Remnant Vegetation

***To maintain the extent of all native vegetation types at 1999 levels in keeping with the goal of Net Gain listed in Victoria's Biodiversity Strategy 1997.***

The incremental loss of native vegetation is a critical problem to resolve. Implementation of this Strategy depends on developing mechanisms to achieve Net Gain across the Corangamite Catchment in the context of current declining quality and quantity of native vegetation and the ongoing need for development.

Three possible mechanisms for addressing the critical problem of the incremental loss of native vegetation are

- the application of *Clause 52.17 of Victoria Planning Provisions* using the context of Net Gain,
- promoting land managers' duty of care for native vegetation and
- increasing reservation status.

The majority of native vegetation is on public land. There are nationally agreed criteria developed by the Australian and New Zealand Environment and Conservation Council and the Ministerial Council on Forestry, Fisheries and Aquaculture, that set benchmarks for 'comprehensive', 'adequate' and 'representative' (CAR) reserve systems. The CAR reserve system is applied to Ecological Vegetation Classes (EVCs).

The level of protection of native vegetation in dedicated conservation reserves varies widely for each EVC and the low level of reservation for some EVCs in the Catchment is of serious concern. Even though some of these vegetation types may be well protected elsewhere outside the Catchment, it is still important to protect as wide a range of distribution of EVCs as possible to ensure representative protection of BVTs and variations within these vegetation types. To achieve this the maintenance of vegetation cover at 1999 levels is vitally important.

##### 8.2 Goal 2: Enhancing the Quality of Existing Remnants

***To enhance the quality of existing native vegetation by managing 90% of native vegetation cover on both public and private land according to Best Management Practices by 2010.***

Evidence suggests that the quality of remnants in some public land reserves and on private land is very poor. Measurement of a remnant's quality requires assessment of such attributes as levels of exotic species present, composition and structure of the native Plant community, and the extent to which the remnant represents the expected Plant species of the community. There are no current methods for measuring changes in vegetation quality at the Catchment-scale, although methods are being developed by NRE for Victoria in cooperation with the approach being developed by the National Land & Water Resources Audit for Australia.

An assessment of quality can be estimated at the broader landscape scale but needs confirmation by data collected at the local level. The inclusion of quality assessment in the Planning process is a matter of developing suitable protocols. It is important for the information to be collected in such

## Draft Corangamite Native Vegetation Plan

a way that it can contribute to a vegetation database. This will improve the information base for future decision-making and reporting. Ideally, a standard assessment procedure should be used across the State for comparison and reporting purposes. A system is currently being developed by NRE.

Developing a Best Management Practice (BMP) approach is one way to broadly promote adoption of sustainable management principles and ensure an integrated approach to managing and protecting native vegetation. The level of BMP adoption also provides a measure of progress in moving towards a sustainable future.

BMPs result from decisions based on the best available information that considers such things as the needs of a land manager, the rest of the community and the capability of the resource. BMPs for native vegetation encompass objectives for production and on and off-site sustainability, and so might include consideration of issues of forestry, salinity, air and water quality, habitat, stock shelter and aesthetics/landscape.

The adoption rate of BMPs by land managers will be used as an interim measure of progress towards improved vegetation quality in the absence of any direct measurement process. This necessitates rigorous benchmarking exercises and ongoing monitoring and evaluation to ensure that BMP adoption is indeed translating through to improvements in native vegetation quality.



Fig 11: In some areas the only component of the original vegetation remaining is the overstory eucalypts with little or no understory.

## Draft Corangamite Native Vegetation Plan

### 8.3 GOAL 3: Targeted Revegetation and Regeneration of Native Vegetation

***To increase overall cover of native vegetation to 30% of the catchment and the cover of the majority of threatened Ecological Vegetation Classes (EVCs) to at least 10% of their pre-European vegetation cover by 2030, (where the current level of the EVC is under 2% the goal will be to increase the cover to 5% by 2030)***

At the broadest level a goal to restore a minimum of 30% of pre-European native vegetation to the Catchment is achievable. This will mean revegetating and regenerating approximately 3400 hectares of native vegetation per annum over 30 years.

To restore a minimum of 10% of pre-European cover for the majority of the endangered EVCs (i.e. those with less than 10% of pre-European extent remaining) by 2030 is a reasonable goal. At this level, some ecosystem breakdown (resulting in some loss in species) would be expected, but it will be a dramatic improvement on the present levels and is likely to arrest the decline of some species within the Catchment.

For the remaining EVCs currently under 2% of pre-European distribution, increasing to a 5% level of pre-European distribution is the goal. This will be complemented by a goal to have 75% of the area of the EVCs currently under 5% placed under secure management agreements.

### 8.4 GOAL 4: Increasing the Viability of Threatened Communities and Species

***To increase the viability of threatened species and the extent and quality of threatened ecological communities.***

While the Plan's focus is generally on the management of the most depleted vegetation types, there must also be management provisions for individual species and communities in critical need. These are usually identified in government legislation such as the *Flora and Fauna Guarantee Act 1988*.

The relevant goal in Victoria's Biodiversity Strategy 1997 is;  
'an increase in the viability of threatened species and in the extent and quality of threatened ecological communities'.

Threatened ecological communities are being determined as mapping is completed and ways to measure viability will be developed as appropriate.

The focus will first be on developing a strategic approach to managing threatened species and ecological communities, with emphasis on those covered under existing legislative agreements and treaties. Monitoring and evaluation will be conducted on a bioregional basis once communities have been identified and ways of measuring viability have been determined.



## Draft Corangamite Native Vegetation Plan

Fig 12: In some areas of the Heystebury roads are being revegetated with direct seeding while vegetation on other roads is being degraded or lost.



### 9. Key Lead Programs – Proposed Actions, Implementation Responsibilities & Timeframes

Five lead programs have been developed for implementation over the first five years of the Plan. These have been identified on the urgency of the issue and the potential benefits towards improved native vegetation management across a range of stakeholders. Complimentary supporting programs are found in Chapter 10. These programs support the work of the five lead programs and enable continual monitoring, evaluation and improvement to on ground management. The five lead programs are:

6. Native Vegetation Retention controls
7. Grassy Ecosystem Management
8. Waterway and Wetland Vegetation Management
9. Roadside Vegetation Management
10. Native Vegetation Management and Plantations

The supporting programs in Chapter 10 are:

1. Conservation of Biodiversity Values
2. Information Management
9. Targeted and Strategic Revegetation
10. Integrated Planning and Implementation
11. Management of Threatening Processes
12. Research and Monitoring
13. Cost Sharing and Commitment
14. Education, Communication and Consultation

The tables outlining the programs detail the intended action, the bioregion the action will occur in, the priority of the action, who is responsible, including partners in the action and a time frame for evaluation.

## Draft Corangamite Native Vegetation Plan

### 9.1 Native Vegetation Retention Controls (NVR)

Applications to clear native vegetation need to be assessed in the context of the overall goals of this Native Vegetation Plan.

Applications to clear native vegetation should be made with reference to the bioregion ensuring that all vegetation communities are adequately conserved across the region. Application of the decision-making process for NVR uses ecological vegetation classes (EVCs) as the fundamental unit for achieving Net Gain.

The following process outlines the format for assessing applications for the removal of native vegetation and appropriate responses.

The conservation significance of the vegetation is determined by the conservation status of the vegetation which was outlined in Table 2 (Chapter 7) and combining this with an onsite quality assessment and other biodiversity attributes that occur at that particular site. (Table 3). This then gives the particular area of vegetation in question a regional conservation significance rating of very high, high, medium or low.

The recommended responses should then be followed for the relevant categories of significance as outlined in Table 4.

## Draft Corangamite Native Vegetation Plan

Table 3: Conservation Significance of Native Vegetation

Biodiversity Attributes				Conservation Significance
Vegetation Types		Or	Or	
Conservation Status	Vegetation Quality	Flora and Fauna Species	Other Attributes	
Rare	0.8 – 1.0	<ul style="list-style-type: none"> <li>Habitat of viable populations of endangered or vulnerable species<sup>1</sup></li> </ul>	<ul style="list-style-type: none"> <li>Old growth forest</li> <li>Unique National Estate Values</li> <li>National sites of significance</li> <li>JAMBA / CAMBA sites etc.</li> <li>Areas that provide refuges for threatened species</li> <li>EVCs where less than 5% occurs within conservation reserves</li> </ul>	<b>Very High</b>
Endangered	0.4 – 1.0			
Vulnerable	0.6 – 1.0			
Rare	0.4 – < 0.8	<ul style="list-style-type: none"> <li>Habitat of viable populations of rare species<sup>1</sup></li> </ul>	<ul style="list-style-type: none"> <li>Rare National Estate Values</li> <li>State sites of significance</li> <li>Areas that provide refuges for rare species</li> <li>Areas that are priorities for threatened species rehabilitation.</li> <li>EVCs where 5-15% occurs within conservation reserves</li> </ul>	<b>High</b>
Endangered	< 0.4			
Vulnerable	< 0.6			
Depleted	0.8 – 1.0			
Rare	< 0.4	<ul style="list-style-type: none"> <li>Habitat of viable populations of regionally significant species<sup>1</sup></li> </ul>	<ul style="list-style-type: none"> <li>Uncommon National Estate Values</li> <li>Regional sites of significance</li> <li>EVCs where 15-30% occurs within conservation reserves</li> </ul>	<b>Medium</b>
Depleted	0.4 – < 0.8			
Common	0.6 – 1.0			
Depleted	0.4 – 1.0			
Common	< 0.4			<b>Low</b>

<sup>1</sup> Conservation status of species determined with reference to NRE Victorian Rare or Threatened Flora and Fauna lists. Viable population characteristics vary according to species and management input, and must be estimated on a case-by-case basis.



## Draft Corangamite Native Vegetation Plan

Table 4: Reflecting conservation significance in application of the Net Gain approach to regional outcomes and local responses

CONSERVATION SIGNIFICANCE.	EXPECTED REGIONAL OUTCOMES			PREFERRED RESPONSES AT LOCAL LEVEL
	remnant retention	gains in habitat score	net outcome	
VERY HIGH	no losses	substantial gains	substantial Net Gain	<ul style="list-style-type: none"> <li>clearing not permitted unless exceptional circumstances apply (i.e. determined at the Ministerial level)</li> <li>offsets must achieve a <b>substantial Net Gain</b> (i.e. at least twice the identified loss) at the local level according to the Net Gain criteria and such gains must be of an on-going and secure nature</li> <li>highest priority for biodiversity conservation investment</li> </ul>
HIGH	minimise losses	moderate gains	Net Gain	<ul style="list-style-type: none"> <li>clearing not permitted unless exceptional circumstances apply (i.e. determined at the Ministerial level)</li> <li>offsets must achieve a <b>Net Gain</b> (i.e. more than the identified loss) at the local level according to the Net Gain criteria and such gains must be of an on-going and secure nature</li> <li>high priority for biodiversity conservation investment</li> </ul>
MEDIUM	minimise losses	some gains	equivalence between losses and gains	<ul style="list-style-type: none"> <li>clearing may be permitted but only as part of an appropriate sustainable use response as determined by the responsible Planning authority</li> <li>offsets must achieve a <b>Net Gain</b> at local level according to the Net Gain criteria and such gains must be of an on-going and secure nature</li> <li>lower priority for biodiversity conservation investment but may be a high priority for land &amp; water resource protection or climate change investment</li> </ul>
LOW	some losses	longer-term gains	short-term loss  longer-term equivalence between losses and gains	<ul style="list-style-type: none"> <li>clearing may be permitted but only as part of an appropriate sustainable use response as determined by the responsible Planning authority</li> <li>offsets must aim for <b>equivalent gains</b> at local level in the longer-term but will not achieve this in the short-term (i.e. less than ten years). For forest or woodland vegetation with less than 0.2 habitat score, tree replacement criteria rather than the full Net Gain criteria will be used as specified in Native Vegetation Plans</li> <li>lowest priority for biodiversity conservation investment but may be a high priority for land &amp; water resource protection or climate change investment</li> </ul>
	TOTAL- reversal of decline			(i.e. shift from net loss to Net Gain)

## Draft Corangamite Native Vegetation Plan

### Native Vegetation Retention Controls

The following actions will need to be implemented to ensure that the NVR control process works efficiently and is an effective tool to achieving a Net Gain of native vegetation across the region.

No.	Proposed Action	Bioregion	Priority	Responsibility	Partners	Time frame	Key Performance Indicators
9.1.1	Review NVR to reflect current government policies and scientific knowledge.	All	High	NRE	CCMA, Municipalities, community	2001	
9.1.2	Review current exemptions to NVR to assist in achieving a Net Gain in native vegetation across the landscape.	All	High	NRE	CCMA, Municipalities, community	2001	
9.1.3	Ensure threatened EVCs and flora and fauna are protected through NVR.	All	High	NRE	Municipalities, CCMA	Ongoing	
9.1.4	Investigate having CMAs as a referral authority to vegetation removal and permit applications.	All	Medium	CCMA	NRE, CCMA	2002	

## Draft Corangamite Native Vegetation Plan

### 9.2 Grassy Ecosystem Management

No.	Proposed Action	Bioregion	Priority	Responsibility	Partners	Time frame	Key Performance Indicators
9.2.1	Develop a protected area network system for grassy ecosystems on the Victorian Volcanic Plain.	Victorian Volcanic Plain	High	NRE	Parks Vic, CCMA, Landcare, Municipalities	2002	
9.2.2	Prepare and implement management Plans for all significant grassy ecosystems.	All	High	NRE	TFN, CCMA	2003	
9.2.3	Develop a roadside fuel reduction program that is sensitive to ecological requirements for grassy ecosystems.	Victorian Volcanic Plain	High	Municipalities	NRE, CFA, CCMA	2001	
9.2.4	Integrate pest, Plant and animal control programs with grassy ecosystems management to ensure significant sites are not damaged inadvertently.	All	High	NRE	CCMA, Landcare	2001	
9.2.5	Assist private landholders with Planning and management programs for significant grassy ecosystems.	Victorian Volcanic Plain	Medium	NRE	CCMA, GAV, TFN	2003	
9.2.6	Assist landholders with significant grassy ecosystems through rate reductions and conservation rebates.	Victorian Volcanic Plain	Medium	Municipalities	CCMA, NRE, TFN	2003	

### Draft Corangamite Native Vegetation Plan

No.	Proposed Action	Bioregion	Priority	Responsibility	Partners	Time frame	Key Performance Indicators
9.2.7	Develop grassland revegetation systems that enable cost efficient large-scale revegetation programs to be implemented.	Victorian Volcanic Plain	Medium	NRE	CCMA, TFN, GAV	2003	
9.2.8	Establish a market for native grassland seed for revegetation projects	Victorian Volcanic Plain	Medium	NRE	Industry, CCMA, GAV	2002	
9.2.9	Develop systems that integrate native grassland management into sustainable land management.	Victorian Volcanic Plain	Medium	CCMA	NRE, TFN, GAV	2002	

## Draft Corangamite Native Vegetation Plan

### 9.3 Waterway and Wetland Vegetation Management

No.	Proposed Action	Bioregion	Priority	Responsibility	Partners	Time frame	Key Performance Indicators
9.3.1	Develop and implement Ramsar Wetland management Plans.	Victorian Volcanic Plain	High	Parks Vic	CCMA, NRE	2002	
9.3.2	Identify and protect high value riparian vegetation communities.	All	High	CCMA	NRE, Landcare, TFN	2003	
9.3.3	Develop a streamside 'Code of Practice'	All	High	CCMA	NRE, GAV	2001	
9.3.4	Encourage through a range of mechanisms fencing and revegetation of riparian zones.	All	High	CCMA	NRE, Landcare, Municipalities	2003	
9.3.5	Protect intact riparian vegetation along the Otway Coastal streams	Otway Ranges	High	CCMA	Landcare, NRE, GAV	2003	
9.3.6	Develop and implement estuary management Plans.	Otway Plain, Warrnambool Plain	Medium	Western Coastal Board	CCMA, NRE, Landcare	2003	
9.3.7	Develop projects through the CCMA that focus on protecting remnant vegetation along high value reaches of the Barwon & Gellibrand catchments	Otway Plains	Medium	CCMA	Landcare, NRE, community	2002	
9.3.8	Establish sites where natural flooding allows wetland vegetation communities to regenerate.	All	Medium	CCMA	Landcare, NRE	2004	
9.3.9	Control invasive exotic vegetation and replace with indigenous native vegetation	All	Medium	CCMA	NRE, Landcare	Ongoing	

### Draft Corangamite Native Vegetation Plan

No.	Proposed Action	Bioregion	Priority	Responsibility	Partners	Time frame	Key Performance Indicators
9.3.10	Review Southern Rural Water permit conditions for works on streams to reflect principles outlined in Native Vegetation Plan	All	Medium	Southern Rural Water	CCMA, NRE	2001	
9.3.11	Promote the value of riparian vegetation through regional training opportunities.	All	Medium	CCMA	GAV, NRE	2002	
9.3.12	Develop sustainable vegetation management programs for wetland vegetation at Glenaire	Otway Ranges	Medium	CCMA	NRE, Landcare	2004	
9.3.13	Examine changes in hydrology to lakes in the Corangamite catchment and implement appropriate changes to ensure biodiversity values are protected	Victorian Volcanic Plain	Medium	CCMA	NRE	2003	

## Draft Corangamite Native Vegetation Plan

### 9.4 Roadside Vegetation Management

No.	Proposed Action	Bioregion	Priority	Responsibility	Partners	Time frame	Key Performance Indicators
9.4.1	Complete and implement roadside management Plans for municipalities in the region.	All	High	Municipalities	CCMA, NRE	2001	
9.4.2	Develop and implement a Regional Code of Practice for roadside management.	All	High	CCMA	NRE, Municipalities	2000	
9.4.3	Develop BMPs to manage roadside burning and fuel reduction programs	All	High	CFA	NRE, CCMA, Municipalities	2001	
9.4.4	Assist voluntary roadside managers (e.g. CFA) with grants linked to BMPs.	All	Medium	CCMA	NRE, Municipalities, VicRoads	2001	
9.4.5	Review roadside grazing permit system to ensure native vegetation is managed sustainably.	All	Medium	Municipalities	CCMA, NRE	2001	
9.4.6	Implement roadside weed management programs to protect significant roadside native vegetation.	All	Medium	CCMA	NRE, Municipalities	2003	

## Draft Corangamite Native Vegetation Plan

### 9.5 Native Vegetation in Plantations

No.	Proposed Action	Bioregion	Priority	Responsibility	Partners	Time frame	Key Performance Indicators
9.5.1	10% of the area of new Plantations be revegetated with indigenous vegetation (this can include streams, steep areas, roadside buffers).	All	High	Industry	CCMA, NRE, Municipalities	2002	
9.5.2	Existing remnant vegetation including isolated trees within Plantations be retained in accordance with the NVR.	All	High	Municipalities	NRE, CCMA	Ongoing	
9.5.3	Develop and implement a code of practice for the management of native vegetation in Plantations	All	High	CCMA	Industry, NRE, Municipalities	2001	
9.5.4	Streamside buffers, steep areas and other areas that are excluded from harvesting under the Code of Forest Practice be revegetated with indigenous vegetation.	All	Medium	Industry	CCMA, NRE, Municipalities	2003	
9.5.5	Roadside Vegetation to be used during Plantation establishment and harvesting is to be protected.	All	Medium	Municipalities	NRE, CCMA	2003	
9.5.6	Timber from Blue Gum and Sugar Gum Plantations to be utilised as part of a sustainable firewood industry.	All	Medium	NRE	Industry, CCMA	2003	
9.5.7	Plantations utilising indigenous species to be established to cater for projected increase in demand for high quality furniture timbers.	All	Low	Industry	NRE	2005	



## Draft Corangamite Native Vegetation Plan

### 10. Key Supporting Programs - – Actions, Implementation Responsibilities & Timeframes

#### 10.1 CONSERVATION OF BIODIVERSITY VALUES

No.	Proposed Action	Bioregion	Priority	Responsibility	Partners	Time frame	Key Performance Indicators
10.1.1	Undertake immediate action to conserve most threatened EVCs	All, priority EVCs	High	NRE	TFN, GAV, Landcare & community	2002	
10.1.2	Develop & implement roadside management Plans	All	High	Municipalities	CFA, VicRoads, NRE, Community, RCC	2002	
10.1.3	Encourage and support the development of cooperative arrangements for management of remnant native vegetation outside conservation reserves.	All	High	TFN	CCMA, NRE, Municipalities	2004	
10.1.4	Prioritise significance of vegetation based on threats, vulnerability, quality, habitat values	All	High	NRE	CCMA, community	2001	
10.1.5	Provide support and mechanisms for implementation of legislation, regulation and Planning schemes	All	Medium	NRE	Municipalities, TFN, Environs Australia	2003	
10.1.6	Protect & manage remnants in good condition along the Leigh River	Central Victorian UPlands, Victorian Volcanic Plain	Medium	Landcare	CCMA, NRE	2004	

### Draft Corangamite Native Vegetation Plan

No.	Proposed Action	Bioregion	Priority	Responsibility	Partners	Time frame	Key Performance Indicators
10.1.7	Develop Planning mechanisms in Local Government that adequately protect native vegetation during subdivisions and other land-use changes	All	Medium	Municipalities	NRE, CCMA	2002	
10.1.8	Develop programs that protect isolated remnants from further decline	All	Medium	NRE	CCMA, Landcare, community	2003	
10.1.9	Implement a program where private landholders are provided with adequate incentives to manage significant sites for biodiversity conservation	All	Medium	NRE	TFN, CCMA, Municipalities	2003	
10.1.10	Develop programs to strategically link remnants for priority fauna species like the Rufous Bristlebird and Yellow bellied Glider.	Warnambool Plain	Medium	NRE	Landcare, community, CCMA	2004	

## Draft Corangamite Native Vegetation Plan

### 10.2 INFORMATION MANAGEMENT

The collection, management and utilisation of existing and new information are crucial to the long-term future of biodiversity in the region. The efficient use of available information will benefit all managers in their decision-making processes. This will lead to an approach in the Planning and implementation of projects that acknowledges and caters for biodiversity values.

No.	Proposed Action	Bioregion	Priority	Responsibility	Partners	Time frame	Key Performance Indicators
10.2.1	Develop and collate a standardised vegetation database at scale 1:25,000 for Corangamite	All	High	NRE	CCMA, Municipalities	2001	
10.2.2	Develop database of stakeholders to improve knowledge & understanding	All	High	CCMA	NRE, TFN, Municipalities, Landcare & community	2001	
10.2.3	Establish a Corangamite Native Grass Resource Group to facilitate information exchange and new solutions	Victorian Volcanic Plains	High	NRE	CCMA, TFN, Municipalities, Landcare & community	2001	
10.2.4	Provide database to all user groups from a readily accessible, common source	All	Medium	CCMA	NRE, Municipalities, TFN Landcare & community	Ongoing	
10.2.5	Collate existing revegetation Plans on CD for the region. Make available in regional libraries	All	Medium	CCMA	NRE, TFN, Municipalities, Landcare & community	2001	
10.2.6	Establish a framework and coordinating group for the sharing of knowledge – both at a local and regional level	All	Medium	CCMA	CCMA, NRE, TFN, Municipalities, Landcare, GAV & community	2002	

## Draft Corangamite Native Vegetation Plan

### 10.3 TARGETED & STRATEGIC VEGETATION

No.	Proposed Action	Bioregion	Priority	Responsibility	Partners	Time frame	Key Performance Indicators
10.3.1	Utilise native vegetation to address weed infestation, salinity recharge and soil erosion in the upper parts of the Woody Yallock, Moorabool and Leigh Rivers	Central Victorian UPLands	High	NRE	CCMA, GAV, Landcare	2003	
10.3.2	Utilise native vegetation to address salinity and nutrient issues in the Thompsons Creek and Swan Bay catchments	Otway Plain	High	Landcare	CCMA, NRE, GAV, Municipalities	2003	
10.3.3	Revegetate cleared land around Apollo Bay to address land slippage, ragwort control and greenhouse climate change	Otway Ranges	High	Landcare	CCMA, NRE, GAV, Municipalities	2003	
10.3.4	Utilise native vegetation such as Woolly Tea Tree in vegetation buffers for nutrient management along waterways	Warnambool Plain	High	CCMA	CCMA, NRE, GAV, Municipalities, Landcare	2003	
10.3.5	Implement nutrient buffers on waterways which utilise native vegetation	All	High	Landcare	CCMA, NRE, GAV	2003	
10.3.6	Funding bodies to adopt a realistic project timeline for Planning, implementation and maintenance	All	Medium	CCMA	NRE, TFN,GAV	2003	

### Draft Corangamite Native Vegetation Plan

No.	Proposed Action	Bioregion	Priority	Responsibility	Partners	Time frame	Key Performance Indicators
10.3.7	Create strategic linkages and buffers along roadside vegetation and other isolated remnants	All	Medium	Landcare	CCMA, NRE, GAV, Municipalities	2005	
10.3.8	Create strategic linkages on private land for priority fauna moving between large areas of public land.	All	Medium	NRE	CCMA, GAV, Municipalities	2004	
10.3.9	Target revegetation of land for greenhouse climate change programs	All	Medium	CCMA	NRE, GAV, Municipalities	2004	
10.3.10	Ensure revegetation corridors are of an adequate minimum width to address particular issues (20m from streams, 30m for wildlife corridors).	All	Medium	CCMA	NRE, GAV, Municipalities	2001	
10.3.11	Develop BMPs that encourage the most cost effective ecologically sustainable revegetation methods such as direct seeding.	All	Medium	NRE	CCMA, GAV, Municipalities	2004	

### Draft Corangamite Native Vegetation Plan

No.	Proposed Action	Bioregion	Priority	Responsibility	Partners	Time frame	Key Performance Indicators
10.3.12	Establish biodiversity Plantings across the landscape that are a minimum of 4ha and 100m in width.	All	Medium	Landcare	CCMA, NRE, GAV, Municipalities	2004	
10.3.13	Ensure revegetation programs include species that provide structure (ground layer, understorey, overstorey) to an area.	All	Medium	CCMA	Landcare, NRE, GAV	2002	
10.3.14	Utilise large-scale revegetation to address serious catchment issues such as serrated tussock, gorse, nutrient management and salinity.	All	Medium	NRE	CCMA, GAV, Landcare	Ongoing	
10.3.15	Develop an incentives/ reward system to landowners who maintain and enhance revegetation projects on their land	All	Low	NRE	CCMA, VFF	Ongoing	

## Draft Corangamite Native Vegetation Plan

### 10.4 INTEGRATED PLANNING AND IMPLEMENTATION

No.	Proposed Action	Bioregion	Priority	Responsibility	Partners	Time frame	Key Performance Indicators
10.4.1	Develop a register of existing resource information	All	High	CCMA	Municipalities, NRE, Landcare, Community	Ongoing	
10.4.2	Develop and adopt a partnership approach towards vegetation management between agencies, community groups, industry, and research institutions	All	High	CCMA	NRE, all agencies and community groups	Ongoing	
10.4.3	Build a system of incentives for landowners and resources for conservation and protection	All	High	CCMA	NRE, Municipalities	Ongoing	
10.4.4	Develop agreed priorities for native vegetation management across all stakeholders	All	High	CCMA	NRE, Municipalities	2001	
10.4.5	Ensure integration and coordination at the local project level	All	High	NRE	CCMA, Landcare, Community	Ongoing	
10.4.6	Coordinate Planning scheme mechanisms to achieve consistent approach to the regulation and management of vegetation through local Planning schemes	All	High	CCMA	NRE, Municipalities	2003	
10.4.7	Integrate native vegetation management solutions into property management Plans.	All	High	NRE	CCMA, Municipalities	Ongoing	

### Draft Corangamite Native Vegetation Plan

No.	Proposed Action	Bioregion	Priority	Responsibility	Partners	Time frame	Key Performance Indicators
10.4.8	Develop a register of project outcomes	All	Medium	CCMA	NRE, Community, TFN, GAV	2003	
10.4.9	Provide clear leadership through the coordination and communication of stakeholder activities	All	Medium	CCMA	NRE, GAV, Municipalities, TFN, Industry	Ongoing	
10.4.10	Develop administration arrangements that protect native vegetation on public land through licence agreements	All	Medium	NRE	Municipalities, CCMA	2003	
10.4.11	Develop action Plans involving stakeholders in implementation	All	Medium	Landcare,	CCMA, NRE	2004	
10.4.12	Utilise the model of the Ballarat LINC project and Ballarat to Barwon Project	Central Victorian UPlands	Medium	CCMA	NRE, GAV, Municipalities	2004	
10.4.13	Integrate native grassland vegetation and wetlands into sustainable profitable farming systems	Victorian Volcanic Plain	Medium	NRE	CCMA, Landcare	2003	
10.4.14	Integrate native vegetation remnants and revegetation into sustainable dairy farming practices	Warnambool Plains	Medium	NRE	CCMA, GAV, Municipalities	2003	
10.4.15	Using existing local research on habitat requirements and corridors to develop well Planned projects.	All	Medium	NRE	CCMA, Landcare	2004	



## Draft Corangamite Native Vegetation Plan

### 10.5 MANAGING THREATENING PROCESSES

No.	Proposed Action	Bioregion	Priority	Responsibility	Partners	Time frame	Key Performance Indicators
10.5.1	Develop & implement long term strategic environmental weed management Plans	All	High	NRE	Municipalities, CCMA, GAV, Landcare, Community, Parks Vic	2002	
10.5.2	Increase resources to priority vegetation communities to combat threatening processes	All, priority EVCs	High	CCMA	NRE, Municipalities	2002	
10.5.3	Review local Planning schemes to identify regulatory mechanisms to address threatening processes through local Planning schemes.	All	High	Municipalities	CCMA, NRE	2003	
10.5.4	Develop & implement best management practices to ensure public land is managed for long term vegetation protection	All	Medium	Parks Vic	Municipalities, NRE, Vicroads	2004	
10.5.5	Develop best practice native vegetation management programs for the control of serrated tussock on escarpments in the Moorabool Valley.	Central Victorian UPlands	Medium	NRE	Municipalities, CCMA, Landcare, Community	2003	
10.5.6	Implement Myrtle Wilt control program to protect rainforest communities	Otway Ranges	Medium	NRE	Parks Vic, community	2003	
10.5.7	Revegetate areas infested with serrated tussock with indigenous grassland species	Victorian Volcanic Plain	Medium	NRE	Landcare, CCMA	2004	

## Draft Corangamite Native Vegetation Plan

### 10.6 RESEARCH AND MONITORING

No.	Proposed Strategy	Bioregion	Priority	Responsibility	Partners	Time frame	Key Performance Indicators
10.6.1	Consult & communicate with land managers to achieve best practice in understanding & knowledge	All	High	NRE	CCMA, VFF, Farmsmart, Municipalities	2001	
10.6.2	Commission survey works to fill in identified knowledge gaps	All, Priority EVCs	High	CCMA	NRE, Universities	2003	
10.6.3	Develop trial systems that demonstrate the benefits of native grasslands and wetlands to sustainable farming systems	Victorian Volcanic Plain	High	NRE	CCMA, Landcare	2002	
10.6.4	Identify a specific organisation to coordinate research and monitoring of programs	All	Medium	CCMA	NRE, GAV, TFN, Parks Vic	2001	
10.6.5	Continue to study ecosystems to further understand processes at the community level.	All, Priority EVCs	Medium	NRE	Industry, Universities	Ongoing	
10.6.6	Collate information on what has been achieved on a regular basis	All	Medium	CCMA	NRE, Landcare	Ongoing	
10.6.7	Utilise Ballarat University expertise in biodiversity and vegetation management	All	Medium	CCMA	NRE, Landcare	Ongoing	

## Draft Corangamite Native Vegetation Plan

### 10.7 COST SHARING AND COMMITMENT

No.	Proposed Action	Bioregion	Priority	Responsibility	Partners	Time frame	Key Performance Indicators
10.7.1	Develop programs supported by Government that protect high priority vegetation on private land	All	High	CCMA	State & Federal Government, NRE	2002	
10.7.2	Explore the provision of financial incentives to enable retention of remnant native vegetation	All	High	CCMA	Federal, State, & Local Government	Ongoing	
10.7.3	Implement a program where private landholders are provided with adequate incentives to manage significant sites for biodiversity conservation	Victorian Volcanic Plains and priority EVCs in other Bioregions	High	CCMA	Federal, State, & Local Government	2003	
10.7.4	Develop Government policies that reflect the long term nature of vegetation management	All	Medium	State & Federal Government	CCMA	2004	
10.7.5	Source non government finances for implementation	All	Medium	CCMA	NRE, Industry, Landcare	2004	
10.7.6	Tax Incentives to be explored to protect native vegetation	All	Medium	Federal Government		2002	

## Draft Corangamite Native Vegetation Plan

### 10.8 EDUCATION, COMMUNICATION AND CONSULTATION

No.	Proposed Action	Bioregion	Priority	Responsibility	Partners	Time frame	Key Performance Indicators
10.8.1	Develop, as part of Native Vegetation Plan, a community education program	All	High	CCMA	NRE, TFN, GAV	2001	
10.8.2	Document success stories and recognise best management practice in native vegetation management	All	High	CCMA	NRE, Landcare, GAV	Ongoing	
10.8.3	Provide a list of funding sources for vegetation management	All	High	CCMA	NRE	2001	
10.8.4	Provide information and training/education to land managers e.g.. Whole farm Planning	All	High	NRE	CCMA, Municipalities, GAV	Ongoing	
10.8.5	Integrate native vegetation and biodiversity management principles into extension services being provided by government staff and industry representatives	All	High	NRE	CCMA, Industry, GAV, TFN	2001	
10.8.6	Coordinated training programs for all land managers responsible for road and rail line vegetation management	Victorian Volcanic Plains	High	CCMA	NRE, GAV	2001	

### Draft Corangamite Native Vegetation Plan

No.	Proposed Action	Bioregion	Priority	Responsibility	Partners	Time frame	Key Performance Indicators
10.8.7	Document and publicise regional achievements in sustainable vegetation management	All	High	CCMA	NRE, Landcare, Municipalities	Ongoing	
10.8.8	Develop an understanding of vegetation management issues across the political system	All	Medium	CCMA	NRE	2003	
10.8.9	Establish an "Ambassador/Patron for the region to provide profile, political linkages and on-going support	All	Medium	CCMA	GAV, TFN, Municipalities, NRE	2001	
10.8.10	Promote school curriculum to include native vegetation and biodiversity	All	Medium	CCMA	Education Dept., NRE, GAV	Ongoing	
10.8.11	Utilise the skills and experience of community groups from the Aireys Inlet, Anglesea and Torquay area on regional projects.	Otway Plain	Medium	CCMA	NRE, community	2003	
10.8.12	Utilise the interest and skills in native vegetation of communities living in the Otway Ranges.	Otway Ranges	Medium	CCMA	NRE, community	Ongoing	
10.8.13	Link agricultural production to the 'Clean Green' image through improved vegetation and biodiversity management	All	Low	NRE	CCMA	2005	

## Draft Corangamite Native Vegetation Plan

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## **Draft Corangamite Native Vegetation Plan**

### **Part D – Resource and Management Information – Appendices**

#### **Appendix 1: Current Policies and Programs in relation to Regional Native Vegetation Planning**

##### **International Conventions**

###### **The Convention on Biological Diversity (1993)**

The Convention on Biological Diversity (1993) is an international partnership developed for the Earth Summit in Rio (1992) in recognition of the environmental, social, cultural and economic value of biodiversity and its significant ongoing reduction around the world. Signatories are required to implement the Convention's objectives through national strategies, Plans and programs, which include the integration of conservation and sustainable management of biodiversity in sectors such as agriculture.

###### **The United Nations Framework Convention on Climate Change (1994)**

The ultimate objective of the Convention is to achieve stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

The key commitment of promoting sustainable development and promoting and cooperating in the conservation and enhancement of sinks and reservoirs of all greenhouse gases including biomass, forests and oceans relates directly to the development of the Native Vegetation Plan.

##### **National Agreements and Strategies**

###### **The Inter-Governmental Agreement on the Environment (1992)**

An agreement signed by the Commonwealth, State and Territory Governments in May 1992 to facilitate:

- A co-operative national approach to the environment
- A better definition of the roles of the respective governments
- A reduction in the number of disputes on environmental issues between the Commonwealth and the States and Territories.
- Greater certainty of Government and business decision making on the environment, and
- Better protection of the environment.

###### **The National Strategy for Ecologically Sustainable Development (1992)**

The goal of the Strategy is to ensure that future development is beneficial to the total quality of life, both now and in the future, maintaining the ecological processes on which life depends. The core objectives in achieving this goal are:

- To enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations.
- To provide for equity within and between generations.
- To protect biological diversity and maintain essential ecological processes and life-support systems.

## **Draft Corangamite Native Vegetation Plan**

### **The National Forest Policy Statement – A New Focus for Australia’s Forests**

Following the United Nations Conference on the Environment and Development in Rio de Janeiro in 1992 the Commonwealth, State and Territory Governments developed the National Forest Policy Statement. The Statement identified eleven broad national goals. Two of these goals are:

1. The Conservation goal - to maintain an extensive and permanent native forest estate in Australia and to manage that estate in an ecologically sustainable manner so as to conserve the full suite of values that forests can provide for current and future generations.
2. The Private native forests goal - to ensure that private native forests are maintained and managed in an ecologically sustainable manner, as part of the estate, as a resource in their own right, and to complement the commercial and conservation values of public forest.

One of the goals relating to Plantations is to increase Plantings to rehabilitate cleared agricultural land, to improve water quality, and to meet other environmental, economic or aesthetic objectives.

### **The National Strategy for the Conservation of Australia’s Biological Diversity (1996)**

Australia’s principle means for coordinated implementation of The Convention on Biological Diversity is The National Strategy for the Conservation of Australia’s Biological Diversity (see 2.1). The Strategy aims to bridge the gap between current activities and those measures necessary to ensure the effective identification, conservation and ecologically sustainable use of Australia’s biodiversity.

### **Plantations for Australia – The 2020 Vision (1997)**

This document provides a framework for action for the National Forest Policy Statement (1992) and the Wood and Paper Industry Strategy (1995). It identifies the target of trebling the effective area of Australia’s Plantations between 1996 and 2020.

### **State Agreements, Strategies and Legislation.**

#### **‘Managing Victoria’s Catchments - Partnerships in Action’ (1997)**

The ‘Partnerships in Action’ (1997) statement sets out a strategic framework for the partnership between the Victorian Government and the community for the effective delivery of catchment management and sustainable agriculture programs for the next five years.

A primary focus of this partnership is the implementation of the ten Regional Catchment Strategies, which have been prepared by the Catchment and Land Protection Boards (nine of which are now Catchment Management Authorities). Victoria’s vision for natural resource management ‘Sharing Victoria’s resources: Prosperity with Care’ seeks to ensure that:

- The quality of land and water resources are enhanced.
- Long term productivity of our natural resource based industries is enhanced,
- Regional catchment communities are resilient and prosperous.

## Draft Corangamite Native Vegetation Plan

### Victoria's Biodiversity Strategy (1997)

Goals for biodiversity management have been stated in Part A, 1.3 Background.

The strategy aims to:

- Increase awareness of the need to conserve biodiversity.
- Enable continued development of partnerships between community, industry and government in the custodianship of our biodiversity.
- Indicate the mechanisms, existing and proposed, for achieving the objectives of flora and fauna conservation and management in the context of ecological sustainability.
- Provide perspectives on advances in flora and fauna conservations and directions for future management of exiting habitats and the continuation of natural ecological processes.
- Highlight the need for protection and replenishment of the total area of native vegetation, with particular emphasis on threatened or depleted types such as Box-Ironbark forests, grasslands and riparian communities
- Highlight the major threatening processes to the conservation of biodiversity in each bioregion
- Highlight the habitats and environments that require urgent attention.

### 'Victoria's Greenhouse Action: Responding to a global warning' (1998)

This action strategy commits the Victorian Government to investing \$15 million/year over the next three years in initiatives which "reduce greenhouse gas emissions, enhance greenhouse sinks and manage the risks of climate change".

The Government is investing \$9 million over the next three years into 'Growing Victoria's Greenhouse Sinks' in order to better understand and extend Victoria's greenhouse sink capacity. Approximately half of this funding will be committed to funding revegetation programs across the State.

### Private Forestry in Victoria: Strategy towards 2020

The vision articulated in this strategy is that by 2020, Victoria will have developed a major market-driven commercially and environmentally sustainable private forestry sector with strategically placed concentrations of Plantations comprising suitable species. The target is to treble the effective area of private forestry in Victoria between 1998 and 2020.

### Flora and Fauna Guarantee Act (1988)

The *Flora and Fauna Guarantee Act* (1988) (FFG) provides a legal and administrative structure to promote flora and fauna conservation. The objectives of the Act are:

1. 'to provide a program of community education in the conservation of flora and fauna.
2. To encourage co-operative management of flora and fauna through amongst other things, the entering into of land management co-operative agreements under the *Conservation Forests and Lands Act* (1987).
3. Of assisting and giving incentives to people, including landholders, to enable flora and fauna to be conserved.

### Catchment and Land Protection Act (1994)

The *Catchment and Land Protection Act* (1994) has the objective of establishing a framework for the integrated and coordinated management of catchments which will:

## Draft Corangamite Native Vegetation Plan

- Maintain and enhance long-term land productivity while also conserving the environment, and
- Aim to ensure that the quality of the State's land and water resources and their associated Plant and animal life are maintained and enhanced.

The Act established ten Catchment and Land Protection Boards, nine of which have since expanded their roles to become Catchment Management Authorities. The Catchment and Land Protection Act (1994) provides for the development of Regional Catchment Strategies. which, among other things, must assess the nature, causes, extent and severity of land degradation of the catchments in the region and identify areas for priority attention. Local Planning schemes must have regard for the Regional Catchment Strategies.

### **Victorian Conservation Trust Act (1972)**

The Trust for Nature, a statutory authority, was established under the *Victorian Conservation Trust Act (1972)* and has the power to hold, buy and sell real property and the power to enter a binding covenant with a landholder. The Trust uses this power to operate a revolving fund in which areas of high conservation significance are purchased then resold following the placement on the title of a covenant to protect the conservation values.

### **Victoria Planning Provisions**

The Victoria Planning Provisions (VPP) provide a standard format for all Victorian Planning Schemes. Within the VPP the State Planning Policy Framework (SPPF) sets out principles for land use and development, Planning and policies for settlement, environment, management of resources, infrastructure, economic well-being, social needs and regional co-operation. Specific policies encompass objectives, generic implementation techniques applied? across Victoria. The objective of the Conservation of native flora and fauna policy is:

- 'To assist the protection and conservation of biodiversity, including native vegetation retention and provision of habitats for native Plants and animals and control of pest Plants and animals.'

The general implementation of the VPP instructs the responsible authority to have regard for a range of National, State and regional strategies particularly Native Vegetation Plans and roadside management strategies.

The objective of the policy on protection of catchments, waterways and groundwater is

- 'To assist the protection and, where possible, restoration of catchments, waterways, water bodies groundwater, and the marine environment.'

Again Planning authorities must have regard to relevant aspects of the Native Vegetation Plans. Planning and responsible authorities must take account of and give effect to both the general principles and the specific policies applicable to issues before them. The SPPF seeks to ensure that the objectives of Planning as described in s4 of the *Planning and Environment Act (1987)* in Victoria are fostered. One of these objectives is

- 'to provide for the protection of natural and man-made resources and the maintenance of ecological processes and genetic diversity'

## Draft Corangamite Native Vegetation Plan

The Local Planning Policy Framework contains the Municipal Strategic Statement (MSS) and Local Policies. The MSS contains the strategic Planning, land use and development objectives of the Council and spells out:

- Strategies for achieving objectives,
- Opportunities and constraints which provide a context for local Planning decisions
- Demonstrated links between the municipality's strategic Planning, the regional context and the SPPF, and
- An explanation of the relationship between the objectives, strategies and controls on land use and developments.

Local Policies provide detailed directions regarding land use but not development. They either relate to specific areas or local issues and should have their origins in the MSS.

The VPP has also introduced a standard set of Zones that control the use of land and Overlays that control development of land.

### Native Vegetation Retention Controls

The Native Vegetation Retention controls (NVR) were established under the provisions of the *Planning and Environment Act 1987* and introduced into the State Section of all Victorian Planning schemes in 1989. NVR requires a Planning permit to remove, destroy or lop native vegetation (subject to a range of exemptions designed to facilitate normal domestic and rural practices).

In the VPP the NVR controls are located in the Particular Provisions under Clause 52.17 and have the stated purpose:

- 'to protect and conserve native vegetation to reduce the impact of land and water degradation and provide habitat for Plants and animals.'

The decision guidelines for permits required under Clause 52.17 require the responsible authority to consider, among a range of other things, the approved Native Vegetation Plan.

### Regional Strategies and Plans

The Corangamite Catchment Management Authority covers the Barwon, Moorabool, Corangamite and Otway Coast catchments.

The CCMA has significant responsibilities towards maintenance and viability of biodiversity and the integration of native vegetation and sustainable land use. This will be achieved through encouraging the community to lead and participate in Planning and implementation of on-ground works and to adopt natural resource management practices consistent with sustainable use.

The CCMA has significant responsibilities for the conservation and management of biodiversity and integration of native vegetation conservation as part of promoting sustainable land use practices. This will be achieved through encouraging the community to lead and participate in the Planning and implementation of on-ground conservation works and to incorporate natural resource management practices as part of sustainable land use management.

A number of conservation strategies and sustainable land management programs have been Planned and implemented in the Catchment since the 1980s.

## Draft Corangamite Native Vegetation Plan

### Corangamite Catchment Management Strategy

The CCMA was established in 1997 to integrate and deliver land and water management programs in the Corangamite Region. It has statutory functions including waterway management, floodplain management and regional drainage. In partnership with the State Government and the community, it is responsible for implementing, monitoring and reporting on the Catchment Strategy.

The CCMA's Catchment Strategy was developed as a requirement of the Catchment and Land Protection Act 1994. Its objectives include the following:

- | <b><u>Program</u></b>                        | <b><u>Objective</u></b>   |
|--|---|
| • <i>Sustainable production program –</i>    | to support and enhance economic and social development in the region through the protection and continuous improvement in the long term productive capacity of natural resources. |
| • <i>Water resources program –</i>           | to ensure the quality and quantity of surface water, waterways, groundwater and wetlands meets the requirements of ecological, domestic and industrial systems.                   |
| • <i>Biodiversity conservation program –</i> | to protect and enhance indigenous ecosystems and species.   |
| • <i>Community education program –</i>       | to develop and implement a co-ordinated education program of natural resource management through the Corangamite region.  |
| • <i>Catchment amenity program –</i>         | to ensure a clean, healthy and unique environment that supports individual lifestyle aspirations and community well – being.  |
| • <i>Monitoring and evaluation program –</i> | incorporate monitoring and evaluation in all research and remedial projects and establish a methodology for assessing regional catchment health indicators and issues.            |

The Catchment Management Strategy lists declining biodiversity as one of six major issues to be focused on to maintain the ongoing health and viability of the catchment. The objective for the *Biodiversity conservation program* is

- “to protect and enhance indigenous ecosystems and species”, which provides clear direction at the catchment level for future Planning and implementation programs.

Key actions and areas to consider under the *Biodiversity Conservation Program* are;

1. The preparation of a Native Vegetation Plan,
2. Vegetation Retention and Protection,
3. Wetlands and Flow Management,
4. Native Grassland Communities,
5. Environmental Weeds,
6. Statutory Planning,
7. Reinstating Habitat,
8. Pest Animal Control,
9. Species management and
10. Fire as a Management Tool.

## Draft Corangamite Native Vegetation Plan

### Appendix 2: Descriptions of Ecological Vegetation Classes (EVCs) occurring in the Corangamite CMA Region

#### Notes:

- The EVC descriptions below are sourced from the West Victoria RFA Report – Biodiversity Assessment Feb 2000. For further information please consult this report which is available at [www.rfa.gov.au](http://www.rfa.gov.au)
- A vegetation **mosaic** consists of discrete floristic entities (EVCs) which were unable to be distinguished in the mapping due to the scale used (i.e. 1:100 000).
- A vegetation **complex** occurs where floristic entities are unable to be distinguished in an area but are known to exist discretely elsewhere.
- Mosaics and complexes where all components are individually described in this appendix have not been described separately.
- \* denotes alien species

Categories of rare or threatened plants in Victoria:

E	Species presumed endangered in Australia
e	Species presumed endangered in Victoria
V	Species presumed vulnerable in Australia
v	Species presumed vulnerable in Victoria
R	Species presumed rare in Australia
R	Species presumed rare in Victoria
K	Species presumed poorly known in Australia
K	Species presumed poorly known in Victoria
d	Species that are not rare in Victoria in the wild state, yet are considered threatened as their regeneration is problematic or less than necessary to replace losses and the populations are continuing to decrease.

#### INDEX

EVC 1	Coastal Dune Scrub Mosaic	EVC 164	Creekline Herb-rich Woodland
EVC 3	Damp Sands Herb-rich Woodland	EVC 165	Damp Heath Scrub
	<i>Victorian Volcanic Plain</i> Damp Sands Herb-rich Woodland	EVC 175	Grassy Woodland
	<i>Warrambool Plain</i> Damp Sands Herb-rich Woodland		<i>Floristic Community 175-04 Low Rises Grassy Woodland</i>
EVC 6	Sand Heathland		<i>Floristic Community 175-10 Lunette Grassy Woodland</i>
EVC 8	Wet Heathland		<i>Floristic Community 175-11 Granitic Grassy Woodland</i>
EVC 10	Estuarine Wetland	EVC 178	Herb-rich Foothill Forest/Shrubby Foothill Forest Complex
	<i>Lower Estuary</i> Estuarine Wetland	EVC 181	Coast Gully Thicket
	<i>Upper Estuary</i> Estuarine Wetland	EVC 196	Seasonally Inundated Sub-saline Herbland
EVC 16	Lowland Forest	EVC 198	Sedgy Riparian Woodland
	<i>Floristic Community 16-10 Midlands 1 Lowland Forest</i>	EVC 200	Shallow Freshwater Marsh
EVC 17	Riparian Scrub Complex	EVC 201	Shrubby Wet Forest
EVC 18	Riparian Forest	EVC 203	Stony Rises Woodland
EVC 20	Heathy Dry Forest	EVC 233	Wet Sands Thicket
EVC 21	Shrubby Dry Forest	EVC 282	Shrubby Woodland
	<i>Floristic Community 21-05 Midlands Escarpments Shrubby Dry Forest</i>		<i>Floristic Community 282-03 Brisbane Ranges Shrubby Woodland</i>
	<i>Floristic Community 21-06 Midlands Depauperate Shrubby Dry Forest</i>	EVC 292	Red Gum Wetland
EVC 22	Grassy Dry Forest	EVC 300	Reed Swamp
EVC 23	Herb-rich Foothill Forest	EVC 641	Riparian Woodland
EVC 30	Wet Forest		<i>Victorian Volcanic Plain</i> Riparian Woodland
EVC 31	Cool Temperate Rainforest	EVC 647	Plains Sedgy Wetland
EVC 37	Montane Grassy Woodland		<i>Victorian Volcanic Plain</i> Plains Sedgy Wetland
EVC 45	Shrubby Foothill Forest	EVC 653	Aquatic Herbland
EVC 47	Valley Grassy Forest	EVC 681	Deep Freshwater Marsh
EVC 48	Heathy Woodland	EVC 684	Permanent Saline
	<i>Floristic Community 48-12 Steiglitz Heathy Woodland</i>	EVC 710	Damp Heathland
	<i>Floristic Community 48-13 Midlands Heathy Woodland</i>		<i>Group 1</i> Damp Heathland
EVC 52	Coastal Saltmarsh Complex		<i>Group 1</i> Damp Heathland
EVC 53	Swamp Scrub	EVC 793	Damp Heathy Woodland
EVC 55	Plains Grassy Woodland		<i>Warrambool Plain</i> Damp Heathy Woodland
	<i>Floristic Community 55-06 Riverina Plains Grassy Woodland</i>	EVC 851	Stream-bank Shrubland
EVC 56	Floodplain Riparian Woodland	EVC 858	Calcarene Dune Woodland
EVC 67	Alluvial Terraces Herb-rich Woodland	EVC 863	Floodplain Reedbed
EVC 68	Creekline Grassy Woodland	EVC 891	Plains Brackish Sedge Wetland
EVC 71	Hills Herb-rich Woodland	EVC 894	Scoria Cone Woodland
	<i>Floristic Community 71-01 Granitic Hills Herb-rich Woodland</i>	EVC 895	Escarpment Shrubland
EVC 72	Granitic Hills Woodland	EVC 898	Cane Grass – Lignum Halophytic Herbland
EVC 74	Wetland Formation	EVC 899	Plains Freshwater Sedge Wetland
EVC 83	Swampy Riparian Woodland		
EVC 104	Lignum Wetland		
EVC 128	Grassy Forest		
EVC 125	Plains Grassy Wetland		
EVC 132	Plains Grassland		
	<i>Victorian Volcanic Plain 1</i> Plains Grassland		
	<i>Victorian Volcanic Plain 2</i> Plains Grassland		
	<i>Victorian Volcanic Plain 3</i> Plains Grassland		
	<i>Wimmera</i> Plains Grassland		
EVC 140	Mangrove Shrubland		
EVC 160	Coastal Dune Scrub		
EVC 161	Coastal Headland Scrub		
EVC 163	Coastal Tussock Grassland		
	<i>Headland</i> Coastal Tussock Grassland		
	<i>Estuarine Flats</i> Coastal Tussock Grassland		

# Draft Corangamite Native Vegetation Plan

## EVC 1 Coastal Dune Scrub Mosaic

This EVC was often mapped in mosaic with Coastal Tussock Grassland. Due to limitations of scale (i.e. 100 000) it was often not possible to separate these two EVCs in the floristic vegetation mapping exercise so they were mapped as a mosaic. They also have floristic affinities with each other.

Coastal Dune Scrub/Coastal Tussock Grassland Mosaic occurs on exposed foredunes or on more protected secondary dunes extending from west of Port Campbell to the Bellarine Peninsula. Wind-blown calcareous sands form the dune system behind the rocky headland. The average altitude is 10-30m asl and average annual rainfall is 900mm.

There are two forms of this mosaic. The first is predominantly treeless, with the occasional Swamp Gum *Eucalyptus ovata* or Messmate *E. obliqua*. The shrub layer may be dense or patchy and is characterised by Coast Beard-heath *Leucopogon parviflorus* with Coast Daisy-bush *Olearia axillaris*, Seaberry Saltbush *Rhagodia candolleana* ssp. *candolleana*, the rare *Exocarpus syrticola*, the rare Velvet Correa *Correa backhousiana* and the scrambling Bower Spinach *Tetragonia implexa*.

The dominant lifeforms are tussock forming graminoids and forbs. Blue Tussock-grass *Poa poiformis* and Knobby Club-sedge *Isolepis nodosa* dominate this layer, with Coast Sword-sedge *Lepidosperma gladiatum* and Black-anther Flax-lily *Dianella brevicaulis/revoluta* s.l. often interspersed. On the fore dune the tussock-dominated grassland is often dominated by the introduced Marram Grass *Ammophila arenaria* which replaces the native sand-binding grass Hairy Spinifex *Spinifex sericeus*. Forbs are common and include Yellow Wood-sorrel *Oxalis corniculata* ssp. agg., Branched Centaury *Centaureum tenuiflorum*, Pimpernel *Anagallis arvensis*, Bidgee-widgee *Acaena novae-zelandiae*, Coast Groundsel *Senecio spathulatus*, Ivy-leaf Violet *Viola hederacea* and Cat's Ear *Hypochoeris radicata*. Both floristic alliances are easily disturbed due to the proximity to beaches and subsequently a large proportion of species present are weeds.

The second form of this mosaic grows on exposed fore dunes of the Bellarine Peninsula at Breamlea Spit. It is less diverse than the previous form.

Coast Tea-tree *Leptospermum laevigatum* is the dominant shrub with Coast Beard-heath *Leucopogon parviflorus*, Coast Wattle *Acacia sophorae*, Cushion Bush *Leucophyta brownii*, Seaberry Saltbush *Rhagodia candolleana* ssp. *candolleana* comprising the remaining shrub layer. The dominance of Coast Tea-tree *Leptospermum laevigatum* is one of the main differences between the two forms. Forbs and grasses comprise a large percentage of the ground layer and include Coast Sow-thistle *Actites megalocarpa*, Beach Rocket *Cakile maritima* ssp. *maritima*, Hairy Spinifex *Spinifex sericeus*, Marram Grass *Ammophila arenaria*, Sea Celery *Apium prostratum* ssp. *prostratum*, Bidgee-widgee *Acaena novae-zelandiae*, Pimpernel *Anagallis arvensis*, Angled Pigface *Carpobrotus aequilaterus* and Knobby Club-sedge *Isolepis nodosa*. This form also carries a diverse array of weeds.

## EVC 3 Damp Sands Herb-rich Woodland

Within the Midlands and Otways region Damp Sands Herb-rich Woodland occurs on deep sandy loams, usually associated with adjacent creeks or seasonal lakes and swamps. In the Midlands region it is only mapped in the Langi Ghiran State Park and in small patches around the Upper Stony Creek Reservoirs (near the Brisbane Ranges) at altitudes ranging from 350-600m above sea level (asl). In the Otways region it occurs on public land only near the coast with an average altitude of 70m asl. It does occur further inland in this area however, but mostly on private land. It grows in areas of average to high annual rainfall ranging from 650-700mm in the Midlands to 1000mm in the Otway Ranges. Effective rainfall is increased by the shallow water-tables associated with the creeks which provide adequate moisture to support a rich ground layer of forbs and grasses, including many weed species.

Due to a long history of and continuing land clearance and disturbance Damp Sands Herb-rich Woodland carries a high proportion of weed species. In addition, density of the overstorey has been significantly reduced in many areas. The high proportion of weed species is exacerbated by continued disturbance, proximity to farmland and good site quality.

The overstorey is dominated by Manna Gum *Eucalyptus viminalis*. In the drier Midlands region this grows in association with Scentbark *E. aromaphloia* or Candelbark *E. rubida* and with scattered Black Wattle *Acacia mearnsii* and Blackwood *A. melanoxylon*. In the higher rainfall areas of the Otways region it grows in association with Messmate *E. obliqua* and Swamp Gum *E. ovata*.

A few scattered shrubs may be present including Coast Beard-heath *Leucopogon parviflorus*, Prickly Moses *Acacia verticillata*, Sweet Bursaria

*Bursaria spinosa*, Prickly Tea-tree *Leptospermum continentale*, Tree Everlasting *Ozothamnus ferrugineus*, Small-leaf Bramble *Rubus parvifolius*, Matted Rice-flower *Pimelia biflora* and Coast Pomaderris *Pomaderris oraria* ssp. *oraria* and Large-leaf Bush-pea *Pultenaea daphnoides*.

The ground is dominated by a dense layer of Austral Bracken *Pteridium esculentum* over a diverse layer of forbs, grasses and other graminoids. Common forbs include Bidgee-widgee *Acaena novae-zelandiae*, Cat's Ears *Hypochoeris radicata*, Austral Cranesbill *Geranium solanderi*, Common Raspwort *Gonocarpus tetragynus*, Common Centaury *Centaureum erythraea*, Kidney-weed *Dichondra repens*, Yellow Wood-sorrel *Oxalis corniculata* ssp. agg., Pimpernel *Anagallis arvensis*, Grassland Wood-sorrel *Oxalis perennans*, Prickly Starwort *Stellaria pungens* and Grass Trigger-Plant *Stylidium graminifolium*, Common Lagenifera *Lagenifera stipitata*, Hairy Pennywort *Hydrocotyle hirta*, Ivy-leaf Violet *Viola hederacea*, Hairy Speedwell *Veronica calycina*, and Greenhoods *Pterostylis* spp.. Common graminoids include Weeping Grass *Microlaena stipoides*, Common Tussock-grass *Poa labillardieri*, Hare's Tail *Lagurus ovatus*, Spiny headed Mat-rush *Lomandra longifolia* and Black-anther Flax-lily s.l. *Dianella brevicaulis/revoluta*

Grassy or bracken-dominated eucalypt woodland or forest with large range of herbs including several annuals. Occurs on moderately fertile, relatively well-drained, sandy or loamy topsoils over heavier subsoils (duplex soils). Often associated with limestone or shallow aeolian deposits, not on volcanic substrates except rarely where overlain by shallow sand deposits. Soils are generally moist in winter and dry in summer, which promotes geophytic and annual species. Previously widespread and locally extensive within the study area but now largely cleared. Recorded from all bioregions in study area.

## Victorian Volcanic Plain Damp Sands Herb-rich Woodland

**Floristics:** Dominated by *Eucalyptus viminalis* ± *E. baxteri* ± *E. ovata*. *Pteridium esculentum* is typically conspicuous, often with *Gahnia radula* and *Xanthorrhoea minor* in understoreys which are rich in herbs and grasses when intact.

**Structure:** Woodland 12–25 m tall.

**Habitat:** Relatively well-drained sites on shallow typically reddish sands of at least moderate fertility overlying Quaternary basalt.

**Nearest relatives:** Plains Grassy Woodland, Herb-rich Foothill Forest, Lowland Forest.

## Warrnambool Plain Damp Sands Herb-rich Woodland

**Floristics:** Dominated by *Eucalyptus viminalis* ± *E. ovata* ± *Allocasuarina verticillata*, rich in geophytes and grasses when intact.

**Structure:** Woodland or open-forest (5–)10–20 m tall, stunted where exposed to salt-laden wind 500 m from coast. Trees are typically low-branching and spreading.

**Habitat:** Relatively well-drained sites of moderate fertility, strongly associated with limestone soils including sinkhole (karst) terrain but also on well-drained paludal soils.

**Nearest relative:** Herb-rich Foothill Forest.

## EVC 6 Sand Heathland

Within the Midlands Sand Heath is restricted to very small areas surrounded by Lowland Forest in the Brisbane Ranges National Park. It grows on flat to gently undulating topography, at altitudes of 290-340m asl and has an average annual rainfall of approximately 700mm. Soils are Tertiary sands over an impervious clay layer which are periodically very dry or waterlogged. on flat to gently undulating country.. Due to these conditions, the tree layer is often absent.

When present, the overstorey carries sparse and spindly Messmate *Eucalyptus obliqua*. The shrub layer is very dense to 2m high and is dominated by Heath Tea-tree *Leptospermum myrsinoides* Prickly Tea-tree *L. continentale*, Silver Banksia *Banksia marginata* Common Aotus *Aotus ericoides* and Red-fruit Saw-sedge *Gahnia sieberiana*. The ground layer is sparse and includes Blue Squill *Chamaescilla corymbosa*, Milkmaids *Burchardia umbellata* and Sundew *Drosera* spp.

## EVC 8 Wet Heathland

Wet Heathland, occurs within the Otways region, predominantly on flats and depressions with impeded drainage within Carlisle State Park, on Hanson Plain and on the coastal plains of the Otways National Park. The soils have varying depths of tertiary sandy loams, layered over clay loams. The clay layer impedes further drainage, creating an organic soil of low fertility. Such drainage lines are frequent in Carlisle State Park and Hanson Plain, north of the Otway Range.

Wet Heathland is most often treeless but Brown Stringybark *Eucalyptus baxteri*, Shining Peppermint *E. willisii* and Swamp Gum *E. ovata*, may occur as sparse, short (less than 20m tall) and scattered individuals.



# Draft Corangamite Native Vegetation Plan

The shrub layer is characterised by two shorter layers. The taller one is 1-2m tall and consists of a sometimes patchy and relatively dense thicket of shrubs including Prickly Tea-tree *Leptospermum continentale*, Scrub Sheoke *Allocasuarina paludosa*, Scented Paperbark *Melaleuca squarrosa*, Smooth Parrot-pea *Dillwynia glaberrima* and Silver Banksia *Banksia marginata* (shrub form). The lower shrub stratum is characterised by epacrids including Pink Swamp-heath *Sprengelia incarnata*, Woolly-style Heath *Epacris lanuginosa* and Common Heath *Epacris impressa*. The climbers and scramblers Slender Dodder-laurel *Cassytha glabella* and Spreading Rope-rush *Empodisma minus* are usually present below and within this stratum. Wiry Bauera *Bauera rubioides* and Pouched Coral-fern *Gleichenia dicarpa* are also present. Dense Button Grass *Gymnoschoenus sphaerocephalus* dominates and is characteristic of this EVC. Other tussock forming species include Tall Yellow-eye *Xyris operculata*, Austral Grass-tree *Xanthorrhoea australis* and Red-fruit Saw-sedge *Gahnia sieberiana*. Due to the low fertility of the soil and dense understorey, the ground cover is virtually non-existent, with the exception of Swamp Selaginella *Selaginella uliginosa* and Screw Fern *Lindsea linearis*, which may form in patches. Weeds are uncommon due to a lack of disturbance and the infertile, wet soils.

## EVC 10 Estuarine Wetland

Estuarine Wetland is limited in occurrence within the Otways region being confined to lower reaches of streams near the coast. This EVC receives saline water from tidal movements and fresh water flows from inland. The inundating waters are usually salty, sometimes brackish and occasionally fresh over the period of a year depending upon river flooding regimes. Soils are anaerobic peat-rich muds. Rainfall is between 800-1000 mm per annum. Elevation is 0-2 m asl.

Estuarine Wetland is dominated by the Common Reed *Phragmites australis*, Creeping Monkey-flower *Mimulus repens*, Water Buttons *Cotula coronopifolia*, Streaked Arrow grass *Triglochin striatum*, Club Sedge *Bolboschoenus spp.* and Shiny Swamp-mat *Selliera radicans*. An example of Estuarine Wetland can be found adjacent to Lake Craven and Lake Hordern around the lower reaches of the Aire River.

Treeless sedge-dominated wetland vegetation in estuaries. Vegetation is determined by fluctuating salinity, which varies in time from occasionally fresh to brackish or occasionally saline according to river flood and marine tide events. Soils are heavy silts and clays. Quadrats are recorded from the Warrnambool Plain within the study area but this EVC occurs or originally occurred in all estuaries within the study area (Glenelg Plain, Victorian Volcanic Plain at Portland, Warrnambool Plain).

## Lower Estuary Estuarine Wetland

**Floristics:** Dominated by sedge *Gahnia filum*, comprising a small number of salt-tolerant (halophytic) herbs.

**Structure:** Sedgeland 1.5 m tall.

**Habitat:** Outer (landward) zones of large estuaries, subject to fluctuating salinity including occasional freshwater/brackish floods and tidal inundation.

**Nearest relative:** Coastal Salt Marsh.

**Comments:** The stand at Curdies Inlet is one of the largest in south-east Australia (J. Yugovic pers. obs.) and requires detailed survey. Small stands of *Estuarine Flats* Coastal Tussock Grassland occur within this area but are below mapping threshold.

## Upper Estuary Estuarine Wetland

**Floristics:** Dominated by *Juncus kraussii*, comprising a range of moderately salt-tolerant and some typically freshwater species.

*Phragmites australis* is scattered throughout the community.

**Structure:** Rushland 1.0 m tall.

**Habitat:** Upper reaches of estuary, less saline than for Estuarine Wetland (Community 1).

**Nearest relative:** Estuarine Wetland (Community 1).

**Comments:** Estuarine vegetation within the study area requires further survey.

## EVC 16 Lowland Forest

Lowland Forest is mapped in both the Midlands and Otways study areas and will be described separately (below).

### Midlands study area:

Lowland Forest is a very restricted EVC in the Midlands study area. It occurs in two very small, disjunct localities, each representing a different floristic community

### Floristic Community 16-10 Midlands 1 Lowland Forest

*Midlands 1* Lowland Forest occurs in the Brisbane Ranges National Park and the nearby Bamganie State Forest. Despite its narrow distributional range, it is floristically and structurally variable

This floristic community grows Tertiary sands/clays and the floristic and structural variation is possibly due to differing proportions of sand and clay in the soil. The land is flat and soils are often seasonally wet despite the low annual rainfall of less than 650mm. Altitude ranges from 300-380m asl.

The overstorey is a dense canopy of Messmate *Eucalyptus obliqua* to 15m tall. The shrub layer is highly variable in height, species diversity and types of shrubs present (either narrow-leaved mesic or ericoid). The most common species include Myrtle Wattle *Acacia myrtifolia*, Dusty Miller *Spyridium parvifolium*, Common Flat-pea *Platylobium obtusangulum*, Honey-pots *Acrotriche serrulata*, Erect Guinea-flower *Hibbertia riparia*, Silver Banksia *Banksia marginata*, Rusty Pomaderris *Pomaderris ferruginea* Heath Tea-tree *Leptospermum myrsinoides* and Furze Hakea *Hakea ulicina*.

The ground layer may be sparse but diverse in sedges, lillies, forbs and grasses. Species include Hatch Saw-sedge *Gahnia radula*, Tortuous Rapier-sedge *Lepidosperma semiteres*, Blue Squill *Chamaesilla corymbosa*, Reed Bent-grass *Deyeuxia quadriseta*, Button Everlasting *Helichrysum scorpioides*, Trailing Goodenia *Goodenia lanata* and Wallaby-grasses *Austrodanthonia spp.*

Austral Grass-tree *Xanthorrhoea australis* was once common in this EVC, however it has declined due to the infestation of the Cinnamon fungus *Phytophthora cinnamoni*. It is still common in the adjacent better-drained soils, which support Heathy Dry Forest.

### Floristic Community 16-11 Midlands 2 Lowland Forest

*Midlands 2* Lowland Forest is found in the Mt Charlie Flora Reserve (north of Riddells Creek) and in the nearby Mt Teneriffe and T Hill Flora Reserves. It occurs on soils derived from sandstones and shales, on mainly sheltered aspects of both steep and gentle slopes. Annual rainfall is 700-800 mm, altitude is 450-700m asl which is generally higher than Lowland Forest elsewhere in the State.

The overstorey is dominated by medium height Messmate *Eucalyptus obliqua* with Manna Gum *E. viminalis* and Narrow-leaf Peppermint *E. radiata*. The shrub stratum is very open and diverse with no defined layers. Common species include Silver Wattle *Acacia dealbata*, Blackwood *A. melanoxylon*, Prickly Moses *A. verticillata*, Cluster Pomaderris *Pomaderris racemosa*, Austral Grass-tree *Xanthorrhoea australis*, Bushy Hakea, *Hakea sericea*, Handsome Flat-pea *Platylobium formosum* and Silver Banksia *Banksia marginata*.

The ground layer is diverse though often visually dominated by Silvertop Wallaby-grass *Joycea pallida*. Other species include Bracken *Pteridium esculentum*, Stinking Pennywort *Hydrocotyle laxiflora*, Tall Sword-sedge *Lepidosperma elatius*, Forest Wire-grass *Tetrarrhena juncea*, Ivy-leaf Violet *Viola hederea*, Running Postman *Kennedia prostrata*, Creeping Bossiaea *Bossiaea prostrata* and Grey Tussock-grass *Poa sieberiana*.

### Otways study area:

Within the Otways study area there are two forms of Lowland Forest. The first occurs on sandy loam to sandy orange clay loam soils in high rainfall areas, averaging 1100mm per annum and at moderate altitudes, averaging 150m asl. These areas are mostly concentrated in the vicinity of Cape Otway on duplex soils (sand/clay) and Carlisle State Park. Prior to European settlement Lowland Forest is presumed to have occurred extensively on the undulating terrain overlying the Gellibrand Marl geology. Limited examples of this remain.

The characteristic feature of Lowland Forest is a diversity of species and lifeforms. The overstorey is usually dominated by Brown Stringybark *Eucalyptus baxteri* but occasionally Messmate *E. obliqua*, Narrow-leaf Peppermint *E. radiata* and the rare Bog Gum *Eucalyptus kitsoniana* may co-occur.

The understorey is includes a combination of drier, ericoid species due to the sandier soils. Characteristic species are Prickly Tea-tree *Leptospermum continentale*, Silver Banksia *Banksia marginata*, Prickly Moses *Acacia verticillata*, Common Heath *Epacris impressa*, Honey-pots *Acrotriche serrulata*, Common Correa *Correa reflexa*, Broom Sedge *Amperea xiphioclada*, Large-leaf Bush-pea *Pultenaea daphnoides* and Austral Grass-tree *Xanthorrhoea australis*. On sites with a higher proportion of clay in the soil, species such as Narrow-leaf Wattle *Acacia mucronata*, Dusty Miller *Spyridium parvifolium*, Hop Goodenia *Goodenia ovata*, Pink-bells *Tetratheca ciliata*, Red-fruit Saw-sedge *Gahnia sieberiana* and Tall Sword-sedge *Lepidosperma elatius* occur.

The ground layer consists of Spreading Rope-rush *Empodisma minus*, Common Raspwort *Gonocarpus tetragynus*, Ivy-leaf Violet *Viola hederea*, Trailing Goodenia *Goodenia lanata*, Screw Fern *Lindsea linearis* and climbers such as Common Apple-berry *Billardiera scandens* and Downy Dodder-laurel *Cassytha pubescens*. Austral Bracken *Pteridium esculentum* and Forest Wire-grass *Tetrarrhena juncea* are also quite common. Weed species are not common.

# Draft Corangamite Native Vegetation Plan

The second form of Lowland Forest differs in the dominance of species normally associated with EVC 48 Heathy Woodland and the higher diversity of tussock-forming Plants. This form occurs on gentle to moderate slopes of the Otway Plain Natural Region. Here soils are early to late Tertiary sediments of sandy loams and silty clay loams. Rainfall is lower at around 900mm per annum.

The overstorey includes Narrow-leaf Peppermint *Eucalyptus radiata* ssp. *radiata*, Messmate *E. obliqua* and Scentbark *E. aromaphloia*. The shrub layer includes Common Heath *Epacris impressa*, Honey-pots *Acrotriche serrulata*, Prickly Geebung *Persoonia juniperina*, Pink-bells *Tetratheca ciliata* and Common Aotus *Aotus ericoides*. The ground strata include Common Raspwort *Gonocarpus tetragynus*, Trailing Goodenia *Goodenia lanata*, Reed Bent-grass *Deyeuxia quadriseta*, Black-anther Flax-lily *Dianella revoluta* and Spreading Rope-rush *Empodisma minus*. Sedges are also common and include Wattle Mat-rush *Lomandra filiformis*, Many-flowered Mat-rush *L. multiflora* and Spiny-headed Mat-rush *L. longifolia*.

## EVC 17 Riparian Scrub Complex

Riparian Scrub is restricted to parts of the Otways study area with an underlying Tertiary sands geology. The most well developed examples occur in drainage lines where stream alluvium is present. This EVC typically forms in broad, gently sloping drainage lines and is commonly surrounded by EVC 48 Heathy Woodland or EVC 8 Wet Heathland. The altitude range is between 20 and 170 m asl and average annual rainfall varies from approximately 650mm in the Anglesea area to 900-1300mm in the Carlisle River area. During the pre-1750 vegetation mapping exercise extensive areas of Riparian Scrub Complex were modelled on alluvial flood-plain deposits. It was modelled extensively along the Gellibrand River, at and near the junction with Carlisle River and further downstream on the flood-plain sections of the Gellibrand River.

Structurally, Riparian Scrub is a closed scrub 2.5 to 6 metres tall. Species diversity is low due to the dense cover of Scented Paperbark *Melaleuca squarrosa* and less commonly Prickly Tea-tree *Leptospermum continentale*. Scattered overstorey trees are often present, usually Manna Gum *Eucalyptus viminalis* and Messmate *E. obliqua*. Common species in the understorey include Red-fruit Saw-sedge *Gahnia sieberiana*, Spreading Rope-rush *Empodisma minus* and Variable Sword-sedge *Lepidosperma laterale* var. *majus* which may be locally common.

## EVC 18 Riparian Forest

Riparian Forest is mapped in both the Midlands and Otways study areas and will be described separately (below).

### Midlands study area:

Riparian Forest is scattered throughout the study area as narrow bands along the banks and alluvial terraces of (usually) perennial streams. Soils are well-drained and alluvial and a constant supply of moisture supports a tall, high biomass, multi-layered, species-rich forest.

The overstorey is usually patchy in cover. It is dominated by Manna Gum *Eucalyptus viminalis* with Blue Gum *E. globulus* ssp. *biscosta*, Narrow-leaf Peppermint *E. radiata* s.l., Messmate *E. obliqua* and Swamp Gum *E. ovata* also occurring. The small tree layer includes Blackwood *Acacia melanoxylon*, Silver Wattle *Acacia dealbat* and Hazel Pomaderris *Pomaderris aspera*.

The tall shrub stratum includes Prickly Currant-bush *Coprosma quadrifida*, Hop Goodenia *Goodenia ovata* and Austral Mulberry *Hedycarya angustifolia*.

The field layer is diverse in water-dependent species including sedges, forbs and ferns. Species present include Fishbone Water-fern *Blechnum nudum*, Water-ribbons *Triglochin procerum*, Austral Brooklime *Gratiola peruviana*, Tall Sedge *Carex appressa*, Swamp Club-sedge *Isolepis inundata* and Rushes *Juncus* spp.

Due to a history of disturbance in many of these areas and the moist, fertile nature of the soils weeds such as Blackberry *\*Rubus fruticosus* and Yorkshire Fog-grass *\*Holcus lanatus* are common and may dominate the field layer.

### Otways study area:

Within the Otways study area Riparian Forest occurs along rivers and creeks, on alluvial terraces and occasionally in the heads of gullies leading into creeks and rivers. The rainfall of is high, averaging 1250mm per annum and average altitude is 200m asl. Soils are alluvial, fine grey sand at the surface, gradually changing to a mottled orange clay loam at depth.

The overstorey is dominated by Blackwood *Acacia melanoxylon*, Manna Gum *Eucalyptus viminalis* occurring in less than half of the sites surveyed. The rare Brooker's Gum *Eucalyptus brookeriana* may also be present.

The understorey includes a variety of tall shrubs including Austral Mulberry *Hedycarya angustifolia*, Prickly Currant-bush *Coprosma quadrifida*, Musk Daisy-bush *Olearia argophylla*, Hazel Pomaderris *Pomaderris aspera*, Banyalla *Pittosporum bicolor* and Privet Mock-olive *Notelaea ligustrina*.

The ground layer is dominated by a high diversity of moisture-dependent ferns. Taller ferns and epiphytes include Kangaroo Fern *Microsorium pustulatum*, Soft tree-fern *Dicksonia antarctica*, the rare Skirted Tree-fern *Cyathea X marcescens*, the rare Slender Tree-fern *Cyathea cunninghamii*, and Rough Tree-fern *Cyathea australis*. Ground ferns include Mother Shield-fern *Polystichum proliferum*, Bat's Wing Fern *Histiopteris incisa*, Fishbone water-fern *Blechnum nudum*, Lance Water-fern *B. chambersii*, Hard Water-fern *B. wattsi*, the rare Bristly Shield-fern *Lastreopsis hispida* and the rare Ground Spleenwort *Asplenium terrestre* ssp. *terrestre*. Other species in the ground layer include Scrub Nettle *Urtica incisa*, Shade Nettle *Australina pusilla* ssp. *muelleri*, the rare Tufted Club-sedge *Isolepis wakefieldiana*, the rare Snowdrop Wood-sorrel *Oxalis magellanica*, Forest Starwort *Stellaria flaccida*, Tall Sedge *Carex appressa* and Blackberry *Rubus fruticosus* spp. agg.

## EVC 20 Heathy Dry Forest

Heathy Dry Forest is widespread across the Midlands study area, particularly at lower elevations in the lower rainfall areas, where it grows on gentle slopes and on all aspects. In higher rainfall areas it is restricted to exposed slopes and ridgetops. It occurs on Ordovician shales and sandstones which produce skeletal soils with low fertility and water-holding capacities.

The largest areas of Heathy Dry Forest in the study area are on the broad flat ridges of the Brisbane Ranges National Park and the Lerderberg and Enfield State Parks, the more exposed slopes and ridges in the southern part of the Wombat State Forest, the areas immediately north of Daylesford and the gentle lower slopes of the Pyrene State Forest and Ararat Hills State Forest.

Heathy Dry forest has a similar structure throughout the Midlands though floristics and diversity of the understorey vary greatly. The overstorey is a low open forest though it may often tend toward woodland in tree density and tree form. Messmate *Eucalyptus obliqua* and Brown Stringybark *E. baxteri* dominate in the Brisbane Ranges while Broad-leaf Peppermint *E. dives*, Red Stringybark *E. macrorhyncha* and Red Box *E. polyanthemus* are common in other areas.

The shrub layer is extremely variable floristically and structurally, depending on site characteristics and management history. Many sites have been subject to a long history of disturbance by burning, clearing and mining. Generally this stratum is dominated by low ericoid shrubs dominated by the Fabaceae, Proteaceae and Epacridaceae. Species present may include Daphne Heath *Brachyloma daphnoides* and Common Beard-heath *Leucopogon virgatus* in the northern areas, Common Heath *Epacris impressa*, Bushy Hakea *Hakea sericea* and Bushy Parrot-pea *Dillwynia ramosissima* in Lerderberg State Park, Golden Bush-pea *Pultenaea gunni* and Small Grass-tree *Xanthorrhoea minor* in Enfield State Park and Austral Grass-tree *Xanthorrhoea australis* and Matted Bush-pea *Pultenaea pedunculata* in the Brisbane Ranges National Park.

The ground layer is generally sparse with a low diversity of scattered forbs and grasses. The most common species are Common Raspwort *Gonocarpus tetragynus*, Mat-rushes *Lomandra* spp. Variable Stinkweed *Opercularia varia*, Black-anther Flax-lily *Dianella revoluta*, Common Hovea *Hovea linearis*, Grey Tussock-grass *Poa sieberiana* and Silvertop Wallaby-grass, *Joycea pallida*.

Within the Midlands region many areas identified as Heathy Dry Forest are floristically depauperate. These tend to be areas with a long history of disturbance by frequent fires and clearing and massive soil disturbance for mining which have resulted in a severe reduction in species diversity. The shrub layer is sparse to non-existent and the ground layer is often dominated by Silvertop Wallaby-grass *Joycea pallida* with few other species present. Although the species which are present all commonly occur in Heathy Dry Forest, most characteristic species are absent, particularly in the shrub layer which is the characteristic feature of Heathy Dry Forest.

## EVC 21 Shrubby Dry Forest

Shrubby Dry Forest is mapped in both the Midlands and Otways study areas and will be described separately (below).

### Midlands study area:

Within the Midlands region three floristic communities of Shubby Dry Forest are currently recognised. In general, Shrubby Dry Forest is a low,

# Draft Corangamite Native Vegetation Plan

open forest with a diverse though sometimes sparse shrub layer and sparse and species-poor ground layer.

## Floristic Community 21-05 Midlands Escarpments Shrubby Dry Forest

*Midlands Escarpments Shrubby Dry Forest* occurs on very steep, exposed, rocky slopes in the Brisbane Ranges National Park, Lerderberg State Park and Werribee Gorge State Park. The soils are infertile and skeletal (to virtually non-existent), derived from Ordovician shale and sandstones. The steepness and lack of soil combined with an annual rainfall of less than 600mm create an extremely low effective rainfall and harsh site quality. In its most extreme habitats this floristic community may structurally resemble a Rocky Outcrop Shrubland.

The overstorey may contain any combination of Brown Stringybark *Eucalyptus Baxteri*, Red Ironbark *E. tricarpa*, Long-leaf Box *E. goniacalyx* and Red Box *E. polyanthemos*. These are low, often less than five metres tall and spreading in form.

The shrubby stratum is diverse and sparse though Golden Wattle *Acacia pycnantha* may occasionally form a dense layer. Other species include Shiny Cassinia *Cassinia longifolia*, Large-leaf Bush-pea *Pultenaea daphnoides*, Prunus *Pomaderris pomaderris prunifolia*, Shrubby Platysace *Platysace lanceolata*, Digger's Speedwell *Derwentia perfoliata* and Fragrant Saltbush *Rhagodia parabolica*.

The ground layer is sparse and low in diversity, most species restricted to crevices and rocky shelves. Species present include Black-anther Flax-lily *Dianella revoluta*, Many-flowered Mat-rush *Lomandra multiflora*, Fireweed Groundsel *Senecio linearis*, Australian Stonecrop *Crassula sieberiana*, Karkalla *Carprotus rossii*, and Pink Purslane *Calandrinia calypttrata*.

## Floristic Community 21-06 Midlands Depauperate Shrubby Dry Forest

*Midlands Depauperate Shrubby Dry Forest* occurs on dry ridges on the northern and western edges of the Wombat State Forest. Soils are infertile, derived from Ordovician shales and sandstones. Rainfall is higher than the other two floristic communities of Shrubby Dry Forest at around 750mm per annum. Topography is gently sloping to flat.

The overstorey is dominated by Messmate *Eucalyptus obliqua* to 20m tall.

The understorey is very low and sparse or totally bare. Narrow-leaf Hop-bush *Daviesia leptophylla*, Narrow-leaf Wattle *Acacia mucronata*, Thin-leaf Wattle *A. aculeatissima*, Common Hovea *Hovea linearis*, Black-anther Flax-lily *Dianella revoluta*, Common Heath *Epacris impressa* and Trailing Ground-berry *Acrotriche serrulata* are common. Silvertop Wallaby-grass *Joycea pallida* may dominate.

### Otways study area:

Within the Otways study area Shrubby Dry Forest has a limited distribution centred near the boundary of the lower Cretaceous and late Tertiary sediments near Aireys Inlet. The most well developed examples occur on exposed western and northern aspects on moderate slopes. The soils are orange-brown silty loams to silty clay loams. The average annual rainfall is 650-800mm and altitude is approximately 10-200 m asl.

The overstorey is an open forest dominated by Messmate *Eucalyptus obliqua*, Blue Gum *E. globulus*, Scentbark *E. aromaphloia* and Red Ironbark *E. tricarpa*.

The shrub stratum is diverse and dense and includes Large-leaf Bush-pea *Pultenaea daphnoides* Common Heath *Epacris impressa*, Prickly Moses *Acacia verticillata*, Narrow-leaf Wattle *A. mucronata* and Netted Daisy-bush *Olearia speciosa*.

The ground stratum may vary in density and includes a number of grasses, the more common being Grey-tussock Grass *Poa sieberiana*, Silver-top Wallaby-grass *Joycea pallida* and Short-hair Plume-grass *Dichelachne micrantha*. Sedges are strongly represented by Wattle Mat-rush *Lomandra filiformis*, Many-flowered Mat-rush *L. multiflora*, Spiny-headed Mat-rush *L. longifolia* and Thatch Saw-sedge *Gahnia radula*. Other common species include Trailing Goodenia *Goodenia lanata*, Honey-pots *Acrotriche serrulata* and Love Creeper *Comesperma volubile*.

## EVC 22 Grassy Dry Forest

Grassy Dry Forest is mapped in both the Midlands and Otways study areas and will be described separately (below).

### Midlands study area:

Grassy Dry Forest occurs across the drier sections of the Midlands study area. Further sampling is required to define the variation of this EVC within the study area.

In general, Grassy Dry Forest occurs on moderately fertile soils derived from Ordovician shales and sandstones. It is more common on sheltered aspects, slopes may be steep or gentle. Rainfall is less than 700mm per annum.

The overstorey is a low forest 6-15m tall and trees may grow in a spreading 'woodland' form.

Long-leaf Box *Eucalyptus goniacalyx*, Red Box, *E. polyanthemos*, Red Stringybark *E. macrorhyncha*, Yellow Box *E. melliodora* and Candelbark *E. rubida* are common in the north and west of the study area with Messmate *E. obliqua* and Yellow gum *E. leucoxyton* more common in the south.

There is little or no shrub layer, though disturbance by fire may encourage dense stands of Narrow-leaf Bitter-pea *Daviesia leptophylla*.

The ground layer is dominated by a diversity of grasses and forbs though in dry periods many species retreat to rootstock or soil-stored seed. Common grasses include Grey Tussock-grass *Poa sieberiana*, Plume-grasses *Dichelachne* spp. Wallaby grasses *Austrodanthonia* spp., Hair grasses *Aira* spp. and Quaking-grass *Briza maxima*. A few areas, such as Mt Toowong near Macedon and Napoleons Ridge at Ararat are dominated by Kangaroo Grass *Themeda triandra*. Common associated species include Wattle Mat-rush *Lomandra filiformis*, Rock-fern *Cheilanthes* spp., Variable Plantain *Plantago varia*, Blue Pincushion *Brunonia australis*, Yam Daisy *Microseris lanceolata*, Cotton fireweed *Senecio quadridentatus* and Magenta Stork's-bill *Pelargonium rodneyanum*. Many species are area-specific such as Clustered Everlasting *Chrysocephalum semipapposum* which dominates many Grassy Dry Forest sites in the Pyrenees Ranges but was not present in Grassy Dry Forest elsewhere in the Midlands.

Langi Ghiran State Park carries a variant of Grassy Dry Forest. Here it occurs on potentially more fertile soils derived from granodiorite. The ground cover is more dense and there is significant shrub component where the EVC abuts Rocky Outcrop Shrubland. Common shrubs are Sticky Hop-Bush *Dodonea viscosa*, Grey Everlasting *Ozothamnus obcordatus* and Myrtle Wattle *Acacia myrtifolia*.

Grassy Dry Forest often occurs in association with Heathy Dry Forest and in frequently burnt or disturbed areas where diagnostic species may be missing the two EVCs can be difficult to distinguish as only the hardy species common to both EVCs remain. In such areas (eg. in Waterloo State Forest near Beaufort) the vegetation is mapped as EVC 320 Heathy Dry Forest/Grassy Dry Forest Complex.

### Otways study area:

Within the Otways study area Grassy Dry Forest was only identified in an area just west of Lorne. Average annual rainfall is 800-950mm and elevation is 80-250m asl. Soils are shallow and rocky and are less weathered and have a higher iron content than soils of the adjacent EVC 21 Shrubby Foothill Forest. Grassy Dry Forest is confined to northern and western aspects on gentle to moderately steep slopes and ridges.

The overstorey is a low forest 15-20m tall dominated by Scentbark *Eucalyptus aromaphloia*, Blue Gum *E. globulus* and Mountain Grey Gum *E. cypellocarpa*.

The shrub stratum is low in diversity and sparse, except in areas affected by 1983 wildfires, which are dominated by dense stands of Hop Wattle *Acacia stricta* and Hop Goodenia *Goodenia ovata*. These are behaving as post-fire regenerators, which takes advantage of conditions during and immediately following a wildfire to dominate for a short period and are now senescing.

The diversity of grasses in the ground stratum characterises this EVC. Common species are Wallaby grasses *Austrodanthonia* spp., Plume-grasses *Dichelachne* spp., Silvertop Wallaby-grass *Joycea pallida*, Soft tussock-grass *Poa morrisii*, Grey Tussock-grass *P. sieberiana* and Weeping grass *Microlaena stipiodes*. Sweet Vernal-grass *Anthoxanthum odoratum* and Common Tussock-grass *P. labillardieri* occur in sites with increased moisture availability. Common herbaceous species include Variable Stinkweed *Opercularia varia*, *Laginifera* spp., Common Centaury *\*Centaurium erythraea*, Blue Pincushion *Brunonia australis*, Milkmaids *Burchardia umbellata* and Small St. John's Wort *Hypericum gramineum*.

## EVC 23 Herb-rich Foothill Forest

Herb-rich Foothill Forest is mapped in both the Midlands and Otways study areas and will be described separately (below). Further sampling is required to define the variation of this EVC within both the Midlands and Otways study areas.

Within the Midlands region many areas identified as Herb-rich Foothill Forest are floristically depauperate. These areas lack the species rich herb layer that characterises this EVC.

# Draft Corangamite Native Vegetation Plan

## Midlands study area:

Herb-rich Foothill Forest is widespread across the Midlands though most is on or north of Great Dividing Range. It occurs in areas with high rainfall and fertile soils, though it also occurs on some moderately fertile soils. The main occurrences within the study area are Mt Cole and Cobaw State Forests and Mt Buangor State Park on fertile loams and sandy loams derived from granodiorite, at Mt Macedon Regional Park on rhyodacite, in the Wombat State Forest on both fertile soils derived from basalt and much less fertile soils derived from Odovician shales and sandstone and in the Pyrene State Forest on less fertile soils similar to the Wombat State Forest. Altitude is usually 600-900m asl and the annual rainfall is 800-1000mm.

In general, Herb-rich Foothill Forest is a medium to tall open forest with a sparse to non-existent shrub layer and a diverse ground layer of forbs and grasses. In the east of the study area the overstorey is dominated by Messmate *Eucalyptus obliqua* with some Manna Gum *E. viminalis* and Narrow-leaf Peppermint *E. radiata* while in the west, Eurabbie *E. globulus* ssp. *bicostata* dominates. Silver Wattle *Acacia dealbata* is often the only shrub present though Narrow-leaf Wattle *A. mucronata* and Prickly Currant-bush *Coprosma quadrifida* may be present.

The most common forbs and grasses are Ivy-leaf Violet *Viola hederacea*, Bidgee-widgee *Acaena novae-zelandiae*, Kidney-weed *Dichondra repens*, Hairy Pennywort *Hydrocotyle hirta*, Prickly Starwort *Stellaria pungens*, Small Poranthera *Poranthera microphylla*, Mountain Clematis *Clematis aristata*, Spiny-headed Mat-rush *Lomandra longifolia* ssp. *longifolia* Common Tussock-grass *Poa labillardieri* (Sword Tussock-grass *P. ensiformis* in the west) Weeping Grass *Microlaena stipoides*, and Forest Wire-grass *Tetrarrhena juncea*. Austral Bracken *Pteridium esculentum* is also very common and often dominates the understorey.

## Otways study area:

Within the Otways study area Herb-rich Foothill Forest occurs inland from the coast, in the Angahook Lorne State Park, Lorne State Forest and east of Carlisle State Park. The soils are gradational clay loams over mottled clays. This EVC occurs at an average altitude of 290m asl and mean annual rainfall of 1100mm.

The overstorey is dominated by Messmate *Eucalyptus obliqua* tree with Mountain Grey Gum *E. cypellocarpa* often co-dominant. Other species may include Narrow-leaf Peppermint *E. radiata*, Blue Gum *E. globulus*, Scentbark *E. aromaphloia* and Swamp Gum *E. ovata*. Blackwood *Acacia melanoxylon* is occasional as an understorey tree.

The shrub layer is unusually diverse and this may be in response to disturbance from frequent burning or high visitor pressure in recreational areas. Species present may include Tree Everlasting *Ozothamnus ferrugineus*, Narrow-leaf Wattle *Acacia mucronata*, Prickly Moses *A. verticillata*, Snow Daisy-bush *Olearia lirata*, Prickly Currant-bush *Coprosma quadrifida* and Hop Goodenia *Goodenia ovata*. Austral Bracken *Pteridium esculentum* is nearly always found beneath the shrubs.

The ground stratum is diverse in forbs and grasses, many of them weeds. Species present include the vulnerable Wrinkled Buttons *Leptorhynchus gatesii*, Austral Cranesbill *Geranium solanderi*, Ivy-leaf Violet *Viola hederacea*, Cat's Ears *Hypochoeris radicata*, Yellow Wood-sorrel *Oxalis corniculata* spp. agg., Bidgee-widgee *Acaena novae-zelandiae*, Prickly Starwort *Stellaria pungens*, Common Raspwort *Gonocarpus tetragynus*, Matted Pratia *Pratia pedunculata*, Grasses Slender Tussock-grass *Poa tenera*, Common Tussock-grass *P. labillardieri* and Weeping Grass *Microlaena stipoides* var. *stipoides*. Wire Grass *Tetrarrhena juncea* is common and may intertwine through the shrubs and along the ground.

## EVC 30 Wet Forest

Wet Forest is mapped in both the Midlands and Otways study areas and will be described separately (below).

### Midlands study area:

Wet Forest has a very limited distribution in the Midlands Study area. It is confined to sheltered south-facing gullies on fertile, deep alluvial soils in the higher rainfall and higher altitude areas of the Mt Buangor State Park, Mt Cole State Forest and the Macedon Regional Park. Altitude is above 700m asl and annual rainfall exceeds 1000mm. The effective rainfall is further enhanced by cloud cover and fog drip.

The overstorey is a tall forest dominated by Mountain Ash *Eucalyptus regnans* in the Macedon area with Messmate *E. obliqua* and Manna Gum *E. viminalis* ssp. *viminalis* while Eurabbie *Eucalyptus globulus* ssp. *bicostata* dominates in the Mt. Cole and Mt Buangor areas. Under this is a layer of understorey trees/tall shrubs including Blackwood *Acacia melanoxylon*, Silver Wattle *A. dealbata*, Austral Mulberry *Hedycarya angustifolia* and Musk Daisy-bush *Olearia argophylla*.

The ground is characteristically rich in ferns including Rough Tree-fern *Cyathea australis*, Soft Tree-fern *Dicksonia antarctica*, Austral King-fern *Todea barbara*, Fishbone Water-fern *Blechnum nudum*, Hard Water-fern *B. watsii* and often dense Mother Shield-fern *Polystichum proliferum*. The non-vascular bryophytes (mosses and liverworts) are also an important component of the ground cover and, among which are found forbs such as Forest Starwort *Stellaria flaccida*, Prickly Starwort *S. pungens* and the climber Mountain Clematis *Clematis aristata*.

### Otways study area:

Within the Otways study area there are two forms of Wet Forest. The first is distributed along the Otway range from the northern section of the Otway National Park and north of the Great Ocean Road to the Beech Forest Water Catchment. It has an extremely high annual rainfall or 1550mm and occurs in gullies or on protected south and south east-facing slopes of the Otway Range. In addition, it may extend out of more sheltered situations and on to ridges due to the protected nature of the topography and high rainfall and low cloud cover. Geology is mostly non-marine, early cretaceous sediments and soils are fertile loams, where slumping and erosion is common.

The overstorey is a tall forest dominated by pure stands of Mountain Ash *Eucalyptus regnans* on wetter sites and mixed stands of Mountain Ash with Mountain Grey Gum *Eucalyptus cypellocarpa* and Messmate *Eucalyptus obliqua*, the latter more frequent at lower altitudes. Blackwood *Acacia melanoxylon* forms a tall secondary tree layer.

The shrub layer is well established and is dominated by mesic shrubs including Musk Daisy-bush *Olearia argophylla*, Prickly Currant-bush *Coprosma quadrifida*, Austral Mulberry *Hedycarya angustifolia* and Blanket-leaf *Bedfordia arborescens*. Sclerophyllous, non-ericoid species, such as Bootlace Bush *Pimelea axiflora*, Hazel Pomaderris *Pomaderris aspera*, Banyalla *Pittosporum bicolor*, Satinwood *Phebalium squameum* and Privet Mock-olive *Notolea ligustrina* are also common.

There is an abundance and diversity of ferns in all strata as ground ferns, tree ferns or epiphytes. Epiphytic ferns, fern allies and filmy ferns include the vulnerable Beech Finger-fern *Grammitis magellanica* ssp. *nothofagei*, Kangaroo Fern *Microsorium pustulatum*, Common Finger-fern *Grammitis billiardieri*, Gipsy Fern *Ctenopteris heterophylla*, Austral Filmy Fern *Hymenophyllum cupressiforme* Leathery Shield-fern *Ruhmora adiantiformis*. Ground ferns include Mother Shield-fern *Polystichum proliferum*, Hard Water-fern *Blechnum watsii* and Bat's Wing Fern *Histiopteris incisa*. Soft Tree-fern *Dicksonia antarctica* is nearly always present, with the rare Slender Tree-fern *Cyathea cunninghamii* and Rough Tree-fern *Cyathea australis* sometimes co-occurring.

The ground stratum is usually sparse with a high cover of leaf litter. Common forbs include the vulnerable Tall Astelia *Astelia australiana*, Forest Starwort *Stellaria flaccida*, Tall Sword-sedge *Lepidosperma elatius* and Shade Nettle *Australina pusilla* ssp. *muelleri*.

The second form of Wet Forest in the Otways study area is more wide spread and is located in the northern section of Otway National Park both south and north of the Great Ocean Road. This form occurs on more exposed northerly slopes and ridges at lower altitudes, averaging 330m asl and average annual rainfall is 1450mm. Geology is of cretaceous sediments and soils are moderate to high in fertility and less moist than the previous form of this EVC.

The overstorey is dominated by Mountain Ash *Eucalyptus regnans* overstorey over 40m tall. On drier sites this co-dominates with Messmate *E. obliqua*, Mountain Grey Gum *E. cypellocarpa* and Victorian Blue Gum *E. globulus* ssp. *bicostata*. Blackwood *Acacia melanoxylon* often forms a tall secondary tree layer.

The understorey is more open and species-rich in shrubs than the previous form and includes Musk Daisy-bush *Olearia argophylla*, Snow Daisy-bush *Olearia lirata*, Hazel Pomaderris *Pomaderris aspera*, Prickly Currant-bush *Coprosma quadrifida*, Satinwood *Phebalium squameum*, Privet Mock-olive *Notolea ligustrina*, Austral Mulberry *Hedycarya angustifolia* and Victorian Christmas-bush *Prostanthera lasianthos*.

Ferns are neither common or abundant. Those that are present include Soft Tree-fern *Dicksonia antarctica*, Kangaroo Fern *Microsorium pustulatum*, Austral Bracken *Pteridium esculentum*, Hard Water-fern *Blechnum watsii*, Bat's Wing Fern *Histiopteris incisa* and Mother Shield-fern *Polystichum proliferum*. Other species in the ground stratum are more common and include Forest Starwort *Stellaria flaccida*, Hop Goodenia *Goodenia ovata*, Tall Sword-sedge *Lepidosperma elatius* and Mountain Clematis *Clematis aristata*. Forest Wire-grass *Tetrarrhena juncea* has a high cover and often dominates in response to disturbance.

## EVC 31 Cool Temperate Rainforest

# Draft Corangamite Native Vegetation Plan

The following description is from Peel (1999).

On the southern fall of the Otway Ranges Cool Temperate Rainforest occurs in steeply dissected gullies and valleys which represent the wettest and most sheltered niches available. I occupy extensive riverine terraces. On the northern fall of the Ranges this EVC is restricted to the headwaters of streams near the main divide where rainfall is highest and cloud cover most persistent. Altitudes are low, averaging 250-350m asl and average annual rainfall is high at around 1000-1500mm. Generally soils are deep, well structured, reddish clays and sandy clay loams high in organic content but on alluvial terraces they are chocolate brown to grey silts and silty clay loams.

The overstorey is usually well developed Myrtle Beech *Nothofagus cunninghamii* to 30m tall.

The understorey is dominated by a dense canopy of Soft Tree-fern *Dicksonia antarctica* along with a diversity of understorey trees and tall, mesic shrubs including Prickly Currant-bush *Coprosma quadrifida*, Austral Mulberry *Hedycarya angustifolia*, Banyalla *Pittosporum bicolor*, Musk Daisy-bush *Olearia argophylla* and Blackwood *Acacia melanoxylon*. The rare Slender Tree-fern *Cyathea cunninghamii* is also commonly present. Other treeferns commonly present include the rare Skirted Tree-fern *Cyathea X marcescens* and Slender Tree-fern *Cyathea cunninghamii* which has a National threatened status of rare and a Statewide status of vulnerable.

This EVC is characterised by the diversity and abundance of obligate epiphytes or species that are epiphytic at crucial stages in their life cycle. This includes vascular species (predominantly ferns) and non-vascular species (mosses, liverworts and lichens). The usual epiphytic substrates are the caudexes ('trunk' or stem) of Soft tree-fern *Dicksonia antarctica* and the trunks of Myrtle Beech. Epiphytic ferns are particularly prominent and include Leathery Shield-fern *Rumohra adiantiformis*, Kangaroo Fern *Microsorium pustulatum*, Austral Filmy Fern *Hymenophyllum australe*, Shiny Filmy Fern *H. flabellatum*, Common Filmy Fern *H. cupressiforme*, Narrow Filmy Fern *H. rarum*, Common Finger-fern *Grammitis billiardieri*, Weeping Spleenwort *Asplenium flaccidum* ssp. *flaccidum*, Mother Spleenwort *A. bulbiferum* ssp. *gracillimum*, the rare Ground Spleenwort *Asplenium terrestre* ssp. *terrestre* and Veined Bristle-fern *Polyphlebium venosum*.

The ground stratum is dominated by ground ferns with the occasional forb. Ferns include Mother Shield-fern *Polystichum proliferum*, Ray Water-fern *Blechnum fluviatile*, Lance Water-fern *B. chambersii*, Austral Lady-fern *Allantodia australis* and the rare Bristly Shield-fern *Lastreopsis hispida*. Shade Nettle *Australina pusilla* ssp. *muelleri* is commonly present.

Cool Temperate Rainforest in the Otway Ranges contains a number of Nationally and Statewide listed rare and vulnerable species. See Peel (1999).

## EVC 45 Shrubby Foothill Forest

Shrubby Foothill Forest is mapped in both the Midlands and Otways study areas and will be described separately (below).

### Midlands study area:

Within the Midlands study area Shrubby Foothill Forest has been identified in the Wombat State Forest and adjacent areas where it is common and widespread. It is a drier form of the EVC than that in the Otways region. It occurs on moderately fertile soils derived from Ordovician shale and sandstones at elevations of 500-900m asl. In higher elevations it may occur on all slopes and aspects, while in drier areas it is restricted to sheltered slopes and gullies. Annual rainfall varies from 750-1150mm. This EVC has a long history of intense and repeated logging.

The overstorey is a medium forest usually dominated by Messmate *E. obliqua*, though Broad-leaved Peppermint *E. dives*, Narrow-leaf Peppermint *E. radiata*, Candlebark *E. rubida* and Mountain Grey Gum *E. cypellocarpa* may also be present.

The mid stratum is diverse in narrow-leaved or ericoid shrubs, low and often structurally open. Species include Narrow-leaf Wattle *Acacia mucronata*, Common Heath *Epacris impressa*, Moth Daisy-bush *Olearia erubescens*, Mueller's Bush-pea *Pultenaea muelleri* var. *reflexifolia*, Golden Bush-pea *P. gunnii* and Gorse Bitter-pea *Davesia ulicifolia*.

The ground layer is sparse and species poor and includes Ivy-leaf Violet *Viola hederacea* and Common Raspwort *Gonocarpus tetragynus*. Forest Wire-grass *Tetrarrhena juncea* and Austral Bracken *Pteridium esculentum* are common and may dominate the understorey in response to disturbance.

### Otways study area:

Shrubby Foothill Forest occurs widely across the study area, on exposed aspects and slight to moderate slopes. It has been identified close to and

remote from the coast, with an average annual rainfall greater than 1100mm. The soils are clay loams over medium to heavy clays. Closer to the coast the clay loams become more shallow over rock. Average altitude is 180m asl.

The overstorey is a medium forest dominated by Messmate *Eucalyptus obliqua* to 30m tall. Mountain Grey Gum *E. cypellocarpa* is also common. Occasional other species include Scentbark *E. aromaphloia*, Brown Stringybark *E. baxteri*, the rare Brooker's Gum *E. brookeriana*, Blue Gum *E. globulus*, Swamp Gum *E. ovata*, Narrow-leaf Peppermint *E. radiata* s.l., Mountain Ash *E. regnans* and Manna Gum *E. viminalis* s.l. There is no understorey tree layer.

A diverse shrub layer characterises this EVC. The most common species include Hop Goodenia *Goodenia ovata*, Prickly Moses *Acacia verticillata*, Snow Daisy-bush *Olearia lirata*, Prickly Currant-bush *Coprosma quadrifida*, Narrow-leaf Wattle *Acacia mucronata*, Privet Mock-olive *Notelaea ligustrina*, Tree everlasting *Ozothamnus ferrugineus*, Prickly Tea-tree *Leptospermum continentale*, Hazel Pomaderris *Pomaderris aspera* and Large-leaf Bush-pea *Pultenaea daphnoides*.

The ground stratum lacks diversity and is often dominated by Austral Bracken *Pteridium esculentum* and Forest Wire-grass *Tetrarrhena juncea* which may dominate in response to disturbance. Other species include Tall Sword-sedge *Lepidosperma elatium*, the rare Cluster-headed Mat-rush *Lomandra longifolia* ssp. *exilis*, the vulnerable Swamp Flax-lily *Dianella callicarpa* and Ivy-leaf Violet *Viola hederacea*. Mountain Clematis *Clematis aristata* is the only climber.

## EVC 47 Valley Grassy Forest

Valley Grassy Forest generally occurs in small pockets scattered across the drier sections of the Midlands region. It usually grows on quaternary alluvium deposited on valley floors, which may be totally dry or carry intermittent streams. Altitude is usually less than 600m asl and mean annual rainfall is below 700mm.

Within the study area there are two isolated basalt caps (surrounded by Ordovician Shales and sandstones supporting Heathy Dry Forest) which have been mapped as Valley Grassy Forest. Though they are not in the typical Valley Grassy Forest landform, they are floristically similar, have fertile soils and occur in the same altitude and rainfall range.

The overstorey may carry a variety of eucalypts, usually species, which which prefer more moist or more fertile conditions as compared to the species in surrounding habitats. Most common are Yellow Box *Eucalyptus melliodora*, Red Box *E. polyanthemos*, Messmate *E. obliqua*, Narrow-leaf Peppermint *E. radiata* and Candlebark *E. rubida*. Apart from scattered Black Wattle *Acacia mearnsii* and Silver Wattle *A. dealbata* the shrub layer is virtually non-existent.

The ground is usually covered in a dense grassy sward with a high diversity of both grasses and forbs. Dominant species vary depending on moisture levels. The most common dominant species are Weeping Grass *Microlaena stipoides*, Common Tussock-grass *Poa labillardieri*, and Grey Tussock-grass *P. sieberiana*. Other grasses usually present are Sweet Vernal-grass *Anthoxanthum odoratum*, Silvertop Wallaby-grass *Joycea pallida*, Five-awned Spear-grass *Pentapogon quadrifidus*, Common Wheat-grass *Elymus scabrus*, Plume grasses *Dichelachne* spp. and Wallaby grasses *Austrodanthonia* spp.. Forbs include Blue Pincushion *Brunonia australis*, Ivy-leaf Violet *Viola hederacea*, Kidney-weed *Dichondra repens*, Common Lagenifera *Lagenifera stipitata*, Austral Bugle *Ajuga australis*, Chocolate-lily *Arthropodium strictum* and Austral Bracken *Pteridium esculentum*.

Valley Grassy Forest usually occurs adjacent to dry forests such as Grassy Dry Forest and Heathy Dry Forest though in the Macedon/Cobaw area it is adjacent to Herb-rich Foothill Forest.

## EVC 48 Heathy Woodland

Heathy Woodland is mapped in both the Midlands and Otways study areas and will be described separately (below).

### Midlands study area:

Heathy Woodland in the Midlands occurs in small patches scattered across the study area. Several floristic communities have been identified.

### Floristic Community 48-12 Steiglitz Heathy Woodland

Steiglitz Heathy Woodland occurs on a tiny patch of Tertiary clays in the Steiglitz Historic Park. Altitude is 340m asl and average annual rainfall is 650mm.

The overstorey consists of Red Stringybark *Eucalyptus macrorhyncha* over an open understorey of Austral Grass-tree *Xanthorrhoea australis*, Dusty Miller *Spyridium parvifolium*, Heath Tea-tree *Leptospermum*

# Draft Corangamite Native Vegetation Plan

*myrsinoides*, Dwarf Geebung *Persoonia chamaepeuce* and Golden Grevillea *Grevillea chrysophaea*. The groundlayer is sparse and includes Sundew *Drosera peltata*, Button Everlasting *Helichrysum scorpioides* and Wallaby-grass *Austrodanthonia* spp.

## Floristic Community 48-13 Midlands Heathy Woodland

Midlands Heathy Woodland occurs on narrow Tertiary cappings on ridgetops in the Wombat and Pyrete State Forests. Soils are a very fine white clay. Altitudes in the Wombat State Forest are 600-830m asl and average annual rainfall is 900-1100mm. In the Pyrete State Forest altitude is 400-500m asl and average annual rainfall is 700mm.

The overstorey is dominated by Broad-leaf Peppermint *Eucalyptus dives*, which, in the Pyrete State Forest may be only two or three metres tall. The understorey may be dense or sparse and includes Dagger Wattle *Acacia oxycedrus*, Bushy Hakea *Hakea sericea*, Prickly Tea-tree *Leptospermum continentale*, Rosy Baeckea *Baeckea ramosissima*, Silver Banksia, *Banksia marginata*, Bundled Guinea-flower, *Hibbertia prostrata*, Common Rapier-sedge, *Lepidosperma filiforme* and Curly-wig *Caustis flexuosa*.

### Otways study area:

Two forms of Heathy Woodland have been identified within the Otways study area. The first is the most widespread, occurring from sites near Port Campbell and Lower Gellibrand along the tertiary sand belt and in the Eastern View to Anglesea area.

The overstorey is dominated by Brown Stringybark *Eucalyptus baxteri*, Narrow-leaf Peppermint *E. radiata* s.l., Messmate *E. obliqua* and Shining Peppermint *E. willisii* s.l.

The shrub stratum is diverse and includes Prickly Tea-tree *Leptospermum continentale*, Common Heath *Epacris impressa*, Narrow-leaf Wattle *Acacia mucronata*, Prickly Geebung *Persoonia juniperina*, Common Beard-heath *Leucopogon virgatus*, Silver Banksia *Banksia marginata*, Pink Bells *Tetralochea ciliata*, Smooth Parrot-pea *Dillwynia glaberrima*, Western Furze *Hakea repullans*, Common Aotus *Aotus ericoides* and Slender Rice-flower *Pimelea linifolia*. Species in the ground stratum include Austral Grass-tree *Xanthorrhoea australis*, Tassel Rope-rush *Hypolaena fastigiata*, Spreading Rope-rush *Empodisma minus*. Spiny-headed Mat-rush *Lomandra longifolia* and Swamp Selaginella *Selaginella uliginosa*.

The second form of Heathy Woodland in the Otways study area occurs on late Tertiary sediments between Eastern View and Point Addis of Anglesea. Average annual rainfall is 550-700mm. Distinguishing features of this form of Heathy Woodland are its relatively high species richness and the frequency of tussock forming species compared with the previous form.

Common overstorey species are Messmate *Eucalyptus obliqua*, Brown Stringybark *E. baxteri* and Scentbark *E. aromaphloia*. The diverse shrub layer includes Silver Banksia *Banksia marginata*, Common Flat-pea *Platylobium obtusangulum*, Common Heath *Epacris impressa*, Honey-pots *Acrotriche serrulata*, Prickly Tea-tree *Leptospermum continentale*, Heath Tea-tree *L. myrsinoides*, Erect Guinea Flower *Hibbertia riparia*, Prickly Geebung *Persoonia juniperina*, Pink-bells *Tetralochea ciliata*, Common Beard-heath *Leucopogon virgatus*, Dwarf Wedge-pea *Gompholobium ecostatum*, Myrtle Wattle *Acacia myrtifolia*, Common Rice-flower *Pimelea humilis*, Smooth Parrot-pea *Dillwynia glaberrima* and Leafless Globe-pea *Sphaerolobium vimineum*.

Common species in the ground stratum include Thatch Saw-sedge *Gahnia radula*, Bent Goodenia *Goodenia geniculata*, Wattle Mat-rush *Lomandra filiformis*, Blue Squill *Chamaescailla corymbosa* var. *corymbosa*, Wire Rapier-sedge, *Lepidosperma semiteres*, Variable Stinkweed *Opercularia varia*, Heath Xanthosia *Xanthosia pusilla*, Screw fern *Lindsea linearis*, Button Everlasting *Helichrysum scorpioides* and Hidden Violet *Viola cleistogamoides*. Other common species include Austral Grass-tree *Xanthorrhoea australis*, Tassel Rope-rush *Hypolaena fastigiata*, Common Rapier-sedge *Lepidosperma filiforme*, Tall Sundew *Drosera peltata* ssp. *auriculata* and Milkmaids *Burchardia umbellata*.

## EVC 52 Coastal Saltmarsh Complex

Coastal Saltmarsh Complex occurs on the Bellarine Peninsula, southwest of Anglesea along the Painkalac Creek and at Queenscliff in the Breamlea estuary, and within the Port Campbell National Park. This EVC occurs at or just above sea level and has an average annual rainfall range of 600 - 780mm. Fertile clay loam soils and disturbance from recreation activities combine to encourage a high proportion of weeds. Species diversity is low, reflecting the saline nature of the estuarine environment.

There are two forms of Coastal Saltmarsh Complex mapped within the study area. Both are treeless with rushes, sedges, forbs and aquatic plants dominating. Within the Breamlea estuary dominant species include

Beaded Glasswort *Sarcocornia quinqueflora*, Austral Seablite *Suaeda australis* and Shrubby Glasswort *Sclerostegia arbuscula* whilst elsewhere Creeping Brookweed *Samolus repens* is most common, co-occurring with Sea Rush *Juncus kraussii*. Grasses such as Australian Salt-grass *Distichlis distichophylla*, Blue Tussock-grass *Poa poiformis*, Annual Beard-grass *Polypogon monspeliensis* grow on the fringes of the estuary. Buck's-horn Plantain *Plantago coronopus*, Shiny Swamp-mat *Selliera radicans*, Beaded Glasswort *Sarcocornia quinqueflora*, Aster-weed *Aster subulatus*, Water Buttons *Cotula coronopifolia* and Smooth Willow-herb *Epilobium billardierianum* ssp. *billardierianum* also occur on the margins of this complex. Nodding Club-sedge *Isolepis nodosa* and Knobby Club-sedge *Isolepis nodosa* are the most common sedges.

Examples of this EVC can be found at Painkalac Creek at Aireys Inlet, the estuarine flat of the Erskine River at Lorne and the wetland area south of the Old Great Ocean Road at Princetown, approximately 1km from its intersection with the Great Ocean Road.

## EVC 53 Swamp Scrub

Swamp Scrub occurs close to the coast in the study area and has affinities with Shallow Freshwater Marsh. Both occupy similar swamp habitats, however the Swamp Scrub occurs on slight rises where the soil is deeper and better drained.

This EVC lacks an overstorey and is dominated by tall Woolly Tea-tree *Leptospermum lanigerum*, which forms dense impenetrable thickets, out-competing other species. Coast Saw-sedge *Gahnia trifida* and Common Reed *Phragmites australis* are also common

## EVC 55 Plains Grassy Woodland

Plains Grassy Woodland was once widespread across the study area in the vicinity of the volcanic plains, in some areas growing in association with Plains Grassland. Due to a long history of grazing and clearing for agriculture the majority of this EVC has disappeared and that which is left is often severely degraded. Of the areas remaining on public land the largest is around the Upper Stoney Creek Reservoirs, mainly on land managed by Barwon Water though some occurs in the adjacent Brisbane Ranges National Park. Other areas include the Dolly Creek State Forest, Bannockburn and Inverleigh Commons and a very small patch in the Langi Ghiran State Park.

There is great variation within these areas and it is likely that several different floristic communities exist. However, due to the paucity of sampling of intact remnants, distinctions at the floristic community level have not been made here. All sites are virtually flat, altitudes range from 350 to 380m asl except in the Bannockburn and Inverleigh areas which are 90 to 100m asl and annual rainfall is approximately 650mm. Soils are generally fertile, most sites occurring on Tertiary sands and clays though soils of the Inverleigh Common are aeolian sands and the Langi Ghiran State Park example is on granitic-outwash soils.

Tree density within the areas mapped varies from almost forest to very open woodland. Dominance within the overstorey varies with soil moisture which is related to the proportions of sand and clay within the soil. Fire and management history may also influence overstorey structure and species composition.

Dominant species within this EVC may include Yellow Gum *Eucalyptus leucoxylon*, Swamp Gum *E. ovata*, Yellow Box *E. melliodora* or Manna Gum *E. viminalis* with Silver Banksia *Banksia marginata* (tree form), Black Sheoke *Allocasuarina littoralis* Blackwood *Acacia melanoxylon* and Black Wattle *A. mearnsii*. There is no shrub layer apart from localised thickets of Hedge Wattle *A. paradoxa* in the Bannockburn and Inverleigh areas.

The ground layer is very species rich with a mixture of low ericoid shrubs, such as Peach Heath *Lissanthe stigosa*, Cranberry Heath *Astroloma humifusum* and Honey-pots *Acrotriche serrulata*, and a diversity of lilies, forbs and grasses. Common species include Yellow Rush-lily *Tricoryne elatior*, Milkmaids *Burchardia umbellata*, Running Postman *Kennedia prostrata*, Common Rice-flower *Pimelea humifusum*, Creeping Bossia *Bossia prostrata*, Wiry Buttons *Leptorhynchus tenuifolius*, Scaly Buttons *L. squamatus*, Kidneyweed *Dichondra repens*, Sundew *Drosera peltata*, Spear-grasses *Austrostipa* spp., Wallaby-grasses *Danthonia* spp., Reed Bent-grass *Deyeuxia quadriseta*, Weeping Grass *Microleana stipoides* and Kangaroo Grass *Themeda triandra*. In some areas there are dense patches of Black-anther Flax-lily *Dianella revoluta* and Variable Sword-sedge *Lepidosperma laterale*.

Plains Grassy Woodland has been largely cleared for agriculture or residential or commercial development or disturbed by grazing, as a result there are very few intact remnants on public land.

Within Midlands and Otways study area extant examples of Plains Grassy Woodland are small and fragmented and restricted to tiny areas, mainly

# Draft Corangamite Native Vegetation Plan

on Tertiary sands/clays and Aeolian sands. Prior to European occupation this EVC once existed extensively across the study area. It occurred on a number of geologies over a wide rainfall range and was floristically variable. It has also been mapped over large areas as a mosaic with Plains Grassland.

The majority of Plains Grassy Woodland occurs on fertile, flat or gently undulating basalt plains and associated volcanic cones. Most of these plains have a rainfall of 550-650mm per annum. The overstorey consists of open woodland dominated by Red Gum *Eucalyptus camaldulensis*. The ground-layer is dominated by Kangaroo Grass *Themeda triandra* with a diversity of grasses and herbs including Common Everlasting *Chrysocephalum apiculatum*, Yam Daisy *Microseris scapigera*, Scaly Buttons *Leptorhynchus squamatus* and Blue Devil *Eryngium ovinum*. In higher rainfall areas (over 700mm) across the northern section of the study area such as around Creswick, Ballan, Tylden, Macedon and Kilmore, the overstorey is dominated by Swamp Gum *E. ovata* and Candlebark *E. rubida*, however, as no good quality remnants of this type were found, it is not possible to typify the understorey. The lowest rainfall areas often have an overstorey of Grey Box *E. microcarpa* and/or Yellow Gum *E. leucoxylon* with a ground layer dominated by Wallaby *Austrodanthonia* spp. and Spear Grasses *Austrostipa* spp. Other common species include Windmill Grass *Chloris truncata*, Common Wheat-grass *Elymus scabra*, Weeping Grass *Microlaena stipoides*, Kidney-weed *Dichondra repens*, Black-anther Flax-lily *Dianella revoluta*, Saloop Saltbush *Einadia hastata*, Small-leaved Clematis *Clematis microphylla* and the shrubs Varnish Wattle *Acacia verniciflua*, Golden Wattle *A. pycnantha*, Tree Violet *Hymenathera dentata* and Sweet Bursaria *Bursaria spinosa*.

On the drier plains west of Melbourne large areas of Plains Grassy Woodland were also modelled on Tertiary and Quaternary alluvial and colluvial soils washed over the basalt plains from the surrounding sedimentary hills. These areas tend to have low rainfall and have similar species to the low rainfall areas on basalt geology. Plains Grassy Woodland has also been modelled on sedimentary soils near the Lal Lal State Forest which are dominated by Manna Gum *E. viminalis* over Spear Grasses in the ground layer.

## Floristic Community 55-06 Riverina Plains Grassy Woodland

*Riverina* Plains Grassy Woodland is a floristic community of Plains Grassy Woodland. It was once widespread across the Northern Plains of Victoria, from Birchip to Albury with isolated occurrences in dry rain shadow areas south of the Great Dividing Range. Because of its wide geographic range, it is likely that a number of sub-units existed within it. However, due to its suitability for grazing and agriculture, few undisturbed remnants remain for analysis.

Paperbark *Melaleuca squarrosa*. The ground layer is sparse to absent due to competition from the dense shrub stratum. Other characteristic species include Red-fruit Saw-sedge *Gahnia sieberiana*, Prickly Tea-tree *Leptospermum continentale*, Stinkwood *Ziera arborescens*, Handsome Flat-pea *Platylobium formosum*, Wiry Bauera *Bauera rubiodes* and Austral Bracken *Pteridium esculentum*.

## EVC 56 Floodplain Riparian Woodland

During the pre-1750 mapping exercise Floodplain Riparian Woodland was modelled across the study area on major slow-moving rivers and creeks where they meander across the plains. Floodplain Riparian Woodland was mapped along the Barwon River and the lower reaches of the Leigh, Moorabool and Werribee Rivers and the Sutherland and Thompson Creeks. No fully intact remnants were found.

It covers the lowest, most frequently flooded terraces and generally encompasses a network of former channels and intermittent and permanent wetlands. Species composition and positioning within the EVC depends on the frequency of flooding and length of inundation of each area. Due to high levels of disturbance (natural and man-made), soil fertility, abundance of water and general accessibility and proximity to arable lands, few intact remnants of Floodplain Riparian Woodland remain and where they do occur, weeds are a dominant feature.

The overstorey is a tall woodland dominated by Red Gum *Eucalyptus camaldulensis* with occasional Manna Gum *E. viminalis* and Swamp Gum *E. ovata*. The shrub stratum is patchy and includes Silver Wattle *Acacia dealbata*, Black Wattle *A. mearnsii*, Tree Violet *Hymenathera dentata*, River Bottlebrush *Callistemon sieberi*, and Woolly Tea-tree *Leptospermum lanigerum*. The ground layer is dominated by Common Tussock-grass *Poa labillardierei* on the drier elevated areas, with Common Reed *Phragmites australis*, Tall Sedge *Carex appressa*, Rushes *Juncus* spp., Spike Sedges *Eleocharis* spp. and Water-ribbons *Triglochin procerum* on inundated soils beside rivers. Herbs range from dryland herbs on the banks to aquatics in the river and wetland areas.

## EVC 67 Alluvial Terraces Herb-rich Woodland

Alluvial Terraces Herb-rich Woodland occurs in the north-west of the study area, in the Pyrenees Ranges, Waterloo and Dunneworthy State Forests and the Langi Ghiran State Park. It grows on low-lying alluvial terraces and plains and has been extensively cleared across its range, now only occurring in small pockets around the edges of public land. Soils are relatively fertile and have a higher water-holding capacity than the surrounding low hills. Altitudes are generally below 350m asl and the annual rainfall is below 650mm.

Within this EVC the overstorey is of tall woodland trees, mainly Yellow Box *Eucalyptus melliodora* with Candlebark *E. rubida*, River Red Gum *E. camaldulensis*, Red Box *E. polyanthemos* and Blue Gum *E. globulus* also occurring occasionally. There is no shrub layer, and the ground layer is diverse in forbs, lilies and grasses including many annuals. In dry seasons the ground may appear very bare, many species retreating to rootstocks or existing as soil-stored weed. Common species include Scaly Buttons *Leptorhynchus squamatus*, Solenogyne *Solenogyne dominii*, Yellow Rush-lily *Tricoryne elatior*, Chocolate Lily *Arthropodium strictum*, Yam-daisy *Microseris lanceolata*, Common Bog-sedge *Schoenus apogon*, Common Wheat-grass *Elymus scabrus* and Wallaby-grasses *Austrodanthonia* spp.

Most areas of Alluvial Terraces Herb-rich Woodland have suffered a severe history of disturbance, from mining, grazing and timber cutting. As a consequence weeds are common, particularly annual grasses.

## EVC 68 Creeklane Grassy Woodland

Elsewhere in the State Creeklane Grassy Woodland has been mapped across northern Victoria on minor creeks and tributaries on the lower slopes of the foothills and on small, intermittent creeks on the plains. During the pre-1750 mapping exercise this EVC was modelled in the study area in the driest areas, in the far north-west from Beaufort to Stawell and south of the Great Dividing Range on the drier plains, particularly just west of Melbourne and Geelong. In the north, it was mapped in association with Alluvial Terraces Herb-rich Woodland, *Low Rises* Grassy Woodland and Plains Grassy Woodland. In the south it was associated with Plains Grassland, Plains Grassy Woodland and various wetland EVCs. Soils are usually Quaternary stream alluvials and rainfall is generally less than 600mm per annum.

No intact examples of Creeklane Grassy Woodland were found in the Midlands and Otways study areas. From the few remnants seen it was assumed to be the same EVC as described by Muir *et al.* (1995) in the Box-Ironbark Region (which is similar to the Goldfields Region currently under review by the Environment Conservation Council) and by Berwick (in press) in the Goulburn-Broken Catchment Management Authority (CMA) Region.

The overstorey is dominated by Red Gum *Eucalyptus camaldulensis* with a scattered shrub layer of Black Wattle *Acacia mearnsii*, Blackwood *A. melanoxylon* and Sweet Bursaria *Bursaria spinosa*. The ground layer is dense with grasses and sedges, most commonly Common Tussock-grass *Poa labillardierei*, Weeping Grass *Microleana stipoides*, Kangaroo Grass *Themeda triandra*, Common Wheat-grass *Elymus scabra*, Common Blown-grass *Agrostis avenacea*, Tall Sedge *Carex appressa* and Rushes *Juncus* spp.

## EVC 71 Hills Herb-rich Woodland

### Floristic Community 71-01 Granitic Hills Herb-rich Woodland

Within the Midlands region, *Granitic Hills* Herb-rich Woodland is uncommon and is typically found at the boundaries of blocks of public land such as Mt Buangor State Park, Langi Ghiran State Park, Mt Cole State Forest, Mt Lonarch State Forest and Ben Major Forest Reserve on fertile granodiorite and granodiorite-derived soils. The most extensive intact example within the study area is in Mt Beckworth State Forest where it occupies most of the park. Altitudes range from 350 to 700m asl and annual rainfall is less than 700mm.

The overstorey is a woodland of large eucalypts, usually Yellow Box *Eucalyptus melliodora*. Shrubs and understorey trees are sparse with Black Wattle *Acacia mearnsii* and less commonly Cherry Ballart *Exocarpus cupressiformis* most usual.

On the outwash slopes to the west of Mount Langi Ghiran this floristic community grows on soils which appear less fertile and are more often waterlogged than those of steeper slopes elsewhere. Here the low tree layer is missing, and tall shrubs such as Hedge Wattle *Acacia paradoxa* and Varnish Wattle *A. verniciflua* may be present, rarely forming dense stands.

The ground layer is rich in grasses and forbs such as Wallaby-grasses *Austrodanthonia* spp., Kidney-weed *Dichondra repens*, Austral Bugle *Ajuga australis*, Austral Bear's-ears *Cymbonotus preissianus* and Green

# Draft Corangamite Native Vegetation Plan

Rock Fern *Cheilanthes austrotenuifolia*. Low ericoid shrubs such as Cranberry Heath *Astroloma humifusum* and Peach Heath *Lissanthe strigosa* are also common.

Due to the fertile nature of the soils and disturbance by grazing (rabbits and marsupials) weeds are common, particularly annual grasses.

## EVC 72 Granitic Hills Woodland

Granitic Hills Woodland is restricted in the Midlands to the YouYangs Regional Park where it occurs on steep granite hills and rocky outcrops. Average annual rainfall is low at approximately 550mm and effective rainfall even lower due to the steep slopes and shallow free-draining soils. Altitude ranges from 200-350m asl.

The overstorey varies from sparse to almost forest-like depending on soil depth and the availability of deep cracks for root growth. Red Stringbark *Eucalyptus macrorhyncha* dominates although Yellow Gum *E. leucoxylon*, Red Ironbark *E. tricarpa* and Yellow Box *E. melliodora* may also occur. The shrub layer is usually dense where there is enough soil for unless there are large slabs of exposed rock, which lacks enough soil for establishment of root systems. Common shrubs include Snowy Mint-bush *Prostanthera nivea*, Hegde Wattle *Acacia paradoxa*, Lightwood *A. implexa*, Sticky Hop-bush *Dodonaea viscosa*, Shiny Cassinia *Cassinia longifolia* and the weed Boneseed *\*Chrysanthemum monilifera*. Among the rocks are grasses and forbs such as Kangaroo Grass *Themeda triandra*, Fibrous Spear-grass *Austrostipa semibarbara*, Weeping Grass *Microleana stipoides*, Black-anther Flax-lily *Dianella revoluta*, Small-leaved Clematis *Clematis microphylla*, Yellow Rush-lily *Tricoryne elatior* and Narrow Rock-fern *Cheilanthes tenuifolia*.

## EVC 74 Wetland Formation

Wetland Formation is a broad, undersampled group occurring throughout the study area. Wetland vegetation is often severely degraded and weed-invaded having suffered a history of disturbance including alteration of drainage patterns such as up-stream damming for water storage or draining and clearing for agriculture or grazing. This formation includes generally herbaceous wetland vegetation in ephemeral and permanent water bodies. On the volcanic plain EVCs present may include EVC 125 Plains Grassy Wetland, EVC 136 Sedge Wetland, EVC 647 Plains Sedgy Wetland, EVC 653 Aquatic Hermland, EVC 647 Plains Sedgy Wetland and areas of open fresh or saline water. In areas of lower rainfall EVCs present may include EVC 104 Lignum Wetland, EVC 291 Cane-grass Wetland and EVC 292 Red Gum Wetland. These EVCs are individually described in other sections of this text.

## EVC 83 Swampy Riparian Woodland

Swampy Riparian Woodland has been mapped in only one location in the Midlands study area, in the Wombat State Forest where it occurs on Recent alluvial flats adjacent to the Werribee River in association with Herb-rich Foothill Forest and Shrubby Foothill Forest. The area is flooded regularly and is nearly always wet even when the river is not flowing. The altitude is 600m asl and average annual rainfall is approximately 850mm.

Swampy Riparian Woodland consists of a very open to virtually absent canopy of Swamp Gum *Eucalyptus ovata* and Manna Gum *E. viminalis*. The shrub layer is also very sparse with scattered Blackwood *Acacia melanoxylon*, Silver Wattle *A. dealbata*, Hazel Pomaderris *Pomaderris aspera*, Prickly Currant-bush *Coprosma quadrifida* and the occasional Rough Tree-fern *Cyathea australis* and Soft Tree-fern *Dicksonia antarctica*. The ground layer is dense, dominated by Fishbone Water-fern *Blechnum nudum*. Other common species include Mother Shield-fern *Polystichum proliferum*, Leafy Flat-sedge *Cyperus lucidus*, Tall Sedge *Carex appressa* and Hard Water-fern *Blechnum watsii*. Patches between the ferns support herbs such as Bidgee-widgee *Acaena novae-zelandiae*, Kidney-weed *Dichondra repens*, Hairy Pennywort, *Hydrocotyle hirta* and Austral Brooklime *Gratiola peruviana*.

## EVC 104 Lignum Wetland

Lignum Wetland is common across the arid areas of north-western Victoria, however within the Midlands and Otways study areas it is restricted to tiny areas scattered across the plains from Bacchus Marsh to Melton to south of Geelong. Rainfall in this area is very low (500-550mm per annum). Lignum Wetland generally occurs within areas of Plains Grassland, on swamp and lagoonal deposits and quaternary stream alluviums deposited in minor depressions on the basalt volcanic plains. Soils are very heavy grey clays, waterlogged for much of the year but also experience periods of extreme dryness. Species diversity is very low as few Plants can thrive in these conditions.

Lignum Wetland is a shrubland dominated Tangled Lignum *Muehlenbeckia florulenta*. Ground species include Common Spike-sedge *Eleocharis acuta*, Sharp Club-sedge *Schoenoplectus pungens*, Brown-back Wallaby-grass *Austrodanthonia duttoniana*, Yellow Rush *Juncus*

*flavidus*, Large-fruit Tassel *Ruppia megacarpa* and Common Nardoo *Marseilea drummondii*.

Wetlands are complex by nature, with distinct zonation patterning dependent on water depth and period of inundation. Most have been severely disturbed by drainage and dam building works in addition to heavy grazing and weed invasion. As a result they are difficult to classify. It is likely that Lignum Wetland is a complex of a number of different entities. Of the wetlands mapped as Lignum Wetland in the Midlands and Otways study area, some are freshwater, some are slightly brackish and some, with less extreme soil conditions and hence more species, have close affinities with Plains Grassy Wetland.

## EVC 128 Grassy Forest

Within the Midlands region remnants of Grassy Forest were only mapped in a small area in the valley between the Macedon Regional Park and the Wombat State Forest. Prior to European settlement, as identified in the modelling of pre-1750 vegetation types, it occurred extensively in the Gisborne-Woodend area. The best quality remnants of this EVC are on roadsides rather than on broad-scale public land blocks. Grassy Forest occurs on relatively infertile soils derived from Ordovician sediments with moderate average annual rainfall of 700-850mm and an altitude range of 400-600m asl.

The overstorey is a low forest (20m tall) of Messmate Stringybark *Eucalyptus obliqua*, Narrow-leaf Peppermint *E. radiata* and Manna Gum *E. viminalis* growing in association with an understorey tree layer of Blackwood *Acacia melanoxylon*, Black Wattle *A. mearnsii* and Chery Ballart *Exocarpos cupressiformis*. If present, the shrub layer is low and sparse and includes Narrow-leaf Wattle *A. mucronata*, Matted Bossiaea *Bossiaea buxifolia* and Parrot-peas *Dillwynia* spp.

The ground-layer is dominated by grasses, particularly Grey Tussock-grass *Poa sieberiana*, Silver-top Wallaby-grass *Joycea pallida*, Weeping Grass *Microleana stipoides* and Plume Grasses *Dichelachne* spp. Other common species include Purple Coral-pea *Hardenbergia violacea*, Black-anther Flax-lily *Dianella revoluta*, Handsome Flat-pea *Platylobium formosum*, and Common Hovea *Hovea linearis*.

## EVC 125 Plains Grassy Wetland

The pre-1750 extent of Plains Grassy Wetland was in very shallow depressions on the northern alluvial plain, scattered across the riverina bioregion and amongst the grassy woodlands of the basalt plateaus south west of Seymour. Average annual rainfall is less than 700mm. Some of the areas modelled are meanders of prior streams, others are discrete depressions. The unifying feature is the heavy clay soil which holds moisture as distinct from the more free-draining soils of the adjacent terrestrial vegetation. Inundation is periodic over the winter months alternating with dry periods during the summer months

This EVC is a (usually) treeless shallow seasonal wetland. River Red Gum *Eucalyptus camaldulensis* may occur on perimeter or, less frequently, scattered throughout. Structure is generally a grassland, grading into sedgeland or hermland. Species present include a range of herbs and grasses, which tolerate the seasonally inundated conditions. Aquatic species may be recorded during periods of inundation.

Grasses present include species include Veined Swamp Wallaby-grass *Amphibromus nervosus*, Brown-back Wallaby-grass *Austrodanthonia duttoniana*, Common Blown Grass *Agrostis avenacea*, Rigid Panic *Homopholis prolata*, and Forbe Poa *Poa fordeana*. Barren Cane Grass *Eragrostis infecunda* may also be present. Herbs include Drumsticks *Pycnosorus globosus*, Swamp Daisy *Brachycome basaltica* var. *gracilis*, Hairy Willow-herb *Epilobium hirtigerum*, Rough Raspwort *Haloragis aspera*, Common Sneezeweed *Centipeda cunninghami*, Small Loosestrife *Lythrum hyssopifolia*, Buttercups *Ranunculus* spp, Poison Lobelia *Lobelia pratioides*, Sprawling Bluebell *Wahlenbergia gracilis* s.l., River Bluebell *W. fluvialis* and Slender Monkey-flower *Mimulus gracili*. Aquatic species typical of inundated sites include Common Nardoo *Marseilea drummondii*, Water Plantain *Alisma Plantago-aquatica*, Pacific Azolla *Azolla filiculoides*, Ferny Azolla *Azolla pinnata*, Western Water Starwort *Callitriche cyclocarpa*, Common Spike-sedge *Eleocharis acuta*, Swamp Lily *Ottelia ovalifolia*, Upright Milfoil *Myriophyllum crispatum*, Tiny Milfoil *Myriophyllum integrifolium*, Ridged Milfoil *Myriophyllum porcatum* and Amphibious Milfoil *Myriophyllum simulans*. Rushes and sedges include: Hollow Rush *Juncus amabilis*, Toad Rush *Juncus bufonius*, Yellow Rush *Juncus flavidus*, Joint-leaf Rush *Juncus holoschoenus*. Rush Sedge *Carex tereticaulis* may dominate wetter areas.

Significant species include Stiff Groundsel *Senecio behrianus* (endangered in Victoria and Australia), Barren Cane Grass *Eragrostis infecunda* (vulnerable in Australia), Water Starwort *Callitriche cyclocarpa* (vulnerable in Victoria and Australia) and Ridged Milfoil *Myriophyllum porcatum* (vulnerable in Victoria and Australia).



# Draft Corangamite Native Vegetation Plan

Primarily grassy (to sedgy-herbaceous) vegetation of ephemeral to seasonal wetlands on fertile soils of volcanic and sedimentary plains, sometimes with scattered or fringing eucalypts or lignum shrubs. The grassy/sedgy-herbaceous ground-layer comprises various balances of true aquatics and species tolerant of intermittent to seasonal inundation. The vegetation ranges from extremely species-poor to species-rich on some verges or shallower more ephemeral sites. Occurs in seasonally wet depressions on plains, typically associated with heavy paludal soils. Previously widespread and common in suitable habitat but now largely cleared and remnants mostly under threat. Recorded from two bioregions within study area (Victorian Volcanic Plain, Wimmera).

## Victorian Volcanic Plain 1 Plains Grassy Wetland

**Floristics:** Dominated by grasses (principally *Glyceria australis*, *Austrodanthonia duttoniana*, *Poa labillardierei*, *Amphibromus nervosus*), with sedges and herbs (notably *Eleocharis acuta*, *Juncus holoschoenus*, *Eryngium vesiculosum*, *Lobelia pratioides*) often conspicuous. Sites range from low to high species-richness. Outer fringes and more ephemeral sites can support a wide range of graminoid and herbaceous species tolerant of intermittent inundation. The relationship between mapping and classification is complicated by the linking of quadrats from the wet cores of drier systems with sites from drier margins of wetter systems.

**Structure:** Open-grassland, mostly 0.5–1.0 m in height.

**Habitat:** Shallow seasonally wet depressions and poorly defined drainage systems, on heavy grey-black clay soils.

**Nearest relative:** Red Gum Wetland

## Victorian Volcanic Plain 2 Plains Grassy Wetland

**Floristics:** Dominated by *Glyceria australis*, often with *Eleocharis acuta*, consistently very species-poor. Most of the few associated species are typically aquatic or very inundation-tolerant herbs. Some sites appear to be always species-poor, others reveal increased floristic diversity following seasonal retreat of wetland inundation.

**Structure:** Open-grassland.

**Habitat:** Seasonally wet depressions and poorly defined drainage systems, with very heavy grey-black clay soils, prone to turbidity during inundation.

**Nearest relative:** Other Plains Grassy Wetland communities, Plains Sedgy Wetland.

**Comments:** The more floristically diverse outer verges of most remnants are degraded by loss of species and weed invasion.

## EVC 132 Plains Grassland

During the pre-1750 mapping exercise within the Midlands and Otways study areas Plains Grassland was modelled on the dry basalt plains immediately north and west of Melbourne. It has also been modelled across large sections of the western volcanic plains as a mosaic with Plains Grassy Woodland. A vast majority has been cleared for agriculture and settlement and it now only occurs as small, isolated and disturbed remnants, mainly on road and rail reserves. Altitude is usually less than 200m asl (to 400m near Mt Wallace). Rainfall is generally 500-550mm per annum (to 650mm near Meredith). Soils are heavy grey cracking clays, which are often waterlogged in winter. The combination of these soils with low rainfall severely restricts tree-root growth resulting in virtually treeless plains.

The ground flora is generally visually dominated by grasses but species diversity and composition can vary greatly, largely depending on past management practices in the area; particularly past fire and grazing regimes. The most common species include Kangaroo Grass *Themeda triandra*, Lemon Beauty-heads *Calocephalus citreus*, Pink Bindweed *Convolvulus erubescens*, Scaly Buttons *Leptorhynchus squamatus*, Blue Devil *Eryngium ovinum*, Prickly Woodruff *Asperula scoparia*, Common Everlasting *Chrysocephalum apiculatum*, Wallaby Grasses *Austrodanthonia* spp. Long-hair Plume-grass *Dichelachne crinita* and Cut-leaf Goodenia *Goodenia pinnatifida*.

Tussock grassland, sometimes with scattered woody Plants, typically rich in (usually perennial) herbs when intact. Occurs on fertile, usually heavy loam or clay soils, sometimes seasonally waterlogged or collecting small ephemeral pools in gilgai depressions. Mostly on basalt derived soils, but extending to some sedimentary soils, especially in lower rainfall areas. Previously widespread and locally extensive in the north of the study area but now largely extinct and restricted to poor-quality sites along some road reserves. Recorded from two bioregions (Victorian Volcanic Plain, Wimmera).

## Victorian Volcanic Plain 1 Plains Grassland

**Floristics:** Dominated by *Themeda triandra*, with low diversity of associated grasses and small herbs (mean number of native species 15).

**Structure:** Closed tussock grassland (mostly less than 0.5 m in height), sometimes with scattered woody Plants (to 20 m). Some sites potentially derived from woodland.

**Habitat:** Fertile, basaltic, loamy to silty or clay-loam topsoils over heavy subsoils, sometimes seasonally waterlogged.

**Nearest relatives:** Plains Grassland / Plains Grassy Woodland Complex, Plains Grassy Woodland.

**Comments:** Floristic classification is at least in part a reflection of the management history of the respective sites, where diversity has been reduced by sward closure, grazing and weed invasion in some instances.

## Victorian Volcanic Plain 2 Plains Grassland

**Floristics:** Dominated by *Themeda triandra*, sometimes as co-dominant with *Poa* spp., *Austrodanthonia* spp. or *Austrostipa* spp., originally in part with scattered woody Plants, primarily species of *Eucalyptus*, *Acacia*, *Bursaria*, *Hymenathera*, *Allocasuarina*, with a low to moderate diversity of associated grasses and small herbs with perennial rootstocks (mean total number of native species 25). This community may include prior Stony Knoll Shrubland.

**Structure:** Tussock grassland mostly less than 0.5 m in height, sometimes with scattered woody Plants (to 20 m, mostly much smaller). Some sites potentially derived from former shrubland or woodland (Stony Knoll Shrubland).

**Habitat:** As well as to some extent reflecting disturbance, floristics also indicate an affiliation with more freely draining red loamy-soils of more elevated rocky crests and low stony knolls.

**Nearest relatives:** Plains Grassland / Plains Grassy Woodland Complex, Plains Grassy Woodland, Plains Grassland / Stony Knoll Shrubland Mosaic.

**Comments:** Floristic classification is at least in part a reflection of the management history of the respective sites, where diversity has been influenced by possible tree removal, the extent and duration of sward closure, grazing and weed invasions. Most remnants are degraded by loss of species and weed invasion.

## Victorian Volcanic Plain 3 Plains Grassland

**Floristics:** Dominated by *Themeda triandra*, sometimes as co-dominant with *Poa* spp., *Austrodanthonia* spp. or *Austrostipa* spp., possibly in part originally with at least scattered woody Plants, primarily species of *Eucalyptus* and *Acacia*, with a moderate to high diversity (mean total native species 43) of associated grasses and small herbs with perennial rootstocks.

**Structure:** Tussock grassland mostly less than 0.5 m tall. Some sites possibly former woodland.

**Habitat:** Fertile soils derived from basalt. Floristics suggest that while most sites are on loamy to silty or clay-loam topsoils over heavy subsoils and can be seasonally waterlogged, some sites are on drier red loamy soils.

**Nearest relative:** Plains Grassland / Plains Grassy Woodland Complex, Plains Grassy Woodland.

**Comments:** Floristic classification is at least in part a reflection of the management history of the respective sites, where diversity has been influenced by the extent and duration of sward closure, grazing and weed invasions. Most relatively species-rich remnants on roadsides and, where still regularly burnt, rail reserves. Most remnants subject to on-going degradation by loss of species and weed invasion.

## EVC 140 Mangrove Shrubland

Within the Midlands and Otways study areas Mangrove Shrubland was only mapped in tiny patches along the coast and in river estuaries from Altona Bay to Barwon heads. Altitude is at or just above sea level, rainfall is approximately 550-600mm per annum.

Mangrove Shrubland grows in saline waters, usually on mud flats within the tidal zone. Mangroves are common in this environment in warmer parts of Australia. Here they are near their southern-most limit and rarely grow over 1.5m in height. Mangrove Shrubland is often monospecific, dominated by White Mangrove *Avicennia marina* var. *australasica*. This EVC is usually surrounded by or associated with Coastal Saltmarsh Complex.

## EVC 160 Coastal Dune Scrub

Scrub or shrubland on coastal sand dunes subject to strong salt-laden winds. Occurs extensively along the coast wherever sand dunes, as opposed to rocky cliffs and bluffs, are present. More protected, less saline and largely consolidated dunefields further inland support(ed) Calcarenite Dune Woodland. Recently stabilised sections of the Discovery Bay and Bridgewater Bay dunes support this EVC. Recorded from two bioregions within the study area (Glenelg Plain, Warrnambool Plain).

## Coastal Dune Scrub

**Floristics:** Dominated by *Leucopogon parviflorus* and/or *Acacia longifolia* var. *sophorae* with a range of salt-tolerant species requiring good drainage.

**Structure:** Scrub or shrubland 2-3 m tall.

# Draft Corangamite Native Vegetation Plan

**Habitat:** Unconsolidated coastal sand dunes.

**Nearest relative:** Coastal Headland Scrub

**Comments:** Mapping of this EVC and Coastal Headland Scrub was in part based on geological mapping—verification required in areas without access. European grass *Ammophila arenaria*, previously Planted as a sand binder, is a major threat to this vegetation type.

## EVC 161 Coastal Headland Scrub

Coastal Headland Shrubland occurs in exposed situations on the limestone plains of coastal cliffs at Port Campbell and arkose sandstone cliffs at Cape Otway. The vegetation is often wind and salt-pruned due to exposure to prevailing south-west winds and salt spray. Fertile soils and high average annual rainfall of 950mm combine to maintain a diversity of species. Coastal Headland Shrubland occurs on the more protected south-west slopes and east-facing gullies.

Coastal Headland Shrubland is treeless, except for the occasional stunted Messmate *Eucalyptus obliqua*. It is dominated by a closed heath of Manuka *Leptospermum scoparium* with Silver Banksia *Banksia marginata*, Prickly Moses *Acacia verticillata*, Prickly Tea-tree *Leptospermum continentale* and Dusty Miller *Spyridium parvifolium* often occurring in lower densities. Honey-pots *Acrotriche serrulata*, Coast Beard-heath *Leucopogon parviflorus*, Ridged ground-berry *Acrotriche affinis*, Cranberry Heath *Astroloma humifusum*, Common Correa *Correa reflexa*, Common Heath *Epacris impressa* and Rough Guinea-flower *Hibbertia aspera* form a lower, ericoid shrub layer.

Sedges such as Common Bog-sedge *Schoenus apogon*, Bare Twig-sedge *Baumea juncea*, Short-stem Sedge *Carex breviculmis* and Coast Saw-sedge *Gahnia trifida* are often present. Blue Tussock-grass *Poa poiformis* is the most common grass species, with occasional Grey Tussock-grass *Poa sieberiana*. A few scattered herbs are present including Branched Centaury *Centaureum tenuifolium*, Ivy-leaf Violet *Viola hederacea*, Common Raspwort *Gonocarpus tetragynus*, Kidney-weed *Dichondra repens* and Shiny Swamp-mat *Selliera radicans*.

Coastal Headland Shrubland near Port Campbell can also occur as a mosaic with Coastal Tussock Grassland.

Scrub or shrubland on coastal cliffs and bluffs subject to strong salt-laden winds and salt spray. Occurs extensively along rocky sections of the coast. Further survey and analysis is required to determine relationships between communities of this EVC in Victoria. Recorded from all coastal bioregions within the study area (Glenelg Plain, Victorian Volcanic Plain, Warrnambool Plain).

## Warrnambool Plain Coastal Headland Scrub

**Floristics:** Dominated by *Leucopogon parviflorus* with a range of other salt and wind tolerant species.

**Structure:** Low shrubland 0.5+ m.

**Habitat:** Rocky coastal cliffs and bluffs exposed to strong salt-laden winds and salt spray, drainage poor compared to Coastal Dune Scrub.

**Nearest relatives:** Coastal Dune Scrub, Spray-zone Coastal Shrubland.

**Comments:** Wind-blown sand overlying rock results in vegetation resembling Coastal Dune Scrub; the two EVCs can intergrade with depth of sand over short distances. Forms a mosaic with Coastal Tussock Grassland in areas and may have occupied areas now supporting this EVC before grazing and burning associated with European colonisation.

## EVC 163 Coastal Tussock Grassland

Coastal Tussock Grassland occurs on cliff-top plateaus affected by seaspray. The soils are poorly structured with sands over bedrock that can only support shallow-rooted Plants. Water availability at depth is often good due to the proximity of bedrock. Harsh site quality encourages stunted and poorly-formed Plants. Rainfall for this EVC is 950mm and the average altitude is 36m asl.

This EVC is treeless and is dominated by Blue Tussock-grass *Poa poiformis*. Other grasses include Bristly Wallaby-grass *Austrodanthonia setacea*, Common Blown Grass *Agrostis avenacea* and Mat Grass *Hemarthria uncinata* var. *uncinata*. A few shrub species often occur, including Coast Beard-heath *Leucopogon parviflorus*, Manuka *Leptospermum scoparium*, Silver Banksia *Banksia marginata* and Coast Daisy-bush *Olearia axillaris*. The ground layer may carry sedges such as Bare Twig-sedge *Baumea juncea*, Common Bog-sedge *Schoenus apogon*, Short-stem sedge *Carex breviculmis*, Coast Saw-sedge *Gahnia trifida* and Coast Sword-sedge *Lepidosperma gladiatum*. Coastal Tussock Grassland supports a diversity of forbs in low densities. These include the endangered Metallic Sun-orchid *Thelymitra epipactoides*, Common Centaury *Centaureum erythraea*, Hairy Hawkbit *Leontodon taraxacoides*, Coast Daisy *Brachyschome parvula*, Kidney-weed *Dichondra repens*, Pimpernel *Anagallis arvensis*, Cat's Ear *Hypochoeris radicata*, Sow-thistle *Sonchus oleraceus*, Angled Lobelia *Lobelia alata*, Shiny Swamp-mat *Sellaria radicans*, Ivy-leaf Violet *Viola hederacea*,

Common Woodruff *Asperula conferta*, Grassland Wood-sorrel *Oxalis perennans*, Buck's-horn Plantain *Plantago coronopus*, Bidgee-widgee *Acaena novae-zelandiae*, Spear Thistle *Cirsium vulgare* and Rough Fireweed *Senecio hispidulus*. A diversity of weed species may occur within this Coastal Tussock Grassland.

Shallow ephemeral swamp depressions occur within this EVC. The zone where the water recedes allows herbs to establish, which links these ephemeral sites to the Coastal Tussock Grassland. For mapping purposes, these sites will be incorporated in Coastal Tussock Grassland. In addition, Coastal Tussock Grassland near Port Campbell may occur as a mosaic with Coastal Headland Shrubland.

Tussock grassland ± emergent shrubs on coastal cliffs and bluffs or estuaries. Soils are saline and, on cliffs and bluffs, also exposed to strong salt-laden winds, thus precluding tree growth. Comprises two floristic communities in different ecological situations although both dominated by the same grass *Poa poiformis*. Recorded from one bioregion within study area (Warrnambool Plain) but likely to have also occurred in estuaries of the other coastal bioregions (Glenelg Plain, Victorian Volcanic Plain).

## Headland Coastal Tussock Grassland

**Floristics:** Dominated by tussock grasses *Poa poiformis* and *Themeda triandra*, with the shrub *Leucopogon parviflorus* as a common associate.

**Structure:** Closed-grassland or open-shrubland.

**Habitat:** Rocky coasts with at least some soil development.

**Nearest relative:** Coastal Headland Scrub.

**Comments:** Except for narrow strip along cliff tops, likely to have extended inland at the expense of Coastal Headland Scrub with European land use.

## Estuarine Flats Coastal Tussock Grassland

**Floristics:** Dominated by *Poa poiformis*, comprising a small number of salt-tolerant (halophytic) herbs such as *Distichlis distichophylla*.

**Structure:** Grassland 1.0 m tall.

**Habitat:** Sand deposits (cheniers) on estuarine flats and on outer (landward) zone of estuaries. Subject to fluctuating salinity but rarely if ever flooded by tides.

**Nearest relative:** Estuarine Wetland.

**Comments:** Stands observed at Curdies Inlet are below mapping threshold but the area requires detailed survey.

## EVC 164 Creepline Herb-rich Woodland

Creepline Herb-rich Woodland is limited in extent and is found scattered across the drier sections of the Midlands region, often growing in association with Heathy Dry Forest, Grassy Dry Forest or Valley Grassy Forest.

It occurs on creek terraces of ephemeral streams. Altitudes vary from 250-600m asl and annual is rainfall generally less than 700mm. Major occurrences are in the Brisbane Ranges National Park, Enfield State Park and the north eastern section of Wombat State Forest.

Creepline Herb-rich Woodland is an open woodland of Swamp Gum *Eucalyptus ovata*, or the rare Yarra Gum *E. yarraensis*, with occasional Manna Gum *E. viminalis* and Narrow-leaf Peppermint *E. radiata*. Scattered shrubs such Blackwood *Acacia melanoxylon*, Silver Wattle *A. dealbata*, Large-leaf Bush-pea *Pultenaea daphnoides* or Sweet Bursaria *Bursaria spinosa* may be present along with clumps of Austral Bracken *Pteridium esculentum*. The ground has a dense covering of Common Tussock-grass *Poa labillardieri* with scattered herbs such as Cinquefoil *Geranium potentilloides*, Bidgee-widgee *Acaena novae-zelandiae*, Prickly Starwort *Stellaria pungens*, Fireweed Groundsel *Senecio linearifolius*, Kidney-weed *Dichondra repens* and Common Maidenhair *Adiantum aethiopicum*. The weeds Spear Thistle *Cirsium vulgare*, Sweet Vernal Grass *Anthoxanthum odoratum* and Yorkshire Fog *Holcus lanatus* are also common.

## EVC 165 Damp Heath Scrub

Damp Heath Scrub occurs on flat to gently sloping terrain, on or near coastal sites near Port Campbell and in a number of widely distributed locations including Cooriemungle and Jancourt Forest/Hanson Plain public land blocks. During the pre-1750 vegetation mapping exercise, this EVC was modelled on an extensive flat near the coast between the Port Campbell National Park and the Cooriemungle public land block. This extends its distribution from the valley-type environments it commonly occupies in the extant examples on public land. High rainfall and lack of drainage of the tableland-like area combine to retain high levels of moisture throughout the year.

Floristically this EVC carries influences of Wet Heath The overstorey is generally sparse and includes Swamp Gum *Eucalyptus ovata* and less commonly Brown Stringbark *E. baxteri*. The shrub layer is very dense and includes Prickly Tea-tree *Leptospermum continentale*, Silver Banksia *Banksia marginata*, Prickly Moses *Acacia verticillata*, Scrub Sheoke

# Draft Corangamite Native Vegetation Plan

*Allocasuarina paludosa*, Common Heath *Epacris impressa*, Scented Paperbark *Melaleuca squarrosa*, Dusty Miller *Spyridium parvifolium* and Honey-pots *Acrotriche serrulata*.

Other common species are Austral Grass-tree *Xanthorrhoea australis*, Spreading Rope-rush *Empodisma minus*, Slender Dodder-laurel *Cassytha glabella*, Common Rapier-sedge *Lepidosperma filiforme*, Screw-fern *Lindsea linearis* and Honey Cone-bush *Isopogon ceratophyllus*.

## EVC 175 Grassy Woodland

Within the Midlands and Otways study areas the pre-European extent of Grassy Woodland was modelled across large areas, on a variety of geologies and in a range of environments. All Grassy Woodlands, not considered part of the plains were placed in this group. It is therefore, a very broad EVC which encompasses a number of floristic communities, further sampling and analyses are required to resolve these groupings.

In general, Grassy Woodlands grow in areas with moderate to low rainfall and relatively fertile soils. The largest area of Grassy Woodland modelled is on the eastern section of the Otway Plain (including the Bellarine Peninsula). This is a large area of gently undulating plains extending from Portarlington to Colac. Geology is Tertiary sands, altitude is generally below 250m and the average annual rainfall varies from a low of 550mm per annum near Torquay to 700mm at Colac. The same land form and geology continues further west but with increased rainfall that supports forested communities. In the drier eastern sections, the overstorey is dominated by Drooping She-oak *Allocasuarina verticillata* with Manna Gum *Eucalyptus viminalis* and Black Wattle *Acacia mearnsii*. The shrub layer is sparse and includes scattered Golden Wattle *Acacia pycnantha* and Sweet Bursaria *Bursaria spinosa*. The ground layer is likely to have been dominated by Wallaby-grasses *Austrodanthonia* spp. and Spear Grasses and *Austrostipa* spp. As rainfall increases to the west, Drooping She-oak and shrubs disappear, Manna Gum *E.viminalis* and Blackwood *Acacia melanoxylon* become dominant in the overstorey and Kangaroo Grass *Themeda triandra* dominates the ground layer.

Other areas mapped as Grassy Woodland include:

The Barrabool Hills just southwest of Geelong. Low but highly dissected hills of Cretaceous sandstone. Rainfall is low and the few remnants suggest the vegetation was similar to the nearby drier sections of the Otway Plain. Whether the steep sided valleys had the same vegetation as the flatter hill tops was not clear. These hills have been virtually completely cleared the Pentland Hills, north west of Bacchus Marsh. Steeply dissected hills of highly weathered Tertiary volcanics ranging from an altitude of 200m asl and 500mm annual rainfall at Bacchus Marsh to 500m and 700mm at Greendale. The overstorey is dominated by scattered Candelbark *Eucalyptus rubida* and Swamp Gum *E. ovata* near Greendale and of White Cypress Pine *Callitris glaucophylla* on steep and otherwise bare scree slopes near Bacchus Marsh. Blackwood *Acacia melanoxylon* and Black Wattle *A. mearnsii* are present throughout.

Low hills just east of the Bamganie State Forest (southwest of Meredith). Gently undulating hills of Ordovician sediments and Tertiary fluvial gravels and silts. Altitude is 300m asl and mean annual rainfall is approximately 650mm. The overstorey is dominated by Manna Gum *Eucalyptus viminalis* with patches of Swamp Gum *E. ovata* and scattered tall shrubs including Blackwood *Acacia melanoxylon*, Black Wattle *A.mearnsii* and Black She-oak *Allocasuarina littoralis*. The ground layer is dominated by Spear-grasses *Austrostipa* spp. with Wallaby-grasses *Austrodanthonia* spp., Kangaroo Grass *Themeda triandra*, Black-anther Flax-lily *Dianella revoluta* and Honey-pots *Acrotriche serrulata*.

Kongaderra Hills north of Mickleham. Low, undulating of hills of Silurian sediments (marine sandstones and siltstones) with an altitude range of 200-300m asl. Rainfall is approximately 600mm per annum. These hills are now virtually devoid of trees. Remnants include scattered Yellow Box *Eucalyptus melliodora* on lower slopes and gullies leading into Deep Creek and Red Gum *E. camaldulensis* in the creek itself in addition to a few Grey Box *E. microcarpa* and Drooping She-oak *Allocasuarina verticillata*. Shrubs are common along the roadside reserves including Blackwood *Acacia melanoxylon*, Hedge Wattle *A. paradoxa*, Black Wattle *A. mearnsii*, Golden Wattle *A. pycnantha* and Lightwood *A. implexa*. The ground layer is dominated by grasses, particularly Spear-grasses *Austrostipa* spp., Wallaby-grasses *Austrodanthonia* spp. and Kangaroo Grass *Themeda triandra*, with Tussock-grasses *Poa* spp., Weeping Grass *Microleana stipoides* and Common Wheat-grass *Elymus scaber*.

## Floristic Community 175-04 Low Rises Grassy Woodland

Low Rises Grassy Woodland was once widespread across north-central Victoria where it occurred on the boundary between the plains (usually Riverina Plains Grassy Woodland) and the dry forests (usually Box-Ironbark Forest) of the low hills. It has been largely cleared for agriculture and is described by Muir *et al.* (1995).

Within the pre-1750 mapping exercise for the Midland and Otways study areas Low Rises Grassy Woodland was modelled in the far northwest, around Ararat, Stawell and the Pyrenees Ranges and in a small, isolated area south of the Great Dividing Range in the dry rain shadow areas near Melton. Low Rises Grassy Woodland occurs on the lowest of rises on the boundary between the infertile Ordovician sediments of the hills and the more fertile Quaternary alluvials and colluvial geologies of the plains. Altitude varies from 200 to 300m, rainfall is generally below 550mm per annum.

The overstorey is dominated by Grey Box *Eucalyptus microcarpa*, though Yellow Gum *E. leucoxylon* may be co-dominant and Yellow Box *E. melliodora* is occasionally present. The shrub layer can be sparse or dense but is generally low and lacks diversity. Species include Sticky Wattle *Acacia verniciflua*, Gold-dust Wattle *A. acinacea*, Golden Wattle *A. pycnantha*, Drooping Cassinia *Cassinia arcuata*, Grey Everlasting *Ozothamus obcordata* and Moonah *Melaleuca lanceolata*. The ground layer is often sparse but diverse in grasses and forbs including Spear-grasses *Austrostipa* spp., Wallaby-grasses *Austrodanthonia* spp. Grey Tussock-grass *Poa sieberiana*, Common Wheat-grass *Elymus scaber*, Windmill Grass *Chloris truncata*, Saloop *Einadia hastata*, Fuzzy New Holland Daisy *Vittadinia cuneata*, Pink Bindweed *Convolvulus erubescens*, Shiny Everlasting *Bracteantha viscosa* and Small-leaved Clematis *Clematis microphylla*.

## Floristic Community 175-10 Lunette Grassy Woodland

Lunette Grassy Woodland has been modelled on crescent-shaped rises of Quaternary aeolian sands. These lunettes are found on the eastern shore of existing or past lakes from which they are derived, blown from the lake beds during dry periods. It is usually modelled in association with Plains Grassy Woodland, Stony Rises Herb-rich Woodland or Swamp Scrub. Mean annual rainfall ranges is approximately 550-700mm. No remnants of this community were observed, its pre-1750 extent has been modelled to follow Quaternary lunette geology. Other EVCs which also occupy lunettes are Sand Forest and Damp Sands Herb-rich Woodland from which Lunette Grassy Woodland is modelled by the absence of Austral Bracken *Pteridium esculentum* which occurs in these two EVCs and is rarely ever eradicated, regardless of disturbance. Environmental factors influencing their distribution are possibly depth of sand and drainage patterns.

## Floristic Community 175-11 Granitic Grassy Woodland

Granitic Grassy Woodland is a highly variable group and represents all Grassy Woodlands occurring on granite geologies within the study area. Variability in the structure and mineralogy of different granites (particularly clay content) impacts on the fertility and water holding capacity of the derived soils which in turn influences the vegetation present at a site. Granitic Grassy Woodland occurs on highly weathered granites, on gentle to flat topography and in moderate rainfall areas. Within the pre-1750 mapping exercise for the Midlands and Otways study areas, Granitic Grassy Woodland was modelled in only a few, small areas. The largest of these is in the Flagstaff Hill area, west of Linton where altitude ranges from 300-450m asl and average annual rainfall is approximately 650mm. In remnants the overstorey is dominated by Manna Gum *Eucalyptus viminalis* with Messmate Stringybark *E. obliqua*. The ground layer is rich in grasses and forbs. Common species include Kangaroo Grass *Themeda triandra*, Common Wheat-grass *Elymus scaber*, Wallaby-grasses *Austrodanthonia* spp., Grey Tussock-grass *Poa sieberiana*, Velvet Tussock-grass *P. rodwayi*, Bidgee-widgee *Acaena novae-zealandiae*, Common Everlasting *Chrysocephalum apiculatum*, Stinking Pennywort *Hydrocotyle laxiflora* and Common Rice-flower *Pimelea humilis*.

This floristic community was also modelled in the Yendon/Mt Egerton area where altitude ranges from 480-540m asl and rainfall is approximately 700-800mm per annum. In remnants, the overstorey varies from open woodland towards open forest. It is dominated by Manna Gum *Eucalyptus viminalis* and Narrow-leaf Peppermint *E. radiata* with scattered Swamp Gum *E. ovata* and Snow Gum *E. pauciflora* and the understorey tree/shrub Blackwood *Acacia melanoxylon*. The ground layer is diverse and includes Tussock-grasses *Poa* spp., Wallaby-grasses *Austrodanthonia* spp., Reed Bent-grass *Deyeuxia quadrisetata*, Weeping Grass *Microleana stipoides*, Yellow Rush-lily *Tricoryne elatior*, Austral Bracken *Pteridium esculentum* and Common Rice-flower *Pimelea humilis*.

## EVC 178 Herb-rich Foothill Forest/Shrubby Foothill Forest Complex

Along the western edge of the Wombat State Forest near Barkstead a large area has been mapped as Shrubby Foothill forest/Herb-rich Foothill Forest Complex. This contains the diverse herb layer of EVC 23 Herb-rich Foothill forest while retaining the diverse shrub layer of EVC 45 Shrubby Foothill Forest. It is usually dominated by species, which occur at the drier end of both EVCs.

## EVC 181 Coast Gully Thicket

# Draft Corangamite Native Vegetation Plan

Coast Gully Thicket occurs along drainage lines and small creeks close to the coast. The soils are shallow sands grading to clay over limestone. Closed coastal scrub is a wind stressed environment as the prevailing south-west winds prune Plants greater than three metres in height.

Swamp Gum *Eucalyptus ovata* and Messmate Stringybark *E. obliqua* are the dominant eucalypts and are short, wind pruned individuals. Some of the sites lack a eucalypt overstorey. This EVC is dominated by a dense cover of Rough Guinea-flower *Hibbertia aspera* and Austral Bracken *Pteridium esculentum*. Manuka *Leptospermum scoparium* also adds to the dense thicket, making it difficult for other Plants to establish at ground level. Prickly Tea-tree *Leptospermum continentale* and Coast Beard-heath *Leucopogon parviflorus* occasionally contribute to the shrub layer. Easterly sites that offer some protection provide suitable conditions for tufted graminoids to establish such as Spiny-headed Mat-rush *Lomandra longifolia*, Black-anther Flax-lily (s.l.) *Dianella brevicaulis/revoluta*, Coast Saw-sedge *Gahnia trifida*, Tall Sword-sedge *Lepidosperma elatius* and Variable Sword-sedge *Lepidosperma laterale* and Common Tussock-grass *Poa labillardieri*. Downy Dodder-laurel *Cassytha pubescens* s.s. takes advantage of the shrub structure and Mountain Clematis *Clematis aristata* is the other climber.

## EVC 196 Seasonally Inundated Sub-saline Herbland

The following description is from Yugovic (1985).

Within the Midlands and Otways study area Seasonally inundated Sub-saline herbland was only mapped in the Lake Connemare State Game Reserve south of Geelong which is the only known location of this EVC in Victoria. Here it occupies the centre of a broad shallow basin, the relic of a former tidal lagoon. The area is totally surrounded by Coastal Saltmarsh Complex, it is not affected by tides, however a shallow brackish lake forms over the herbland for several months following major floods of the Barwon River (2km to the north). The soil is a grey silty clay. The geology is recent aeolian estuarine sands and the rainfall is approximately 600 mm per annum.

The low, prostrate shrub Silky Wilsonia *Wilsonia humilis* dominates this EVC, forming extensive, almost pure stands. Narrow-leaf Wilsonia *W. backhousei* and Round-leaf Wilsonia *W. rotundifolia* are common in depressions at the southern end of the herbland.

## EVC 198 Sedgy Riparian Woodland

Sedgy Riparian Woodland is mapped in both the Midlands and Otways study areas and will be described separately (below).

### Midlands study area:

Sedgy Riparian Woodland is limited has a limited distribution within the Midlands area. It occurs in broad flat drainage lines which may be seasonally inundated. Soils are generally recent Quaternary alluvial of varying depths. This EVC occurs in a wide range of altitudes and rainfall.

Sedgy Riparian Woodland usually has an overstorey of Swamp Gum *Eucalyptus ovata* or the rare Yarra Gum *E. yarraensis* over an open shrub layer of Blackwood *Acacia melanoxylon*, Prickly Moses *A. verticillata*, Prickly Tea-tree *Leptospermum continentale* and Wiry Bossiaea *Bossiaea cordigera*.

The groundlayer is often dominated by a very dense sward of Red-fruit Saw-sedge *Gahnia sieberiana* and/or Tall Sword-sedge *Lepidosperma elatius*. Sometimes it is more open with scattered clumps of Spiny-headed Mat-rush *Lomandra longifolia* ssp. *longifolia* among a layer of small sedges, rushes and herbs including Spreading Rope-rush *Empodisma minus*, Club-sedges *Isolepis* spp. Rushes *Juncus* spp. Slender Tussock-grass *Poa tenera*, Weeping grass *Microleanea stipoides*, Kidney-weed *Dichondra repens* and Prickfoot *Eryngium vesiculosum*.

Weed species are often present due to high soil fertility and ready availability of moisture. These include Yorkshire Fog-grass *\*Holcus lanatus*, Cat's ear *\*Hypochoeris radicata*, Sweet Vernal-grass *\*Anthoxanthum odoratum* and Perennial Thistle *\*Cirsium vulgare* are often present.

### Otways study area:

Within the Otways study area Sedgy Riparian Forest occurs on riparian flats of creeks that are frequently inundated by flooding or along drainage lines carrying ephemeral streams. The soils are alluvial grey silty loams to silty clay loams. These soils are typically deep but occasionally shallow over a layer of clay. Average altitude is 110m asl and an average annual rainfall is 800mm. Some sites mapped as Sedgy Riparian Forest are not directly associated with creeks or drainage lines but occur upslope from these areas. These tend to have more herbs and grasses dominating the ground layer and less sedges, thereby expressing an affinity with EVC 23 Herb-rich Foothill Forest.

Generally this EVC is dominated by a Swamp Gum *Eucalyptus ovata* overstorey, 25 to 30m tall and is often associated with Messmate *Eucalyptus obliqua*. Prickly Tea-tree *Leptospermum continentale*, Prickly Moses *Acacia verticillata*, Scented Paperbark *Melaleuca squarrosa* and Prickly Currant-bush *Coprosma quadrifida* often form dense stands in the shrub layer.

A dense layer of sedges in the ground stratum is characteristic of this EVC. This layer is commonly comprised of Variable Sword-sedge *Lepidosperma laterale* var. *majus* though Red-fruit Saw-sedge *Gahnia sieberiana* and Thatch Saw-sedge *Gahnia radula* can also form dense stands.

More open sites allow herbs to establish such as Common Raspwort *Gonocarpus tetragynus*, Cat's ear *Hypochoeris radicata*, Shady Wood-sorrel *Oxalis exilis*, Bidgee-widgee *Acaena novae-zelandiae*, Ivy-leaf Violet *Viola hederacea*, Matted Pratia *Pratia pedunculata*, Kidney-weed *Dichondra repens* and Hairy Pennywort *Hydrocotyle hirta*. Austral Brooklime *Gratiola peruviana* is present at creek sites. Slender Tussock-grass *Poa tenera* and Forest Wire-grass *Tetrarhena juncea* are the dominant grasses, with the

## EVC 200 Shallow Freshwater Marsh

During the pre-1750 vegetation mapping exercise, evidence of this EVC was found on a different geology to that of extant vegetation. This was swamp and lagoonal deposits within the newer volcanics, whereas extant examples were found on stream alluvium and depressions within tertiary sand areas. In both cases the soils are deep anaerobic silts. It was identified within the grounds of the Avalon Airport, approximately 15 km north east of Geelong. Due to lack of intact remnants in the pre-1750 area, species are presumed to be similar to extant examples.

## EVC 201 Shrubby Wet Forest

Within the Otways study area Shrubby Wet Forest is widely distributed. It occupies western and northern aspects and ridgelines and grows in association with EVC 30 Wet Forest where the elevation and rainfall within the study area decreases. Average annual rainfall is high at 1200mm, soils are fertile clay loams over medium to heavy clay and average altitude is 200m asl.

Shrubby Wet Forest differs from Wet Forest in generally having no epiphyte cover, a lower diversity of ground ferns, and Rough Treefern *Cyathea australis* is the common treefern, Soft Treefern *Dicksonia antarctica* occurring only rarely. In addition it has a higher diversity and cover of herbs due to increased light reaching the forest floor.

The overstorey is a tall forest dominated by Messmate *Eucalyptus obliqua*, Mountain Grey Gum *E. cypellocarpa* and Manna Gum *E. viminalis*. Blackwood *Acacia melanoxylon* and Hazel Pomaderris *Pomaderris aspera* form a lower tree layer.

The tall-shrub layer is dominated by mesic shrubs including Prickly Currant-bush *Coprosma quadrifida*, Musk Daisy-bush *Olearia argophylla*, Snow daisy-bush *O. lirata*, Hazel Pomaderris *Pomaderris aspera*, Tree everlasting *Ozothamus ferrugineus* and Austral Mulberry *Hedycarya angustifolia*. Prickly Moses *Acacia verticillata* and Hop Goodenia *Goodenia ovata* form a mid shrub layer. Tree-form Varnish Wattle *Acacia verniciflua* and Dwarf Silver Wattle *A. nano-dealbata* and the shrubs *Prostanthera melissifolia* and *Spyridium parvifolium* also commonly occur, their density varying, possibly in response to timber harvesting.

Rough Treefern *Cyathea australis* and Mother Shield-fern *Polystichum proliferum* are common ferns with Austral Bracken *Pteridium esculentum* dominating.

The ground layer may be sparse and includes the herbs Bidgee-widgee *Acaena novae-zelandiae*, Cinquefoil Cranesbill *Geranium potentilloides*, Ivy-leaf Violet *Viola hederacea*, Creeping Wood-sorrel *Oxalis corniculata*, *Galium* sp. and Forest Starwort *Stellaria flaccida*. Mountain Clematis *Clematis aristata* is the only climber and Tall Sword-sedge *Lepidosperma elatius* the only sedge. Forest Wire-grass *Tetrarhena juncea* is commonly present and may dominate, often in response to disturbance.

## EVC 203 Stony Rises Woodland

Stony Rises Woodland was only located at the Floating Islands Reserve along the Princes Highway west of Colac. The reserve has a history of grazing and much of it is in extremely poor condition and weed-invaded. Soils are derived from quaternary basalts and in some places may be absent where bedrock protrudes from the surface.

Structurally the vegetation is open grassy woodland to 15m tall. The overstorey is dominated by Manna Gum *Eucalyptus viminalis* and Swamp

# Draft Corangamite Native Vegetation Plan

Gum *E. ovata*. The shrub layer is scattered and includes Shiny Cassinia *Cassinia longifolia*, Blackwood *Acacia melanoxylon*, Tree Violet *Hymenanthera dentata*, Cherry Ballart *Exocarpus cupressiformis* and the occasional Musk Daisy-bush *Olearia argophylla* surviving on rocky rises. The ground layer is dominated by Common Tussock-grass *Poa labillardieri*, *Senecio* spp, Sickle Fern *Pelleaea falcata*, Yorkshire Fog *Holcus lanatus*, *Geranium* spp, Spiny-headed Mat-rush *Lomandra longifolia* ssp. *longifolia*, Cat's Ear *Hypochoeris radiata*, *Aira* spp, Cleavers *Galium alparine*, *Pterostylis* spp and *Pelagonium* spp.

Stony Rises Woodland is found on Quaternary volcanics of the western volcanic plains of Victoria where lava tunnels have collapsed forming a mosaic of rocky woodland and wetlands. These wetlands are typically Plains Sedgy Wetland.

Stony Rises Herb-rich woodland was only identified on public land in a tiny area at the Floating Islands Flora Reserve to the south of Lake Corangamite. During the pre-1750 vegetation mapping exercise it was modelled extensively to follow the Quaternary volcanic stony-rise geology. Soils are fertile clays though often shallow and rocky. The topography is undulating and the mean annual rainfall varies from approximately 550-700mm. Much of the prior extent of this EVC has been cleared for agriculture.

The overstorey is woodland of Manna Gum *Eucalyptus viminalis* ssp. *viminalis* over a ground layer dominated by Austral Bracken *Pteridium esculentum* and Common Tussock-grass *Poa labillardieri*. Frequently occurring shrubs are Tree Violet *Hymenanthera dentata* and Blackwood *Acacia melanoxylon*.

## EVC 233 Wet Sands Thicket

Wet Sands Thicket has a limited distribution within the Otways study area and is restricted to areas that combine high rainfall with sandy Tertiary outwash geology. The average elevation is 200m asl and average annual rainfall is high at 1300mm where this EVC is best developed, dropping to 1000-1200mm in more marginal sites. The soils are characteristically deep, coarse grey sands.

The overstorey is a tall open forest dominated by Messmate *Eucalyptus obliqua*, Brown Stringybark *E. baxteri* and Blue Gum *E. globulus*, ranging in height from 30-50m. In the Cape Otway the rare Bog Gum *Eucalyptus kitsoniana* dominates. The shrub layer is characteristically dense to impenetrable and is strongly represented by Showy Bossiaea *Bossiaea cinerea*, Bushy Broom-heath *Monotoca glauca* and to a lesser extent by Forest Boronia *Boronia muelleri*, Victorian Christmas-bush *Prostanthera lasianthos*, Musk Daisy-bush *Olearia argophylla* and Scented

## EVC 282 Shrubby Woodland

### Floristic Community 282-03 Brisbane Ranges Shrubby Woodland

Brisbane Ranges Shrubby Woodland occurs in a small area of the Brisbane Ranges National Park on Tertiary sands and clays. It grows on the boundary between EVC 55 Plains Grassy Woodland and EVC 16 Lowland Forest. The area is flat, altitude 350m asl and average annual rainfall is 650mm.

The overstorey is dominated by Messmate *Eucalyptus obliqua* over a low, sparse, heathy shrub layer including Prickly Tea-tree *Leptospermum continentale*, Heath Tea-tree *L. myrsinoides*, Honey-pots *Acrotriche serrulata* and Common Beard-heath *Leucopogon virgatus*. The ground stratum is diverse and includes Hidden Violet *Viola cleistogamoides*, Trailing Goodenia *Goodenia lanata*, Creeping Bossiaea *Bossiaea prostrata*, Common Bog-sedge *Schoenus apogon*, Weeping Grass *Microlaena stipoides* and Yellow Rush-lily *Tricoryne elatior*.

Shrubby Woodland is similar to an area described as Herb-rich Heathy Woodland in Dergholm State Park (Rankin 1997).

Within the Midlands and Otways study areas *Riverina* Plains Grassy Woodland has been modelled for the pre-1750 mapping exercise in the far north-west, on the plains near the Pyrenees Ranges and in isolated pockets south of the Great Dividing Range on the western plains near Melton. In the north, *Riverina* Plains Grassy Woodland has been modelled on Quaternary alluvial flood plain deposits and in the south mainly on basalt plains in addition to some Quaternary colluvial deposits. Altitude ranges from 120-300m asl, rainfall is a low 500-550mm per annum.

*Riverina* Plains Grassy Woodland is open woodland of Grey Box *Eucalyptus microcarpa* with scattered stands of Buloke *Allocasuarina luehmannii*. Extant remnants have few if any shrubs, however it is thought that this community may have been of a shrubby nature prior to European settlement. Shrubs recorded include Gold-dust wattle *Acacia acinacea*, Golden Wattle *A. pycnantha*, Sticky Wattle *A. verniciflua*, Sweet Bursaria

*Bursaria spinosa*, Tree Violet *Hymenanthera dentata*, Drooping Cassinia *Cassinia arcuata* and Turkey Bush *Eremophila deserti*. The grassy understorey is dominated by Wallaby-grasses and Spear Grasses including Common Wallaby-grass *Austrodanthonia caespitosa*, Bristly Wallaby-grass *A. setacea*, Stiped Wallaby-grass *A. racemosa* and Spear-grasses including Rough Spear-grass *Austrostipa scabra* ssp. *falcata* and Kneed Spear-grass *A. bigeniculata*. Other common grasses include Windmill Grass *Chloris truncata*, Red-leg Grass *Bothriochloa macra*, Common Wheat-grass *Elymus scaber* and Grey Tussock-grass *Poa sieberiana*. Chenopods such as Nodding Saltbush *Einadia nutans*, Wingless Bluebush *Maireana enchylaenoides* and Ruby Saltbush *Enchylaena tomentosa* are also common along with Kidney-weed *Dichondra repens*, Black-anther Flax-lily *Dianella revoluta* and Small-leaved Clematis *Clematis microphylla*.

The best remnants of *Riverina* Plains Grassy Woodland in the Midlands and Otways study area are on the Eynesbury Estate south of Melton on private land and not accessible to the public.

## EVC 292 Red Gum Wetland

Eucalypt woodland with sedgy or grassy-herbaceous ground-layer, comprising various balances of true aquatics and species tolerant of intermittent to seasonal inundation. Occurs in seasonally wet depressions on plains, typically associated with heavy paludal soils, sometimes with gilgai development. Previously common in suitable habitat but now largely cleared. Recorded from two bioregions within study area (Grampians, Wimmera).

## EVC 300 Reed Swamp

Reed Swamp has only been mapped in one location in the Midlands and Otways study areas, in the Lake Connewarre State Game Reserve, south of Geelong, where it covers much of Reedy Lake. It occurs on Quaternary sedimentary geology of mainly estuarine sands. The soils are peaty, silty clays and average annual rainfall is approximately 600mm. Reed Swamp requires shallow water (to 1m deep) and low current-scour. It can only tolerate very low levels of salinity. It occupies approximately 5 square kilometres of the centre of Reedy Lake. The more saline margins of the lake support Coastal Saltmarsh Complex and Cane Grass-Lignum Halophytic Hermland.

Reed Swamp is a closed to open grassland/sedgeland dominated by Common Reed *Phragmites australis* to 2-3m tall. Amongst the Common Reed are more open areas of tall sedges to 2m including Cumbungi *Typha orientalis*, River Club-sedge *Schoenoplectus validus* and Tall Spike-sedge *Eleocharis sphacelata*. Also growing in these less shaded areas are small species such as Swamp Crassula *Crassula helmsii*, Water Buttons *Cotula coronopifolia* and the floating species Pacific Azolla *Azolla filliculoides* and Common Duckweed *Lemna minor*.

## EVC 641 Riparian Woodland

Woodland dominated by *Eucalyptus camaldulensis* over tussock grass *Poa labillardieri* dominated understorey, beside permanent streams, typically on narrow alluvial deposits. Tall shrubs may be present and amphibious herbs may occur in occasional ponds and beside creeks. While flooding may be common, sites are rarely inundated for lengthy periods. High volume seasonal flows may be common. Formerly widespread along major creeks and rivers on the plains within the study area, now greatly reduced in area due to clearing for agriculture. Remnant areas are subject to high levels of disturbance from grazing, timber cutting, and recreational vehicles and weed invasion. Recorded from four bioregions (Wimmera, Glenelg Plain, Dundas Tablelands, Victorian Volcanic Plain).

### Victorian Volcanic Plain Riparian Woodland

**Floristics:** Dominated by *Eucalyptus camaldulensis*, typically with *Poa labillardieri*, sedges and instream aquatics sometimes conspicuous in more intact sites.

**Structure:** Woodland 10-30 m tall.

**Habitat:** Alluvial soils on verges of permanent streams, including instream ponds.

**Nearest relative:** Creepline Grassy Woodland, Floodplain Riparian Woodland.

## EVC 647 Plains Sedgy Wetland

Primarily sedgy-herbaceous vegetation of ephemeral to seasonal wetlands on fertile soils of volcanic and sedimentary plains, sometimes with scattered or fringing eucalypts or tea-tree/paperbark shrubs in higher rainfall areas. A range of aquatic herbs can be present, and species-richness is mostly relatively low to moderate, but higher towards drier margins. Occurs in seasonally wet depressions on plains, typically associated with silty peaty or heavy clay paludal soils. Plains Sedgy

# Draft Corangamite Native Vegetation Plan

Wetland typically occurs in sites of most sustained and deeper inundation than Plains Grassy Wetland. Previously widespread and relatively common in restricted suitable habitat, but now largely cleared and remnants mostly under threat. Recorded from two bioregions within study area (Dundas Tablelands, Victorian Volcanic Plain).

## **Victorian Volcanic Plain Plains Sedgy Wetland**

**Floristics:** Variouly dominated by *Carex tereticaulis*, *Amphibromus sinuatus* and aquatic herbs (notably *Stellaria angustifolia*, *Isolepis fluitans*, *Myriophyllum* spp., *Triglochin procerum*, *Neopaxia australasica*). In higher rainfall versions such as Annya Forest, *Juncus procerus* and *Carex appressa* may be the largest graminoids present. These variants, with a somewhat similar but less-rich aquatic flora, are presumed to represent an undescribed additional community.

**Structure:** Open-sedgeland (to 1.5 m) to mat-forming or weakly emergent aquatic hermland.

**Habitat:** Occurs in seasonally wet depressions on plains typically associated with silty peaty paludal soils over heavy clays.

**Nearest relative:** Plains Grassy Wetland, Aquatic Hermland.

## **EVC 653 Aquatic Hermland**

Hermland of permanent to semi-permanent wetlands, dominated by sedges (especially on shallower verges) and/or aquatic herbs. Occurs on fertile paludal soils, typically heavy clays beneath organic accumulations. Previously widespread within restricted areas of suitable habitat across the study area but now greatly reduced through draining and use for agriculture. Recorded from five bioregions (Dundas Tablelands, Glenelg Plain, Victorian Volcanic Plain, Warrnambool Plain, Wimmera).

### **Aquatic Hermland**

**Floristics:** Dominated by *Eleocharis sphacelata*, *Triglochin procerum* and *Myriophyllum* spp., sometimes with other aquatics such as *Potamogeton tricarlinatus* and *Villarsia reniformis* also conspicuous.

**Structure:** Sedgeland or hermland, with submerged and floating to (mostly less than 0.5 m) emergent aquatic species.

**Habitat:** Deeper, more continuously inundated wetlands, with heavy clay soils beneath organic layers.

**Nearest relatives:** Plains Sedgy Wetland, wetlands within Floodplain Riparian Woodland and Riparian Woodland.

**Comments:** Reasonably resilient flora capable of invading suitable artificial waterbodies.

## **EVC 681 Deep Freshwater Marsh**

Semi-permanent wetlands, where at least central areas are inundated for in excess of 6 months each year and soils remain virtually continuously wet. Centres of wetlands in this category of wetland typically support Aquatic Hermland. Fringes are variously dominated by sedges, reeds or rushes, or shrubs, varying according to habitat type in which wetland is occurring. Each wetland descriptor refers to the deepest or wettest area of the respective wetland, hence Deep Freshwater Marsh typically represents mosaics of different vegetation types reflecting the inundation regime. The main EVCs occurring within Deep Freshwater Marsh are mosaics with Aquatic Hermland, variously including Red Gum Wetland, Plains Sedgy Wetland, Sedge Wetland, Swamp Scrub, Floodplain Riparian Woodland and rarely small areas of Brackish Wetland.

## **EVC 684 Permanent Saline**

Descriptor denotes saline waterbodies where inundation, at least in their central portion, is continual. Peripheral vegetation is typically similar to that of semi-permanent saline wetlands in same area. Permanent water areas support species-poor hermland dominated by *Ruppia* spp. or *Lepilaena* spp. (Aquatic Meadow). Both semi-permanent saline and permanent saline wetlands have mostly been treated as the same EVC (Saline Lake) during mapping, except where it was reasonable to attempt to distinguish drier verges or more seasonal wetland communities such as Brackish Wetland, Inland Saltmarsh / Salt Paperbark Woodland or Lignum Swamp.

## **EVC 710 Damp Heathland**

Heathland, or scrub (>2 m tall) if long unburnt, developed on sites of intermittent waterlogging, typically wet in winter and dry in summer. Floristically and hydrologically intermediate between Sand Heathland on well-drained substrates and Wet Heathland on poorly drained substrates, but equally nutrient poor. Recorded from two bioregions (Glenelg Plain, Warrnambool Plain).

### **Group 1 Damp Heathland**

**Floristics:** Dominated by *Leptospermum continentale* ± *Melaleuca squarrosa* ± *Allocasuarina paludosa* ± *Melaleuca gibbosa*. Other prominent species include *Banksia marginata*, *Hypolaena fastigiata*, *Xanthorrhoea caespitosa*, *Leptocarpus tenax*, *Calytrix tetragona*, *Paterosonia fragilis*, *Lepyrodia muelleri*. Emergent *Eucalyptus ovata* may be present.

**Structure:** Closed-heath ± emergent eucalypts.

**Habitat:** Sites with intermittent waterlogging, typically wet in winter and dry in summer, and with low nutrient availability. An impeding subsoil layer is frequently present.

**Nearest relative:** Damp Heathy Woodland.

**Comments:** Boundaries between Damp Heathland and Wet Heathland are transitional; these cannot be represented in the mapping and arbitrary divisions have been necessary in places.

### **Group 2 Damp Heathland**

**Floristics:** Poorly defined group of two quadrats with little similarity to other Damp Heathlands in this bioregion; separation is preliminary pending more quadrat data collection. One site is dominated by

*Allocasuarina paludosa*, the other by *Leptospermum continentale*.

**Structure:** Closed-heathland.

**Habitat:** Sites with intermittent waterlogging, typically wet in winter and dry in summer, and with low nutrient availability. An impeding subsoil layer is frequently present.

**Nearest relative:** Damp Heathy Woodland.

## **EVC 793 Damp Heathy Woodland**

Woodland with heathy understorey which becomes scrub (>2 m tall) if long unburnt in high rainfall areas. Developed on sites of intermittent waterlogging, typically wet in winter due to impeding layer in soil and dry in summer. Slightly better drained and thus drier than Damp Heathland, but equally nutrient poor. Recorded from two bioregions within study area (Glenelg Plain, Warrnambool Plain).

### **Warrnambool Plain Damp Heathy Woodland**

**Floristics:** Dominated by *Eucalyptus ovata* ± *E. viminalis* ± *E. willisii*, with *Leptospermum continentale*, *Acacia verticillata* and *Lepidosperma longitudinale* conspicuous understorey species, along with a wide range of grasses, herbs, small shrubs and tough-leaved monocots (e.g. *Paterosonia fragilis*, *Lepyrodia muelleri*, *Lepidosperma filiforme*).

**Structure:** Woodland 10–20 m tall, sometimes only sparsely treed in wetter sites.

**Habitat:** Poorly drained sandy soils of moderate to low fertility, formerly in a fine scale mosaic with Damp Sands Herb-rich Woodland, Damp Heathland and wetlands.

**Nearest relative:** Damp Heathland, Damp Sands Herb-rich Woodland.

## **EVC 851 Stream-bank Shrubland**

Stream-bank Shrubland was not recognised during the extant vegetation mapping exercise where it was mapped as Riparian Forest/Riparian Shrubland Mosaic. Subsequent work during the pre-1750 mapping exercise identified quality intact remnants in the Midlands and Otways study area on the Moorabool River at the Meredith-Steiglitz Road crossing and along the gorge sections of the Werribee and Lerderderg Rivers.

Prior to European settlement it has been modelled on rivers and major streams throughout the study area on basalt geology or sediments where the watercourse has cut into the underlying rock producing rocky banks, a flat rocky stream bed and in the larger rivers, quite broad gravel banks which are often dry but are also regularly flooded by fast flowing waters. Where watercourses cut deeply into basalt, the upper banks (beyond the reach of floodwaters) often support Escarpment Shrubland. Where they cut deeply into sediments as in the Werribee and Lerderderg Gorges, the upper banks often support *Midlands Escarpments* Shrubby Dry Forest. Annual rainfall is usually below 700mm.

The overstorey is generally sparse, usually consisting of Manna Gum *Eucalyptus viminalis* or Red Gum *E. camaldulensis* though Blue Gum *E. globulus* and Swamp Gum *E. ovata* have also been recorded. The shrubs layer is the dominant stratum and includes Woolly Tea-tree *Leptospermum lanigerum* and River Bottlebrush *Callistemon sieberi* amongst the rocks on the stream bed, and Sweet Bursaria *Bursaria spinulosa*, Tree Violet *Hymenanthera dentata*, Shiny Cassinia *Cassinia longifolia* and Hop Goodenia *Goodenia ovata* occupying the stream banks. Other common species among the rocks and gravel on the stream bed are Bidgee-widgee *Acaena novae-zelandiae*, Willow-herb *Epilobium* spp., *Carex polyantha* and Spiny-headed Mat-rush *Lomandra longifolia*.

## **EVC 858 Calcarenite Dune Woodland**

Within the Midlands/Otways study area, Calcarenite Dune Woodland is restricted to coastal and near coastal areas from Torquay to Altona Bay. It commonly occurs on the landward side of primary dunes and adjacent to Coastal Saltmarsh Complex in estuarine environments. It occurs on a variety of geologies and soil types Annual rainfall is approximately 550-600mm.

The overstorey is a dense woodland of Moonah *Melaleuca lanceolata* over a shrub layer including Wirilda *Acacia retinodes*, Coast Beard-heath *Leucopogon parviflorus*, and Thyme Rice-flower *Pimelea serpyllifolia* and

## Draft Corangamite Native Vegetation Plan

a sparse understorey of Blue Tussock-grass *Poa poiformis*, Bower Spinach *Tetragonia implexicoma*, Seaberry Saltbush *Rhagodia candolleana* and Small-leaved Clematis *Clematis microphyllya*.

### EVC 863 Floodplain Reedbed

Floodplain Reedbed was identified in only one location in the Midlands and Otways study areas, in Craven, Costin and Hordern Lakes, which are on the broad swampy flats of the lower reaches of the Aire River. It occurs in the slightly deeper areas of inundation on these flats. The remainder of the flats were mapped as Swamp Scrub. Soils are Quaternary swamp and lagoonal desposits of clays, silts and peat. Altitude is just above sea level (less than 5m). Rainfall is greater than 1000mm per annum.

Floodplain Reedbed is dominated by a dense sward of Common Reed *Phragmites australis* to 2m tall. Other species recorded include Sea Rush *Juncus kraussii*, Creeping monkey-flower *Mimulus repens*, Water Buttons *Cotula coronopifolia*, Australian Gipsywort *Lycopus australis* and Water-ribbons *Triglochin procerum*.

### EVC 891 Plains Brackish Sedge Wetland

Within the Midlands and Otways study areas Plains Brackish Sedge Wetland was only identified in the Lake Connewarre area south of Geelong. It occurs on flat to very gently sloping terrain in a strip around the southern edge of Reedy Lake. The width of this strip varies from a few meters to over 100m and is dependent on the degree of slope into the lake. This EVC appears to be very site-specific as it does not occur around the slightly more saline shores of nearby Lake Connewarre. The Quaternary aeolian geology mainly consists of estuarine sands. Annual rainfall is approximately 600mm.

Plains Brackish Sedge Wetland is grows in association with Reed Swamp, Plains Freshwater Sedge Wetland and Coastal Saltmarsh Complex. It is a closed sedgeland to 80cm tall dominant by Sharp Club-sedge *Schoenoplectus pungens*, Creeping Cotula *Leptinella reptans* and River Buttercup *Ranunculus rivularis*. Swamp Crassula *Crassula helmsii* and Common Spike-sedge *Eleocharis acuta* are less common.

### EVC 894 Scoria Cone Woodland

Typically woodland or open-shrubland, grassy to bracken-dominated, with a range of herbs conspicuous. Occurred on the slopes of freely-draining scoria cones, but confined to spatter areas of more coarse boulder-forming flow sources, where it is otherwise replaced by Stony Rises Woodland. Soils can be skeletal but are very fertile. Previously localised and restricted habitat now almost entirely cleared. Recorded from one bioregion within study area (Victorian Volcanic Plain).

#### Scoria Cone Woodland

**Floristics:** Often uncertain due to previous modification. Probably dominated by various associations of *Eucalyptus viminalis*, *Acacia melanoxylon*, *Allocasuarina verticillata*, *Bursaria spinosa*, *Poa labillardierei*, *Pteridium esculentum*. The vegetation appears to have been at least moderately herb-rich.

**Structure:** Grassland, shrubland or woodland (presumed to 15 m, mostly considerably less), reflecting local site conditions. Trees and larger shrubs were probably frequently stunted by harsh conditions and high water stress.

**Habitat:** Free-draining stony soils of scoria cones, especially spatter zones or more consolidated finer particles on cone slopes.

**Nearest relative:** Stony Rises Woodland, Cinder Cone Woodland.

### EVC 895 Escarpment Shrubland

Within the Midlands and Otways study area Escarpment Shrubland has been identified on escarpments associated with the edges of basalt flows or where watercourses have cut through a basalt capping. It occurs in lower rainfall areas or where effective rainfall is low, for example, steep west-facing escarpments. Prior to European settlement it is thought to have been scattered across the volcanic areas of the Midlands region. No extant quality intact examples of this EVC were identified and in the pre-1750 mapping exercise many of its prime habitat sites were too small to be mapped at 1:100 000 scale.

Species present varies depending on soil and water availability, cover is often sparse. Common shrubs include Tree Violet *Hymenanthera dentata*, Varnish Wattle *Acacia verniciflua*, Lightwood *A. implexa*, Hedge Wattle *A. paradoxa*, Sweet Bursaria *Bursaria spinosa* and Sticky Hop-Bush *Dodonea viscosa*. Turkey-bush *Eremophila deserti* and Fragrant Saltbush *Rhagodia parabolica* can be locally common. Occasionally Drooping Sheoke *Allocasuarina verticillata* dominates. Eucalypts, mainly Candelbark *E. rubida*, when present, are usually concentrated on the upper edge of the escarpment.

### EVC 898 Cane Grass – Lignum Halophytic Herbland

Within the Midlands and Otways study area, this EVC is restricted to the Lake Connewarre area south of Geelong. It occurs within shallow depressions on otherwise flat terrain, surrounded by Coastal Saltmarsh Complex and Plains Grassland. The geology is Quaternary sedimentary estuarine sands. The soils are silty clays, subject to periodic freshwater flooding from the nearby Barwon River. Annual rainfall is approximately 600mm. This EVC has been identified in two small areas, to the south of Reedy Lake in the Lake Connewarre State Game Reserve and on the west bank of the Barwon River, south east of Geelong

Cane Grass – Lignum Halophytic Herbland is a shrubland dominated by Tangled Lignum *Muehlenbeckia florulenta*, though in slightly better drained areas the Lignum is sparse and Common Tussock Grass *Poa labillardierei* dominates. The ground layer is dominated by sedges, with Common Spike-sedge *Eleocharis acuta* prominent at the wetter sites and Sharp Club-sedge *Schoenoplectus pungens* in more brackish situations.

### EVC 899 Plains Freshwater Sedge Wetland

Within the Midlands and Otways study area this EVC is confined to the Lake Connewarre area south of Geelong. It grows in association with Plains Grassland, Plains Brackish Sedge Wetland and Coastal Saltmarsh Complex. It occurs on quaternary sedimentary geology, consisting mainly of estuarine sands, the soils are peaty silty clays. Annual rainfall is approximately 600mm.

Plains freshwater sedge wetland is open to closed sedgeland, reaching heights to 1m. The dominant species are Common Spike-sedge *Eleocharis acuta*, Common Blown Grass *Agrostis avenacea* and the weed, Curled Dock *Rumex crispus* with Swamp Crassula *Crassula helmsii* and Water-ribbons *Triglochin procerum* sub dominant.

## Draft Corangamite Native Vegetation Plan

### Appendix 3: Ecological Vegetation Class Analysis

#### Central Victorian UPLands EVC Analysis

Ecological Vegetation Class	EVC Cons. Status	Pre1750 Area (ha)	Total Extant Area (ha)	Extant/Pre1750 (%)	Con Res extant (%)	Private/extant (%)
Wetland Formation	E	163	0	0%	0%	0%
Plains Grassland/Plains Grassy Woodland Mosaic	E	2643	27	1%	0%	101%
Plains Grassland	E	4741	90	2%	0%	100%
Plains Grassy Wetland	E	1270	34	3%	0%	100%
Riparian Woodland	E	1606	56	3%	0%	89%
Grassy Woodland	E	18521	1050	6%	0%	91%
Hills Herb-rich Woodland	E	1184	70	6%	0%	100%
Scoria Cone Woodland	E	123	9	7%	0%	100%
Swampy Riparian Woodland	E	1370	158	12%	0%	85%
Aquatic Herbland/Plains Sedgy Wetland Mosaic	E	891	152	17%	0%	100%
Basalt Escarpment Shrubland	E	219	49	22%	0%	100%
Granitic Hills Woodland	E	256	67	26%	0%	41%
Sand Forest	E	31	13	40%	0%	100%
Alluvial Terraces Herb-rich Woodland	E	19	12	60%	0%	33%
Plains Grassy Woodland	E	48479	3679	8%	1%	81%
Damp Sands Herb-rich Woodland	E	235	136	58%	1%	56%
Plains Sedgy Wetland	E	586	41	7%	1%	80%
Creepline Herb-rich Woodland	E	6466	2657	41%	3%	46%
<b>Total Endangered</b>			<b>8296</b>			
Grassy Forest	V	1947	578	30%	0%	100%
Stream-bank Shrubland	V	1444	600	42%	0%	68%
Valley Grassy Forest	V	12517	3473	28%	3%	68%
<b>Total Vulnerable</b>			<b>4651</b>			
Shrubby Foothill Forest	LC	742	202	27%	0%	23%
Shrubby Dry Forest	LC	45	40	89%	0%	68%
Heathy Woodland	LC	227	167	74%	4%	63%
Lowland Forest	LC	2932	1799	61%	23%	54%
Sand Heathland	LC	26	26	100%	100%	0%
<b>Total Least Concern</b>			<b>2234</b>			
Herb-rich Foothill Forest	D	14948	2738	18%	0%	75%
Herb-rich Foothill Forest/Shrubby Foothill Forest Complex	D	4166	2630	63%	0%	18%
Grassy Dry Forest	D	23810	9627	40%	2%	65%
Heathy Dry Forest	D	48648	29789	61%	10%	40%
<b>Total Depleted</b>			<b>44784</b>			
Shrubby Woodland	R	221	221	100%	100%	0%
<b>Total Rare</b>			<b>221</b>			
Sedgy Riparian Woodland	NR	947	392	41%	3%	36%
<b>Total Naturally Restricted</b>			<b>392</b>			
<b>Totals</b>		<b>201419</b>	<b>60578</b>			



## Draft Corangamite Native Vegetation Plan

### Otway Plains EVC Analysis

<b>Ecological Vegetation Class</b>	<b>EVC Cons. Status</b>	<b>Pre1750 Area (ha)</b>	<b>Total Extant Area (ha)</b>	<b>Extant/ Pre1750 (%)</b>	<b>Con Res extant (%)</b>	<b>Private/ extant (%)</b>
Coast Gully Thicket	X	1	0	0%	0%	0%
Plains Grassy Wetland	X	23	0	0%	0%	0%
Scoria Cone Woodland	X	209	1	0%	0%	100%
<b>Total Presumed Extinct</b>			<b>1</b>			
Plains Sedgy Wetland	E	542	3	0%	0%	101%
Aquatic Herbland/Plains Sedgy Wetland Mosaic	E	517	4	1%	0%	94%
Grassy Woodland	E	80925	2050	3%	0%	87%
Lignum Wetland	E	79	2	3%	0%	0%
Plains Grassland	E	1295	40	3%	0%	29%
Floodplain Riparian Woodland	E	5547	270	5%	0%	51%
Grassy Forest	E	1597	139	9%	0%	100%
Damp Heath Scrub	E	421	48	11%	0%	100%
Swampy Riparian Woodland	E	2740	346	13%	0%	96%
Calcarenite Dune Woodland	E	4017	515	13%	0%	50%
Stream-bank Shrubland	E	7	1	19%	0%	0%
Wetland Formation	E	233	55	23%	0%	19%
Shallow Freshwater Marsh	E	4	4	100%	0%	0%
Swamp Scrub	E	6064	183	3%	0%	91%
Damp Sands Herb-rich Woodland	E	2364	433	18%	2%	76%
<b>Total Endangered</b>			<b>4094</b>			
Plains Grassy Woodland	V	13032	216	2%	0%	59%
Stoney Rises Herb-rich Woodland	V	737	151	20%	0%	100%
Coastal Saltmarsh Complex	V	3485	1713	49%	0%	2%
Estuarine Wetland	V	221	119	54%	0%	52%
Plains Brackish Sedge Wetland	V	29	16	55%	0%	0%
Plains Freshwater Sedge Wetland	V	91	82	90%	0%	0%
Cool Temperate Rainforest	V	1	1	100%	0%	0%
Riparian Forest	V	2861	997	35%	2%	67%
Clay Heathland	V	32	32	100%	5%	0%
Coastal Dune Scrub Mosaic	V	1201	736	61%	18%	7%
Wet Sands Thicket	V	516	503	97%	18%	9%
Coastal Headland Scrub	V	751	570	76%	27%	9%
Coastal Tussock Grassland	V	246	173	70%	44%	7%
Coastal Headland Scrub/Headland Coastal Tussock Grassland Mosaic	V	253	193	76%	67%	12%
<b>Total Vulnerable</b>			<b>5501</b>			
Lowland Forest	D	60587	28766	47%	5%	36%
<b>Total Depleted</b>			<b>28766</b>			
Heathy Woodland/Sand Heath Mosaic	LC	869	85	10%	0%	100%
Herb-rich Foothill Forest/Shrubby Foothill Forest Complex	LC	1081	226	21%	0%	78%
Wet Forest	LC	188	175	93%	0%	19%
Herb-rich Foothill Forest	LC	3849	1983	52%	3%	29%
Heathy Woodland	LC	26724	21869	82%	16%	16%
Shrubby Dry Forest	LC	1290	969	75%	36%	49%
Sand Heathland	LC	176	167	95%	49%	25%
<b>Total Least Concern</b>			<b>25473</b>			
Cane Grass-Lignum Halophyllic Herbland	R	137	89	65%	0%	0%

## Draft Corangamite Native Vegetation Plan

<b>Ecological Vegetation Class</b>	<b>EVC Cons. Status</b>	<b>Pre1750 Area (ha)</b>	<b>Total Extant Area (ha)</b>	<b>Extant/Pre1750 (%)</b>	<b>Con Res extant (%)</b>	<b>Private/extant (%)</b>
Mangrove Shrubland	R	64	50	78%	0%	14%
Reed Swamp	R	565	517	92%	0%	0%
Seasonally-inundated Sub-saline Herbland	R	36	36	100%	0%	0%
Shrubby Wet Forest	R	578	482	83%	19%	25%
<b>Total Rare</b>			<b>1173</b>			
Sedgy Riparian Woodland	NR	2683	1376	51%	7%	34%
Riparian Scrub Complex	NR	5937	4394	74%	13%	24%
Shrubby Foothill Forest	NR	5716	3857	67%	17%	26%
Wet Heathland	NR	2184	1614	74%	21%	10%
<b>Total Naturally Restricted</b>			<b>11241</b>			
<b>Totals</b>		<b>242704</b>	<b>76249</b>			

### Otway Ranges EVC Analysis

<b>Ecological Vegetation Class</b>	<b>EVC Cons. Status</b>	<b>Pre1750 Area (ha)</b>	<b>Total Extant Area (ha)</b>	<b>Extant/Pre1750 (%)</b>	<b>Con Res extant (%)</b>	<b>Private/extant (%)</b>
Grassy Forest	X	2	1	29%	0%	100%
<b>Total Presumed Extinct</b>			<b>1</b>			
Swamp Scrub	E	1550	223	14%	0%	36%
<b>Total Endangered</b>			<b>223</b>			
Coastal Tussock Grassland	V	62	54	86%	68%	18%
Cool Temperate Rainforest	V	10174	8601	85%	10%	18%
Floodplain Reedbed	V	112	0	0%	0%	0%
Wet Sands Thicket	V	779	763	98%	30%	1%
<b>Total Vulnerable</b>			<b>9418</b>			
Herb-rich Foothill Forest	D	1442	1015	70%	6%	26%
Herb-rich Foothill Forest/Shrubby Foothill Forest Complex	D	5025	3938	78%	0%	14%
<b>Total Depleted</b>			<b>4953</b>			
Damp Heath Scrub	LC	100	95	94%	63%	21%
Damp Sands Herb-rich Woodland	LC	484	396	82%	46%	25%
Estuarine Wetland	LC	71	53	75%	4%	3%
Grassy Dry Forest	LC	291	275	95%	53%	20%
Heathy Woodland	LC	570	493	87%	17%	16%
Lowland Forest	LC	3524	2815	80%	24%	29%
Riparian Scrub Complex	LC	132	113	85%	45%	15%
Scoria Cone Woodland	LC	1	1	100%	100%	0%
Shrubby Dry Forest	LC	791	788	100%	75%	1%
Shrubby Foothill Forest	LC	30488	24981	82%	29%	22%
Shrubby Wet Forest	LC	37434	32015	86%	14%	22%
Wet Forest	LC	50957	40799	80%	14%	20%
Wet Heathland	LC	199	132	66%	37%	0%
<b>Total Least Concern</b>			<b>102955</b>			
Sedgy Riparian Woodland	R	233	214	92%	9%	17%
<b>Total Rare</b>			<b>214</b>			
Coastal Dune Scrub Mosaic	NR	265	167	63%	30%	2%
Coastal Headland Scrub	NR	1774	1337	75%	35%	34%
Riparian Forest	NR	2789	2155	77%	18%	24%
<b>Total Naturally Restricted</b>			<b>3659</b>			
<b>Totals</b>		<b>149248</b>	<b>121423</b>			

## Draft Corangamite Native Vegetation Plan

### Victorian Volcanic Plains EVC Analysis

Ecological Vegetation Class	EVC Cons. Status	Pre1750 Area (ha)	Total Extant Area (ha)	Extant/Pre1750 (%)	Con Res extant (%)	Private/extant (%)
Lignum Wetland	E	6	0	-7%	0%	0%
Shallow Freshwater Marsh	E	6	0	-1%	0%	0%
Red Gum Wetland	E	9	0	0%	0%	0%
Damp Heathland / Damp Heathy Woodland	E	225	0	0%	0%	0%
Plains Grassy Wetland	E	2767	-13	0%	0%	0%
Swamp Scrub	E	15229	309	2%	0%	26%
Mangrove Shrubland	E	29	8	29%	0%	27%
Aquatic Herbland/Plains Sedgy Wetland Mosaic	E	4434	152	3%	0%	43%
Stream-bank Shrubland	E	1490	395	27%	0%	43%
Plains Grassy Woodland	E	169217	3832	2%	0%	54%
Grassy Woodland	E	20120	656	3%	0%	60%
Scoria Cone Woodland	E	5441	253	5%	0%	65%
Swampy Riparian Woodland	E	862	66	8%	0%	70%
Plains Sedgy Wetland	E	10686	234	2%	0%	74%
Floodplain Riparian Woodland	E	9353	686	7%	0%	76%
Plains Grassland/Plains Grassy Woodland Mosaic	E	168135	1493	1%	0%	82%
Creekline Grassy Woodland	E	1946	96	5%	0%	83%
Riparian Woodland	E	1392	53	4%	0%	88%
Creekline Herb-rich Woodland	E	308	13	4%	0%	98%
Granitic Hills Woodland	E	9	2	26%	0%	100%
Calcarenite Dune Woodland	E	63	1	1%	0%	100%
Grassy Forest	E	241	22	9%	0%	100%
Basalt Escarpment Shrubland	E	280	33	12%	0%	100%
Hills Herb-rich Woodland	E	1888	53	3%	0%	100%
Plains Grassland	E	65699	285	0%	0%	165%
<b>Total Endangered</b>			<b>8629</b>			
Herb-rich Foothill Forest	V	3966	194	5%	0%	100%
Stoney Rises Herb-rich Woodland	V	62851	5933	9%	0%	90%
Grassy Dry Forest	V	1875	187	10%	0%	100%
Valley Grassy Forest	V	1786	232	13%	0%	98%
Riparian Forest	V	79	12	15%	0%	100%
Damp Sands Herb-rich Woodland	V	365	107	29%	0%	11%
Coastal Tussock Grassland	V	19	10	51%	0%	0%
<b>Total Vulnerable</b>			<b>6675</b>			
Damp Heath Scrub	LC	0	5	0%	0%	100%
Lowland Forest	LC	72	21	29%	0%	100%
Coastal Dune Scrub Mosaic	LC	22	7	32%	0%	0%
<b>Total Least Concern</b>			<b>34</b>			
Heathy Dry Forest	D	1991	550	28%	0%	73%
Coastal Saltmarsh Complex	D	770	400	52%	0%	5%
<b>Total Depleted</b>			<b>950</b>			
Sedgy Riparian Woodland	R	24	1	4%	0%	100%
Sand Forest	R	85	48	56%	0%	100%
Seasonally-inundated Sub-saline Herbland	R	23	23	100%	0%	0%
<b>Total Rare</b>			<b>71</b>			
<b>Totals</b>		<b>553761</b>	<b>16359</b>			

## Draft Corangamite Native Vegetation Plan

### Warrnambool Plain EVC Analysis

Ecological Vegetation Class	EVC Cons. Status	Pre1750 Area (ha)	Total Extant Area (ha)	Extant/Pre1750 (%)	Con Res extant (%)	Private/ extant (%)
Plains Grassy Wetland	X	8	0	0%	0%	0%
<b>Total Presumed Extinct</b>			<b>0</b>			
Deep Freshwater Marsh	E	6	0	0%	0%	0%
Aquatic Herbland/Plains Sedgy Wetland Mosaic	E	216	1	0%	0%	100%
Plains Grassy Woodland	E	2208	54	2%	0%	99%
Grassy Woodland	E	46	1	3%	0%	100%
Reed Swamp	E	39	2	6%	0%	100%
Scoria Cone Woodland	E	204	13	7%	0%	100%
Plains Sedgy Wetland	E	40	3	9%	0%	100%
Riparian Forest	E	2002	518	26%	0%	59%
Swamp Scrub	E	4769	217	5%	0%	99%
Damp Heathland / Damp Heathy Woodland	E	7952	8	0%	0%	21%
Estuarine Wetland	E	537	228	43%	3%	24%
<b>Total Endangered</b>			<b>1047</b>			
Wet Heathland	V	2716	336	12%	0%	34%
Herb-rich Foothill Forest	V	34371	5105	15%	0%	44%
Sedgy Riparian Woodland	V	2437	402	16%	0%	40%
Riparian Scrub Complex	V	711	214	30%	0%	24%
Stoney Rises Herb-rich Woodland	V	670	321	48%	0%	100%
Coastal Dune Scrub	V	5	4	65%	0%	4%
Wet Sands Thicket	V	4	4	100%	0%	0%
Damp Heath Scrub/Heathy Woodland Complex	V	16	16	100%	0%	0%
Lowland Forest	V	44674	6295	14%	0%	34%
Damp Heath Scrub	V	15860	1974	12%	3%	42%
Damp Sands Herb-rich Woodland	V	1513	870	58%	23%	50%
Coastal Dune Scrub Mosaic	V	1141	818	72%	61%	3%
Coastal Tussock Grassland	V	198	160	81%	80%	1%
<b>Total Vulnerable</b>			<b>16519</b>			
Coastal Headland Scrub/Headland Coastal Tussock Grassland Mosaic	D	147	79	54%	54%	0%
<b>Total Depleted</b>			<b>79</b>			
Permanent Saline	LC	95	0	0%	0%	0%
Heathy Woodland	LC	1544	284	18%	7%	30%
Shrubby Foothill Forest	LC	2008	1029	51%	18%	33%
Wet Forest	LC	86	79	91%	44%	51%
Herb-rich Foothill Forest/Shrubby Foothill Forest Complex	LC	3	3	100%	86%	14%
<b>Total Least Concern</b>			<b>1395</b>			
Coast Gully Thicket	R	344	196	57%	50%	11%
<b>Total Rare</b>			<b>196</b>			
Coastal Headland Scrub	NR	2200	1250	57%	53%	5%
<b>Total Naturally Restricted</b>			<b>1250</b>			
<b>Totals</b>		<b>128768</b>	<b>20486</b>			

## Draft Corangamite Native Vegetation Plan

### Appendix 4: Threatened Species Information

#### Flora

Range of Victorian Rare Or Threatened Flora (1995 listing, post 1975) Corangamite Region - Flora				
SCIENTIFIC NAME	COMMON NAME	AROTS	VROTS	% of range within region
<i>Adriana quadripartita</i>	Rare Bitter-bush		e	78
<i>Agrostis aemula</i> var. <i>setifolia</i>	Blown Grass		r	15
<i>Agrostis billardieri</i> var. <i>filifolia</i>	Coast Blown Grass		v	0
<i>Amphibromus sinuatus</i>	Wavy Swamp Wallaby-grass		v	6
<i>Asplenium terrestre</i> ssp. <i>Terrestre</i>	Ground Spleenwort		r	79
<i>Astelia australiana</i>	Tall Astelia	V	v	20
<i>Bracteantha</i> sp. aff. <i>Subundulata</i>	Swamp Everlasting		v	16
<i>Caladenia amoena</i>	Melbourne Spider-orchid		e	65
<i>Caladenia flavovirens</i>	Summer Spider-orchid		r	50
<i>Caladenia venusta</i>	Large White Spider-orchid		r	100
<i>Calochilus gracillimus</i>	Delicate Beard-orchid		r	100
<i>Comesperma polygaloides</i>	Small Milkwort		v	23
<i>Conospermum</i> sp. ( <i>Grampians</i> )	Grampians Smoke-bush		r	100
<i>Correa backhousiana</i>	Velvet Correa		r	100
<i>Craspedia</i> aff. <i>variabilis</i> ( <i>Derrinallum</i> )	Derrinallum Billy-buttons		v	22
<i>Cyathea X marcescens</i>	Skirted Tree-fern		r	33
<i>Cyathea cunninghamii</i>	Slender Tree-fern	R	r	32
<i>Desmodium varians</i>	Slender Tick-trefoil		r	3
<i>Discaria pubescens</i>	Hairy Anchor Plant	R	v	12
<i>Distichophyllum microcarpum</i>	Moss		k	26
<i>Diuris</i> sp. aff. <i>lanceolata</i> ( <i>Basalt Plains</i> )	Plains Diuris		r	33
<i>Epilobium pallidiflorum</i>	Showy Willow-herb		d	10
<i>Eucalyptus</i> aff. <i>alaticaulis</i> ( <i>Anglesea</i> )	Otway Grey Gum		r	100
<i>Eucalyptus brookeriana</i>	Brooker's Gum		r	100
<i>Eucalyptus kitsoniana</i>	Bog Gum	V	r	41
<i>Eucalyptus yarraensis</i>	Yarra Gum	R	r	34
<i>Euphrasia scabra</i>	Rough Eyebright	V	e	0
<i>Eutaxia diffusa</i>	Spreading Eutaxia		r	4
<i>Exocarpos syrticola</i>	Coast Ballart		r	25
<i>Gingidia harveyana</i>	Slender Gingidia		v	20
<i>Glycine latrobeana</i>	Clover Glycine	V	v	3

## Draft Corangamite Native Vegetation Plan

Range of Victorian Rare Or Threatened Flora (1995 listing, post 1975) Corangamite Region - Flora				
<i>Grammitis magellanica ssp. Nothofageti</i>	Beech Finger-fern		v	49
<i>Grammitis meridionalis (part of G. magellanica)</i>	Elusive Finger-fern		v	100
<i>Grevillea bedgoodiana</i>	Enfield Grevillea	R	v	100
<i>Halophila decipiens</i>	Devious Sea-wrack		r	100
<i>Huperzia varia</i>	Long Clubmoss		v	20
<i>Isolepis wakefieldiana</i>	Tufted Club-sedge		r	20
<i>Lastreopsis hispida</i>	Bristly Shield-fern		r	68
<i>Lepidium aschersonii</i>	Spiny Pepper-cress	E	e	100
<i>Lepilaena marina</i>	Sea Water-mat		r	100
<i>Leptorhynchos gatesii</i>	Wrinkled Buttons	V	v	100
<i>Leptospermum glabrescens s. l.</i>	Smooth Tea-tree	K		9
<i>Lobelia beaugleholei</i>	Showy Lobelia		r	33
<i>Logania ovata</i>	Oval-leaf Logania		r	62
<i>Lomandra longifolia ssp. Exilis</i>	Cluster-headed Mat-rush		r	3
<i>Lycopodiella serpentina</i>	Bog Clubmoss		r	100
<i>Olearia pannosa ssp. Cardiophylla</i>	Velvet Daisy-bush		v	42
<i>Oxalis magellanica</i>	Snowdrop Wood-sorrel		r	13
<i>Ozothamnus adnatus</i>	Winged Everlasting		v	50
<i>Pimelea biflora</i>	Matted Rice-flower		r	10
<i>Pimelea spinescens</i>	Plains Rice-flower		v	39
<i>Pimelea spinescens ssp. Spinescens</i>	Plains Rice-flower	V	v	49
<i>Poa halmaturina</i>	Salt Tussock-grass		r	14
<i>Pomaderris oraria</i>	Coast Pomaderris		r	5
<i>Pomaderris oraria ssp. Oraria</i>	Coast Pomaderris		r	16
<i>Prasophyllum frenchii</i>	Slaty Leek-orchid	V	v	37
<i>Prasophyllum patens</i>	Broad-lip Leek-orchid		r	11
<i>Prasophyllum spicatum</i>	Congested Leek-orchid		r	100
<i>Prasophyllum suaveolens</i>	Basalt Plain Leek-orchid		r	50
<i>Pratia gelida</i>	Snow Pratia	R	v	49
<i>Psoralea parva</i>	Small Psoralea	E	e	44
<i>Ptilotus erubescens</i>	Hairy-tails		e	9
<i>Pultenaea subalpina</i>	Rosy Bush-pea	R	r	100
<i>Ruppia tuberosa</i>	Tuberous Tassel		r	100
<i>Rutidosia leptorrhynchoides</i>	Button Wrinklewort	E	e	33
<i>Rytidosperma procerum</i>	Tall Wallaby-grass		k	19
<i>Rytidosperma richardsonii</i>	Straw Wallaby-grass		v	0

## Draft Corangamite Native Vegetation Plan

Range of Victorian Rare Or Threatened Flora (1995 listing, post 1975) Corangamite Region - Flora				
<i>Senecio macrocarpus</i>	Large-fruit Groundsel	V	e	16
<i>Senecio psilocarpus</i>	Swamp Groundsel		v	20
<i>Stipa gibbosa</i>	Spurred Spear-grass		r	10
<i>Thelymitra azurea</i>	Azure Sun-orchid		v	0
<i>Thelymitra benthamiana</i>	Blotched Sun-orchid		r	40
<i>Thelymitra circumsepta</i>	Bog Sun-orchid		v	17
<i>Thelymitra epipactoides</i>	Metallic Sun-orchid	E	e	24
<i>Thelymitra matthewsii</i>	Spiral Sun-orchid	V	v	33
<i>Thelymitra sp. aff. pauciflora (Anglesea)</i>	Anglesea Sun-orchid		r	100
<i>Tmesipteris elongata ssp. Elongata</i>	Slender Fork-fern	R	v	68
<i>Triglochin minutissimum</i>	Tiny Arrow-grass		r	67
<i>Zieria sp. (Grampians)</i>	Grampians Zieria		r	50

## Fauna

Range of Victorian rare or threatened Fauna (1993 listing, post 1975) Corangamite Region - Fauna			
SCIENTIFIC NAME	COMMON NAME	TWV	% of range within region
<i>Coturnix chinensis</i>	King Quail	R/R	8
<i>Turnix pyrrhotorax</i>	Red-chested Button-quail	Ins	4
<i>Pedionomus torquatus</i>	Plains-wanderer	Vul	8
<i>Rallus pectoralis</i>	Lewin's Rail	R/R	14
<i>Porzana pusilla</i>	Baillon's Crake	Ins	13
<i>Phalacrocorax fuscescens</i>	Black-faced Cormorant	R/C	100
<i>Phalacrocorax varius</i>	Pied Cormorant	R/C	7
<i>Pelecanus conspicillatus</i>	Australian Pelican	R/C	67
<i>Sterna nilotica</i>	Gull-billed Tern	R/C	27
<i>Sterna caspia</i>	Caspian Tern	R/C	45
<i>Sterna albifrons</i>	Little Tern	End	19
<i>Sterna nereis</i>	Fairy Tern	Vul	32
<i>Thinornis rubricollis</i>	Hooded Plover	Vul	20
<i>Numenius madagascariensis</i>	Eastern Curlew	R/R	12
<i>Rostratula benghalensis</i>	Painted Snipe	Ins	15
<i>Burhinus grallarius</i>	Bush Stone-curlew	Vul	2
<i>Ardeotis australis</i>	Australian Bustard	End	3
<i>Grus rubicunda</i>	Brolga	R/R	15
<i>Plegadis falcinellus</i>	Glossy Ibis	R/C	66
<i>Platalea regia</i>	Royal Spoonbill	R/C	17
<i>Egretta garzetta</i>	Little Egret	R/C	35
<i>Nycticorax caledonicus</i>	Nankeen Night Heron	R/C	7
<i>Ixobrychus minutus</i>	Little Bittern	R/R	6
<i>Botaurus poiciloptilus</i>	Australasian Bittern	Ins	11
<i>Cereopsis novaehollandiae</i>	Cape Barren Goose	R/R	28
<i>Anseranas semipalmata</i>	Magpie Goose	Ext	22

## Draft Corangamite Native Vegetation Plan

<b>Range of Victorian rare or threatened Fauna (1993 listing, post 1975) Corangamite Region - Fauna</b>			
<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>	<b>TWV</b>	<b>% of range within region</b>
<i>Stictonetta naevosa</i>	Freckled Duck	R/R	16
<i>Oxyura australis</i>	Blue-billed Duck	R/R	13
<i>Accipiter novaehollandiae</i>	Grey Goshawk	R/R	29
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	R/R	3
<i>Lophoictinia isura</i>	Square-tailed Kite	Vul	2
<i>Elanus scriptus</i>	Letter-winged Kite	R/R	15
<i>Falco subniger</i>	Black Falcon	R/R	12
<i>Ninox connivens</i>	Barking Owl	R/R	5
<i>Ninox strenua</i>	Powerful Owl	R/R	6
<i>Tyto novaehollandiae</i>	Masked Owl	R/R	9
<i>Calyptorhynchus magnificus</i>	Red-tailed Black-Cockatoo	End	1
<i>Calyptorhynchus banksii</i>	Glossy Black-Cockatoo	Vul	0
<i>Cacatua leadbeateri</i>	Major Mitchell's Cockatoo	R/R	1
<i>Neophema chrysogaster</i>	Orange-bellied Parrot	End	27
<i>Lathamus discolor</i>	Swift Parrot	Vul	6
<i>Pezoporus wallicus</i>	Ground Parrot	R/R	15
<i>Psophodes nigrogularis</i>	Western Whipbird	End	15
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler	Vul	1
<i>Dasyornis broadbenti</i>	Rufous Bristlebird	R/R	63
<i>Grantiella picta</i>	Painted Honeyeater	R/R	5
<i>Xanthomyza phrygia</i>	Regent Honeyeater	End	1
<i>Dasyurus maculatus</i>	Spot-tailed Quoll	Vul	11
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	R/R	4
<i>Antechinus minimus</i>	Swamp Antechinus	R/R	23
<i>Sminthopsis murina</i>	Common Dunnart	R/R	4
<i>Perameles gunnii</i>	Eastern Barred Bandicoot	End	13
<i>Thylogale billardierii</i>	Tasmanian Pademelon	Ext	4
<i>Mastacomys fuscus</i>	Broad-toothed Rat	R/R	16
<i>Pseudomys novaehollandiae</i>	New Holland Mouse	End	23
<i>Eubalaena australis</i>	Southern Right Whale	End	50
<i>Balaenoptera musculus</i>	Blue Whale	End	71
<i>Delma impar</i>	Striped Legless Lizard	Vul	18
<i>Tympanocryptus diemensis</i>	Mountain Dragon	Ins	4
<i>Egernia coventryi</i>	Swamp Skink	R/R	1



## Draft Corangamite Native Vegetation Plan

<b>Range of Victorian rare or threatened Fauna (1993 listing, post 1975) Corangamite Region - Fauna</b>			
<b>SCIENTIFIC NAME</b>	<b>COMMON NAME</b>	<b>TWV</b>	<b>% of range within region</b>
<i>Pseudemoia rawlinsoni</i>	Glossy Grass Skink	Ins	1
<i>Limnodynastes fletcheri</i>	Barking Marsh Frog	Ins	4
<i>Prototroctes maraena</i>	Australian Grayling	Vul	8
<i>Galaxias cleaveri</i>	Tasmanian Mudfish	Vul	65
<i>Galaxias olidus</i>	Mountain Galaxias	Ins	4
<i>Galaxias truttaceus</i>	Spotted Galaxias	R/R	18
<i>Edelia obscura</i>	Yarra Pigmy Perch	Vul	15
<i>Gadopsis marmoratus</i>	River Blackfish	Ins	3
<i>Acrodipsas myrmecophila</i>	Small Ant Blue Butterfly	End	23
<i>Archaeophylax canarus</i>	Caddisfly	R/R	10
<i>Orphinotrichia justini</i>	Caddisfly	Ins	100
<i>Taskiria otwayensis</i>	Caddisfly	End	100
<i>Victaphanta compacta</i>	Otway Black Snail	Vul	93

## Draft Corangamite Native Vegetation Plan

### Appendix 5: Flora and Fauna Guarantee Statements

**Flora and Fauna Guarantee Action Statements:** The following apply to the Corangamite Region:

- No. 4 Eastern Barred Bandicoot
- No. 7 Tall Astelia
- No. 9 Hooded Plover
- No. 10 Rough Eyebright
- No. 15 Tiger Quoll
- No. 16 Dainty Maidenhair
- No. 17 Striped Legless Lizard
- No. 28 Button Wrinklewort
- No. 31 Small Psoralea
- No. 32 The use of Lead Shot in Cartridges for Hunting Waterfowl
- No. 34 Grey-crowned Babbler
- No. 35 Southern Lined Earless Dragon
- No. 41 Regent Honeyeater
- No. 43 Orange-bellied Parrot
- No. 44 Predation of Native Wildlife by the Introduced Red Fox
- No. 45 Otway Stonefly
- No. 47 Hairy Anchor Plant
- No. 49 Rufus Bristlebird
- No. 51 Little Tern
- No. 53 Western Plains Grassland Community
- No. 54 Leafy Greenhood
- No. 60 White-bellied Sea-eagle
- No. 63 Brittle Greenhood
- No. 66 Plains Wanderer
- No. 68 Large-fruit Groundsel
- No. 74 New Holland Mouse
- No. 80 Predation of Native Wildlife by the Cat

**Potentially Threatening Processes.** The following apply to the Corangamite Region;

1. Alterations to natural flow regimes of streams and rivers
2. Alteration to the natural temperature regimes of streams and rivers
3. Collection of native orchids
4. Increase in sediment input into rivers and streams due to human activities
5. Input of organotins to Victorian marine and estuarine waters
6. Input of petroleum and related products into Victorian stream and estuarine environments
7. Input of toxic substances into Victorian rivers and streams
8. Introduction of exotic organisms into Victorian marine waters
9. Introduction of live fish into waters outside their natural range
10. Loss of hollow bearing trees from Victorian forests
11. Predation of native wildlife by the cat, *Felis catus*
12. Predation of native wildlife by the red fox, *Vulpes vulpes*
13. Prevention of the passage of aquatic biota as a result of the presence of in-stream structures
14. Removal of wood debris from Victorian streams
15. Spread of *Pittosporum undulatum* into areas outside its natural range
16. Use of lead shot in cartridges for hunting waterfowl
17. Use of *Phytophthora* infected gravel in construction for roads, bridges and reservoirs

## Draft Corangamite Native Vegetation Plan

### Appendix 6: Wetlands Depletion Data

#### Wetland Categories and Depletion

Wetland Category	Pre-European extent		Extent left of original wetlands		Present extent of all wetlands (includes altered or man made)	
	(ha)	(no)	(ha)	(no)	(ha)	(no)
Freshwater meadow	2521	270	1158	171	2873	292
Shallow freshwater marsh	11383	547	2126	239	2523	262
Deep Freshwater Marsh	7194	102	2355	66	2581	72
Permanent Open Freshwater	10552	35	8219	21	11150	512
Semipermanent saline	7890	258	6604	249	8230	258
Permanent Saline	40673	46	38254	38		45

## Draft Corangamite Native Vegetation Plan

### Appendix 7: Land and Water Degradation Issues

#### Overview of degradation issues

<i>Issue and cause</i>	<i>Scale and extent of issue</i>	<i>values/activities threatened and off site impacts</i>
<b>dryland salinity</b> due to vegetation clearing and water cycle change	Inappropriate or poor catchment management has resulted in changing hydrologic characteristics inducing saline discharge. Conservative estimates suggest 14 200 ha affected with potential to expand at a rate of 2% per year.	Cost to agriculture estimated at \$1.15 million per year in lost production-notably pasture productivity/persistence. Salinisation of waterways degrades w/way ecology and water quality. Treatment of saline water in storages cost the community \$770,000 per year. Salinity also associated with waterlogging, soil structure, death of vegetation, water erosion and weed invasion on discharge sites.
<b>groundwater QUALITY/QUANTITY-</b> pollution cause uncertain but may relate to veg clearing.	Inappropriate or poor catchment management resulting in point and diffuse sources of pollution. Preliminary investigations reveal high nutrient levels (nitrates) at over 30 sites in catchment region. The quantity of water is a recently identified issue due to many unlicensed bores.	High nutrient levels especially nitrates limit use for both human and stock consumption. G/water discharging to surface streams and lakes contribute to eutrophication of water bodies restricting recreation and consumptive activities and uses. Over extraction will reduce the amount of water available.
<b>salinisation of waterways</b> - as for dryland salinity	As a result of inappropriate catchment management- linked to dryland salinity as saline g/water intrudes into streams and drainage lines. Issue occurs in the Moorabool River and the Barwon River.	Salinisation of waterways degrades in-stream ecology and water quality and increases salinity levels of the lakes and wetlands into which some w/ways drain. Treatment of saline water in storages cost \$770 000 per year.
<b>flooding</b> - natural event but may have increased due to vegetation clearing and regional water cycle change	Weather associated with vegetation removal and poor catchment management resulting in less water use by Plants and less water storage in soil. Major issue in urban areas of Geelong, Ballarat, Inverleigh, Batesford, Barwon Heads and Lara.	Restricts agricultural activities around lakes and low-lying areas but a major problem for urban areas where infrastructure and property damage occur. Impacts include water erosion, turbidity and nutrient inputs to w/ways, sedimentation of water storage areas. Lack of native riparian vegetation and presence of streambank weeds such as willows compound problems.
<b>turbidity</b> -veg clearing and regional water cycle change but influenced by site management.	A result of inappropriate catchment and site management. All basins in region experience some degree of turbid water during winter months and following summer storms.	Results from soil erosion which (with associated nutrient loss) reduces productive capacity of remaining soils-often initiated through poor vegetation cover (to which rabbits contribute) the main concern is reduction in water quality. This affects potential downstream users.
<b>eutrophication</b> due to vegetation clearing and regional water cycle change but influenced by site management	Inappropriate catchment and site management resulting in nutrient/sediment rich runoff from agricultural and urban areas and point source waste disposal. Problem increasing in region and associated algal blooms are becoming more prevalent in lakes and waterways such as the Barwon, Woody Yaloak and Gellibrand Rivers.	Water quality decline, algal blooms and high nutrient levels limiting consumption and recreation activities and requiring treatment. Associated issues that contribute to the problem include lack of riparian vegetation and water (soil) erosion.
<b>waterway health</b> - due to vegetation clearing/ water cycle change but influenced by local site management.	Catchment scale issue due to poor management of waterways. Currently 51% of w/ways are considered moderate to poor for environmental conditions. Riparian zones have been cleared with native remnants constituting as little as 6% of Corangamite, 12% of the Moorabool and 13% of the Barwon basins respectively.	Degrading waterway health results in reducing water quality restricting use of resource for consumption and recreation. Inappropriate wider catchment management results in polluted water runoff entering w/ways. Accentuating problem is the poor state of riparian zones resulting in high nutrient and turbidity loads, streambank erosion and loss of aquatic biodiversity.
<b>waterlogging</b> - due to veg clearing/ water cycle change, but strongly influenced by site man and inherent qualities	Broad catchment issue due to inherent qualities of the region. The Basalt Plains are part of large natural wetland system while the hydrologic characteristics in other areas similarly lead to waterlogging. Up to 750,000 ha are susceptible in region.	Results in access problems and anaerobic Plant growing conditions. Linked with rising water tables (salinity) but more closely often the result of soil structure problems. May contribute to excessive water runoff and erosion problems in some areas. Natural wetland systems in the region are fundamentally important for water quality and biodiversity conservation and this should not be underestimated
<b>water erosion</b> - Due to veg clearing/ water cycle change - influenced by site management	Occurs in some form across much of the catchment due to poor site management leading to increased overland water runoff. Estimates suggest 91, 000 ha severely affected and 276 000 ha moderately affected.	Loss of topsoil over many years results in reduced agricultural production due to decreasing nutrient levels and water infiltration/holding capacity of remaining sub-soils. Off site impacts of turbidity and high nutrient levels contribute to eutrophication problems degrading water quality.

## Draft Corangamite Native Vegetation Plan

<b>Issue and cause</b>	<b>Scale and extent of issue</b>	<b>values/activities threatened and off site impacts</b>
<b>Degraded soil structure</b> - due to site management/inherent qualities	Occurs naturally but often induced through inappropriate agricultural activities. Estimates suggest 43,000 ha severely affected with 811,000 ha susceptible.	Impediment to pasture and crop production due to root impedance, waterlogging or poor water infiltration. May induce water runoff -erosion and off site impacts for water quality.
<b>mass movement of soil?</b> - Natural process complicated by veg clearing/water cycle change- strongly influenced by local conditions	Prevalent where high rainfall, unstable topography and poor vegetation cover combine. More than 50,000 ha considered susceptible but occurrences limited to 800 ha of active landslips.	Contributes to loss of productive land initiates major erosion points and causes damage to infrastructure such as roads and buildings. Subsequent erosion contributes to turbidity of waterways.
<b>Low soil fertility</b> - due to poor site management and/or inherent qualities.	Most soils in the region (Cropped Volcanics and areas of the Basalt Plains the exception) contain low natural fertility requiring supplements of fertiliser for high production of crops and pastures.	Low soil fertility can lead to a number of problems that are widespread in the region. Besides reduced production of pastures or crops, weed invasion, soil erosion, soil structure decline are associated issues that can be costly to remedy.
<b>soil acidity</b> - due to poor site management and/or inherent qualities	Soils are naturally acid throughout most of the region. Approximately 770,000 ha thought to be inherently acidic. Estimates for amelioration in dairy and grazing areas reach \$26.2 million.	Production is severely limited by high acid soils as crops and pastures require lime for establishment and suffer stress due to toxic effects. Excessive water runoff and erosion may occur due to poor vegetation cover contributing to turbidity/nutrient problems in w/ways. Poor growing medium and bare patches may induce weeds.
<b>wind erosion</b> - result of climate, poor management and/or inherent soil qualities.	Primarily an issue initiated by a combination of drought conditions and local site management or inherent qualities. Suggested to severely affect 31,000 ha and moderately affect 47,000 ha.	In coastal situations sand can cover roads and other public assets, or even encroach on farmland. Dust storms originating in agricultural areas can be a nuisance when blown to urban areas. Results in loss of colloidal fraction of soil so reducing nutrients and productive capacity of remaining soil.
<b>soil contam.</b> - due to local site management.	Currently a restricted problem in the region with the main contamination occurring over 3,300 ha on the Bellarine Peninsula.	Results in contaminated land taken out of production - may cause contamination of stock or produce that could impact on markets for goods.
<b>biodiversity decline</b> - due to vegetation removal.	General clearing of indigenous vegetation combined with land use change (primarily to agriculture) has resulted in isolated remaining ecosystems and species, some of which are listed as threatened. Widespread clearing is often implicated in other issues where changed water cycles are primary cause.	Impact of habitat removal and modification across the region is particularly debilitating for indigenous flora and fauna and reduces biodiversity. Loss of vegetation and poor management contribute to many issues; water erosion, salinity, eutrophication, turbidity, flooding, w/way health, mass movement, wind erosion, and pest, plant and animal invasion.
<b>changed flow regimes</b> - due to local site management.	Sites implicated include Woody Yaloak/Lough Calvert Diversion schemes and rivers used for water harvesting by water authorities.	Diversion schemes may carry saline or nutrient enriched waters degrading downstream water quality restricting domestic and industrial use. Water harvesting may impact on stream ecosystems due to lack of water flow.
<b>changed land use</b> - due to local site management	Major areas of change are occurring around urban centres.	Significant agricultural production loss associated with continuing urban growth. Associated stormwater runoff, water erosion, waste issues, w/way health and quality issues, turbidity, eutrophication and conservation issues.
<b>pest Plants</b> - due to site management, inherent qualities, adjacent land management.	Infestations of a range of weeds occur over the region. The extent of spread has only been estimated for select species such as serrated tussoc (over 100 000 ha) or in select areas.	May have serious implications in off site invasion. Reduces production, contaminates produce, harbours pest animals, reduces w/way health, and threatens areas of conservation value.
<b>pest animals</b> - Introduced self-sustaining issue. Clarity	A wide variety of pest animal inhabit different areas in the region. Most significant environmentally and economically are the fox and rabbit which are distributed over the entire region.	Production losses due to fox destruction of stock and rabbits eating pastures, off site problems associated with water erosion attributable to veg removal by rabbits. Predation by foxes and competition with rabbits threatens conservation of many fauna species. Rabbits also destroy indigenous vegetation through selective grazing and foxes potentially spread disease.
<b>fire</b> – due to lightning strikes and escapesburning-off mismanagement	Intermittent spread depending on year eg. climate and vegetative conditions.	Large capital losses of both public and private assets, environmental damage.



## Draft Corangamite Native Vegetation Plan

### Appendix 8: Best Management Practices

This list indicates some of the good management practices that are being implemented in the Corangamite Region. This list will be expanded over time to exchange information and encourage the adoption of best management practices.

<b>Issue</b>	<b>Contact Group</b>	<b>Contact Name</b>	<b>Ph No.</b>
1 Urban Bushcare	LINCS Ballarat	Tim D'Ombraim	5346 1495
2 Roadside Management	The Geelong Regional Roadside and Vegetation Management Committee	Rob Giddings	5227 0834
3 Grassland Management on Private Property	Leigh Catchment Group	Jeanette Bellchambers	5281 3371
4 Estuary Wetland Planning & Management	Princetown Landcare	Neil Boxshall	5598 8169
5 Integrating Native Vegetation into Catchment Management	Swan Bay Integrated Catchment Management Committee	Steve Smithyman	5223 1854
6 Local Government Vegetation Protection Planning Overlays	Department of Natural Resources & Environment & Corangamite Shire Council	Steve McDougall (NRE)	5233 5516
7 Industry Involvement with Native Vegetation Management	Ford Australia Proving Ground	Colin Anderson	5279 6162