CORANGAMITE REGIONAL CATCHMENT STRATEGY 2013-2019

Together we will make a difference

CORANGAMITE CMA

State Government Victoria

CORANGAMITE CMA

Corangamite Regional Catchment Strategy 2013-2019

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FOREWORD

The Corangamite Regional Catchment Strategy 2013–2019 provides a vision for the integrated management of natural resources in the Corangamite region. It is a blueprint for catchment health in the future and builds on the achievements and lessons from the past.

At the heart of the Regional Catchment Strategy (RCS) is the need to encourage the community to participate in the protection, restoration and enhancement of natural resources across the Corangamite landscape. A motivated community, combined with sound science, increased knowledge and adequate resources, is essential for improving the health and productivity of the catchment. More than two-thirds of the catchment is private land managed by rural landholders, and without their participation, investment and knowledge, we will not realise the vision in this strategy – *a healthy Corangamite catchment valued by engaged communities.*

A key to achieving success is growing and nurturing a range of partnerships. The Corangamite Catchment Management Authority (CMA) recognises the role the Australian, Victorian and local governments play, along with numerous community, Aboriginal people and industry groups. To achieve the vision of the RCS everyone is important, and we can all do something to make a difference.

We firmly believe integration is needed to achieve success. Integrated catchment management brings together people, ideas and practices across land tenure boundaries, and across the range of natural resource management 'silos'. It improves coordination of on-ground action, and can maximise the benefits of any action. Integration is the approach the CMA will use in delivering its programs, and we will encourage our partners to do the same.

In developing this RCS, we have sought feedback from the wider catchment community. As a result, the strategy highlights the need to identify and work together on joint priorities in natural resource management. We trust it will also help guide and encourage investment by other stakeholders to leverage government and private investment.

The RCS looks forward, recognising the challenges of the task ahead, while understanding where we have come from. Since European settlement of the Corangamite region many land use decisions and practices once encouraged have damaged our natural resources. In some cases, the impact has been so great that critical resources such as soil and water have been compromised, and native species have become extinct or threatened.

We are inextricably linked to our catchment and we have a shared responsibility to act to ensure that the environment is healthy and supports our prosperity and wellbeing, and that future generations can enjoy the benefits. Together we will make a difference.

Alice Knight, OAM

Chairman,
Corangamite Catchment Management Authority

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(on CD or available at *http://www.ccma.vic.gov.au*)

CHAPTER 1

INTRODUCTION

The Corangamite Regional Catchment Strategy (RCS) for 2013–2019 is a blueprint for catchment health. It provides a strategic, integrated framework for natural resource management in the Corangamite Catchment Management region of Victoria.

This RCS recognises the strong connection between the health of the catchment and the wellbeing of the community. It encourages greater participation and investment in the protection, enhancement and restoration of land, water and biodiversity resources in the Corangamite region.

The RCS identifies desired regional outcomes and priorities, as well as describing an approach for further inclusion of local priorities. It is an overarching strategic framework for action, but not an action plan.

The RCS builds on the considerable work carried out in the region under strategies developed in 1997 and 2003.

In this RCS, the term:

- 'Corangamite region' is synonymous with 'Corangamite catchment'
- 'Community' refers to all those with an interest or potential interest in the environment who live or work in, or visit, the Corangamite region. 'Community' includes individual landowners, community members and groups, government agencies, industry bodies, authorities and investors.

DEVELOPMENT OF THE RCS

This RCS has been prepared under the provisions of the *Catchment and Land Protection Act 1994* (Vic.). It has been developed in accordance with the requirements of Commonwealth and State legislation and policies relating to biodiversity, land and water resources (Appendix 1). The content of the RCS has been informed by guidelines from the Victorian Catchment Management Council[1] and the Department of Environment and Primary Industries (DEPI)[2].

The process to develop the RCS (Appendix 2), which involved considerable community engagement, provides the foundation for investment decisions to achieve improved outcomes for the region's natural resources. The approach begins by determining the high value natural resources which are a priority for protection, restoration and enhancement, and identifies desired outcomes at a regional scale. These take the form of:

- a vision for the Corangamite region
- an overarching catchment goal
- a strategy to achieve the goal
- four foundations of change
- objectives and actions determined through community engagement.

The Appendices to the RCS provide detailed information that supports the RCS. The Appendices are included as a compact disc at the back of the RCS and are available online at the website of the Corangamite CMA.

Relevant Australian and Victorian legislation, policies and strategies are referred to in Chapter 3. Similarly, relevant regional strategies and action plans are referred to in that chapter.

This page: *Hoary Sunray (Leucochrysum albicans var. tricolor).*

[1] Victorian Catchment Management Council (2011). *Regional catchment strategy guidelines 2011*. Victorian Catchment Management Council, Melbourne.

[2] Department of Environment and Primary Industries (2011). *The asset-based approach to priority setting: applying the asset-based approach to developing Regional Catchment Strategies*. Department of Environment and Primary Industries, Melbourne.

KEY ACHIEVEMENTS SINCE THE LAST RCS (2003-2012)

The landscape of the region continues to evolve. In the interests of the environment and agricultural productivity, there have been many changes in the past decade. Investments and efforts, individually and collectively, have resulted in many achievements.

These include:

- Innovation and the adoption of more sustainable farming practices by many farmers in the region have resulted in significant achievements in the protection and enhancement of natural resources as well as improved farm productivity.
- Strong community participation is a feature in the protection of the region's environment. There are more than 150 active groups, including 72 Landcare groups and a further 80 environment, management or progress groups.
- The region's landholders and community groups have been engaged in the protection, enhancement and restoration of native vegetation at a local and a landscape scale. Much of this investment has resulted in significant and beneficial outcomes in salinity management; erosion control; habitat and biodiversity protection and restoration; the control of pest plants and animals; river, waterway and wetland management; and so on.
- The expansion of WaterWatch and the creation of EstuaryWatch have engaged more than 161 volunteers who have monitored water quality at more than 464 sites.
- Almost 150,000 ha of high value public land have been secured for conservation, compatible recreation and tourism, and some minor resource extraction by the creation of the Great Otway National Park and Otway Forest Park.
- Following the passage of historic legislation through the Victorian Parliament in June 2002, Marine Reserves along the coast of the Corangamite region were established, securing a representative sample of each of the marine bioregions adjacent to the catchment.
- Over 1220 ha of riparian zones have been protected or enhanced along priority waterways through fencing, revegetation and weed control, and more than 35 km of priority stream bed and banks have been stabilized through erosion control works.
- More than 600 km of waterways have been opened up to fish passage by the removal of barriers and installation of fishways.
- Some 10,900 ha of high value native vegetation and habitat has been protected through the Eco Tender, Plains Tender, Wetlands Tender and Coastal Tender programs.
- Municipal planning schemes have been updated to protect natural resources through the use of zones, overlays and local policy: for example, the adoption of salinity management overlays.
- Threats to soils on nearly 9000 ha have been addressed through the Land Health program.
- Environmental water entitlements have been secured for the health of the Moorabool River and Lower Barwon wetlands, which has also been assisted through the redirection of groundwater from the Batesford Quarry to the lower Moorabool.
- The creation and expansion of the Corangamite CMA Knowledge Base[3] has provided an accessible website for housing peer-reviewed research papers, plans and strategies for natural resource management in the catchment.
- Research in natural resource management research addressing regional knowledge gaps has advanced.

[3] http://www.ccmaknowledgebase.vic.gov.au/

CHAPTER 2

REGIONAL OVERVIEW

The Corangamite region is rich in environmental, social and economic values and has important cultural foundations.

The region extends across:

- 1.3 million ha of land, with 78% in private ownership (Figure 1)
- 175 km of coast
- four catchment basins – Barwon, Lake Corangamite, Otway Coast and Moorabool.

It includes all or part of the cities of Ballarat and Greater Geelong, the Borough of Queenscliffe, and the Shires of Colac Otway, Corangamite, Golden Plains, Moorabool, Moyne, and Surf Coast.

This chapter summarises the people, natural resources, employment and industry of the region. A more detailed overview of the region is provided in Appendix 3.

This page: *Victorian Volcanic Plains*

NATURAL ENVIRONMENT

The Corangamite region has rich and diverse landscapes, reflecting its geological, climatic and human history. The natural resources of our region are critical to sustaining the lifestyle of its residents and visitors, as well as providing important habitat for flora and fauna. They support valuable industries such as agriculture and nature-based tourism, and underpin the region's urban water supply needs.

Notable features of the region include:

- Lake Corangamite, the largest permanent saline lake in Australia and the largest natural lake in Victoria, which is a Ramsar listed wetland and a haven for migratory and non-migratory birds.
- Expansive volcanic plains with breached scoria cones, extensive wetlands and threatened grasslands, and the unique landscape of the stony rises with their diverse woodlands, wetlands and rock formations.
- A range of coastal environments including sandy beaches, rocky headlands, estuaries and bays, and the cliffs, caves and sea stacks of the Shipwreck Coast.
- The Otway Ranges with deeply incised rivers, gorges, rapids and waterfalls and extensive forests.
- Parks and reserves, including the Port Campbell and Great Otway National Parks, the Twelve Apostles and Point Addis Marine National Parks and part of the Brisbane Ranges National Park.
- Widespread, diverse and productive landscapes, supporting production forests, cropping, grazing, horticulture, viticulture and dairy enterprises.
- Rivers and waterways including internationally significant wetlands, underpinning water supplies to towns and cities.

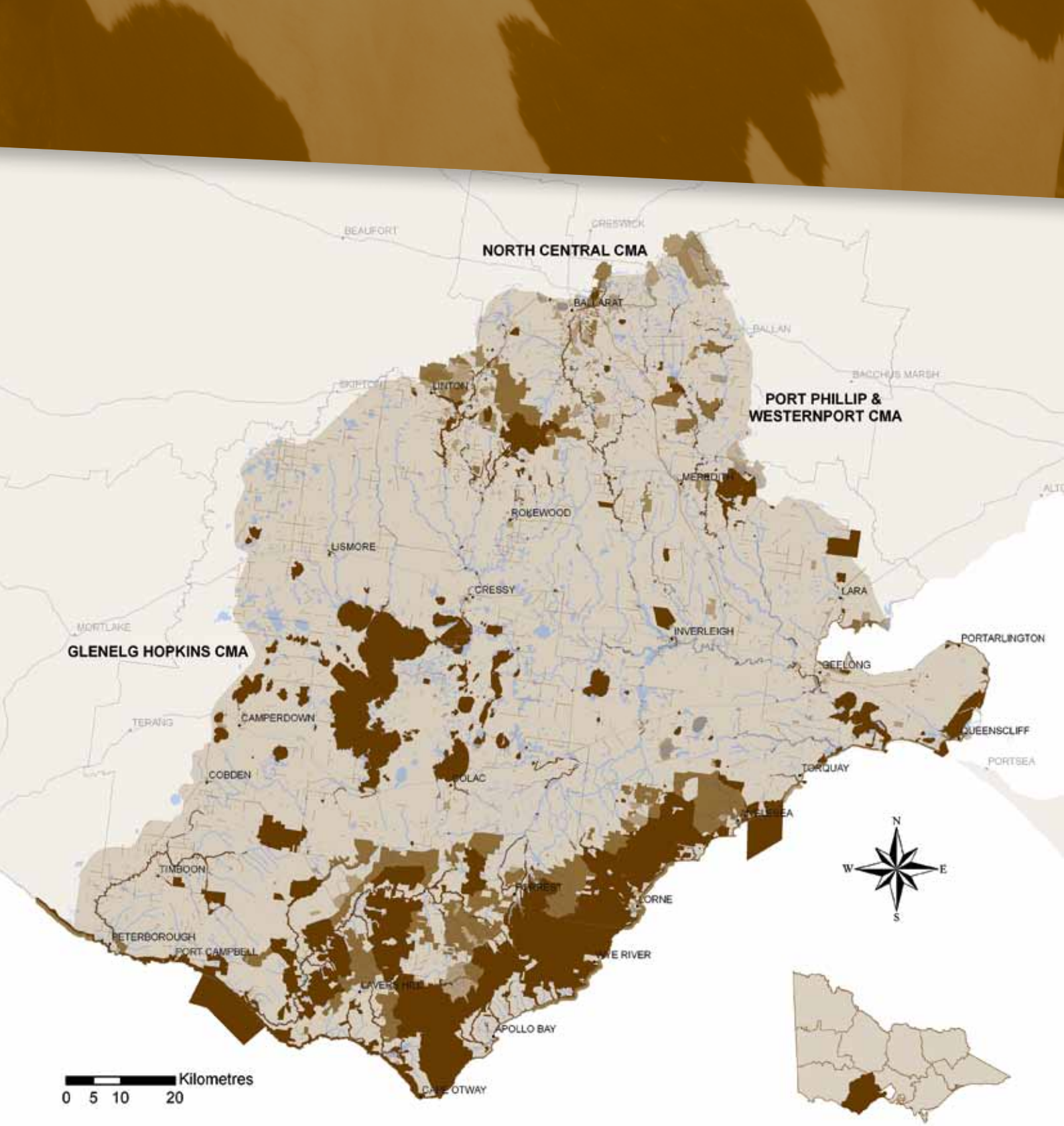

Figure 1 Land tenure in the Corangamite region

TRADITIONAL OWNER STATEMENT

We, the Traditional Owners of what is now Victoria, have existed as part of this land for thousands of generations. We are not separate from the land, but an intrinsic part of it, and we understand that the health of the land is the health of the people. The lore of the land is the very heart of our existence, and our culture – this is what land means to us. Within this meaning lies our great respect for the land and the fundamental knowledge of the essential nature of maintaining a holistic relationship with country.

The Corangamite landscape is a cultural landscape; shaped and influenced by people. Aboriginal footprints exist over every part of this land. The remaining tracts and patches of remnant bush, the wetland, coastal and river environments are the best enduring representations of Aboriginal cultural values, and the protection of these speaks to the very core of our being.

To protect our remaining landscape, indigenous and non-indigenous cultures must genuinely engage with each other; learn from each other, and recognise the value of black and white knowledge. Working side by side, we have a greater chance of responding appropriately to current environmental challenges. Involving Aboriginal people at all levels of land and water management will benefit the whole community.

Wadawurrung Traditional Owners and Registered Aboriginal Party

PEOPLE

Population

The Corangamite region has a population of more than 370,000. The population of the region is:

- Culturally diverse and highly urbanised, with around three-quarters of people residing in the urban centres of Ballarat and Greater Geelong.
- Growing at one of the fastest rates in Victoria, increasing by 26,000 since 2006 and expected to grow at 1.5% per annum to approximately 500,000 by 2026[4].

Traditional Owners

Aboriginal peoples have lived in the area now known as the Corangamite region for thousands of generations. The Wadawurrung language was spoken throughout most of the area; other Traditional Owner language groups included the Kirrae Whurrong, Gadubanud, Gulidjan and Djargurd Wurrung[5]. What we often refer to as the natural environment of the region is in reality a cultural landscape. At the time of European settlement the landscape had been lived in, used, managed and ultimately shaped by Aboriginal peoples over tens of thousands of years, just as much of today's landscape has been heavily shaped by the actions of those who have lived here since settlement.

EMPLOYMENT AND INDUSTRY

The economy of the region reflects its mix of agricultural and other primary industries, tourism, manufacturing and service industries (Figure 2). In 2011, healthcare and social assistance (14%), retail trade (12%) and manufacturing (11%) accounted for the largest shares of employment and were concentrated in Geelong and Ballarat[6].

[4] RM Consulting Group (2012) *Regional Catchment Strategy Regional Overview – Draft Report to the Corangamite Catchment Management Authority*.

[5] Clark, I. (c. 1990). *Aboriginal languages and clans: an historical atlas of western and central Victoria, 1800–1900*. Department of Geography & Environmental Science, Monash University, Melbourne.

[6] Australian Bureau of Statistics (2012) *Census of Population and Housing, 2011*. Australian Bureau of Statistics, Canberra.

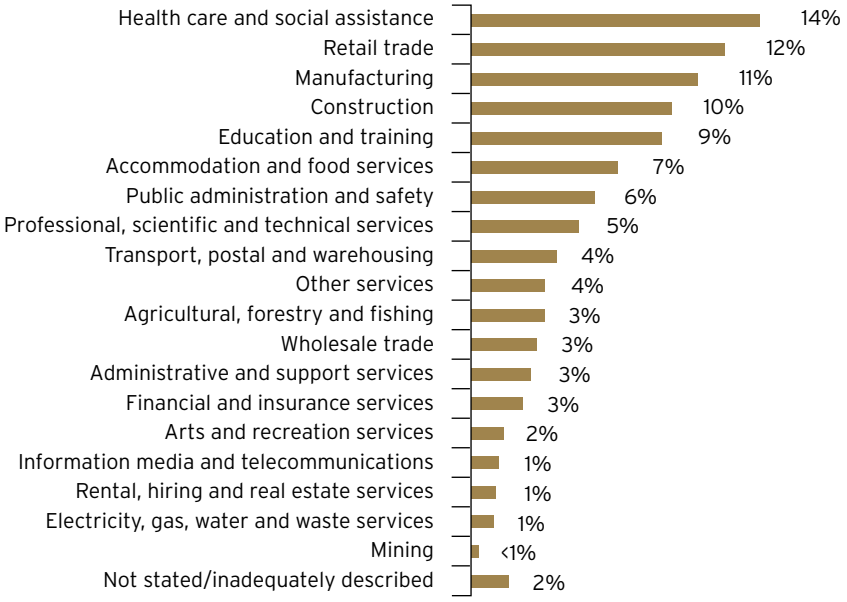

Figure 2 Employment across industries in the Corangamite region in 2011

The share of regional employment in the agriculture and forestry sectors declined from 5% to 3.4% between 2001 and 2011, but this sector remains an important employer for people from smaller regional communities and towns.

Agriculture

Agriculture is the dominant land use of the region, with approximately 3450 agricultural businesses[7] operating across 772,436 ha. Enterprises include sheep and cattle grazing, dairying, cropping, forestry and viticulture. Just over 75% of private land used for food and fibre production is used for livestock grazing and 20% is used for crop production, including timber.

Livestock numbers in 2005–2006 were approximately 271,000 dairy cattle, 209,000 beef cattle and 1.7 million sheep and lambs. In 2005–2006, the Corangamite region produced approximately 10% of the gross value of agricultural commodities produced in Victoria[8].

The gross value of agricultural commodities produced in the region in 2009 was $971 million, up from $770 million in 1999[9].

Tourism

Domestic and international tourism are a significant industry and employer in the Corangamite region. Nature-based tourism destinations include the Great Ocean Road, the Otway Ranges, and the Twelve Apostles.

The Great Ocean Road, one of Australia's 14 National Landscapes, attracted 4.9 million domestic day trip visitors in 2010. This was 20% of all domestic day trips to or within regional Victoria and 50% (163,300) of all international overnight visitors to regional Victoria[10].

The history and culture of Ballarat and the historic seaside villages, beautiful beaches, and the waterfront of Geelong and the Bellarine Peninsula are key tourist attractions.

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[7] Agricultural businesses are those defined as having an Estimated Value of Agricultural Operations greater than $5000.

[8] Australian Bureau of Statistics (2008). *Agricultural commodities: Small area data, Australia, 2005–2006*. Cat. 7125.0. Australian Bureau of Statistics, Canberra.

[9] RM Consulting Group (2012) *Regional Catchment Strategy Regional Overview – Draft Report to the Corangamite Catchment Management Authority*.

[10] Tourism Victoria (2011). *Great Ocean Road market profile year ending December 2010*. Tourism Victoria, Melbourne.

CHAPTER 3

THE REGION'S NATURAL RESOURCES

Natural resources are naturally occurring, tangible elements of the landscape. They occur at or across a particular geographic location and are valued for their environmental, social and economic benefits or 'triple bottom line' values.

Integrating the management of agricultural land with the management of other natural resources is critical. To achieve this, participation of private landholders in the region is vital.

This page: *Alvie Consolidated Primary School children planting native plants.*

Within this RCS, natural resources are grouped into eight categories:

1. soils and agricultural land
2. rivers, estuaries and floodplains
3. wetlands
4. native vegetation
5. threatened flora and fauna
6. coasts
7. marine environment
8. aquifers.

In developing this RCS, each category has been assessed at a regional level, to evaluate the values (Appendix 4) and threats (Appendix 5) associated with it. This chapter summarises the values and condition of each category, and the threats and management factors – including the policy context and the roles of various entities. It identifies high value natural resources in each category and defines the objectives for managing each category. Actions to achieve natural resource objectives are provided in Table 3 (pp. 54-55).

Determining high value natural resources

High value natural resources described in this RCS have been identified on the basis of:

- Government criteria, including the international, national, state and regional importance of resources and places as determined by attributes such as rarity, representativeness and condition of the resource or place.
- Region-wide community knowledge shared during the process of preparing this and previous RCSs and current sub-strategies of the RCS.
- Other environmental social and economic values.

This RCS recognises that local communities frequently use more locally specific criteria to determine the value of their natural resources, in addition to those recognised by broader regional, state or national communities.

A strong foundation of this RCS is the need to work with regional communities to identify further natural resources which are valuable at the regional or local level; as outlined in chapter 6. This is an important part of completing the picture of high value natural resources across the region, as the community – and particularly private landholders – make substantial investments in the protection, enhancement and restoration of natural resources within the catchment and are therefore intimately connected to these resources.

High priority actions or interventions

As a regional-level strategy document, this RCS does not generally identify specific locations for high priority attention, or specify on-ground actions. However, these steps are recommended by the RCS as part of work to be undertaken in the development and review of sub-strategies and local plans.

A process for further identifying local priorities and integrating natural resource management at a more local scale is being developed using existing Corangamite Region Landscape Zones (Appendix 6). This RCS includes an action to complete the preparation of Landscape Zone Action Plans to identify, protect, enhance and restore high value natural resources in each of the catchment's 15 Landscape Zones.

Top: *Waterwatch team members Deirdre Murphy and Rebecca George collecting water bugs.*

Left: *Cotton On volunteers planting native plants along the Bellarine Rail Trail.*

SOILS AND AGRICULTURAL LAND

Soils underpin the health of all land-based natural resources in the region. Two-thirds of the region's land is privately owned and used primarily for agricultural production. The management of soils and agricultural land influences environmental outcomes across the whole region.

Soils support a wide variety of natural resources, including native vegetation communities as well as agricultural industries. Agricultural land is used for the production of food, fibre and forestry products, including dairy, meat, fine wool, cereals, horticulture, viticulture, agroforestry and plantation forestry.

Integrating the management of agricultural land with that of other natural resources – for instance, native vegetation, wetlands and rivers – is crucial for the region, including its estuaries and coasts. Actively engaging the many private landholders in the region and understanding their local priorities is critical to the success of this RCS.

Values of soils and agricultural land

Environmental	Support a diverse range of ecological communities, plant and animal species. Sequester carbon.
Social	Provide direct employment in the agricultural industry, and indirectly in processing, transport, storage and distribution with associated flow-on effects for regional towns. Help define the aesthetics of the landscape.
Economic	Produce food and fibre for domestic and export markets and provide flow-on economic benefits in processing and service industries.

Condition of soils and agricultural land

The health of the region's soils underpins the productivity of land and many natural resources. In turn, the condition of agricultural land affects its productivity levels and other natural resources.

High production value soils of the south-west of the Corangamite region are generally highly fertile and in fair to good condition. High fertility, high rainfall, topography and land-use in these localities make these soils prone to landslides, waterlogging and soil structure decline. These soils are also prone to acidification. Highly productive red volcanic soils of the north-east of the region are naturally fertile but prone to acidification.

Medium production value soils, mostly found in the Victorian Volcanic Plains, are the most widespread soil type in the region. They are generally in average condition. Various inputs, for instance inorganic fertilisers and agricultural lime, are used to manage acidity and maintain, or improve, fertility. These soils are prone to waterlogging and can erode if groundcover is lost and/or the land is used beyond its capability. Secondary salinity may also affect land and soils for food and fibre, especially on the plains, reducing productivity and potentially impacting other catchment resources.

Lower production value sedimentary soils are generally of lower fertility and in average condition. These soils are geologically older and more fragile; they are poorly structured and more dispersive. They may be more subject to water erosion when exposed through the removal of groundcover or over-cultivation. These soils tend to acidify rapidly when disturbed from their natural state and used for agriculture.

This page: *Aire Estuary landholders.*
Opposite: *Dairy farm at Birregurra.*

Threats to soils and agricultural land

Soils

Potential threats and/or threatening processes to the region's soils include:

- nutrient decline
- acidification
- structure decline
- waterlogging
- carbon depletion
- secondary salinity
- landslides
- water erosion
- soil compaction
- decline in soil microbiology
- disturbance of potential acid sulfate soils.

Soils naturally acidify, erode and slip. Natural salinity existed before European settlement and farm development. However, some agricultural practices aggravate these threats. Topography and climatic conditions also influence these threats to soil health.

Agricultural land

Potential threats to this resource and its productivity include:

- threats to soil health
- pest plants and animals
- soil-borne diseases
- population growth and urban development
- climate change (although this could also have positive impacts)
- unsustainable resource utilisation
- inadequate or poor management
- uncontrolled stock access to remnant vegetation or waterways.

While it is important to address threats to agricultural land, the RCS recognises that various land management practices can have positive or adverse effects on the region's natural resources (e.g. native vegetation, rivers and wetlands).

Context for managing soils and agricultural land

Management of soils and agricultural land in the Corangamite region is guided by:

- *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
- *Catchment and Land Protection Act 1994* (Vic.)
- Victorian Soil Health Strategy 2012
- Corangamite Soil Health Strategy 2006
- Corangamite Salinity Action Plan 2001 and Dryland Salinity Statement 2012
- Corangamite Landcare Support Strategy 2004–2009.

Objectives for soils and agricultural land

Soils

Maintain or enhance soil condition for continued environmental benefits and sustainable agricultural production.

Agricultural land

Secure the region's productive agricultural land base so that future food, fibre and forestry demands can be met sustainably.

Work with landholders to increase their participation in natural resource management activities and programs so there is reduced impact on the region's natural resources from agricultural practices.

SOILS AND AGRICULTURAL LAND (CONTINUED)

Roles in the management of soils and agricultural land

Landholders	Manage the land, soils and other natural resources on their properties.
Landcare and community groups	Support landholders and managers to improve natural resource management outcomes on private and public land, support social cohesion and land productivity, and assist in integrating management across property boundaries.
Traditional Owners, Registered Aboriginal Parties and Office of Aboriginal Affairs Victoria	Protect Aboriginal cultural heritage and, as appropriate, share information on Aboriginal cultural heritage values. Approve and/or issue permits for on-ground work on all land tenure that disturbs and destroys Aboriginal cultural heritage under the Aboriginal Heritage Act 2006 (Vic.). Approve Cultural Heritage Management Plans.
Industry partners	Support private land managers to adopt practices that improve the soil resource. Research new methods and practices, and build knowledge and skills to underpin sustainable industries.
Local government	Manage and update municipal planning schemes to protect soils and productive agricultural land from other development, and administer duties as a planning authority.
Department of Environment and Primary Industries	Support the management of soil health for better environmental outcomes and productive and sustainable farm management. Set soil health policy and the Victorian Soil Health Strategy. Manage and administer soil health on public land.
Department of Transport, Planning and Local Infrastructure	Manage Victoria's growth and development. Assess planning scheme amendments and provide planning advice and guidance. Work with local government to lead strategic planning and development assessment.
Corangamite CMA	Develop and review regional strategic planning directions for soil and land health, including the Corangamite Soil Health Strategy. Deliver integrated catchment management by developing strategies, building cooperation, coordination and partnerships, brokering knowledge and investment and delivering key projects.

Identifying the relative productive capacity of agricultural land

The Enhanced Vegetation Index (EVI) has been used to provide a 'relative productivity value' for private land within the region and is a direct representation of the production of plant biomass. EVI data are sourced from NASA's MODIS satellite, which tracks land cover and relative plant growth. Data have been collected daily since 2001. The information from MODIS corresponds closely with mapping done by the Corangamite CMA combining data on soil types with growing-season rainfall.

The relative productivity of areas within the Corangamite region is rated as high, medium or low, according to the EVI (Figure 3). A soil map is included in Appendix 7.

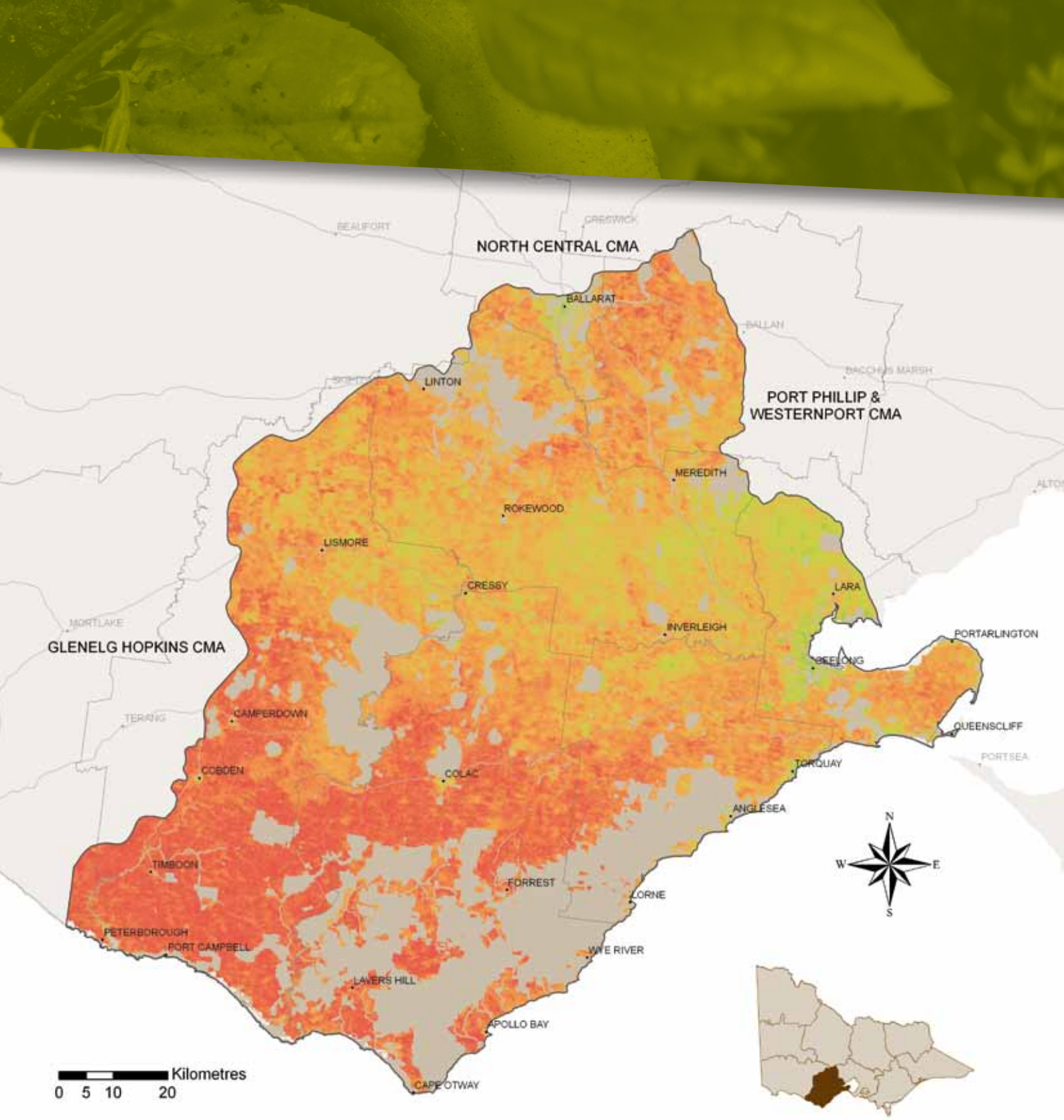


Figure 3 Relative productivity of private agricultural land in the Corangamite region assessed as cumulative plant biomass (2001–2009) from Enhanced Vegetation Index (EVI) data

RIVERS, ESTUARIES AND FLOODPLAINS

The region's rivers, estuaries and floodplains are diverse and complex ecosystems and the 'lifeblood' of many communities. They provide habitat for native fish, invertebrates and water birds, while supporting extensive riverine vegetation communities. Rivers, estuaries and floodplains provide healthy landscapes, which are valued for recreation and tourism. Their catchments provide water for human consumption, farming and industry. Protecting, improving and maintaining the environmental condition of the region's waterways will help maintain these values into the future.

Major rivers in the region are the Gellibrand, Moorabool and Barwon, which are also important sources of water supplies to Geelong, Ballarat, Colac, Warrnambool and other towns of the south-west. Many estuaries along the Great Ocean Road are highly valued and vital to the regional economy. They include the Barwon estuary – which flows to the sea at Barwon Heads – and the Anglesea, Erskine and Gellibrand estuaries.

Values of rivers, estuaries and floodplains

Environmental	Provide and support biodiversity and habitat; habitat connectivity as bio-links; rare and threatened or significant flora and fauna and communities; drought refuges; and ecosystem services of flood storage and conveyance, nutrient cycling, carbon storage and pollution control.
Social	Support recreational opportunities, including fishing, boating, camping, swimming and tourism. Provide cultural and spiritual values, heritage sites, aesthetic and scenic values.
Economic	Supply water for human consumption, farming and industry, provide flood mitigation services, and support tourism and commercial fishing activities.

This page: *St George River estuary.*

Condition of rivers, estuaries and floodplains

Waterway values are predominantly determined by their environmental condition. For example, recreation and tourism industries rely heavily on the health of estuaries along the Great Ocean Road, and the health of the Barwon River is crucial to its role as a key recreational area for Geelong.

The Index of Stream Condition (ISC)[11] is the most widely used indicator of waterway health. The most recent ISC data for the region's rivers, estuaries and floodplains show the condition of the total length of river in each of the four major river basins in the Corangamite region.

Overall, only 13% of the waterways in the Corangamite region are in good or excellent condition, just over half are in moderate condition and almost 40% are in poor or very poor condition (Figure 4). The Otway Basin has the largest percentage of stream length in good and excellent condition, whilst the Moorabool Basin has the largest percentage in poor or very poor condition.

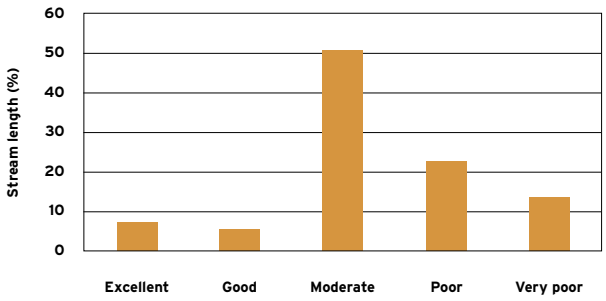


Figure 4 Overall condition of waterways in the Corangamite region

[11] *http://www.water.vic.gov.au/monitoring/river-health/isc*

Threats to rivers, estuaries and floodplains

Factors that have contributed to a decline in the health and condition of rivers, estuaries and floodplains and have the potential to threaten their future values include:

- accelerated erosive processes
- barriers to native fish migration
- channel modification and changes to stream flow (e.g. artificial opening of estuary mouths)
- run-off and point-source discharge (affecting water quality)
- pest plants and animals
- uncontrolled stock access
- degraded riparian vegetation
- loss of in-stream habitat and wetland/floodplain connectivity
- climate change and consequences for sea level rise and stream flows
- disturbance of potential acid sulfate soils
- urban development.

Context for managing rivers, estuaries and floodplains

Management of rivers, estuaries and floodplains in the Corangamite region is guided by:

- Victorian River Health Strategy 2002
- Corangamite River Health Strategy (CRHS) 2006 and its 2010 Addendum.

Other strategies and legislation that guide management of the region's rivers, floodplains and estuaries include:

- *Water Act 1989* (Vic.)
- Victorian Flood Management Strategy 1998
- Victorian Coastal Strategy 2008
- Western and Central Region Sustainable Water Strategies.

A new Corangamite Waterway Strategy for the health of the region's rivers, estuaries and wetlands is being developed in line with the Victorian Waterway Management Strategy. It will confirm the priority waterways for the region and identify management actions to address threats at the waterway reach and catchment scale. The new strategy will also build on work undertaken to review the CRHS and will include any outstanding priority actions.

The management of floodplains has historically focussed on protecting built infrastructure and property from flood through protective works or non-structural means (such as warning systems or planning controls to maintain floodplain storage and conveyance). Future management will be guided by new policy (through the Victorian Government's flood reviews), and the development of a new regional floodplain strategy.

Objectives for rivers, estuaries and floodplains

Retain the ecological function of riverine and estuarine floodplains and protect community infrastructure and values.

Protect waterways within Special Water Supply catchments.

Maintain the resilience of indigenous aquatic and riparian flora and fauna to variable climatic conditions.

Sustain the viability of populations of rare and threatened native fish species for the long term and show evidence of recruitment and a range of age classes.

Identifying high value rivers, estuaries, floodplains and management priorities

Priority waterways of the region were determined for rivers and estuaries in the Corangamite River Health Strategy 2006–2011 and its 2010 Addendum (CRHS).

The ISC methodology divided major waterways into a series of river or estuary reaches. An evidence-based database (River Values and Environmental Risk System, 'RiVERS') provided information on the condition, environmental, social and economic values and threats to these reaches.

The CRHS also used a risk-based approach to identify the main threatening processes and opportunities for restoration, and to set management actions. Appendices 8 and 9 provide the detailed assessments used to determine high value reaches and their risk status.

High value river reaches determined through the CRHS process have been grouped for the RCS so that a whole-of-the-river system is considered.

High value waterways in the region (Figure 5) include the heritage-listed Aire River, river reaches within the region's special water supply catchments, reaches that provide important habitat for rare and threatened native fish populations, coastal estuaries valued for recreation and tourism along the Great Ocean Road, the Leigh Gorge and the Barwon River through Geelong.

RIVERS, ESTUARIES AND FLOODPLAINS (CONTINUED)

Roles in the management of rivers, estuaries and floodplains

Landholders	Manage privately owned waterways and floodplains or licensed Crown and freehold stream frontages.
Individuals, community groups, e.g. Landcare and environment groups	Contribute to on-ground outcomes. Help monitor the health of rivers and estuaries through various programs such as EstuaryWatch and WaterWatch.
Traditional Owners, Registered Aboriginal Parties and Office of Aboriginal Affairs Victoria	Protect Aboriginal cultural heritage and, as appropriate, share information on Aboriginal cultural heritage values. Approve and/or issue permits for on-ground work on all land tenure that disturbs and destroys Aboriginal cultural heritage under the *Aboriginal Heritage Act 2006* (Vic.). Approve Cultural Heritage Management Plans.
Victorian Environmental Water Holder	Hold and manage environmental water entitlements and allocations in Victoria.
Water corporations	Manage water supply catchments. Provide water supply and wastewater services. Regulate the take and use of water.
Local government	Incorporate waterway health and catchment management objectives, priorities and actions into statutory planning processes, and administer duties as a planning authority.
Public land managers, including Parks Victoria, DEPI, local government and committees of management	Manage waterways and floodplains on public land within the jurisdiction of each agency or committee (e.g. parks and reserves, coastal foreshores, stream frontages and other Crown land areas within townships).
Department of Environment and Primary Industries	Set and implement policy for the Victorian Waterway Management Strategy. Regulate the extraction of earth resources from waterways; manage fisheries and recreational fishing in waterways; oversee biosecurity including aquatic invasive species.
Environment Protection Authority	Regulate activities that impact on water quality.
Australian Government	Create and set the national legislative frameworks for water allocation, salinity and water quality, Ramsar wetlands[12] and nationally listed threatened and migratory species.
Corangamite CMA	Develop and implement regional strategic planning directions for waterway management including the Corangamite Waterway Strategy. Deliver statutory waterway, floodplain and drainage management functions and manage specific areas of land under its jurisdiction such as the Barwon through Geelong. Deliver integrated catchment management by developing strategies, building cooperation, coordination and partnerships, brokering knowledge and investment and delivering key projects.

[12] The Ramsar Convention *(The Convention on Wetlands of International Importance, 1971)* is an international treaty for the conservation and sustainable use of wetlands.

RCS Priority waterways

Other waterways

Figure 5 High value rivers and estuaries in the Corangamite region

WETLANDS

Wetlands are significant and diverse natural ecosystems with plants and animals that have adapted to cycles of flood and drought. They are among the most productive ecosystems on Earth, but since 1788 approximately one-third of Victoria's wetlands have been lost.

Corangamite has more than 1500 wetlands covering 63,000 ha (5% of the region). These wetlands range from large open-water saline lakes to shallow, ephemeral, freshwater meadows – many of which are rich in native flora. While 75% of the total wetland area is on public land, a large number of small wetlands are found on private land.

Two wetland areas within the region are recognised as Wetlands of International Importance under the Ramsar Convention (Port Phillip Bay – Western Shoreline and Bellarine Peninsula, and the Western District Lakes) and 24 have been classified as Wetlands of National Importance under the Directory of Important Wetlands in Australia (DIWA).

Values of wetlands

Environmental	Provide habitat for flora and fauna. Support hydrological regimes. Mitigate floods and assist in pollution control.
Social	Provide recreational opportunities, spiritual and cultural heritage sites, science and educational opportunities.
Economic	Support tourism, commercial fishing and aquaculture.

Condition of wetlands

The condition of a wetland affects its ability to provide environmental functions and values. The Index of Wetland Condition (IWC) developed by DEPI provides a guide to the condition of the region's wetlands. It provides a framework to monitor the extent and quality of wetlands when used in conjunction with threatened species mapping, shorebird sites, and revised typology mapping for wetlands.

Assessments undertaken using the IWC in 2009 on Ramsar wetlands and wetlands listed in the DIWA provide a baseline of the condition of high value wetlands in the region (Figure 6).

The condition of the region's Ramsar wetlands is determined nationally by applying criteria to describe the ecological character (or health) of the site. Indicators of trends in the condition of wetlands have also been identified through investigations in the Corangamite region.

There are significant gaps in knowledge of the condition of wetlands in the Corangamite region. Research continues to close these gaps, however, and will continue to be required to help direct investments for improved wetland management.

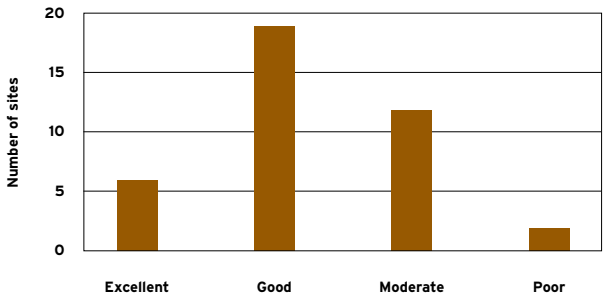


Figure 6 Classification of wetland conditions in the Corangamite region in 2009 according to the Ramsar Convention and Directory of Important Wetlands in Australia

This page: *Royal Spoonbills (Platalea regia) at Lake Colac Bird Sanctuary.*

Opposite: *Lake Weering.*

Threats to wetlands

Activities which change the ecological character of the wetland are threats, including:

- climate change
- physical change (e.g. drainage, change in salinity)
- land use change (e.g. drainage of wetlands for cropping or grazing)
- water storage, diversion and extraction
- inappropriate use (e.g. inappropriate grazing regimes and cropping)
- pest plants and animals
- poor waste management
- urban development and inappropriate recreational activities.

Context for managing wetlands

Management of wetlands in the Corangamite region is guided by:

- Ramsar Convention on Wetlands 1971
- Directory of Important Wetlands in Australia
- Corangamite Wetlands Strategy 2006.

Other strategies relevant to wetlands management include:

- Victorian Coastal Strategy 2008
- Western and Central Region Sustainable Water Strategies.

Objective for wetlands

Maintain the extent of wetlands (by type) and improve their quality relative to 2009 benchmark data.

WETLANDS (CONTINUED)

Roles in the management of wetlands

Landholders	Protect and manage wetlands on their properties.
Landcare and community groups	Participate in wetlands conservation projects on both public and private land.
Traditional Owners, Registered Aboriginal Parties and Office of Aboriginal Affairs Victoria	Protect Aboriginal cultural heritage and, as appropriate, share information on Aboriginal cultural heritage values. Approve and/or issue permits for on-ground work on all land tenure that disturbs and destroys Aboriginal cultural heritage under the *Aboriginal Heritage Act 2006* (Vic.). Approve Cultural Heritage Management Plans.
Local government	Incorporate waterway health and catchment management objectives, priorities and actions into statutory planning processes, and administer duties as a planning authority.
Parks Victoria	Manage wetlands on land under its jurisdiction for their natural, cultural and visitor experience values.
Department of Environment and Primary Industries	Set wetland management policy in Victoria. Implement the Ramsar Convention in Victoria. Support wetland conservation programs through advice and expertise. Coordinate programs that contribute to wetland conservation.
Corangamite CMA	Develop regional strategic directions for wetland conservation, including the development and implementation of the Corangamite Waterway Strategy. Deliver integrated catchment management by developing strategies, building cooperation, coordination and partnerships, brokering knowledge and investment and delivering key projects.

Identifying high value wetlands

Wetland conservation aims to identify and protect the highest value wetlands. Using a wetland classification system to assess their values and threats, the highest value wetlands in the Corangamite region include:

- Internationally important wetlands (Ramsar sites)
- Nationally listed wetlands (Directory of Important Wetlands in Australia)
- High conservation value wetlands, freshwater meadows and marshes, including those listed under the *Environmental Protection and Biodiversity Conservation Act 1999* (Cwlth).

This page: *Duckholes at Dreeite.*

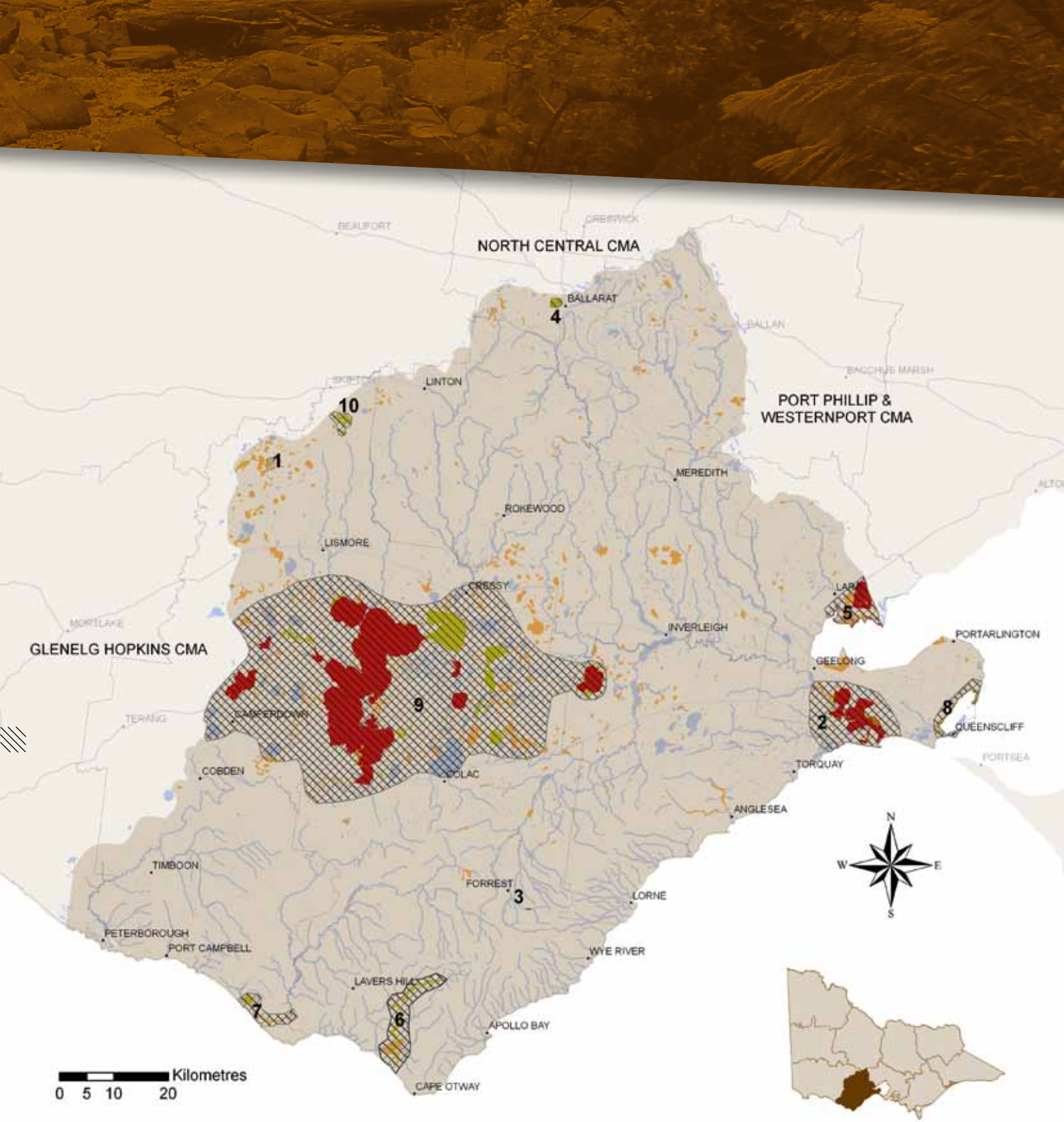


Figure 7 Concentrations of high value wetlands in the Corangamite region

Note: Due to the scale of mapping, many small or isolated high value wetlands may not be identified on this map but remain important for natural resource conservation.

NATIVE VEGETATION

Native vegetation in the region has undergone major changes since European settlement and today less than 25% of pre-1750 native vegetation remains. Much of this is on public land. Current data show that the condition and extent of native vegetation is still declining, highlighting the need for action to prevent further loss.

While much of past land clearing was the result of government policy or direction of the day, the consequences of clearing native vegetation are substantial and include the loss or reduction of vegetation communities such as native grasslands and grassy woodlands, the loss of biodiversity, changes in dryland and wetland salinity, soil erosion, and deterioration of water quality in rivers, creeks and wetlands.

The counterbalance to these consequences is that it has facilitated the development of a diverse agricultural and plantation forestry sector that contributes social and economic values to the region.

This RCS strongly promotes the protection of remnant native vegetation, along with activities to improve catchment health, reduce fragmentation and restore connectivity across the landscape.

Values of native vegetation

Environmental	Supports the maintenance of ecosystems, nutrient storage and cycling, and contributes to climate stability. Supports water resources, soil formation and protection. Provides habitat and food for fauna.
Social	Provides and protects aesthetic, cultural and spiritual sites and connections. Supports nature-based recreation and tourism. Provides opportunities for community engagement and volunteering in conservation activities.
Economic	Provides 'bush' food and fibre, research and education opportunities, tourism, resource opportunities and potential discoveries for medicines.

Condition of native vegetation

The quality and extent of native vegetation affects its ability to carry out important environmental functions and provide other values such as nature-based tourism.

Of the five bioregions within the Corangamite region (Appendix 10), the Victorian Volcanic Plain, Warrnambool Plain and Otway Plain bioregions are amongst the most cleared in the State. The Central Victorian Uplands bioregion is moderately cleared and the Otway Ranges bioregion is amongst the least cleared in Victoria[13].

At a site level the quality of native vegetation is measured by 'habitat hectares', which takes into account the condition of a site, as well as its size and connectivity with other native vegetation. A statewide study conducted by DEPI found the condition and extent of native vegetation across Victoria is in decline[14]. In the Corangamite region, the decline is possibly more extensive because:

- there is a significant area of grassy ecosystems which were more severely impacted
- a significant proportion of the land in the region is in private ownership and much of that has been cleared and developed for commercial farming.

This page: *Stony Rises landholder Lois Dupleix and her grandchildren.*

[13] Victorian Environment Assessment Council (2010). *Remnant native vegetation investigation: discussion paper*. Victorian Environment Assessment Council, Melbourne.

[14] Department of Environment and Primary Industries (2008). *Native vegetation net gain accounting first approximation report*. Department of Environment and Primary Industries, Melbourne.

Threats to native vegetation

Land clearing is one of many factors contributing to the loss, fragmentation and degradation of native vegetation in the Corangamite region.

Other factors threatening native vegetation include:

- pest plants and animals
- diseases
- disturbance such as fire or floods
- inappropriate land use and/or land management practices
- climate change.

Context for managing native vegetation

Management of native vegetation in the Corangamite region is guided by:

- *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
- *National Parks Act 1975* (Vic.)
- Victoria's Biodiversity Strategy 1997
- Native Vegetation Management: A Framework for Action 2002
- Corangamite Native Vegetation Plan 2004
- Public land management plans (e.g. Great Otway National Park and Otway Forest Park Management Plan).

Objective for native vegetation

Halt the decline in quality (condition) and extent of high value native vegetation and enhance its connectivity.

This page: *Wet Forest, Great Otway National Park.*

NATIVE VEGETATION (CONTINUED)

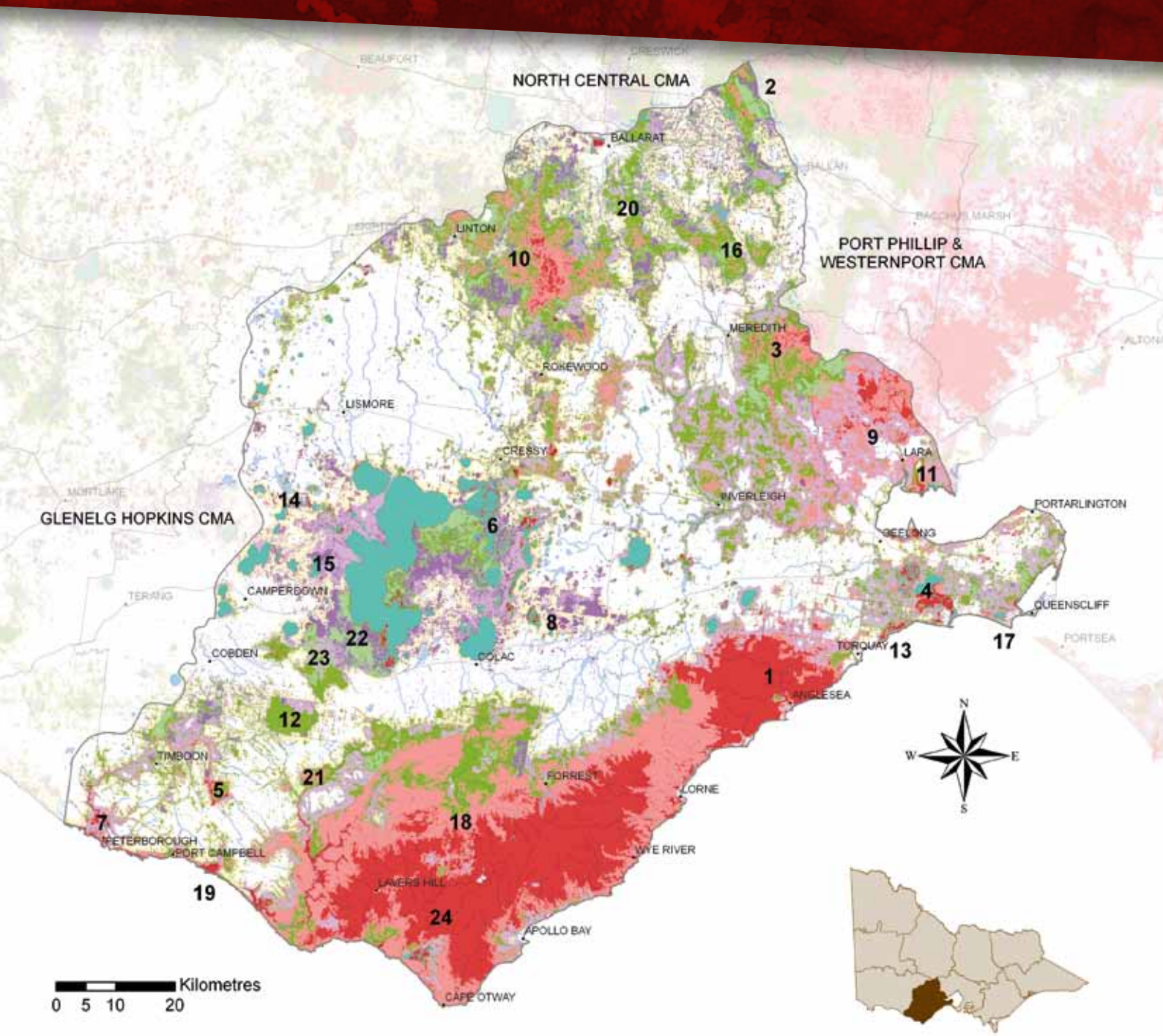
Roles in the management of native vegetation

Landholders	Manage native vegetation on private land.
Landcare and community groups	Participate in on-ground action to protect native vegetation on both public and private land.
Traditional Owners, Registered Aboriginal Parties and Office of Aboriginal Affairs Victoria	Protect Aboriginal cultural heritage and, as appropriate, share information on Aboriginal cultural heritage values. Approve and/or issue permits for on-ground work on all land tenure that disturbs and destroys Aboriginal cultural heritage under the *Aboriginal Heritage Act 2006* (Vic.). Approve Cultural Heritage Management Plans.
Trust for Nature	Provide services for land protection, stewardship, biodiversity markets and partnerships.
Local government	Incorporate native vegetation priorities and actions into statutory planning processes, and administer duties as a planning authority. Manage native vegetation on land under its jurisdiction.
Parks Victoria	Manage native vegetation on land under its jurisdiction for its natural, cultural and visitor experience values.
Department of Environment and Primary Industries	Set native vegetation policy. Oversee implementation of native vegetation management programs. Act as a referral authority for planning permit applications. Support the protection of native vegetation from the impact of pest plants and animals and unsustainable land use practices.
Corangamite CMA	Develop regional strategic directions for the protection of native vegetation, including develop and implement the Corangamite Native Vegetation Plan. Deliver integrated catchment management by developing strategies, building cooperation, coordination and partnerships, brokering knowledge and investment and delivering key projects.

Identifying areas of high value native vegetation

Areas of high value native vegetation in the region have been identified using principles in Victoria's Biodiversity Strategy and Native Vegetation Framework and guided by NaturePrint v2.0 (Figure 8). NaturePrint models the distribution of native vegetation, threatened species and the potential for connectivity and can be used to map at a larger scale than is possible in this RCS (Appendix 11).

This page: *Stony Rise Woodland.*



Artificial impoundment

Wetland habitat

High Values

Low values

1 Anglesea
2 Barkstead
3 Brisbane Ranges
4 Connewarre
5 Cooriemungle
6 Corangamite East
7 Curdies
8 East Beeac
9 Eastern Victorian Volcanic Plains
10 Enfield
11 Hovells
12 Jancourt
13 Karraf
14 Koowerra
15 Kooreetnung-Weeranganuk
16 Lal Lal
17 Lonsdale Lakes
18 Northern Otway
19 Port Campbell
20 Scotsburn
21 Simpson
22 Stony Rises North
23 Stony Rises South
24 Southern Otway

Figure 8 Broad areas of high value native vegetation in the Corangamite region

Note: Due to the scale of mapping, many small or isolated areas of high value native vegetation are not identified on this map (e.g. fragmented native vegetation areas across the Victorian Volcanic Plains), but remain important for natural resource conservation.

THREATENED FLORA AND FAUNA

The survival of threatened flora and fauna and ecological communities depends a great deal on the health of native vegetation and the continuing existence of other habitats, such as the rocky landscapes of the stony rises which support the critically endangered Corangamite water skink. Survival of a species is important – the loss of even a single species has the potential to significantly affect the functioning of an ecological system.

Australia is one of the world's 17 biologically 'mega-diverse' countries, with a significant proportion of species not found elsewhere. Victoria has the highest number of threatened species by sub-region in Australia[15]. In the Corangamite region, there are more than 300 threatened species of flora, fauna, or vegetation communities.

Although there is considerable knowledge of threatened flora and fauna, significant gaps remain. It is likely that species have, and will continue to, become extinct without ever being formally recognised. Knowledge of the role and relationships of individual species within an ecosystem is poor, and the impact of the loss of a single species on a specific ecosystem is largely unknown. Research continues to be important to address knowledge gaps and find new and improved ways to protect threatened species.

Community action can contribute to the protection, enhancement and restoration of the region's threatened flora and fauna. Improved connectivity of vegetation within and between farms (for instance, through revegetation, the protection of remnant vegetation and remnant paddock trees) contributes to sustaining native flora and fauna, and may enhance agricultural production.

Values of threatened flora and fauna

Environmental	Support ecosystems including pollination and predator-prey relationships. Support water resources, protect soil and contributes to climate stability.
Social	Provide and protect aesthetic, cultural and spiritual sites. Support nature-based recreation and tourism. Provide opportunities for community engagement and volunteering in conservation activities.
Economic	Provide research and education opportunities, tourism, resource opportunities and potential discoveries for medicines.

Condition of threatened flora and fauna

The condition of flora and fauna species, populations, and communities is described in terms of their 'conservation status.' The quality and extent of habitat and the overall health of the catchment directly affect this status.

Conservation status is determined according to the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) and the *Flora and Fauna Guarantee Act 1988* (Vic.). Under this legislation, threatened species or communities are listed as either 'Australian Rare or Threatened Species' (AROTS), or 'Victorian Rare or Threatened Species' (VROTS).

The conservation status for listed flora, fauna, and vegetation communities in the Corangamite region is provided at Table 1. Trend data for changes in a species' status are limited.

This page: *Feather Heads (Ptilotus macrocephalus).*

Opposite: *Growling Grass Frog (Litoria raniformis).*

[15] Commissioner for Environmental Sustainability (2008). *State of the environment Victoria 2008*. Commissioner for Environmental Sustainability, Melbourne.

Table 1 Conservation status and numbers of threatened flora and fauna species and vegetation communities in the Corangamite region

	Flora and vegetation communities	Flora species	Fauna species	
Conservation status	Listed as AROTS	Listed as VROTS	Listed as AROTS	Listed as VROTS
Extinct	1	3	3*	1
Critically endangered†	NA††	NA	3	10
Endangered	9	34	8	26
Vulnerable	18	54	11	29
Rare‡	NA	91	NA	2
Poorly known‡	NA	44	NA	12
Total	**28**	**226**	**25**	**80**

* includes species considered likely to have occupied the Corangamite region, based on distribution and habitat requirements (where available).
† not a VROTS category of conservation status under the *Flora and Fauna Guarantee Act 1988* (Vic.).
†† not applicable
‡ not an AROTS category of conservation status under the *Environmental Protection and Biodiversity Conservation Act 1999* (Cwlth).

Notes:
- Data are for the post-European settlement period and therefore do not include prior significant mega-fauna extinctions.
- Data exclude species that largely utilise marine habitat offshore from the Corangamite region, even where they may occasionally visit the coast.

Threats to native flora and fauna

Many threatening processes affect the conservation status of the region's flora and fauna (Appendix 12) – some of which will have contributed to past extinctions. These include:

- vegetation clearing
- modification and fragmentation of habitat
- pest plants and animals
- diseases
- climate change.

Context for managing threatened flora and fauna

Management of threatened flora and fauna in the Corangamite region is guided by:

- Convention on Biological Diversity signed by government leaders including Australia at the 1992 Rio Earth Summit
- *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
- *Flora and Fauna Guarantee Act 1988* (Vic.)
- Actions for Biodiversity Conservation (ABC) database developed by DEPI.

Objective for threatened flora and fauna

Manage the threat of species extinction so that key populations are resilient and secure in the longer-term.

THREATENED FLORA AND FAUNA (CONTINUED)

Roles in the management of threatened flora and fauna

Landholders	Contribute to the protection of threatened flora and fauna on private land.
Landcare and community groups	Contribute to the protection of threatened flora and fauna on both public and private land.
Traditional Owners, Registered Aboriginal Parties and Office of Aboriginal Affairs Victoria	Protect Aboriginal cultural heritage and, as appropriate, share information on Aboriginal cultural heritage values. Approve and/or issue permits for on-ground work on all land tenure that disturbs and destroys Aboriginal cultural heritage under the *Aboriginal Heritage Act 2006* (Vic.). Approve Cultural Heritage Management Plans.
Local government	Incorporate threatened species management objectives, priorities and actions into statutory planning processes. Manage threatened species on land under its jurisdiction.
Parks Victoria	Manage threatened flora and fauna in land under its jurisdiction.
Department of Environment and Primary Industries	Manage the Victorian legislative framework, policy and program implementation for threatened flora and fauna. Intervene to protect species at high priority locations.
Australian Government	Enact legislation (for example, *Environmental Protection and Biodiversity Conservation Act 1999* (Cwlth).) and set national policy. Signatory to international and national conventions.
Corangamite CMA	Develop and implement regional strategic directions for the protection of threatened flora and fauna. Deliver integrated catchment management by developing strategies, building cooperation, coordination and partnerships, brokering knowledge and investment and delivering key projects.

Identifying the locations of high value threatened flora and fauna

The general locations of high value threatened species and communities in the region have been identified by combining information from the ABC database and NaturePrint v2.0 (Figure 9). This can be used to inform the prioritisation of investment for the conservation of threatened species and communities in the region.

The ABC database enables locations and actions to be sorted into high, medium and low priority so that conservation resources can be directed to high priority actions at high priority locations.

This page: *A nesting Brolga (Grus rubicunda).*

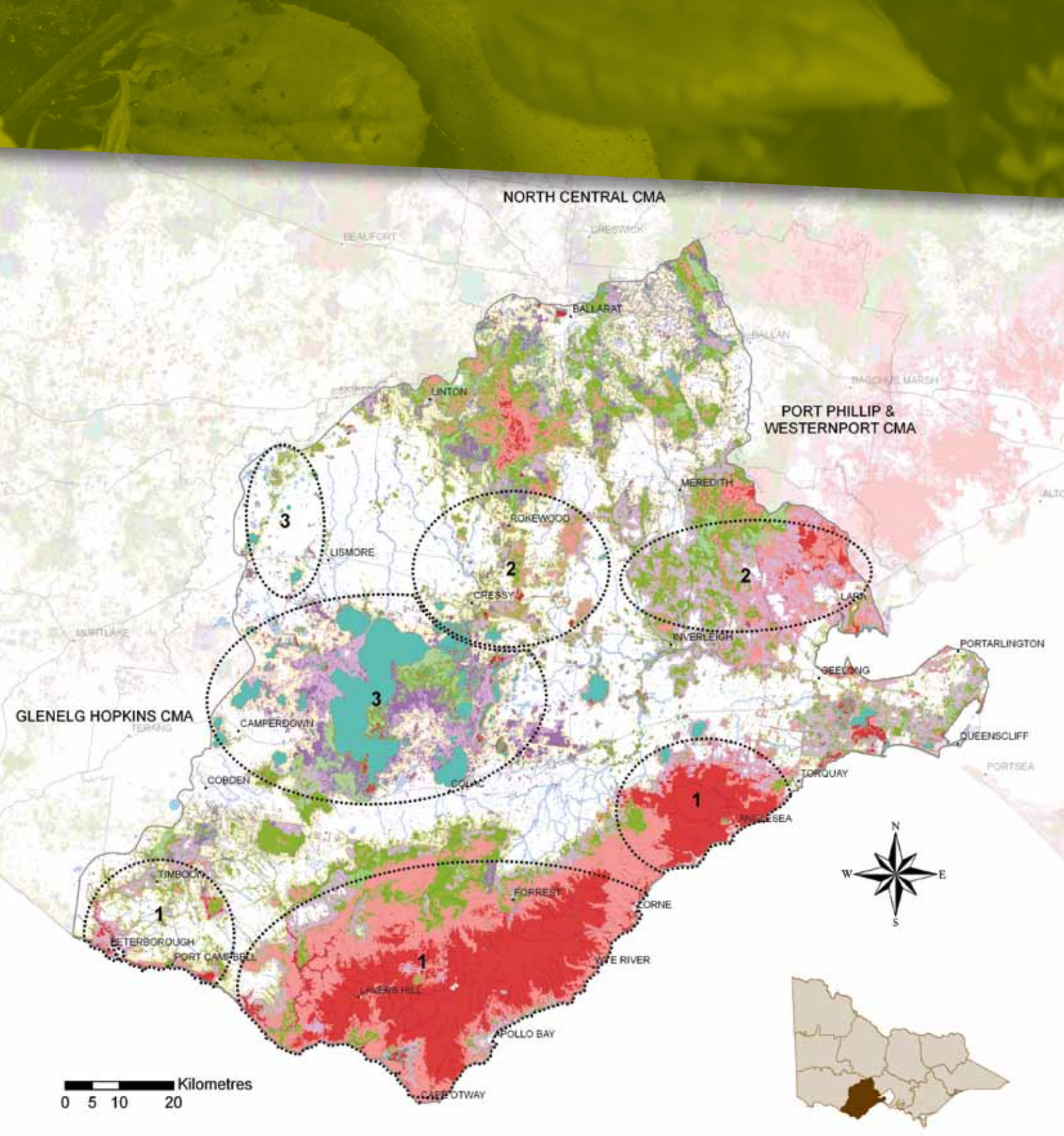


Figure 9 General locations of threatened species and communities of flora and fauna in the Corangamite region

COASTS

The region's coasts feature significant natural values and include large public land reserves such as the Great Otway National Park. Coasts are an important attraction for visitors, contributing social and economic values and outcomes to the region. Coasts are fragile ecosystems subject to pressures from factors such as climate change, resident population growth and an expanding tourism industry. Future management of coasts should be focussed on retaining their environmental, social and economic values.

The Corangamite region has 175 km of coastline from Point Wilson on the north-west shores of Port Phillip Bay to Peterborough in the south-west.

For this RCS, the coastal environment is delimited by the tidal high water mark and the inland extent of coastal vegetation. This is most frequently a very thin strip of land, highlighting the fragility of the coast, making it impossible to effectively map at the scale of this RCS.

Vegetation types found along the coast include forest, woodland, heathland, saltmarsh, and coastal dunes.

Values of coasts

Environmental	Support diverse and fragile ecosystems. Provide nutrient storage and cycling. Contribute to climate stability.
Social	Provide aesthetic, cultural and spiritual sites and nature-based recreation opportunities. Supply opportunities for community engagement and volunteering in conservation activities. Provide a buffer between the inland and marine environments.
Economic	Provide opportunities for nature based tourism, research and education.

Condition of coasts

The condition of the region's coasts varies. Some larger tracts of public land have been actively managed for conservation purposes over many years and are considered to be nearly intact. The conservation status of vegetation can also indicate its condition (e.g. endangered vegetation is indicative of poor coastal condition).

Threats to coasts

Threats to coasts include:

- population growth and urban development
- climate change, sea level rise, coastal inundation and storm surge[16]
- erosive processes
- recreational activity and tourism
- disturbance such as fire or construction of access tracks
- pest plants and animals
- diseases
- land clearing.

Context for managing coasts

Management of coasts in the Corangamite region is guided by:

- *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
- *Coastal Management Act 1995* (Vic.)
- *National Parks Act 1975* (Vic.)
- Western and Central Coastal Boards' Coastal Action Plans
- Victorian Coastal Strategy 2008
- Corangamite Marine and Coastal Biodiversity Strategy 2009.

Other strategies that significantly influence the management of coasts in the region include:

- Coastal Management Plans
- Corangamite Native Vegetation Plan 2004
- Corangamite Wetland Strategy 2006
- Corangamite River Health Strategy 2006
- Park and Coastal Reserve management plans and strategies.

Objective for coasts

Maintain the quality and extent of high value coastal assets.

[16] The Victorian Coastal Inundation Dataset provides further information on the potential risks of sea level rise and storm surge. Available at: *http://www.climatechange.vic.gov.au/adapting-to-climate-change/future-coasts/victorian-coastal-inundation-dataset.*

Roles in the management of coasts

Landholders, Landcare and community groups	Manage private land to protect coasts. Contribute to conservation of public and private land through volunteer activities.
Traditional Owners, Registered Aboriginal Parties and Office of Aboriginal Affairs Victoria	Protect Aboriginal cultural heritage and, as appropriate, share information on Aboriginal cultural heritage values. Approve and/or issue permits for on-ground work on all land tenure that disturbs and destroys Aboriginal cultural heritage under the *Aboriginal Heritage Act 2006* (Vic.). Approve Cultural Heritage Management Plans.
Committees of management	Manage designated Crown land coastal reserves and coastal infrastructure. Develop and implement Coastal Management Plans.
Coastal Boards	Develop and implement Coastal Management Plans and Coastal Action Plans.
Victorian Coastal Council	Develop statewide strategic coastal plans, including preparation of the Victorian Coastal Strategy. Advise government on coastal policy and management issues.
Local government	Incorporate coastal protection objectives, priorities and actions into statutory planning processes and administer duties as a planning authority. Manage coastal areas under its jurisdiction.
Parks Victoria	Manage coastal land under its jurisdiction for its natural, cultural and visitor experience values.
Department of Environment and Primary Industries	Set policy for coastal management. Administer the management of coastal Crown land, resources and marine habitats for environmental, conservation and recreational values.
Corangamite CMA	Develop and implement the Corangamite Marine and Coastal Biodiversity Strategy. Deliver integrated catchment management by developing strategies, building cooperation, coordination and partnerships, brokering knowledge and investment and delivering key projects.

Identifying areas of high value coastal vegetation

Coasts are defined in this RCS using their vegetation type. The locations of areas of high value coastal vegetation have been determined based on their environmental values, using NaturePrint v2.0; similar to identifying high value native vegetation. DEPI is currently leading the development of an approach that, in future, could incorporate social and economic values which are also important to the coast.

There is no specific map for high value coastal vegetation in this RCS because individual areas of coastal vegetation are generally too small to be visible at the scale of maps presented in the RCS. Larger areas of high value coastal vegetation are visible on the native vegetation map (Figure 9) and on the NaturePrint v2.0 map (Appendix 11).

This page: *Port Campbell National Park & Twelve Apostles Marine National Park.*

MARINE ENVIRONMENT

Even though the Corangamite CMA jurisdiction does not extend below the tidal high water mark, there is a direct link between catchment processes and the health of the marine ecosystem. This is especially so for ecosystems close to the shore, lower energy marine ecosystems and embayments. The RCS encourages communities and stakeholders to understand and take action to manage land-based processes that impact on marine ecosystems.

Marine environments offshore from the Corangamite region fall within Australia's south-east marine region, where some 80% of marine organisms are not found elsewhere[17]. Marine flora includes: kelp forests on shallow rocky reefs; sponge and coral gardens on deep rocky reefs; seagrass on sandy seabeds; and mangroves and saltmarsh on sheltered intertidal sediments.

Marine national parks and sanctuaries in the region protect examples of marine ecosystems. In the Corangamite region they include Point Addis and The Twelve Apostles Marine National Parks and five Marine Sanctuaries.

Values of the marine environment

Environmental	Supports maintenance of ecosystems, climate and atmospheric regulation and nutrient cycling, and local climate regulation.
Social	Provides aesthetic, cultural and spiritual connections and nature-based recreation opportunities. Enables community engagement and volunteering in conservation activities.
Economic	Provides opportunities for nature-based tourism, research and education. Supports commercial fishing, oil and gas enterprises. Has potential for discovery of medicines.

Condition of the coastal waters

The condition of the region's coastal waters is generally good, with low levels of eutrophication, turbidity and bio-contaminants and good light conditions[18]. The condition of the wider marine environment, of which coastal waters are a part, is outside the scope of this RCS. Near-shore marine ecosystems are at greater risk from land-based threats and are unlikely to be in as good condition as open coastal waters.

Threats to the marine environment

Threats to the marine ecosystems are extensive and varied. Catchment-based threats include:

- wastes and pollutants
- sedimentation from inland or coastal erosion
- increased nutrient loads.

This page: *A Weedy Seadragon (Phyllopteryx taeniolatus), Victoria's Marine Emblem taken by A. Newton courtesy of the Victorian Coastal Council.*

Opposite: *Leather Kelp (Eklonia radiata) taken by Bill Boyle courtesy of the Department of Environment and Primary Industries.*

[17] National Oceans Office (2004). *South-east regional marine plan: implementing Australia's ocean policy in the south-east marine region*. National Oceans Office, Hobart.

[18] Parks Victoria (2003). *Victoria's system of marine national parks and marine sanctuaries: management strategy 2003-2010*. Parks Victoria, Melbourne.

Context for managing the marine environment

The management of the marine environment and the land-based impacts on this environment is guided by:

- South-east Commonwealth Marine Reserves Network Management Plan 2012–2022
- *National Parks Act 1975* (Vic.)
- Victoria's Biodiversity Strategy 1997
- The Victorian Coastal Strategy 2008
- State Environment Protection Policy: Waters of Victoria
- Better Bays and Waterways (Water Quality Improvement Plan 2009–2014)
- Victoria's System of Marine National Parks and Marine Sanctuaries Management Strategy 2003
- The Corangamite Marine and Coastal Biodiversity Strategy 2009.

Objective for the marine environment

Limit impacts to the marine environment from the catchment such that they are within the bounds of its resilient capacity.

MARINE ENVIRONMENT (CONTINUED)

Roles in the management of the marine environment

Landholders and community groups	Contribute to the conservation of the marine environment.
Traditional Owners, Registered Aboriginal Parties and Office of Aboriginal Affairs Victoria	Protect Aboriginal cultural heritage and, as appropriate, share information on Aboriginal cultural heritage values. Approve and/or issue permits for on-ground work on all land tenure that disturbs and destroys Aboriginal cultural heritage under the *Aboriginal Heritage Act 2006* (Vic.). Approve Cultural Heritage Management Plans.
Coastal Boards	Develop and implement Coastal Management Plans and Coastal Action Plans.
Victorian Coastal Council	Develop statewide strategic coastal plans, including preparation of the Victorian Coastal Strategy. Advise government on coastal policy and management issues.
Parks Victoria	Manage coastal land and marine areas under its jurisdiction to protect its natural, cultural and visitor experience values.
Department of Environment and Primary Industries	Set policy for coastal management. Administer the management of coastal Crown land, resources and marine habitats for environmental, conservation and recreational values. Manage fisheries activities in coastal and marine waters through Fisheries Victoria. License oil and gas exploration, extraction and facilities.
Environment Protection Authority	Responsible for the investigation and prosecution of pollution in Victorian Waters as the Regulatory Agency.
Corangamite CMA	Develop and implement the Corangamite Marine and Coastal Biodiversity Strategy. Deliver integrated catchment management by developing strategies, building cooperation, coordination and partnerships, brokering knowledge and investment and delivering key projects.

Identifying important marine areas

A specific analysis of the value of marine ecosystems has not been undertaken as part of the RCS. Important marine areas have been mapped, however, based on the DEPI Marine Resource map. Marine National Parks, Marine Sanctuaries, and marine assets are identified (Figure 10).

Marine bioregions

- Otway
- Central Victoria
- Victorian Embayments

Marine reserves

1. Barwon Bluff Marine Sanctuary
2. Point Danger Marine Sanctuary
3. Point Addis Marine National Park
4. Eagle Rock Marine Sanctuary
5. Marengo Reefs Marine Sanctuary
6. The Arches Marine Sanctuary
7. Twelve Apostles Marine National Park

Marine assets

- a The Paddock
- b Cape Otway Reefs
- c Kennet-Wye off-shore area
- d Surfcoast steep bathymetric area
- e Point Danger
- f Port Phillip Heads Lonsdale Bight
- g Port Phillip Heads asset group
- h Swan Bay
- i Indented Head reef complex
- j Curlewis Bank nearshore
- k Stingaree Bay
- l Limestone Bay Estuary
- m Corio Bay northern shoreline

Figure 10 Important marine areas in the Corangamite region

AQUIFERS

An aquifer is a discrete, below-ground layer of fractured rock, gravel, sand or limestone that is porous enough to hold and convey groundwater. Groundwater is an important resource shared by many users, sustaining key components of the region's environment and services. Groundwater is not a limitless resource and needs to be managed to ensure its use is sustainable. The RCS aims to develop greater knowledge about aquifers and groundwater use in the Corangamite region.

Aquifers are classified as upper, middle or lower which differ in quality, yield and depth. Upper aquifers have relatively low yields of groundwater and are within 70 metres of the surface. They are primarily used for domestic and stock water, and some irrigation. Middle aquifers have higher yields than upper aquifers with better quality groundwater that is generally used for agriculture. These aquifers are generally 70–700 metres below the surface. Lower aquifers (more than 700 metres below the surface) have the highest yields, low salinity and are used for urban supplies.

Values of aquifers

Environmental	Contribute to regional groundwater dependent ecosystems, including most wetlands and rivers. Groundwater discharge sustains vegetation communities, cave ecosystems and terrestrial and aquatic fauna.
Social	Provide domestic water supply for many rural households and urban centres. Natural springs (including mineral springs) provide opportunities for tourism and recreation.
Economic	Provide domestic, livestock, irrigation and industrial water.

Condition of aquifers

The condition of an aquifer is assessed on the basis of groundwater level, yield, quality and salinity as monitored via state observation bores and through metering of licensed extraction. All bores constructed to intercept groundwater are licensed and bore-log data are collected for resource management. Surface water–groundwater interactions are also studied and mapped for future monitoring.

Data on groundwater levels show that after a period of decline, aquifers in Groundwater Management Areas in the Corangamite region recovered in the mid 2000s and are now stable. For Water Supply Protection Areas, long-term trends are not available, but as at June 2011, short-term trends indicate that groundwater levels were rising.

This page: *Windmill near Lake Weering.*

Threats to aquifers

Unsustainable water extraction causes groundwater levels to fall, with impacts on neighbouring users and the environment.

Other threats include:

- changes to recharge areas – such as urban development and large-scale revegetation or plantation establishment
- poorly-maintained urban infrastructure
- inappropriate fertiliser practices (wrong rate, timing or type)
- over-extraction of groundwater
- inappropriate techniques for extracting earth resources
- climate change.

This page: *During dry periods groundwater can sustain remnant habitat pools and the flora and fauna that depend on them.*

Above: *Thompsons Creek remnant habitat pool.*

Right: *Moorabool River She Oaks habitat pool.*

Context for managing aquifers

Management of aquifers and groundwater in the Corangamite region is guided by:

- *Water Act 1989* (Vic.)
- The Water Register (a public register of water-related entitlements)
- The Secure Allocation, Future Entitlement project – an aquifer-based framework to regulate the allocation of groundwater
- Environmental Water Reserve (water allocated to the environment under the *Water Act 1989*)
- Central and Western Region Sustainable Water Strategies.

Priorities for the management of groundwater based on threats have been set in regional sustainable water strategies.

Objective for aquifers

Protect the health of groundwater resources for the environment and current and future users.

AQUIFERS (CONTINUED)

Roles in the management of aquifers

Southern Rural Water	Regulate and manage groundwater use in the region including issuing work, take-and-use licences and monitoring of groundwater use. Provide information and knowledge.
Department of Environment and Primary Industries	Set policy and oversee the management and monitoring of groundwater resources. Provide information and knowledge.
Environmental Protection Authority	Regulate and set policy for discharge into aquifers and regulate for pollution of aquifers.
Corangamite CMA	Manage environmental water entitlements. Referral authority under the *Water Act 1989* (Vic.) for take and use licences.

Identifying aquifers

The locations of aquifers in the Corangamite region are shown in Figure 11.

This page: *Springs flowing into Lake Weering.*

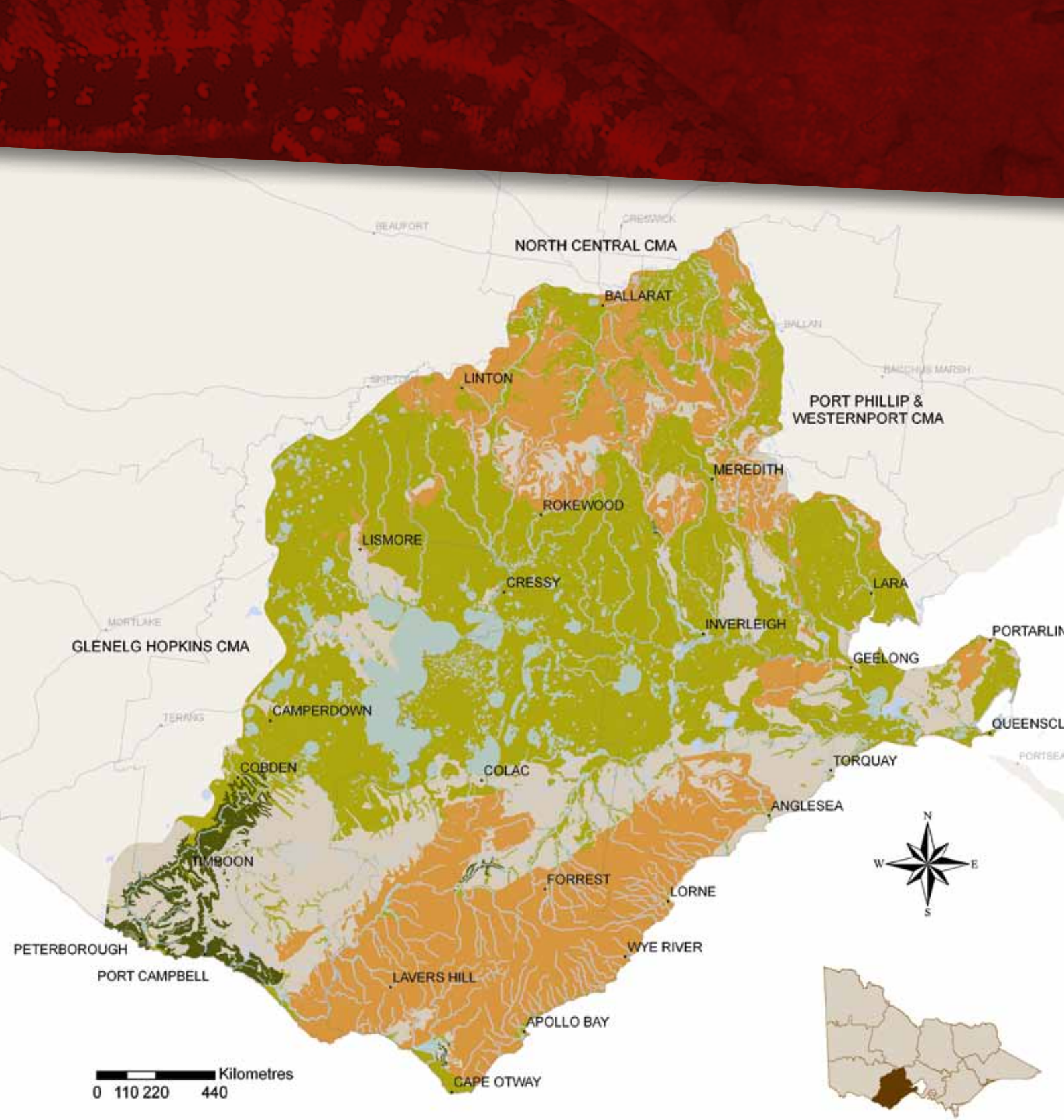


Figure 11 Aquifers in the Corangamite region

IDENTIFYING NATURAL RESOURCE AREAS OF REGIONAL SIGNIFICANCE

Areas of concentrations of high value natural resources identified in the previous sections have been aggregated to show areas of regional significance (Figure 12). Such aggregation paves the way for integrated catchment management as it allows opportunities to achieve efficiencies and multiple benefits from investments, while ensuring that actions taken to protect one category of natural resources do not adversely impact another.

Identification of areas of regional significance depends on the values assigned to natural resources. Community engagement undertaken during the RCS implementation may identify additional values to be included, and thus may extend the areas initially identified. In addition, there are high value natural resources within the catchment that are too small or isolated to be mapped at the regional scale of this RCS. These high value natural resources will be identified through RCS implementation, and particularly through the development of Landscape Zone Action Plans.

Identifying *high priority areas* for action is a step beyond this analysis. Detailed identification of such areas will occur in the development of RCS sub-strategies and local natural resource management plans. In order to protect important natural resources, it is very clear that works will be required within and beyond identified areas of regional significance.

As an early step, the relative productivity of private agricultural land can be overlain with the areas of regional significance (Figure 13). This assists the managers of private and agricultural land to broadly identify where their conservation efforts can be focussed to maximise the benefits.

This page: *Balintore's Doug and Cheryl Lang planting native plants.*

Management of natural resources across CMA boundaries

Each of the 10 CMAs in Victoria has developed their own regional catchment strategy within common guidelines, but based on the needs and preferences of regional communities. The Corangamite CMA is committed to working with other regions where it makes sense to adopt a statewide or multiregional approach, and in the management of high value natural resources which cross the boundaries of neighbouring CMAs.

This page: *Victorian Volcanic Plains grassland – Small Golden Moth Orchid (Diurus basaltica).*

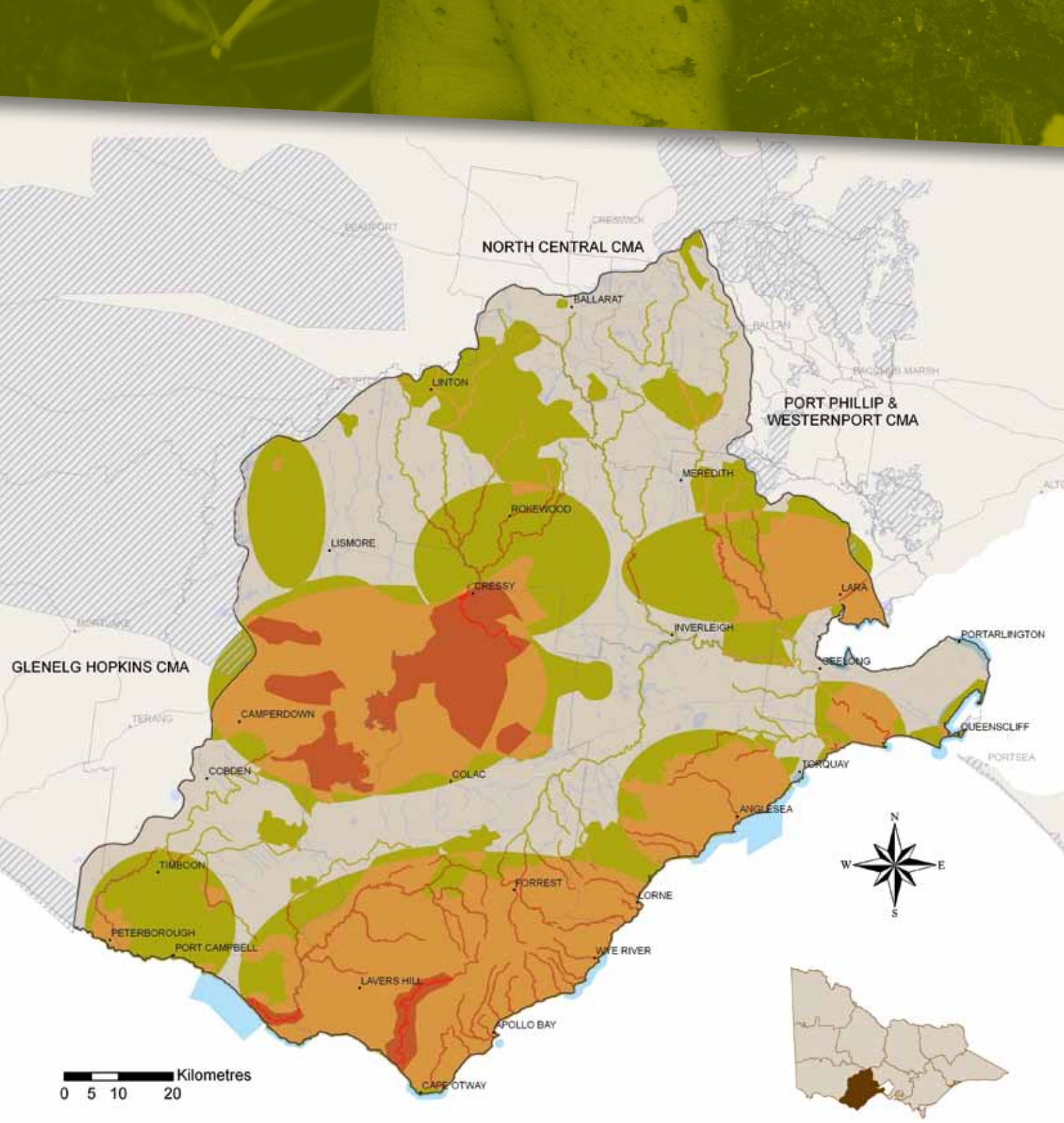


Figure 12 Natural resource areas of regional significance in the Corangamite region

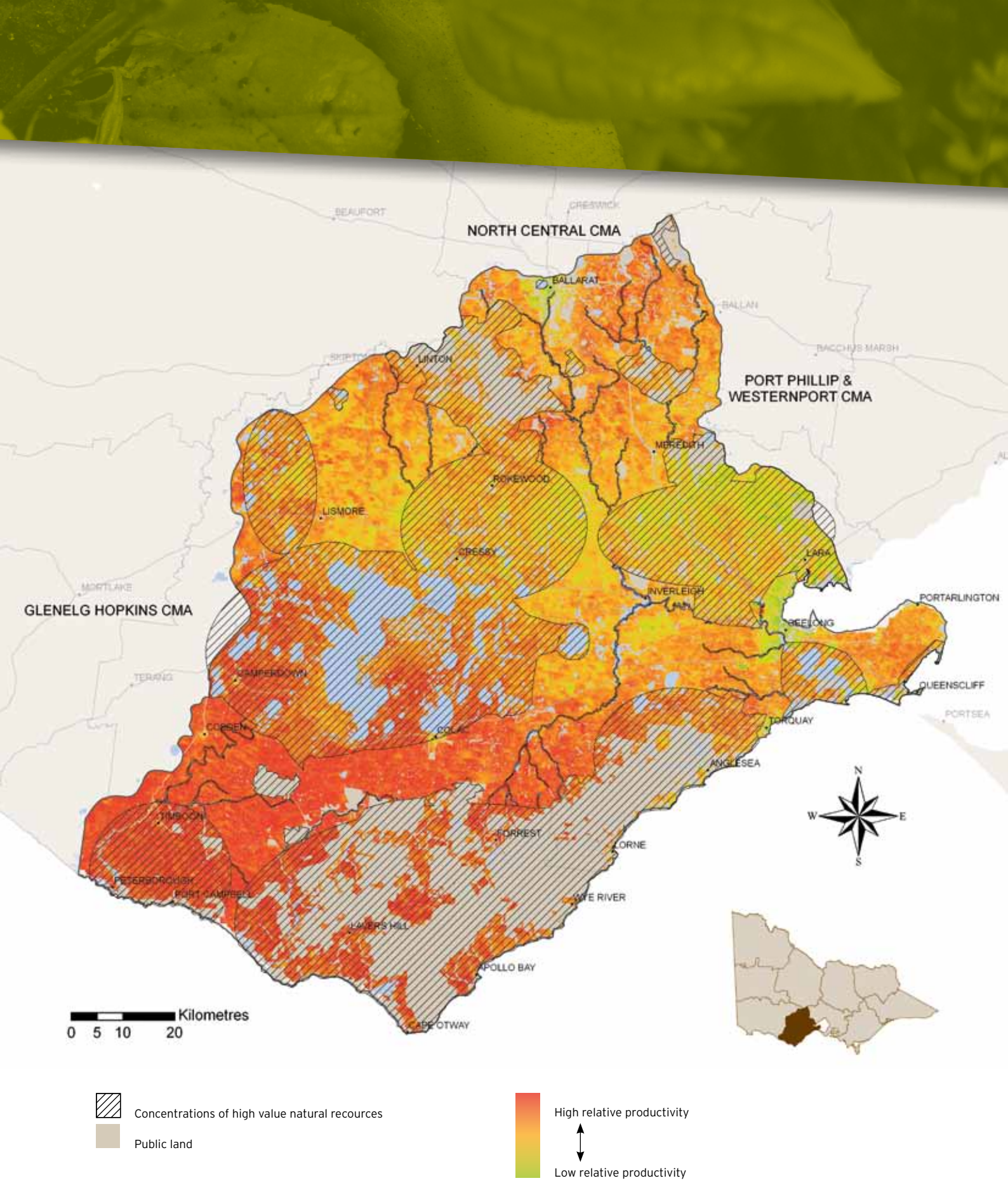


Figure 13 Overlay of relative productivity of private land with natural resource areas of regional significance

CHAPTER 4

THE NEED FOR ACTION

The health of a catchment's natural resources is directly linked to the wellbeing of the people who live within it. A healthy catchment underpins its residents' quality of life, is the foundation for primary production, provides crucial environmental services such as clean air and water, and attracts millions of visitors each year which increases the region's economy.

Chapter 3 described the eight categories of natural resources of the Corangamite region, including their values, condition and threats. With less than 25% of original native vegetation remaining, a growing list of threatened and endangered species and only 13% of waterways in good condition, a disturbing picture emerges. It is clear that there is much to be done to maintain or enhance the condition and extent of the region's natural resources, or even to halt their current decline.

As many of the environmental problems we now face are the result of our collective past actions, the responsibility to protect and repair what we can rests with us all. Together we will make a difference.

The region's natural resources and communities face many challenges and to confront these we need to work together and integrate our efforts across the landscape. This chapter identifies the key challenges and outlines the approach of the RCS in responding to these challenges. Some of the challenges also present opportunities for improved natural resource management in the catchment.

KEY CHALLENGES AND OPPORTUNITIES

Key challenges for natural resource management in the Corangamite region are:

- increasing participation
- identifying joint priorities for investment
- working together, integrating and coordinating management
- sourcing investment
- increasing and sharing knowledge
- accounting for investment
- population growth
- climate change
- achieving practice change on private land.

Increasing participation

At the heart of the RCS is the need to encourage the community to become involved and participate, and to have a sense of stewardship of catchment management. A motivated community, combined with sound science, the best available knowledge and adequate resources is essential for improving the health of the catchment.

A key to achieving success in natural resource management in the region is growing and nurturing a range of partnerships. The Australian, Victorian and local governments, along with numerous community, Aboriginal peoples and industry groups play important roles in catchment management. The RCS aims to inspire, guide and support more people to participate in catchment management and become stewards of the region's natural resources.

Participation can take many forms such as involvement in partnerships, sharing information and knowledge, involvement in the development of plans for natural resource management, investing in planning or undertaking actions, or protecting remnant native vegetation on farms, to name a few.

Participation can be supported in many ways, including providing incentives to undertake works, building capacity, supporting local communities to develop local plans which identify local priorities, and growing and nurturing partnerships.

Many effective partnerships already exist in the region and have delivered outstanding results. For example, Landcare has been important in bringing farmers together to work across property boundaries on issues of mutual interest. The RCS seeks to build on, and strengthen, these partnerships while fostering and facilitating the creation of new partnerships.

Identifying joint priorities for investment

The region must develop a set of priorities for investment in natural resource management which meets the needs of all those who may invest time, funds, ideas, natural resources or land. Developing a list of joint investment priorities that include local as well as government priorities will both increase local participation in natural resource management and improve leveraging so that investment opportunities are expanded across the region.

The Victorian and Australian governments make significant investments in natural resource management in the Corangamite region, which are delivered through a range of government initiatives and programs. The priorities for this investment are driven by the elected governments of the day, and are informed by the latest research findings and understanding of natural resource management needs. Many private landholders and community groups share in the use of these funds, undertaking works that assist in achieving national and state priorities and targets. Importantly, many private landholders contribute funds, resources and time to these projects.

Priorities identified via national and state programs are often important to regional and local communities. However, some participants in natural resource management identify and seek investment in local and regional priorities that are different from those established by governments.

An opportunity exists to better share knowledge between all parties involved in natural resource management to expand our collective understanding and provide better evidence in support of investment proposals. Working together to identify, share, respect, and advocate agreed investment priorities that transcend both government priorities and local priorities should:

- result in a more integrated approach to investment and on-ground actions for natural resource management in the region
- attract participation in natural resource management by community members who otherwise may not become involved
- enhance natural resources other than those identified as priorities by governments.

Opposite: *Carlisle River Primary School and community members after a planting day.*

The development of joint investment priorities should take into account:

- regional and community values when identifying priorities for action
- objectives set within this RCS and relevant sub-strategies and local plans
- the need to protect natural resources identified as important at the international, national, state and regional levels
- use of the best available knowledge, data, and modelling
- the likelihood of success from a technical and capacity perspective
- cost effectiveness (the difference expected as a result of the investment)
- 'triple bottom line' outcomes using quantitative and qualitative inputs to identify environmental values as a first order attribute, followed by social and economic values.
- directions from other regional strategic plans including Regional Strategic Plans and Regional Growth Plans.

The development of joint priorities for investment and action will bring about improved trust, partnerships, co-investment and leveraging opportunities between those involved in natural resource management in the Corangamite region.

Working together, integrating and coordinating management

Integration is essential for the success of this RCS. Greater benefits and efficiencies will be achieved and there will be fewer adverse impacts if plans and actions are implemented across land tenures and natural resource management 'silos', and activities are integrated across agencies, communities and industry throughout the region. Partnerships are pivotal in the integration and coordination of the delivery of natural resource management programs.

An integrated approach to catchment management will help optimise returns on investments in natural resource management and will improve the region's ability to attract private, corporate and philanthropic sector investment to the region.

The Landscape Zone Action Plans being developed for the Corangamite region will identify priorities in natural resource management and opportunities for integration and joint investment within and between each of the region's 15 landscape zones (Appendix 6).

Sourcing investment

Attracting investment to manage natural resources is challenging. Investment can take many forms, from provision of funds, labour or materials, to setting aside land for the protection of natural resources. Success in securing investment relies on matching the priorities and targets of all parties involved. The objective of the RCS is to increase the aggregate investment in the management of natural resources in the catchment.

There has been significant investment in natural resource management in the Corangamite region over many years, primarily by private landowners, community groups including Landcare and environment groups, and the Victorian and Australian governments. Landowner co-investment has provided great leverage to government investments in the past, and should continue to do so if there are joint investment priorities.

Increasing investment into the region will entail the active pursuit of ongoing partnerships with past, current and potential new investors with the investigation, recruitment and application of funds from all sectors. There is some history of corporate and philanthropic sector investment in the region, but in comparison to other investments it has been a minor part of the total.

In considering projects and programs, investors will look for projects that meet their objectives, have a convincing logic, yield a good return on investment, and have a strong likelihood of achieving results and delivering returns. Potential projects must meet investor interests and priorities, provide opportunities for participation, satisfy community and landholder aspirations, match relevant government priorities, and conform to available guidelines and planning tools.

Increasing and sharing knowledge

Ready access to the best and most current knowledge of natural resource management practices helps make the most effective use of available resources and optimise returns on fresh investments. It also helps remove barriers and limitations to more effective natural resource management.

Research and practical on-ground trialling builds knowledge, develops good practice, and builds landowner and agency competence and confidence. Best practice continues to evolve. A key challenge for the region is to support new research and to obtain and share relevant and up-to-date knowledge on natural resource management with the catchment.

Organisations, groups and individuals with knowledge-brokering roles are valuable in collating and sharing information. Partnering with research and educational institutions is an effective way of contributing to improving and sharing knowledge.

The face-to-face sharing of local knowledge and skills, such as farmers learning from other farmers, is also effective.

The Corangamite CMA operates a web-based 'knowledge base' which houses research on natural resource management relevant to the region that is freely accessible to all[19]. An opportunity exists to both expand the database and to encourage greater use of it by all parties involved in natural resource management.

Accounting for investment

Challenges in locating and collecting data, and accounting for investment make it difficult to quantify the region's achievements. It is often hard to quantify the total effort and value of an investment, as many people 'just get on with the job' of restoring the landscape without record of their contribution. However, those who invest in natural resource management activity expect to be able to see tangible outcomes and they expect value for their investment. An inability to clearly report the benefits of natural resource management investment can make it difficult to secure future investment.

A long-term challenge for natural resource managers across the globe is to measure environmental outcomes. By its very nature, measurable change may occur over decades. Part of the challenge is to identify and adopt an agreed, broadscale and long-term measuring and reporting framework.

There is a need for a set of 'environmental accounts' which report on changes in resource condition and extent, and can demonstrate and quantify the relationship between the health of the environment and the health of the economy. A set of environmental accounts is being developed nationally and the Corangamite region is contributing by participating in a regional environmental accounts trial. Such environmental accounts should be comparable at a state, national and international level.

Population growth

Population growth in and adjacent to the region is placing pressure on farmland, public land and the natural resources of the catchment. Retaining productive farmland is a key challenge in the region.

Forecast population growth coupled with the growth expected in regional tourism is increasing the demand for outdoor recreation and nature-based tourism on public land (particularly that with access to water bodies). The careful development and application of policies, strategies and plans that both encourage people to enjoy and appreciate the natural and cultural values of the region and protect those values will become increasingly important.

[19] http://www.ccmaknowledgebase.vic.gov.au

Local governments have an important role in making land use planning determinations to accommodate population growth in a manner that protects productive farm land and natural resources, including landscape aesthetics. Regional Growth Plans are produced to balance the needs of population and economic growth with these other requirements.

Opportunities exist for regional planners across the various areas of interest to integrate planning and thereby optimise planning decisions for population growth, retention of productive land, and protection of natural resources including parks and reserves.

Climate change

The future climate of the region is expected to be hotter and drier than today, with a higher frequency of extreme weather events, including an increased number of hot days, a reduced number of frosts, and increased fire danger. The greatest rainfall reductions are expected to occur in the spring[20].

Changes in the average temperature, rainfall and evaporation will have diverse, long-term consequences for the region. Climate change is predicted to impact the region's water resources, primary production and biodiversity in a range of ways, including changing the distribution and abundance of native flora and fauna, and hastening the spread and establishment of pest plants and animals.

Sea levels are expected to rise and storm surges to increase, which will impact coastal environments and built assets[21]. Improved mapping of the vulnerability of coastal assets will be needed to inform responses and an adaptive management approach will be required.

Climate change will require public land managers, commercial farmers and foresters to adapt to the new conditions, much as they already adapt to drought or periods of high rainfall. Changes in land management practices are inevitable. As knowledge about the impacts of climate change develops, objectives and actions to protect natural resources may need to be revised. It will also, however, present opportunities to capitalise on the new circumstances by, for example, changing tourism and recreation, introducing new crops and livestock enterprises and participating in 'carbon farming' initiatives.

Achieving practice change on private land

The scale, nature and intensity of farming are changing in the region. Farmers change their practices to remain competitive in domestic and export markets, achieve sustainable returns on investment and achieve natural resource management objectives. A key challenge for the region is to inspire, encourage and support changes and practices that will benefit our natural resources.

Many private land managers are increasingly aware of the value of protecting and enhancing natural resources and that some practices can both lift farm productivity and contribute to broader catchment health. Many agencies, authorities, industry bodies and communities are endeavouring to assist land managers adopt or implement such practices. However, there are limitations and barriers to change that need to be overcome if we are to halt or reverse the decline in the condition and extent of the region's valuable natural resources.

There are many opportunities to support change, including:

- gaining a better understanding of barriers and limitations across all participants, including government, and working to overcome those barriers
- coordination of effort
- sharing of knowledge and information, including that held by landholders
- offering incentive programs and projects that excite and inspire participation by people who may not otherwise be involved.

The region has made a substantial investment in revegetation work over decades, at a local and a landscape scale; much of this has resulted in significant biodiversity outcomes, while other revegetation works have been for economic or aesthetic outcomes. A significant opportunity exists to maximise biodiversity outcomes of revegetation works, whilst achieving desired economic and aesthetic benefits.

The scale of farming in the catchment is changing:

- In some localities there is a trend to smaller holdings as productive farms are subdivided to create peri-urban and lifestyle properties, which can reduce land available for primary production
- At other locations, farms are becoming larger and are sometimes owned by large corporations
- Regardless of size, there is a trend for properties to be managed by absentee landholders.

These factors make it more challenging to coordinate land management activities to protect natural resources, for example managing weeds and pest animals. Opportunities exist to better engage new and absentee landowners in the protection of natural resources on their properties.

[20] *Department of Environment and Primary Industries* (2008) *Climate change in the Corangamite region*. Department of Environment and Primary Industries, Melbourne.

[21] As above.

CHAPTER 5

COMMUNITY AS THE KEY AGENT OF CHANGE

The overarching goal of this RCS is to protect, enhance and restore our region's natural resources, and to complete the picture we need to bring together the enthusiasm, commitment, abilities and resources of people across the region and beyond.

The RCS aims to motivate and inspire participation. It recognises the benefits and importance of investing to increase the ability of communities to achieve the natural resource protection, enhancement and restoration outcomes they desire. There are a wide range of partners essential to the successful implementation of the RCS. This chapter summarises the potential roles and contributions of the core contributors.

Private landholders and public land managers

The RCS aims to increase participation in natural resource management on both public and private land; it encourages working across the boundaries of land tenure, CMA areas, government and natural resource categories.

Many private landholders have made, and will continue to make, substantial investments in natural resource management on their land. Without this private investment – sometimes supported by government, corporate or philanthropic sector investment – very little would have been achieved, and little will be achieved in the future.

The protection or restoration of natural resources on private land often requires individual landholders to voluntarily provide cash or in-kind resources, and to set aside land or water from their agricultural business to create an environmental benefit for the region, the state, and in some cases, the nation. Although protection of natural resources on private land is sometimes supported by government incentives, the full cost is often borne by the private landholder; even when government incentives or support is applied, the private landholder contribution often far exceeds government assistance.

Almost all private landholders on commercial farms are engaged one way or another with industry bodies. Such bodies (e.g. Rural Research and Development Corporations) are involved in funding programs for practice change. They are therefore also important partners in natural resource management.

Public land accounts for 22% of the region and includes valuable environmental resources in national parks, marine reserves, wetlands, rivers, estuaries, and the coast. These resources require a strong and ongoing focus and investment by government, and activities should be coordinated across tenures.

This page: *Corangamite CMA and the Southern Otway Landcare Network planting native plants at Apollo Bay.*

Opposite: Anglesea River, acrylic on canvas, Albert Fagan, Wadawurrung Elder.

Traditional Owners

Traditional Owners remain connected to country through continuing cultural practices, caring for country and as custodians of the cultural and material remains of past activities.

In the Corangamite region there are 3000 known Aboriginal cultural heritage places with many more to be identified and assessed. They are often found where there is remnant vegetation and close to coasts and waterways on both private and public land. Areas that remain undisturbed best preserve the Aboriginal cultural landscape. They provide habitat for native birds and animals that Traditional Owners hunted, and contain Aboriginal sites and values such as scar trees, shell middens, artefact scatters and stone arrangements such as fish traps.

The Traditional Owners of the Corangamite catchment have a valuable and unique perspective on caring for country, drawn from the practices of generations. The knowledge and understanding of Traditional Owners should be considered in natural resource management.

On-ground works undertaken to restore natural resources have the potential to impact on Aboriginal heritage places which are highly valuable aspects of our region's culture and are protected under the *Aboriginal Heritage Act 2006* (Vic.). We all have a legal obligation to protect Aboriginal heritage. This RCS aims to support the increased engagement of Aboriginal peoples in natural resource management in the Corangamite catchment.

COMMUNITY AS THE KEY AGENT OF CHANGE (CONTINUED)

Community groups

Community groups and their volunteers are often the link between natural resource management on private and public land.

The Corangamite region has one of the best 'care' networks in Victoria. There are 152 natural resource management groups across the region (Figure 14) with a voluntary membership of over 4000 people. These groups are mature, with strong community ownership and a demonstrated capacity to initiate, plan, resource and carry out on-ground works in natural resource management at a considerable scale.

Many groups are very active and make a significant contribution to the protection of natural resources on public and private land and should continue to be encouraged and supported. Just as Landcare primarily invests in conservation outcomes on private property, environment groups, 'friends' groups, and some Landcare groups also invest in conservation outcomes on public land.

A recent survey[22] indicates that landholders who participate and become involved in groups – such as Landcare or environmental groups – have greater knowledge of natural resource management and this leads to improved land and water management activities.

This page: *School child planting native plants at West Barwon Dam with Waterwatch and Barwon Water.*

Figure 15 The connection between community and natural resources

Community resources and investment

Community participation in the management of the Corangamite region is long-standing and substantial and constitutes a major investment in the conservation of our natural resources.

Investment from individuals, organisations or partnerships can be in many forms: direct funding; the voluntary contribution of labour and skills for research, planning and on-ground works; or voluntarily setting aside land from primary production for conservation outcomes.

Community is the central to natural resource management (Figure 15). The knowledge, commitment and participation of the community are fundamental to the achievement of the RCS objectives.

This RCS will strive to support community participation in the protection, enhancement and restoration of the region's natural resources, as community are the key agent of change.

[22] Department of Environment and Primary Industries (2011). *My Victorian waterway survey*. Department of Environment and Primary Industries, Melbourne.

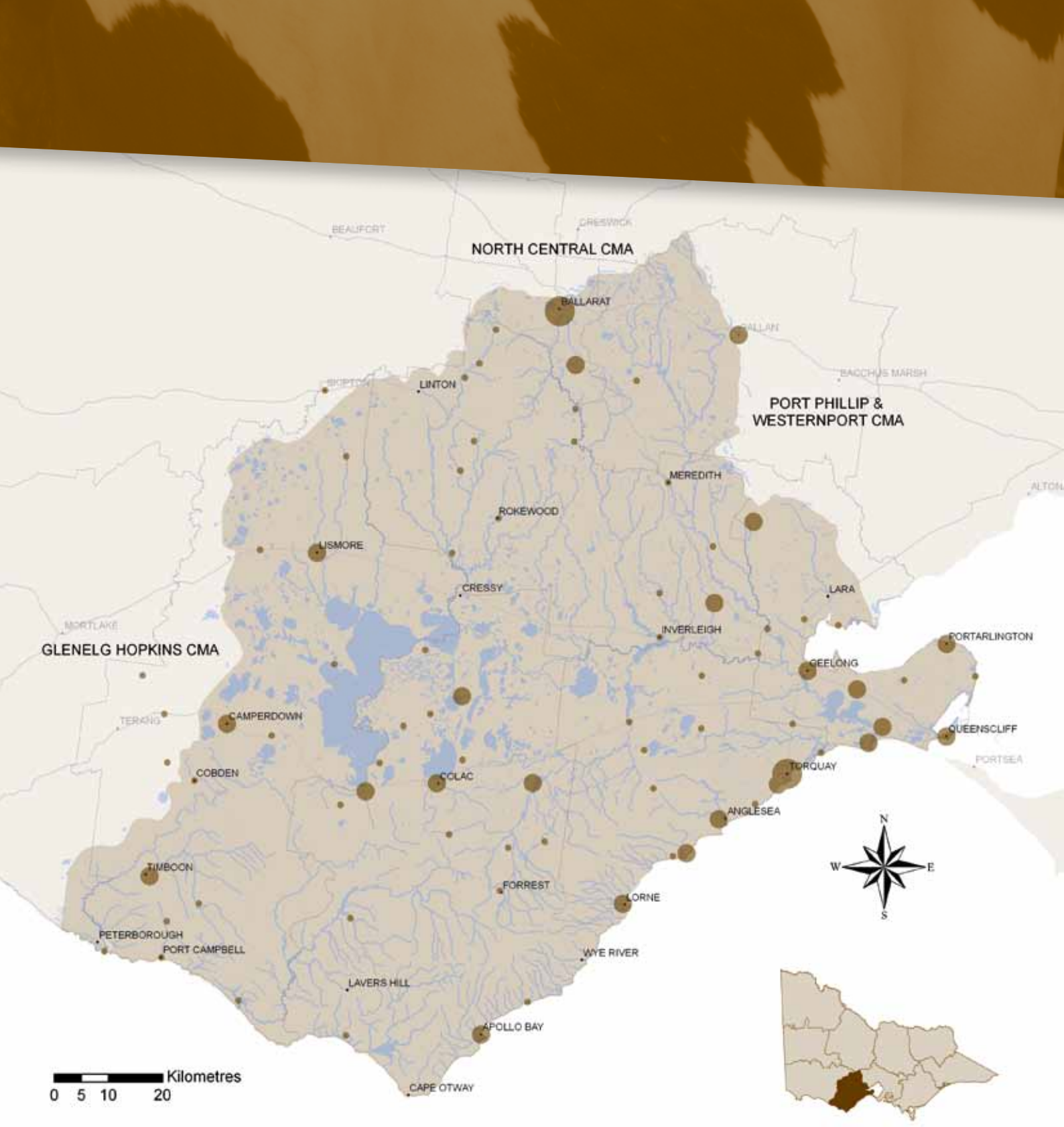


Figure 14 Community groups involved in natural resource management in the Corangamite region

Note: The number of groups is shown, not the size of the group or its membership.

CHAPTER 6

THE STRATEGY

This RCS provides a strategic framework to guide participation and investment to protect, enhance and restore the natural resources of the Corangamite catchment. It is built on four identified foundations for change: increasing participation, increasing investment and developing joint priorities, improving integration and coordination, and increasing and sharing knowledge. Each foundation has defined objectives and a suite of actions to achieve those objectives (Table 2).

The four foundations build the skills and capital needed to achieve the objectives identified for each natural resource category in chapter 3. Specific actions have been identified to achieve these objectives (Table 3).

Ultimately, the achievement of foundation objectives and natural resource management objectives is required to achieve the vision and goal of this RCS.

An essential part of the RCS is a plan for effective evaluation and monitoring, to ensure the vision, goals and objectives are being met. The key elements for this are shown in Table 4, and the detail is described in chapter 7.

THE VISION

A healthy Corangamite catchment valued by engaged communities.

THE GOAL

Increase the protection, enhancement and restoration of valuable natural resources to improve the health and sustainable productivity of the Corangamite catchment.

FOUNDATIONS FOR CHANGE

A region-wide approach to improving natural resource management is needed to achieve the goal of the RCS. The approach in this RCS recognises that the community is the single most important agent of change in natural resource management. Even though funds are essential for achieving this change, it will not occur unless the community is motivated and engaged.

Taking this into account, this RCS has identified four key elements that will provide the foundations for developing and implementing the detailed action plans required to achieve the natural resource management objectives identified in chapter 3.

THE FOUR FOUNDATIONS FOR CHANGE

- increased breadth and depth of participation
- increased investment and develop joint priorities
- improved integration and coordination
- increased and widely shared knowledge.

The objectives of the foundations are described in detail in Table 2. Actions that are needed to achieve the four foundation objectives have been identified and described, recognising that some actions will contribute to more than one objective.

THE STRATEGIC APPROACH

A similar approach will be taken to both develop the foundations for change (Table 2) and to extend the actions identified to achieve the natural resource objectives (Table 3) of the RCS.

The components of this approach are:

1. The regional community will be brought together to discuss RCS implementation, and natural resource management issues and challenges at regional and local levels.
2. An RCS implementation plan will be developed that identifies responsibilities for implementing actions.
3. Existing natural resource management partnerships will be effectively supported and new partnerships established as needed to implement the RCS and address other natural resource management challenges.
4. Local level priorities and actions will be explored and co-developed, and further implementation plans prepared.
5. Funding opportunities will be explored and funds sourced to support a range of priorities identified within the RCS and local natural resource management plans, with investors matching funds to their own priority actions.
6. Funded actions will be implemented to achieve the objectives of the RCS and local natural resource management plans.
7. Outcomes will be measured and performance evaluated to identify future priorities, objectives and actions.

IMPLEMENTATION

In addition to establishing the four foundations for change, implementation of the RCS also requires:

- accountabilities for each action to be identified
- a willingness by participants to work together to achieve the RCS goal, objectives and actions
- adequate resources to implement each action.

One of the first actions of this RCS is to develop an RCS Implementation Plan. A range of agencies, partner and community organisations, groups and individuals will participate in delivery of RCS actions. The contribution of partners was outlined in chapter 5, and details of the roles and responsibilities of all delivery partners are described in Appendix 13. With the support of the community, the Corangamite CMA will lead the development of the RCS Implementation Plan. This plan will identify lead and support accountabilities for each RCS action and describe required resources and delivery timelines.

A willing community and access to high value natural resources are pivotal to implementation of the RCS. This RCS acknowledges the importance of this throughout and recognises increased participation as a cornerstone of its success.

One of the ways the RCS will be implemented is through the development, review and delivery of regional sub-strategies, management plans and action plans that align with the RCS. These strategies and plans will provide a basis for prioritising investment for intervention and on-ground action.

Implementation of the RCS relies on adequate funding. Few of the actions listed in the strategy are currently funded, and substantial new investment is required and will be vigorously pursued.

This page: *Volunteers working on a coastal rehabilitation project at Anglesea. Photograph by Saville Coble.*

THE RCS AT A GLANCE

Table 2 The vision, goal and foundations of the Corangamite RCS

Vision: A healthy Corangamite catchment valued by engaged communities			
Goal: Increase the protection, enhancement and restoration of valuable natural resources to improve the health and sustainable productivity of the Corangamite catchment			
Four foundations for change and their objectives			
Increased breadth and depth of participation	***Increased investment and development of joint priorities***	***Improved integration and coordination***	***Increased and widely shared knowledge***
Participation in the protection, enhancement and restoration of natural resources by landholders, community, industry and agencies has increased. Natural resource management partnerships have grown and existing partnerships are adequately supported.	The aggregate investment to protect, enhance and restore the region's natural resources has increased. Joint priorities for investment in the protection of natural resources are identified and pursued. Natural resource management programs and projects respect and protect Aboriginal cultural values.	Natural resource management partnerships have matured and the region's partners are working collaboratively to achieve effective integrated catchment management. Investment is targeted to the protection of high value natural resources with feasible and cost effective solutions.	Knowledge of the region's natural resources and how to protect, restore and enhance them has increased, resulting in improved practices. The connection of Traditional Owners to land is respected and planning and activities are informed by their skills and knowledge. Improved knowledge of the impacts of climate change is used to review the objectives and actions to protect natural resources.
Foundation actions			
Work with communities across the region to identify, build and support beneficial relationships and partnerships, including collaborating with Traditional Owners to further engage Aboriginal peoples in natural resource management. Design and deliver a range of incentive programs. Undertake a community and land use profiling study to better understand the barriers to participation. Develop and implement a Corangamite Community Engagement Strategy that addresses barriers and opportunities for increased participation leading to practice change in natural resource management. Support activities that increase the conservation security and/or functional connectivity of high value natural resources, such as conservation covenants or the critical or opportunistic purchase of land.	Bring together existing knowledge of the community about natural resource condition and management, and share this knowledge, to aid the development of investment priorities. Work with the community, including landholders, groups, agencies, industry, Traditional Owners and investors to complete Landscape Zone Action Plans to identify, prioritise and protect significant natural resources at the landscape zone scale. Develop and adopt an action plan which identifies new pathways for recruitment of private, government, corporate and philanthropic investment. Develop tools, strategies, programs and projects aligned with a broad range of investor interests to attract investment that delivers feasible and cost effective outcomes.	Establish and maintain a regional alliance of partners to guide natural resource management directions, including reviewing, delivering and reporting on the RCS. Revise and renew the Regional Landcare Support Plan. Establish and support existing partnerships to achieve coordinated and integrated natural resource management. Ensure protection of natural resources and productive land are considered through local government planning provisions and Regional Growth Plans. Develop partnerships with those outside the region to manage cross-border assets. Investigate impacts of planned burn regimes on land, water and biodiversity values and consider impacts in planning future fuel reduction programs on public land.	Encourage face-to-face sharing of knowledge, skills and experience by landholders and others. Conduct targeted engagement, extension and education activities and support agencies, groups and individuals to share and improve NRM knowledge and skills which leads to an increase in effective on-ground action. Support collaborative research partnerships to increase natural resource management knowledge, including climate change impacts and adaptation. Work with Traditional Owners to develop guidelines for on-ground works to assist natural resource management project managers to protect Aboriginal cultural heritage and to navigate Cultural Heritage legislation and policy. Continue to use, profile and add new information to knowledge databases such as the Corangamite CMA online Knowledge Base.

Table 3 Natural resource category objectives and actions of the Corangamite RCS

NATURAL RESOURCE CATEGORY OBJECTIVES AND ACTIONS	
Objectives	**Actions**
Soils and agricultural land	
Soils: Maintain or enhance soil condition for continued environmental benefits and increased agricultural production.	• Work with landholders to maintain or enhance soil condition so it is capable of providing environmental benefits and supporting production. • Review the Corangamite Soil Health Strategy and Salinity Action Plan and update accordingly. • Develop and implement a Corangamite Carbon Action (natural resource management) Plan to optimise biodiversity benefits with emerging carbon sequestration opportunities.
Agricultural land: Secure the region's productive agricultural land base so that future food, fibre and forestry demands can be met sustainably. Work with landholders to increase their participation in natural resource management activities and programs so there is reduced impact on the region's natural resources from agricultural practices.	• Work with local governments and the Department of Environment and Primary Industries to ensure that Regional Growth Plans minimise impacts on productive agricultural land in the planning and approval of land subdivisions, developments, energy and mineral exploration and extraction activities, and urban expansions. • Work with agricultural land managers to deliver a range of extension, knowledge-sharing and incentive programs to maximise the protection of the quality and extent of the region's high value natural resources while retaining or improving farm productivity. • Develop a Corangamite agricultural land strategy to integrate protection of soil health, natural resources and productivity on agricultural land.
Rivers, estuaries and floodplains	
Retain the ecological function of riverine and estuarine floodplains and protect community infrastructure and values. Protect waterways within Special Water Supply catchments. Maintain the resilience of indigenous aquatic and riparian flora and fauna to variable climatic conditions. Sustain the viability of populations of rare and threatened native fish species for the long term and show evidence of recruitment and a range of age classes.	• Develop and adopt the new Corangamite Waterway Strategy and implement it to deliver on-ground river health works at priority locations. • Develop, adopt and implement a new Corangamite Floodplain Management Strategy. • Identify a network of drought refuge areas in riverine and estuarine environments and undertake actions to ensure their protection. • Work with the Victorian Government and the Victorian Environmental Water Holder to achieve agreed environmental water objectives and protect the environmental water reserve.
Wetlands	
Maintain the extent of wetlands (by type) and improve their quality relative to 2009 benchmark data.	• Continue to manage those wetlands listed in Ramsar or the Directory of Important Wetlands in Australia to protect and enhance their ecological character. • Develop, adopt and implement the new Corangamite Waterway Strategy.

...table continued over page

THE RCS AT A GLANCE (CONTINUED)

Table 3 Natural resource category objectives and actions of the Corangamite RCS (Continued)

Objectives	Actions
Native vegetation	
Halt the decline in quality (condition) and extent of high value native vegetation and enhance its connectivity.	• Conduct activities to address the decline of quality and loss of extent of high value native vegetation across the region. • Develop, adopt and implement a new Corangamite Biodiversity Strategy. • Implement the Corangamite Native Vegetation Plan. • Develop and adopt appropriate planning and approval instruments, such as local government planning provisions and Regional Growth Plans, to ensure planning, development and resource use decisions avoid impacts on high value native vegetation.
Threatened flora and fauna	
Manage the threat of species extinction so that key populations are resilient and secure in the longer-term.	• Protect threatened species by continuing to implement high priority actions in high priority locations, consistent with the Actions for Biodiversity Conservation (ABC) database. • Develop, adopt and implement a new Corangamite Biodiversity Strategy. • Continue to fill knowledge gaps in the identification, distribution, status and trends of threatened species.
Coasts	
Maintain the quality and extent of high value coastal assets.	• Implement the Victorian Coastal Strategy and Coastal Action Plans. • Implement the Corangamite Marine and Coastal Biodiversity Strategy, review and update accordingly. • Complete and implement the Victorian coastal asset-based framework , and adapt it to coastal resources in the Corangamite region.
Marine environments	
Limit impacts to the marine environment from the catchment such that they are within the bounds of its resilient capacity.	• Plan for and manage land-based impacts on marine resources. • Implement the Corangamite Marine and Coastal Biodiversity Strategy, review and update accordingly.
Aquifers	
Protect the health of groundwater resources for the environment and current and future users.	• Implement regulatory responsibilities and the Central and Western Region Sustainable Water Strategies. • Work with the Victorian Government and the Victorian Environmental Water Holder to achieve agreed environmental water objectives, protect the environmental water reserve and groundwater dependent ecosystems. • Identify and map significant groundwater dependent ecosystems at a scale relevant for regional planning. • Support ongoing research on groundwater trends and its interaction with the environment.

Table 4 Monitoring and evaluation objectives and actions of the Corangamite RCS

MONITORING AND EVALUATION	
Objectives	***Actions***
Monitor and evaluate changes in natural resource condition and extent.	• Continue to develop an agreed, broadscale and long-term reporting framework for natural resource management. • Contribute to the development of a set of 'national environmental accounts' which report on changes in resource condition and extent, and demonstrate and quantify the relationship between the health of the environment and the health of the economy, and adopt once finalised.
Monitor and evaluate the progress of the strategy.	• Develop, deliver and monitor an implementation plan for the RCS which identifies accountable lead and support partners for each action. • Develop and adopt a Monitoring, Evaluation and Reporting (MER) plan (chapter 7) which includes measures of: - Indicators of the condition and extent of natural resources in the region - progress towards achieving the four foundations for change.

OUTCOMES OF THE RCS

The RCS will have succeeded if it can achieve:

1. ***Landscape change*** – greater protection, enhancement and restoration of valuable natural resources contributing to a healthy and sustainably productive catchment.
2. ***Participation*** – greater breadth and depth of participation by the community, which includes individuals, private landholders, natural resource management groups, Aboriginal community members, agricultural and natural resource industries, agencies and investors, in effective and protective natural resource management, along with growth in natural resource management group membership.
3. ***Investment*** – increased investment from government, corporate, agricultural and natural resource industries, private and philanthropic sectors and the further development of investment priorities to meet the needs of all investors including community.
4. ***Integration and coordination*** – growth in, and maturing of, partnerships across the region, with a coordinated and integrated approach to natural resource management at the landscape scale.
5. ***Knowledge sharing*** – research undertaken to address knowledge gaps and increased knowledge sharing across the region for better management of the region's natural resources.

The level of success for each component will be determined from monitoring and evaluation as summarised in Table 4 and detailed in chapter 7.

CHAPTER 7

MONITORING, EVALUATION AND REPORTING

Monitoring, evaluation and reporting (MER) are important elements of this strategy and its implementation. An effective MER framework that is an integral part of the RCS will:

- be accountable to partners investing in natural resource management
- evaluate the effectiveness of actions undertaken so they can be adjusted if required
- ensure programs and investment achieve the vision, goal and objectives for natural resource priorities.

MONITORING AND EVALUATING THE RCS

The Corangamite CMA will consult with the community, investors and partners in natural resource management in the region to develop a MER plan by December 2013. The MER plan will be structured around the RCS goal and its four foundations for change (chapter 6). It will align with the endorsed DEPI MER Framework.

The MER plan will include:

- documentation of its assumptions and identification of the relationship between RCS objectives and actions (an example of a Program Logic is provided in Appendix 14)
- evaluation questions relating to the impact, appropriateness, effectiveness, efficiency and legacy of the RCS
- a monitoring and implementation plan which clearly states the indicators of success (expected changes and outcomes) and how these will be measured and monitored
- an evaluation and reporting plan clearly stating responsibilities and procedures.

The evaluation component of the MER plan will pose questions such as:

- to what extent were RCS objectives progressed
- to what extent were strategic actions achieved
- how effective were the implemented actions and what change in condition has occurred in each natural resource category as a result of these actions?

The monitoring and measurement components of the plan will provide opportunities to report the progress being made and be able to be used to engender enthusiasm, increase investment and encourage higher levels of participation.

Some of the monitoring will be relatively straight forward. For example, farm practice changes can be readily identified by simple surveys using print, electronic or face-to-face contact. Community awareness and participation in natural resource management activities can be similarly determined, and measured over years rather than decades. Changes in water quality are readily determined and can also be reported within years of the investments.

Other measurements of change will be more demanding. Slow rates of change in some natural resource management areas require long-term monitoring and evaluation. In the event that a system of 'national environmental accounts' is finalised and adopted in Australia and Victoria, the MER framework will include national environmental accounts which report on changes in resource condition and extent, and demonstrate and quantify the relationship between the health of the environment and the health of the economy.

IMPLEMENTING THE MER PLAN

Implementation of the MER component of the RCS will need its own range of actions to enable effective monitoring and evaluation. Led by the Corangamite CMA, partners will collaborate to:

- define key research needs to evaluate the effectiveness of natural resource management activity
- develop approaches for monitoring resource condition
- collect, collate and share data to report on the condition of natural resources in the region.

REPORTING

The MER plan will report on the condition and extent of natural resources in the region and progress towards achieving the four foundations for change. It will deliver:

- biennial progress reports in 2015 and 2017
- periodic review to review or adjust objectives and actions as required, including a mid-term evaluation by December 2016
- a full evaluation of progress and achievements by December 2020.

APPENDICES

ACKNOWLEDGMENTS

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Partners in the development of the RCS: Committee for Ballarat, Department of Environment and Primary Industries, Environmental Protection Authority, Great South Coast Group, Kuuyang Maar Aboriginal Corporation, Local Governments, Parks Victoria, Regional Landcare Networks - represented by Surf Coast and Inland Plains Network and Woady Yaloak Catchment Group, Geelong Landcare Network, Upper Barwon Landcare Network, Southern Farming Systems, Southern Rural Water, Victorian Landcare Council, Wathaurung Aboriginal Corporation (Wadawurrung), Western Coastal Board.

Soils and Agricultural Land category Expert panel: Ballarat University, Department of Environment and Primary Industries, Southern Farming Systems, Regional Landcare Networks represented by Surf Coast and Inland Plains Network and Woady Yaloak Catchment Group, CCMA staff and Board.

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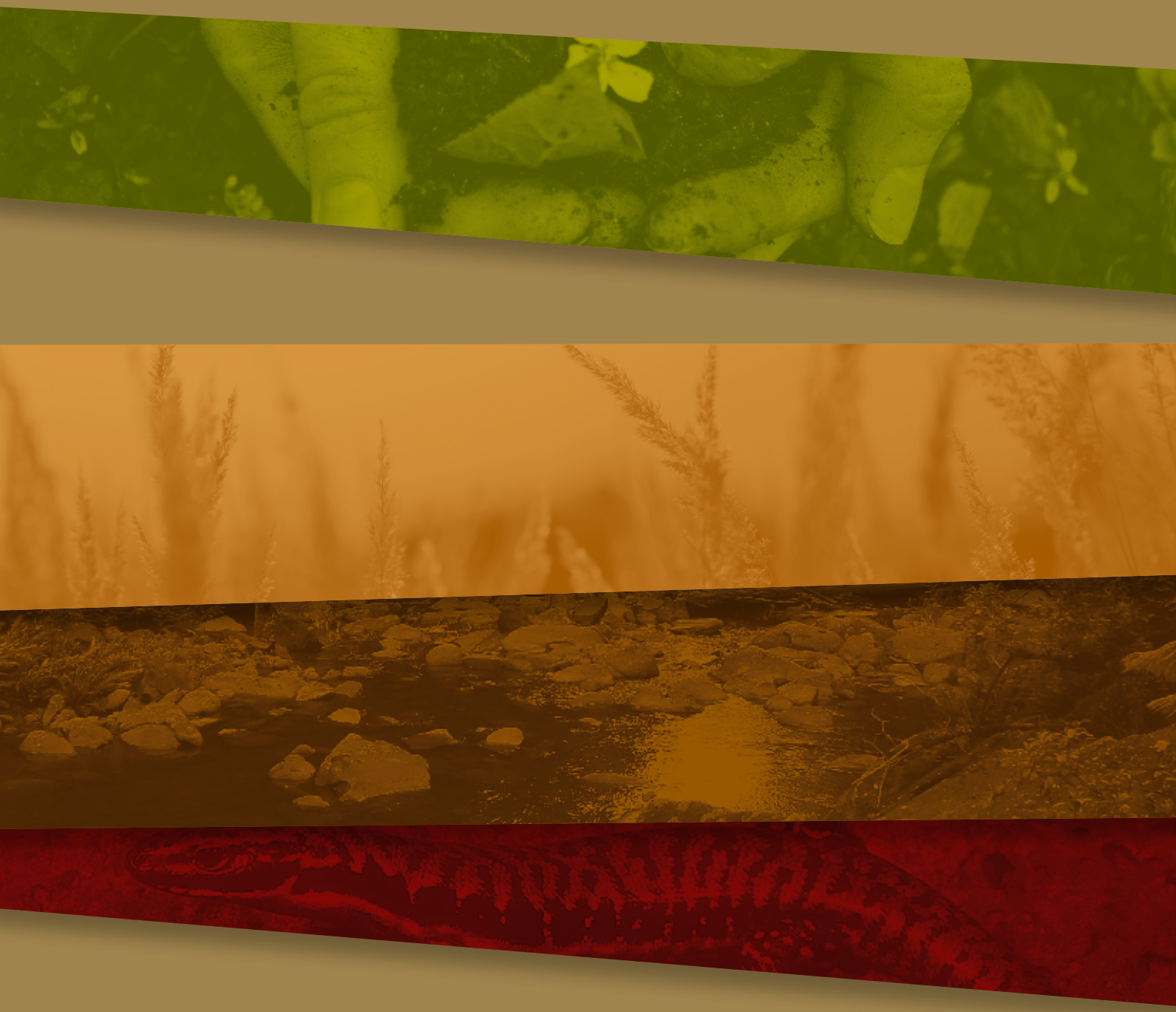

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